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

PREPARED BY
THE PACIFIC FISHERY MANAGEMENT COUNCIL
7700 NE AMBASSADOR PLACE, SUITE 101
PORTLAND, OR 97220
503-820-2280
WWW.PCOUNCIL.ORG

AND THE

NATIONAL MARINE FISHERIES SERVICE
7600 SAND POINT WAY NE, BIN C15700
SEATTLE, WA 98115-0070
206-526-6150

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Executive Summary

The Proposed Action

Using the best available scientific information, the National Marine Fisheries Service (NMFS), in consultation with the Pacific Fishery Management Council (Council), proposes to implement harvest specifications for species and species complexes managed under the Pacific Coast Groundfish Fishery Management Plan (FMP). These harvest specifications, planned for calendar years 2011 and 2012, would include annual catch limits (ACLs) and would establish management measures that constrain total fishing mortality to these specified ACLs and that achieve other management objectives as outlined in the FMP. The specification of ACLs must be consistent with requirements of the Magnuson-Stevens Fishery Conservation and Management Act (MSA). These requirements include preventing overfishing and, for stocks that have been declared overfished and whose biomass is below the maximum sustainable yield (MSY) level, setting catch limits appropriately to return stock biomass to the MSY level. Eight Pacific Coast groundfish species are currently overfished. Seven of these stocks are currently managed under rebuilding plans; the proposed action includes a rebuilding plan for the eighth species, petrale sole. ACLs must be set consistent with the rebuilding plans and the framework described in MSA §304(e), which requires overfished stocks to be rebuilt to the MSY biomass in a time period that is as short as possible, taking into account the status and biology of the overfished stocks, the needs of fishing communities, and the interaction of the overfished stock within the marine ecosystem.

The Alternatives

Harvest Specifications

Harvest specifications for 2011-2012 were developed consistent with the framework under Amendment 23, which the Council adopted concurrently with this action.[1] Amendment 23 modified the harvest specification framework in the FMP to be consistent with the revised National Standard 1 guidelines (50 CFR 600.310). Harvest specifications include the overfishing limit (OFL), acceptable biological catch (ABC), and ACL for each managed stock or stock complex. Accountability measures (AMs) are management controls to prevent the ACL from being exceeded. Optionally, an annual catch target (ACT), which is an AM, may be identified below the ACL in order to reduce the risk of an ACL being exceeded. In summary, these reference points were determined as follows:

- The OFL is equivalent to what is called the ABC under the current framework, the default calculation being the MSY exploitation rate (denoted F_{MSY}) multiplied by the exploitable biomass for the relevant period.
- The ABC is an amount that is reduced from the OFL to account for scientific uncertainty in the estimate of the OFL and any other sources of scientific uncertainty. Different methods were used to determine the ABC depending on the amount of information available for the stock.
- The ACL may be set equal to the ABC or below it in consideration of conservation objectives, socioeconomic concerns, management uncertainty, ecological concerns, and other factors. Fisheries are managed to keep total catch from all sources below this level. This is accomplished through AMs, the measures to monitor catch and constrain fishing mortality. Although the decision framework was different, the Council has been managing groundfish stocks to optimum yield (OY) from each stock. These OYs have functioned as total catch limits.

[1] On December 27, 2010, NFMS approved the general framework established by Amendment 23 and disapproved the proposed removal of dusky and dwarf red rockfish from the FMP.

Thus, ACLs are functionally analogous to and replace OYs identified in previous management cycles.

- The ACT is an amount that can be set below the ACL to address uncertainty in the ability of the management system to effectively keep total fishing mortality below the prescribed ACL. Under the Council's final preferred alternative, an ACT is recommended for two stocks, yelloweye rockfish and Pacific ocean perch (POP). Under NMFS' preferred alternative, an ACT is recommended for POP, but not for yelloweye rockfish.

Rebuilding Plans for Overfished Species

Structuring groundfish fisheries around restrictions needed to rebuild overfished groundfish stocks has been an important part of the harvest specifications process for the past decade. Using new scientific information the Council evaluates whether current rebuilding strategies are appropriate or need to be revised because of changes in the status of a stock or scientific understanding of stock dynamics (e.g., productivity, unfished biomass). Based on new or updated stock assessments, the Council considered changes to the existing seven rebuilding plans.

New stock assessments and rebuilding analyses revealed that, for four of the overfished species (bocaccio, cowcod, darkblotched rockfish, and widow rockfish), the current harvest rate policy results in a re-estimated median year to rebuild earlier than the current target year (T_{TARGET}); these species are "ahead of schedule."[2] For canary rockfish, POP, and yelloweye rockfish, the re-estimated median year to rebuild the stock is later than the current T_{TARGET} (i.e., the stock is not predicted to rebuild by T_{TARGET} with at least a 50 percent probability). In the case of yelloweye rockfish, the new rebuilding analysis indicates rebuilding is slightly behind schedule; however, it is highly probable the stock will rebuild within the prescribed time established under the rebuilding plan specified in Amendment 16-4. The current T_{TARGET} for canary rockfish and POP is also less than the re-estimated value for the time to rebuild in the absence of fishing ($T_{F=0}$). Because canary rockfish and POP are "behind schedule" and cannot rebuild by the current T_{TARGET} with a reasonable probability (i.e., ≥ ~50%), the target year and associated harvest rate currently in the rebuilding plan must be re-specified.

The Council's Preferred Revised Target Years and Harvest Control Rules

In deciding rebuilding plan revisions, the Council considered a variety of different strategies based on the spawning potential ratio SPR harvest rate (which functions as the harvest control rule) and associated median time to rebuild (which can be considered as the new T_{TARGET} if the strategy is adopted). The SPR harvest rate expresses the fishing mortality rate that, over the long term, would produce spawning stock biomass in relation to its unfished biomass. For example, an F77.7 percent SPR harvest rate means that this harvest rate will produce a spawning stock biomass at equilibrium that is 77.7 percent of its abundance if no fishing occurred. Note that a higher percent value for the SPR harvest rate indicates an objective of achieving a larger spawning biomass sooner. The Council proposed lowering the SPR harvest rates for darkblotched and yelloweye rockfish. The Council proposed modifying the yelloweye rockfish rebuilding plan such that rebuilding would occur by the current T_{TARGET} (2084) with at least a 50 percent probability. For the four species ahead of schedule in rebuilding the Council had the option to re-specify T_{TARGET} as the earlier re-estimated median rebuilding year or maintain the current target year. The Council chose to adopt and propose to the agency a new, earlier target year for three of these species. Table ES-1 shows the current and Council-proposed revised target years and SPR harvest rates for the seven species currently under rebuilding plans.

[2] The median year may be considered the most likely year by which the stock will rebuild, because the rebuilding analyses use a probabilistic framework to project rebuilding trajectories.

Table ES-1. Current and the Council's preferred revised target years and harvest control rules for overfished species currently under rebuilding plans.

Species	Current Values			Council's Preferred Revisions	
	T_{TARGET}	Difference in Years Between Current T_{TARGET} and New Median Year to Rebuild [a/]	Harvest Control Rule (SPR Harvest Rate)	T_{TARGET}	Harvest Control Rule (SPR Harvest Rate)
Bocaccio	2026	+ 4	F77.7%	2022	No change
Canary	2021	**- 6***	F88.7%	2027	No change
Cowcod	2072	+ 1	F79.0%	2071	No change
Darkblotched	2028	+ 1	F62.1%	2025	F64.9%
POP	2017	**- 3***	F86.4%	2020	No change
Widow	2015	+ 5	F95.0%	2010	F91.7% [b/]
Yelloweye	2084	- 3	F71.9% [c/]	2084	F72.8%

a/ Positive values reflect rebuilding being ahead of schedule, while negative values reflect delays. Starred values (in bold type face) denote a substantial difference, indicating a low probability (<40%) of rebuilding by T_{TARGET}.
b/ The preferred ACL alternative for widow rockfish is a constant catch of 600 mt. This level of catch corresponds to an SPR harvest rate of F91.7% in 2011.
c/ The yelloweye SPR harvest rate of F71.9% is the constant harvest rate in the current rebuilding plan that would be specified starting in 2011 after the harvest rate ramp-down strategy is completed in 2010.

NMFS' Preferred Revised Target Years, rebuilding plans and Harvest Control Rules

Based on public comments provided on the DEIS and the proposed rule to implement the 2011-2012 specifications, the court order in *NRDC v. Locke*, and other relevant considerations,[3] NMFS has identified a final preferred alternative that differs from the Council's final preferred alternative (FPA). NMFS' preferred alternative is a modified version of the Council's FPA that results in shorter rebuilding periods for yelloweye rockfish and cowcod. NMFS has preliminarily determined that its preferred alternative is more consistent with direction the court provided in *NRDC v. Locke* and is more consistent with the MSA obligations to rebuild overfished species in a timeframe that is as short as possible while taking into account the status and biology of the overfished stock, the needs of the fishing communities, and the interaction of the overfished stock within the marine ecosystem. Under NMFS' preferred alternative, the median time to rebuild for two overfished species, yelloweye rockfish and cowcod, would be shorter than under the Council's FPA and result in lower SPR harvest rates. Table ES-2 shows the current and NMFS' preferred revised target years and SPR harvest rates for the seven species currently under rebuilding plans.

[3] Chapter 1 contains additional information on issues of note in the 2011-2012 harvest specifications and management measures cycle, including information about the court order in *NRDC v. Locke* and relevant developments since the publication of the DEIS.

Table ES-2. Current and NMFS' preferred target years and harvest control rules for overfished species currently under rebuilding plans.

Species	Current Values			NMFS' Preferred Revisions	
	T_{TARGET}	Difference in Years Between Current T_{TARGET} and New Median Year to Rebuild [a/]	Harvest Control Rule (SPR Harvest Rate)	T_{TARGET}	Harvest Control Rule (SPR Harvest Rate)
Bocaccio	2026	+ 4	F77.7%	2022	No change
Canary	2021	**- 6***	F88.7%	2027	No change
Cowcod	2072	+ 1	F79.0%	2068	F82.7%
Darkblotched	2028	+ 1	F62.1%	2025	F64.9%
POP	2017	**- 3***	F86.4%	2020	No change
Widow	2015	+ 5	F95.0%	2010	F91.7% [b/]
Yelloweye	2084	- 3	F71.9% [c/]	2074	F76%

a/ Positive values reflect rebuilding being ahead of schedule, while negative values reflect delays. Starred values in (in bold typeface) denote a substantial difference, indicating a low probability (<40%) of rebuilding by T_{TARGET}.
b/ The preferred ACL alternative for widow rockfish is a constant catch of 600 mt. This level of catch corresponds to an SPR harvest rate of F91.7% in 2011.
c/ The yelloweye SPR harvest rate of F71.9% is the constant harvest rate in the current rebuilding plan that would be specified starting in 2011 after the harvest rate ramp-down strategy is completed in 2010.

Based on the new 2009 stock assessment indicating that petrale sole is overfished, the Council also adopted a new rebuilding plan for this stock. As part of this process, based on analysis and advice of the Scientific and Statistical Committee (SSC), the Council adopted new default reference points for petrale sole and other assessed west coast flatfish species: an F_{MSY} proxy of $F_{30\%}$, a B_{MSY} target of $B_{25\%}$, and a minimum stock size threshold of $B_{12.5\%}$ (half of B_{MSY}).[4] All of the rebuilding strategies considered would rebuild the stock within 10 years as required by the MSA in cases where the biology of the stock would allow rebuilding to occur in 10 years or less. The strategy is estimated to rebuild the stock (T_{TARGET}) by 2016, which is or 2 years longer than the estimated minimum time to rebuild (which in this case is equivalent to $T_{F=0}$). The Council's proposed petrale harvest rate strategy is to set the ACL equal to ABC (976 mt) in 2011 and to apply a 25-5 harvest control rule thereafter, resulting in a 1,160 mt ACL in 2012.[5] NMFS' preferred alternative contains the same petrale sole rebuilding plan and new default reference points for petrale sole and other assessed west coast flatfish species as the Council's FPA.

Table ES-3 shows the ACLs proposed for 2011 and 2012 based on the Council's decisions related to rebuilding plans. The Council recommended ACTs for two stocks; these appear in parentheses within the table.

4 F_{MSY} is defined as the level of fishing that produces the largest assured proportion of MSY, and B_{MSY} is defined as the biomass that allows MSY to be taken. Percentage values represent fractions of unfished biomass; thus $B_{25\%}$ represents one-quarter of unfished biomass.

5 The 25-5 harvest control rule, similar to the Council's 40-10 rule for other stocks, is based on a linear relationship between catch and resulting biomass that produces a precautionary reduction from the OFL to determine the annual catch limit (ACL) when stock size falls between $B_{25\%}$ and $B_{5\%}$.

Table ES-3. ACLs (and ACTs) under the Council's Final Preferred Alternative compared to 2010 OYs.

Overfished Stock	2010 OY (mt)	2011 ACL (ACT) (mt)	2012 ACL (ACT) (mt)
Bocaccio S. of 40°10' N. lat.	288	263	274
Canary	105	102	107
Cowcod S. of 40°10' N. lat.	4	4	4
Darkblotched	330	298	296
Pacific Ocean Perch	200	180 (ACT: 157)	183 (ACT: 157)
Widow	509	600	600
Yelloweye	14	20 (ACT: 17)	20 (ACT: 17)
Petrale Sole	1,200	976	1,160

Table ES-4 shows the ACLs proposed for 2011 and 2012 based on NMFS' preferred alternative related to rebuilding plans. Differences between NMFS' preferred alternative and the Council's FPA are presented in bold font.

Table ES-4. ACLs (and ACTs) under the NMFS' preferred alternative compared to 2010 OYs.

Overfished Stock	2010 OY (mt)	2011 ACL (ACT) (mt)	2012 ACL (ACT) (mt)
Bocaccio S. of 40°10' N. lat.	288	263	274
Canary	105	102	107
Cowcod S. of 40°10' N. lat.	4	**3**	**3**
Darkblotched	330	298	296
Pacific Ocean Perch	200	180 (ACT: 157)	183 (ACT: 157)
Widow	509	600	600
Yelloweye	14	**17**	**17**
Petrale Sole	1,200	976	1,160

The Council also considered harvest specifications for non-overfished stocks and stock complexes based on new stock assessments or, in the absence of a stock assessment, on the best available scientific information. Improved, more scientifically robust methods for determining OFLs for most of the non-assessed stocks, such as depletion-corrected average catch and depletion-based stock reduction analysis, are recommended for 2011 and 2012.

Integrated Alternatives

To facilitate analysis and decision-making, NMFS and the Council developed several alternatives, including the Council's FPA, for analysis in this EIS. These alternatives integrate overfished species ACLs with the management measures needed to constrain total catch below these ACLs and to achieve other FMP objectives. The No Action Alternative represents the continuation of 2010 OYs and the management measures currently specified in Federal regulations into the next biennial period. Table ES-5 shows the overfished species ACLs for these five alternatives, which were narrowed from a much broader range initially adopted for analysis in November 2009. For example, the Council rejected the alternative of setting overfished species ACLs to zero (which would result in rebuilding these stocks in the shortest amount of time) as unrealistic because eliminating fishing mortality would cause too much harm to fishing communities and would contravene other FMP goals and objectives. The Council also rejected overfished species ACL alternatives that are higher than those depicted in Table ES-5, based on the determination that the higher ACLs would not meet the MSA mandate to rebuild stocks in the shortest time possible while taking into account the status and biology of the overfished stock, the needs of the fishing communities, and the interaction of the overfished stock within the marine ecosystem.

Table ES-5. Alternative overfished species ACLs (mt) for 2011 and 2012 adopted for detailed analysis. Overfished species ALCs selected for use in NMFS' preferred alternative are in bold font.

Species	**No Action Alternative**	**Council's Final Preferred Alternative**		**Alternative 1 Low**		**Alternative 2 Intermediate**		**Alternative 3 High**	
		2011	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**
Bocaccio	288	**263**	**274**	53	56	109	115	263	274
Canary	105	**102**	**107**	49	51	94	99	102	107
Cowcod	4	4	4	2	2	**3**	**3**	4	4
Darkblotched	330 [a/]	**298**	**296**	222	222	298	296	332	329
POP	200	**180 (ACT:157)**	**183 (ACT:157)**	80	80	111	113	180	183
Widow	509	**600**	**600**	200	200	400	400	600	600
Yelloweye	14	20 (ACT: 17)	20 (ACT: 17)	13	13	**17**	**17**	20	20
Petrale	1,200	**976**	**1,160**	459	624	776	1,160	976	1,160

a/ The 2010 OY is specified at 330 mt. NMFS guidance is to manage to 290 mt, consistent with the court's underlying intent in *NRDC v. Locke*.

NMFS' preferred alternative is a modified version of the Council's FPA. For yelloweye rockfish, NMFS' preferred ACL would be 17 mt rather than the 20 mt ACL and 17 mt ACT specified in the Council's FPA. NMFS' preferred alternative would not include an ACT for yelloweye rockfish. For cowcod, NMFS' preferred ACL would be 3 mt rather than the 4 mt specified in the Council's FPA. The yelloweye rockfish and cowcod ACLs selected for use in NMFS' preferred alternative are identical to the yelloweye rockfish and cowcod ACLs contained in integrated Alternative 2. In most other respects, NMFS' preferred alternative is identical to the Council's FPA. NMFS' preferred alternative does not, however, include depth restriction changes to the cowcod conservation areas (CCAs) for recreational fisheries in California, nor does it allow the retention of shelf rockfish in the CCAs. Chapter 2 contains a detailed description of NMFS' preferred alternative. As discussed in Chapter 4, the impacts of NMFS' preferred alternative are within the range of impacts associated with the integrated alternatives contained in the DEIS.

Management Measures

Management measures constrain catch to within the ACLs for both non-overfished and overfished stocks. Additionally, management measures are designed to achieve other goals and objectives outlined in the FMP that pertain to socioeconomics and equitable utilization of the resource. The management framework includes a variety of fixed elements and routine management measures that may be adjusted through this biennial harvest specifications process and are varied across the integrated alternatives.

The groundfish limited entry system is an important fixed element of the management framework. Under this program a vessel must be registered to one of a fixed number of permits to fish for groundfish in various circumstances. Along with other measures this limited entry program creates several sectors, around which management measures are crafted. These sectors are described below.

- The trawl sector is defined by vessels fishing with a trawl-endorsed groundfish limited entry permit. The trawl sector has been traditionally further subdivided among four sectors: vessels targeting Pacific whiting and delivering to (1) a mothership or (2) a shore-based processor, (3) catcher-processors targeting whiting, and (4) vessels targeting groundfish species other than Pacific whiting. Vessels targeting whiting fish with midwater trawl nets, which do not normally make contact with the bottom. Other species are caught with bottom trawl gear.

- The limited entry fixed gear sector is defined by gear-endorsed permit holders using longline or pot gear principally to target high-value sablefish during a season that extends from April 1 through October 31.
- The open access sector encompasses vessels either targeting groundfish or catching groundfish incidentally, but not in possession of a Federal groundfish limited entry permit.
- The tribal sector comprises fisheries prosecuted by Washington coastal tribes (Makah, Quileute, Hoh, and Quinault) in their usual and accustomed grounds and stations, under treaties with the Federal government. The tribes participate in groundfish bottom trawl, whiting trawl, and fixed gear fisheries.

The primary management measures for commercial fisheries are applied differently to each of these sectors. The measures may be adjusted through this biennial process and include the following:

- Two-month or monthly cumulative landing limits, frequently referred to as trip limits, are imposed for various combinations of species and species groups related to fishery targets and gear configurations. Landing overfished species during certain periods or fisheries may be prohibited. Separate sets of trip limits are established for each of the commercial sectors and north and south of a management line at 40°10' north latitude (approximately Cape Mendocino, California). Trip limits are often adjusted inseason if information indicates ACLs or sector quotas may be exceeded or catches are projected to be significantly under ACLs or sector quotas for non-overfished species.
- Gear requirements, principally relating to trawl gear, have been implemented in recent years to reduce bycatch.
- Various time and area closures apply to commercial vessels. For example, groundfish conservation areas (GCAs) prohibit vessels from fishing in depths where overfished groundfish species are more abundant. GCAs include coastwide rockfish conservation areas (RCAs) and more geographically discrete Cowcod Conservation Areas (CCAs) in the Southern California bight and Yelloweye Rockfish Conservation Areas (YRCAs) off of Oregon and Washington.
- Total catch limits, or bycatch limits, have been specified for select overfished species to manage the bycatch by Pacific whiting sectors. The fishing sector generally closes inseason if a sector-specific bycatch limit is projected to be attained, even if the whiting quota has not been attained. However, as discussed below, trawl sector management, including sector allocations, is expected to change substantially with the implementation of new measures under Amendments 20 and 21 to the FMP.

Recreational fishery management is implemented principally at the state level, since most recreational fishing occurs in state waters and recreational fishing differs between the states. The Council coordinates management and the states to conform their regulations to those specified at the Federal level. Recreational management measures have to take into account groundfish bycatch in recreational fisheries for non-groundfish species, such as Pacific halibut and salmon. The main recreational management measures implemented in groundfish management are as follows:

- Seasonal closures can be implemented within state recreational management zones.
- Area closures are used to prohibit retention of different groundfish species. The closures usually apply to fishing in depths greater than a specified depth contour, although some area closures are defined by management lines delineated with latitudinal and longitudinal waypoints. Area closures can vary by month or fishing season.
- Overall bag limits and limits for certain species apply on a per-trip and/or per-angler basis. Retention of some species may be prohibited.

- Size limits are specified for some species to control fishing effort (i.e., time on the water to attain a bag limit can be influenced by the allowable size of the fish that are caught) or to protect a segment of the population, such as the spawning stock.
- Gear restrictions may specify the size or number of hooks that may be used.

Various deductions from ACLs and allocations of the harvestable portion of ACLs are another key element of the management framework. Deductions from the ACLs are used to account for fishing mortality from activities that are not directly managed by the Council and NMFS through the types of measures described above.[6] These activities include research fishing, experimental fishing under exempted fishing permits (EFPs), treaty tribe harvests, and fishing in the incidental open access sector.[7] The treaty tribes also have fixed allocations of commercial groundfish species established through the treaty framework, and the tribes implement requisite management measures to access these allocations within their usual and accustomed fishing areas. The tribes also provide catch estimates for other groundfish species to allow managers to account for total catch across all sectors. Formal allocations are established in the FMP and published in Federal regulations. The number of stocks subject to formal allocations was expanded under Amendment 21 to the FMP. Management measures under the integrated alternatives were developed presuming this allocation scheme would be in effect. Updated information on the implementation of Amendment 21 and on other developments since the completion of the DEIS is presented in Chapter 1. In addition, 2-year trawl and non-trawl allocations, mainly for certain overfished species, are established through the biennial process. Finally, the bycatch limits mentioned above function like an allocation. These various mechanisms serve either as an accounting mechanism from which management measures may be developed or as a means to reserve fishing opportunity for a specified set of fishery participants, typically defined through the sectors outlined above. The new formal long-term allocations established through Amendment 21 and 2-year allocations under the proposed action support a variety of new management measures for the groundfish trawl sector, discussed below.

New Management Measures for the Trawl Sector

Amendment 20 to the FMP, which was approved in 2010 and implemented in January 2011, introduces substantial changes to the way in which the groundfish trawl sectors are managed. These measures include the following:

- Individual fishing quota (IFQ) management for a single shoreside sector combining vessels targeting whiting and non-whiting species and delivering to shore-based locations. IFQs replace the current 2-month cumulative trip limits for most species (some infrequently caught non-overfished species will still be managed with trip limits). IFQ is a tradable harvest privilege representing an increment of the allocation of a given stock or stock complex to the shoreside sector. Quota shares, defined in fractional terms, are allocated to groundfish limited access trawl permit holders based on the catch history associated with the permit. Based on ACLs and trawl sector allocations, quota shares are annually converted to quota pounds. All catch of a given stock or stock complex must be matched to an equivalent amount of quota pounds, which is then deducted from the vessel's account. Quota pounds are tradable among

[6] A distinction is made between a set aside, which is an amount of yield dedicated to a particular activity, and yield amounts taken "off the top" of an ACL to account for potential harvest. If off-the-top amounts are overestimated, management measures can be adjusted during the biennial period to allow other fisheries to harvest otherwise unused amounts. In contrast, if a set aside is overestimated, unharvested amounts are unavailable for harvest by other fishery participants.

[7] The incidental open access sector is defined as any fishery that targets non-groundfish stocks in the west coast Exclusive Economic Zone (EEZ) and incidentally catches groundfish species as bycatch.

vessel accounts at the outset of the program; there is a 2-year moratorium on the transfer of quota shares to give participants an opportunity to become familiar with the management program before deciding how to divest their holdings. The program includes limits on the total amount of quota shares that an individual or entity may possess and the number of quota pounds assigned to a vessel.

- Individual bycatch quota (IBQ) for Pacific halibut catch is included as part of the IFQ program for the shore-based trawl sector. IBQ functions similar to IFQ except that Pacific halibut may not be retained.
- A co-op system for the whiting mothership sector in which two or more catcher vessels obligate their catch to a single mothership. Each co-op is assigned an allocation of Pacific whiting and selected overfished species based on the catch histories of catcher vessel members and the allocation to the mothership sector as a whole.
- A gear switching provision that allows IFQ to be fished with any legal groundfish gear type. Although vessels registered to a trawl-endorsed permit would then be allowed to fish with fixed gear, their catches are deducted from the shore-based trawl sector allocation.

The whiting catcher-processor sector already fishes under a voluntary co-op. Amendment 20 does not substantially change the measures applied to this sector.

Impacts of the Alternatives

Impacts of the Harvest Specifications for Overfished Species

As noted above, overfished species rebuilding is a key legal and policy concern in determining harvest specifications. Table ES-6 compares the median time to rebuild for overfished species under the alternatives and Table ES-7 compares corresponding SPR harvest rates.

Table ES-6. Minimum time to rebuild ($T_{F=0}$), maximum permissible rebuilding time (T_{MAX}) and median time to rebuild under the alternatives.

Species	$T_{F=0}$	T_{MAX}	No Action	NMFS' Preferred	Council's FPA	Alternative 1	Alternative 2	Alternative 3
Bocaccio	2018	2031	2026	2022	2022	2019	2020	2022
Canary	2024	2046	2021	2027	2027	2025	2026	2027
Cowcod	2060	2097	2072	2068	2071	2064	2068	2071
Darkblotched	2016	2037	2028	2025	2025	2018	2022	2027
POP	2018	2045	2017	2020	2020	2019	2019	2020
Widow	2010	2035	2015 [a/]	2010	2010	2010	2010	2010
Yelloweye	2047	2089	2084 [b/]	2074	2084 [c/]	2065	2074	2084
Petrale	2014	2021	NA	2016	2016	2014	2015	2016

a/ The current FMP identifies the median time to rebuild for widow rockfish as 2015, based on the 2007 assessment and rebuilding analysis. The 2009 assessment projected a median time to rebuild of 2010, which is reflected in the other alternatives.
b/ A14mt OY in 2010 and carried forward into 14 mt ACL in 2011 and 2012 results in a rebuilding time of 2067
c/ If the harvest rate corresponding to the adopted ACT were continued over the long term, the median rebuilding year would be 2074.

Table ES-7. SPR harvest rates (harvest control rules) under the alternatives.

Species	No Action	NMFS' Preferred	Council's FPA	Alternative 1	Alternative 2	Alternative 3
Bocaccio	77.7%	77.7%	77.7%	95%	90%	77.7%
Canary	88.7%	88.7%	88.7%	94.4%	89.5%	94.4%
Cowcod	79.0%	82.7%	79.0%	90%	82.7%	79.0%
Darkblotched	62.1%	64.9%	64.9%	81.8%	71.9%	62.1%
POP	86.4%	86.4%	86.4% [a/]	93.6%	91.2%	86.4%
Widow	95.0%	91.7%	91.7%	c/	c/	91.7%
Yelloweye	71.9%	76%	72.8% [b/]	80.7%	76%	72.8%
Petrale	NA	ABC / 25:5 rule	ABC / 25:5 rule	F50%	25:5	ABC / 25:5 rule

a/ The harvest rate corresponding to the adopted ACT for POP is F88.0%.
b/ The harvest rate corresponding to the adopted ACT for yelloweye rockfish is F76.0%
c/ values were not calculated.

The Council's FPA is consistent with current rebuilding policies while Alternatives 1 and 2 generally propose more aggressive rebuilding strategies (i.e., rebuilding in earlier years for all overfished stocks except for widow rockfish, which is projected to be rebuilt in 2010 under current policies). Alternative 3, which was the Council's Preliminary Preferred Alternative, contains the same harvest specifications as the Council's FPA, except for darkblotched rockfish and the specification of ACTs for POP and yelloweye under the Council's FPA. The Council's FPA is comparatively summarized as follows, with differences between the Council's FPA and NMFS' final preferred alternative noted in the text:

- The Council's FPA maintains the current SPR harvest rate for three stocks: bocaccio, canary, and POP. For bocaccio this translates into an earlier target year compared to No Action. The target years for canary and POP under No Action are earlier than the updated estimate of the minimum time needed to rebuild the stock ($T_{F=0}$). NMFS' preferred alternative is the same as the Council's FPA in these respects.
- The target years under the Council's FPA reflect the re-estimation of the time to rebuild by continuing to apply the current harvest rate policy, except for widow rockfish where there was no proposed change to T_{TARGET}. NMFS' preferred alternative is the same as the Council's FPA in this respect.
- The harvest rates for darkblotched and yelloweye rockfish are less aggressive under the Council's FPA than under the No Action alternative, resulting in an earlier target year for darkblotched and the same target year as No Action for yelloweye. (Note that a higher percent value for the yelloweye SPR harvest rate indicates an objective of achieving larger spawning biomass sooner than under the No Action alternative.) Under NMFS' preferred alternative, the harvest rate for darkblotched is the same as specified in the Council's FPA. However, the harvest rate for yelloweye rockfish under NMFS' preferred alternative results in a target year to rebuild that is 10 years earlier than the Council's FPA.
- The 2011 and 2012 darkblotched ACLs resulting from the adopted SPR harvest rate are 298 and 296 mt, respectively. NMFS' preferred alternative is the same as the Council's FPA for darkblotched.
- The Council adopted an ACT of 17 mt for yelloweye, upon which allocations and management measures in the Council's FPA are based. The ACT was recommended to address the uncertainty in accurately monitoring recreational fishery catch inseason, and increases the likelihood of a catch that is lower than the ACL. NMFS' preferred alternative does not specify an ACT for yelloweye. Instead, NMFS proposes an ACL of 17 mt. By specifying an ACL of 17 mt rather than an ACT, NMFS' preferred alternative predicts rebuilding will occur in 2074, ten years earlier than under the Council's FPA.
- The Council also adopted an ACT of 157 mt for POP. This is consistent with highest total catch observed in recent years. The Council decided to adopt the higher ACL but manage to a lower ACT as a precaution against exceeding the ACL. Managing to the harvest rate corresponding to

this ACT does not substantially reduce the median rebuilding time from the target year of 2020 adopted under the Council's FPA. NMFS' preferred alternative is consistent with the Council's FPA in this respect.

- The Council's FPA includes a cowcod ACL of 4 mt for 2011-2012, which is the same as the No Action OY. Based on new scientific information, this results in a slightly more aggressive harvest rate, but corresponds to a target year of 2071, one year earlier than the T_{TARGET} in the current rebuilding plan. NMFS' preferred alternative specifies a cowcod ACL of 3 mt for 2011-2012, compared to the Council's FPA ACL of 4 mt. NMFS' preferred ACL for cowcod is identical to the cowcod ACL contained in Alternative 2 and results in a less aggressive harvest rate and a faster time to rebuild than under the No Action OY or the Council's FPA.
- Based on the new 2009 stock assessment, widow rockfish biomass is projected to reach the $B_{40\%}$ B_{MSY} target in 2010. However, any change in stock status will not be confirmed until the next full stock assessment, which is anticipated to be conducted next year. The Council recommended an ACL of 600 mt, which is a modest increase from the No Action OY of 509 but is unlikely to result in targeting of the stock. NMFS' preferred alternative is the same as the Council's FPA in this respect.
- Because petrale sole was declared overfished in 2010 (and this action includes adopting a rebuilding plan), only the action alternatives include rebuilding metrics for petrale.

Potential biological impacts on overfished species would essentially depend on the ACL that would be implemented for each species under each alternative. Alternatives with higher ACLs would be expected to result in higher levels of fishing-related mortality. It is not possible with the data available to determine whether the alternatives would differ substantially in their potential to influence other sources of mortality.

Under all of the alternatives, the risk of overfishing would be minimal. Fisheries are managed to keep total catch from all sources below ACLs, which are set at levels below ABCs in consideration of conservation objectives, management uncertainty, ecological concerns, and other factors. ABCs, in turn, are set at levels below OFLs, to account for uncertainty in modeled estimates of OFLs. These multiple layers of protective buffering are expected to minimize the potential for commercial, tribal, and recreational fisheries to result in unsustainable rates of mortality. Lastly, through the process of regularly reviewing and adjusting catch limits, NMFS and the Council can reasonably be expected to (1) identify stocks that are at risk of dropping (or remaining) below acceptable levels and (2) using that information, implement corrective measures.

Notably, the potential for adverse effects on cowcod may be greater than for other species. All of the alternatives except NMFS' preferred alternative would modify the CCA depth restrictions that allow commercial fixed gear and recreational fishing in the shoreward areas. Under Alternatives 1, 2, and 3 and the Council's FPA, fishing would be allowed at depths up to 30 or 40 fathoms, increased from 20 fathoms under the No Action Alternative. NMFS' preferred alternative would retain the limit at 20 fathoms. Modifying the depth restriction in the CCA is not projected to result in increased catch of adult cowcod compared to the No Action Alternative, but it may increase encounters with juvenile cowcod by allowing fishing in known juvenile cowcod habitat within the CCAs.

Expected Target Species Catch Resulting from the Application of Management Measures

Figure ES-2 shows modeled catch of selected species under the Council's FPA, Alternative 2, Alternative 1, and No Action. (Alternative 3 is not shown because it varies only slightly from the

Council's FPA with respect these catches; similarly Alternative 1b is a variation on Alternative 1a.) Six important target species are shown in the panels in Figure ES-2. Those on the left – Dover sole, sablefish, and shortspine thornyhead – are important commercial species generally caught in deeper water (although Dover sole may be seasonally caught in shallower, inshore waters). Those on the right – cabezon, lingcod, and black rockfish – are important in both commercial and recreational fisheries and are generally confined to shallow waters.

Modeled catch is reported in Section 4.2 using the methods described in Appendix A. Modeled catch is not a precise estimate of expected actual catches; rather these estimates are indicative at an order of magnitude and useful for comparing the alternatives. Also, although management controls account for all catch to ensure that ACLs will not be exceeded, not all catch is modeled. Therefore, actual catches may be higher than modeled catch for this reason alone.

Target species catch is mainly influenced by the ACLs set for overfished species, which act as a constraint on target species catch through the management controls that must be imposed to limit overfished species catch. Thus, the higher ACLs under the Council's FPA allow larger target species catch compared to the other action alternatives. This represents a greater biological impact; however, the objective of the management framework is to constrain catches below the ACLs for each managed stock or stock complex. The ACL is based on the best scientific information to manage stocks to produce MSY over the long term. In the case of overfished species, this results in limits on harvests to rebuild those stocks to their MSY biomass. Taking into account these biological factors, an additional objective is to maximize the socioeconomic benefit of the resource through commercial and recreational fishing opportunity. The overfished species ACLs under Alternatives 1 and 2 allow for faster rebuilding of overfished species but at a cost in terms of sustainable target species catch. Comparing the modeled catch of these six species to the ACLs for these species, the Council's FPA results in about 70 percent of the potential maximum harvest represented by the ACLs; under Alternatives 1 and 2 this ratio ranges from less than half to about three-fifths of potential harvest. In this regard the Council's FPA is more effective in achieving the MSA's objective of optimum yield than Alternative 1 and 2. NMFS' preferred alternative allows for an amount of targeted species catch that is intended to rebuild overfished species in a time frame that is a short as possible while taking into account the status and biology of the overfished stocks, the needs of fishing communities, and the interaction of the overfished stock within the marine ecosystem needs of fishing communities.

In addition to potential under-estimation of catch inherent in the modeling approach, discussed above, fisheries could perform better than estimated. As discussed below, new management measures for the groundfish trawl sector implemented under Amendment 20 to the groundfish FMP could result in higher target species catch than estimated because harvesters will have greater incentive to reduce their catch of overfished species. If so, a greater fraction of target species ACLs would be harvested.

From a socioeconomic perspective the management measures implemented under Alternatives 1 and 2 would also impose additional costs on harvesters. Broadly speaking, management measures introduce operational inefficiencies as a way of constraining catch. For example, cumulative trip limits are lower under Alternatives 1 and 2, meaning a harvester may have to idle his or her vessel for a longer period of time than otherwise necessary, because a cumulative limit has been reached. The size and configuration of RCAs can increase transit time or prevent harvesters from accessing more productive fishing grounds, introducing another type of inefficiency. However, new management measures proposed for the trawl fishery under Amendment 20 could allow for greater operational flexibility and efficiency for those harvesters able to make the transition to a new regulatory environment.

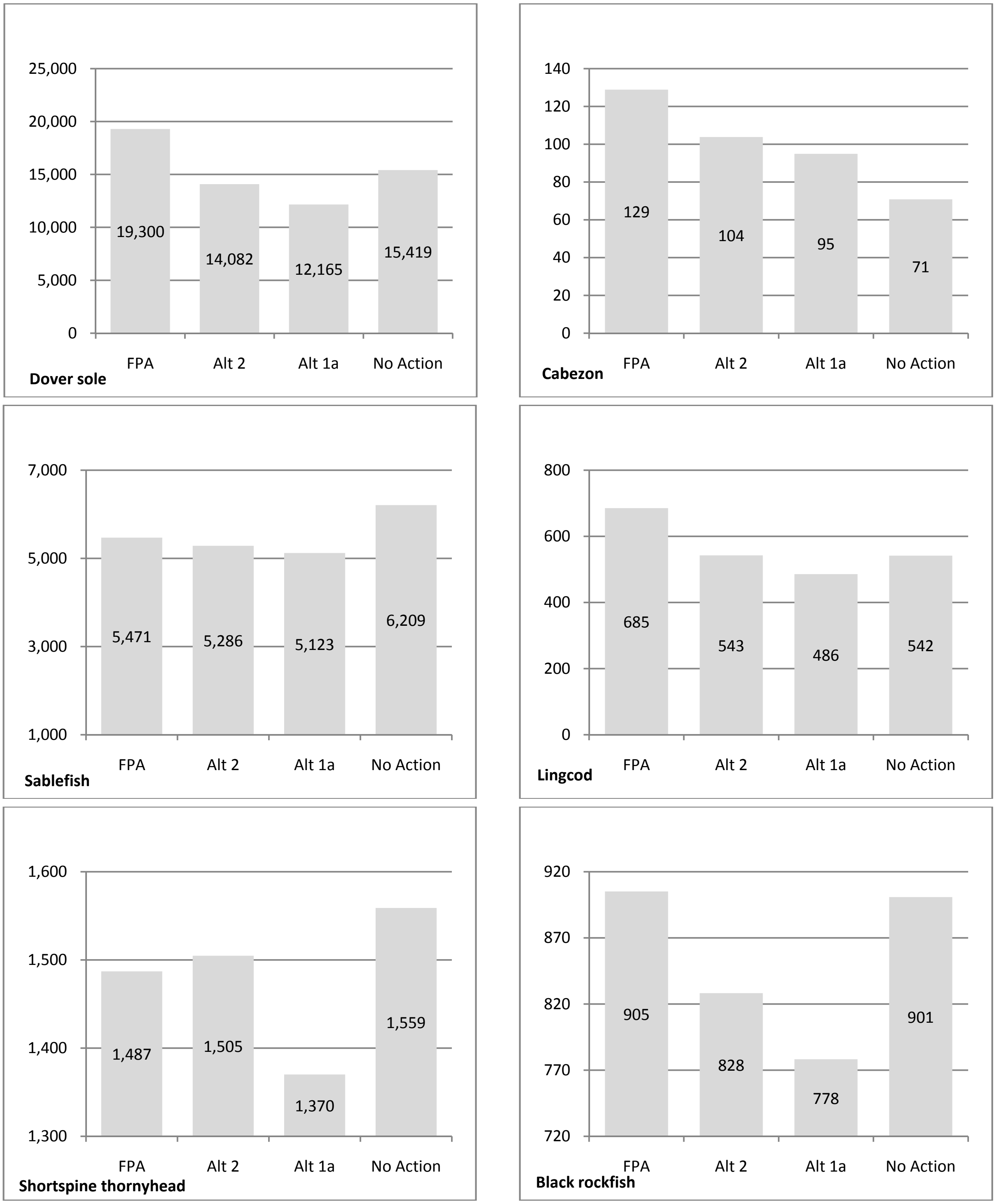

Figure ES-2. Modeled catch (mt) of selected nearshore species under the Council's FPA, Alternative 2, Alternative 1a and No Action (*Alternative 4 is assumed to be similar to the FPA*).

Other Effects of the Management Measures

Socioeconomic Impacts

As noted above, under Alternatives 1 and 2 more aggressive rebuilding strategies would be adopted than under the Council's FPA (and Alternative 3, which was the Council's preliminary preferred alternative).[8] The exception is for darkblotched rockfish, where the Council's FPA is Alternative 2. The Council initially considered alternatives with less aggressive rebuilding strategies (later target years and higher harvest rates) but eliminated them from further consideration during scoping because the Council concluded that they were not consistent with the requirement in the MSA to rebuild the stocks in the shortest time possible while taking into account the status and biology of the overfished stock, the needs of the fishing communities, and the interaction of the overfished stock within the marine ecosystem. As mentioned previously, NMFS' preferred alternative is a modification of the Council's FPA that adopts the Alternative 2 ACLs for cowcod and yelloweye rockfish but maintains the other overfished species' ACLs consistent with the Council's FPA. Table ES-8 shows the change from No Action for ex-vessel revenue, recreational angler trips, and personal income generated from groundfish fisheries in west coast ports. (These estimates are broken out by non-tribal, non-whiting ex-vessel revenue and tribal ex-vessel revenue, because ex-vessel revenue estimates for Pacific whiting fisheries are a function of proxy ACLs used in the analysis. The Pacific whiting ACL is determined in March of each year based on annual stock assessments so, for example, the 2011 ACL will be determined in March 2011.) Alternatives 1 and 2 and the Council's FPA result in declines in estimated ex-vessel revenue and personal income compared to No Action. Only Alternative 1 shows a decline in total (charter and private) recreational angler trips.

For comparison, coastwide groundfish ex-vessel revenue has varied year-to-year, 1999-2009, between a decline of $38.6 million (-34 percent) and a gain of $35.2 million (+46 percent). Considering only shoreside deliveries the variation is -$10.9 million (-18 percent) to +$10.8 million (+18.4 percent). For the non-whiting commercial sectors the variation has been -$8.6 million (-17 percent) and +$9.3 million (23 percent). Although ex-vessel revenue is projected to decline under the Council's FPA, the estimated change, -$2.7 million or -3.4 percent, is within the range of variability experienced over the past decade. Similarly, ex-vessel revenue is also projected to decline under NMFS' preferred alternative as described more thoroughly in Chapter 4.

[8] Alternatives 1a and 1b represent two approaches to managing the sablefish fixed gear fishery; under Alternative 1a the allowable sablefish harvest is reduced, which results in lower overall overfished species bycatch while under Alternative 1b the RCA is expanded to prevent access to areas of higher overfished species bycatch.

Table ES-8. Coastwide change in ex-vessel revenue, total angler trips, and personal income from No Action.

Sector Name	Council's FPA	Alt 1a	Alt 1b	Alt 2	Alt 3 - PPA
Ex-vessel revenue, 14 percent change					
Total, 2011	- 3.4%	- 28.3%	- 34.9%	- 9.8%	+ 10.7%
Non-whiting, 2011 [a/]	- 3.5%	-19.9%	-30.1%	-13.5%	-3.9%
Tribal, 2011 [b/]	-12.5%	-23.2%	-23.2%	-12.5%	-1.9%
Total, 2012	- 4.2%	- 29.1%	-34.1%	- 10.6%	+10.1%
Non-whiting, 2012 [a/]	-4.6%	-20.9%	-28.7%	-14.5%	-4.5%
Tribal, 2012 [b/]	-13.8%	-24.5%	-24.5%	-13.8%	-3.1%
Ex-vessel revenue, change in $1,000s					
Total, 2011	- 2,777	- 23,091	- 28,510	- 8,036	+ 8,708
Non-whiting, 2011 [a/]	-1,867	-10,514	-15,934	-7,114	-2,035
Tribal, 2011 [b/]	-897	-1,660	-1,660	-897	-133
Total, 2012	- 3,435	- 23,733	- 27,842	- 8,677	+ 8,283
Non-whiting, 2012 [a/]	-2,432	-11,063	-15,172	-7,663	-2,366
Tribal, 2012 [b/]	-989	-1,753	-1,753	-989	-225
Total angler trips	+6.0%	-25.9%		+0.5%	+3.4%
Personal income	-3.7%	-23.6%	-33.6%	-12.1%	+2.4%

a/ excludes tribal landings.
b/ includes shoreside whiting.

Projected catches from the non-whiting sectors were estimated using current modeling methods, which rely on historical overfished species bycatch rates to determine appropriate trip limits and RCA configurations. One of the objectives of IFQ management under Amendment 20 is to create incentives for harvesters to reduce bycatch (or incidental catch) rates for overfished species. "Top down" controls like trip limits are replaced by limits imposed on the vessel through the requirement to match quota pounds to catch. Combined with 100 percent observer coverage this is expected to more efficiently constrain catch to the amounts allocated to the sector. If these fishery rationalization measures are effective it should be expected that the trawl sector should perform better than estimated. However, since these new management measures would apply under all the action alternatives the relative differences between these revenue and income estimates would remain.

The stock assessment schedule for Pacific whiting is a second factor affecting these estimates. Assessments are conducted annually with the results available to the Council in March of each year for setting the ACL for that year's fishery, which typically begins sometime in May. In order to model the effects of the proposed action, the 2010 Pacific whiting OY was used as a representative value. In order to represent the possible variability in assessment results one-half the 2010 OY was used for Alternative

1 and 150 percent of the 2010 OY was used for Alternative 3. Alternative 2 and the FPA use the 2010 OY. This accounts for the projected changes in ex-vessel revenue for all sectors and just the shoreside sectors. Personal income impact estimates are also affected by these assumptions, although to a lesser degree since at-sea whiting catches are not included in these income impacts, on the assumption that resulting revenues to do not flow into coastal communities.

In considering year-to-year changes in revenue it is also useful to consider longer term variability in ex-vessel revenue. Figure ES-2 shows average annual inflation adjusted revenues from groundfish for three time periods, 1981-1990, 1991-2000, and 2001-2009 (this does not include revenue from the at-sea whiting sectors, which is kept in a different database). Average annual ex-vessel revenue in the 2000s is a little more than half what it was in the 1980s. These long-term declines contribute to cumulative adverse impacts to fishing communities.

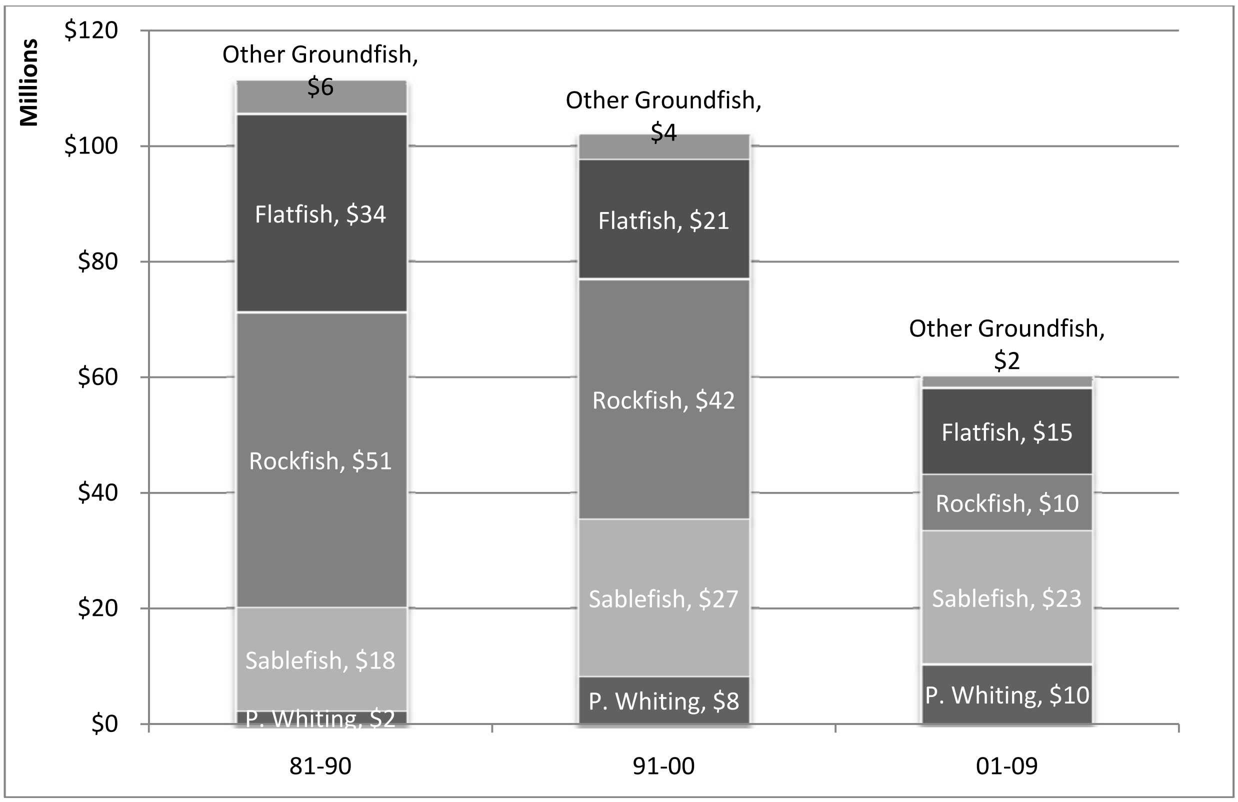

Figure ES-2. Average annual inflation adjusted ex-vessel revenue by species group, $millions, for three time periods.

Compared to No Action, all of the action alternatives are projected to result in reductions in income from commercial fishing and processing activities at nearly all port group areas in the analysis area. The greatest region-wide reduction is modeled for Alternative 1, followed by Alternative 3, then the Council's FPA. Alternative 3 would result in income reductions in most port group areas, but a slight overall increase due to income increases in southern Washington and portions of northern Oregon. In nearly all port group areas under all alternatives, the projected changes in community income impacts fall well within the range of inter-annual percentage changes in community ex-vessel revenue witnessed over the recent past. This suggests that the projected reduction in economic activity for most communities could probably be accommodated without causing severe disruption. Projected changes in community income impacts under Alternative 1b approach or exceed the maximum inter-annual percentage decreases for most communities north of Morro Bay. The change in commercial fishery revenue and recreational fishing trips under NMFS' preferred alternative would be the similar to the FPA.

Impacts to Other Ecosystem Components

Protected species covers those organisms for which laws constrain their take (a term covering mortality and other non-lethal harmful effects). The principal laws are the Marine Mammal Protection Act and the Endangered Species Act. Protected species potentially affected by the proposed action include marine mammals, sea turtles, and seabirds that occur in the action area and especially those for which past interactions have been documented. The differences in effects between the alternatives are unknown.

The MSA requires that FMPs identify essential fish habitat (EFH) for managed species and that Councils consider actions to ensure the conservation and enhancement of such habitat. Amendment 19 to the FMP, implemented in 2006, identifies groundfish EFH and habitat areas of particular concern (these are habitat areas that have special importance for managed species and may be vulnerable to adverse effects). Amendment 19 implemented a variety of mitigation measures including gear restrictions and a series of closed areas where bottom trawl gear or all bottom contacting gear is prohibited.

Fisheries selectively remove particular kinds and sizes (or ages) of fish from populations, affecting trophic structure. Groundfish removals in 2011-2012, which may be considered the direct impact of the action, contribute to the cumulative effect of fishery removals over longer time periods. Trophic effects are more evident in this long-term context. Changes in catch, induced by moving from status quo management to share-based management under FMP Amendment 20, may result in perceptible changes in the food web. Changes in location of catch and changes in the type of gear used may result in changes to the amount and kind of essential fish habitat impacted. Such changes in habitat impacts may have an effect on the ecosystem. However, that link, while logical, is difficult to demonstrate, as noted in the EFH EIS (NMFS 2005).

It is unlikely that any of the alternative 2011-2012 groundfish harvest specifications would result in a significant impact to the ecosystem, especially when considered in the context of the No Action Alternative. A summary of ecosystem impacts can be found in the EIS for FMP Amendment 20.

Incidental take of protected species and impacts on habitat are a function of the total amount of fishing effort expended, its geographic distribution, the types of fishing gear used. It is not possible to distinguish among the alternatives with respect to these effects. Implementation of FMP Amendment 20 is expected to contribute to effects of the proposed action. Under a rationalized fishery, it is difficult to predict fishing behavior and resultant impacts to protected resources. It is likely that any alternative resulting in a decreased overall effort would likewise result in decreased impacts to other ecosystem components. It is possible that a rationalized fishery, assuming an increase targeting efficiency, could increase harvest of targeted species while decreasing bycatch. This circumstance could occur with even less effort than currently used.

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CHAPTER 1 INTRODUCTION

1.1 How This Document Is Organized

This document provides background information about, and analyses of, alternatives for the 2011–12 biennial harvest specifications, including management measures, for fisheries covered by the Pacific Coast Groundfish Fishery Management Plan (FMP), which are developed by the Pacific Fishery Management Council (Council) in collaboration with the National Marine Fisheries Service (NMFS). Groundfish harvest specifications are set every 2 years for a 2-year period. These actions must conform to the Magnuson-Stevens Fishery Conservation and Management Act (MSA), the principal legal basis for fishery management within the Exclusive Economic Zone (EEZ), which extends from the outer boundary of the territorial sea to a distance of 200 nautical miles from shore.

In addition to addressing MSA mandates, this document is an environmental impact statement (EIS), pursuant to the National Environmental Policy Act (NEPA) of 1969, as amended. This document is organized so that it contains the analyses required under NEPA and other applicable law (see Chapter 6). The EIS is organized in chapters:

- Chapter 1 explains why action is being considered for the groundfish fisheries in 2011–12, including revisions to established groundfish rebuilding plans. This purpose and need statement defines the scope of the subsequent analysis.

- Chapter 2 outlines the no action and action alternatives that have been considered to address the defined purpose and need. The Council recommended a preferred alternative from among these alternatives as a basis for establishing or revising the harvest specifications and management measure regulations governing groundfish fisheries in 2011–12. NMFS has developed a modified preferred agency alternative for this FEIS.

- Chapter 3 describes the environmental components affected by the proposed action, which are groundfish and other marine fish, fishery sectors, fishing communities, protected species, essential fish habitat, and the marine ecosystem.

- Chapter 4 describes the direct, indirect, and cumulative effects of the proposed action, including the no action and preferred alternatives, on the environmental components described in chapter 3.

- Chapter 5 details how this amendment meets 10 National Standards set forth in the MSA (Section 301(a)) and groundfish FMP goals and objectives.

- Chapter 6 provides information on those laws and executive orders, in addition to the MSA and NEPA, with which an action must be consistent, and how this action has satisfied those mandates.

- Chapters 7 through 10 include required supporting information: the list of preparers, who received copies of the document, a glossary and acronym list, and the bibliography.
- Chapter 11, Response to Comments, is a required component of this Final EIS; agencies must respond by modifying the EIS or explaining why the comments do not warrant further response (40 CFR 1503.4).
- Appendix A documents the models and methods used to estimate potential catches (harvest impacts) under the alternatives.
- Appendix B is a detailed description and analysis of specific management measures that may be implemented during the 2011-2012 period, which are more generally described in Chapter 2 and analyzed as components of the "integrated alternatives" (see below).
- Appendix C is a detailed description and analysis of the integrated alternatives, described in Chapter 2, that were used for decision-making and the evaluation of impacts
- Appendix D documents the econometric input/output model used to estimate personal income impacts.
- Appendix E describes an update to the community vulnerability analysis prepared in conjunction with the 2007-2008 harvest specifications EIS.
- Appendix F contains tables on historical landings in west coast commercial fisheries for groundfish.
- Appendix G contains additional analysis supporting the discussion of impacts to non-consumptive and non-use values in Chapter 4.

In this FEIS, NMFS has modified the DEIS in response to public comments and in consideration of other relevant developments. The changes include the addition of a modified alternative, the NMFS' preferred alternative, which is based on and within the scope of the alternatives analyzed in the DEIS. NMFS has also reorganized some of the information contained in the DEIS in order to reflect the addition of NMFS' preferred alternative and to make the document more transparent. NMFS has not modified all of the text and tables that were included in the DEIS that refer only to the Council's preferred alternative (FPA); however, NMFS has added additional tables and summary information to reflect the NMFS preferred alternative. As used in this FEIS, the FPA refers to the Council's final preferred alternative and the agency's preferred alternative is referred to either as "NMFS' preferred alternative" or "Alternative 4."

1.2 Proposed Action, Purpose and Need

1.2.1 The Proposed Action

Using the "best available scientific information," the proposed action is to implement harvest specifications, including annual catch limits (ACLs) for calendar years 2011 and 2012 for species and species' complexes managed under the Groundfish FMP and to establish management measures that constrain total fishing mortality to these specified ACLs or achieve other management objectives as outlined in the Groundfish FMP. The specification of ACLs must be consistent with requirements of the MSA including preventing overfishing and, for stocks declared overfished and whose biomass is below the maximum sustainable yield (MSY) level, setting catch limits appropriately to return stock biomass to the MSY level. Eight Pacific Coast groundfish species are currently "overfished." Seven of these stocks are currently managed under rebuilding plans; the proposed action includes a rebuilding plan for the eighth species, petrale sole. ACLs must be set consistent with the rebuilding plans and the framework described in MSA §304(e), which requires overfished stocks to be rebuilt to the MSY biomass in a time period that is as short as possible, taking into account the status and biology of the overfished stocks, the needs of fishing communities, and the interaction of the overfished stock within the marine ecosystem.

1.2.2 Purpose and Need for Action

The purpose of the proposed action is to conserve and manage Pacific Coast groundfish fishery resources to prevent overfishing, to rebuild overfished stocks, to ensure conservation, to facilitate long-term protection of essential fish habitats, and to realize the full potential of the Nation's fishery resources (MSA §2(a)(6)). In order to achieve this purpose, the specification of catch limits needs to be consistent with requirements of the MSA, and particularly the 10 National Standards enumerated in §301(a) of the MSA and advisory guidelines established pursuant to §301(b), which are found at 50 Code of Federal Regulations (CFR) 600 Subpart D.

On January 16, 2009, NMFS issued final guidelines for National Standard 1 of the MSA (74 FR 3178, 50 CFR 600.310). The final rule provides guidance on how to comply with new annual catch limit and accountability measure requirements for ending overfishing of fisheries managed by Federal FMPs.[9] Annual catch limits (ACLs) are amounts of fish that catch cannot exceed in a year. The proposed action needs to be consistent with any amendments to the groundfish FMP adopted to comply with National Standard 1 guidelines, as revised. Annual catch limits must be set at a level that prevents overfishing, according to the best available science. For stocks whose biomass is below the MSY level, ACLs will be set appropriately to return stock biomass to that level.

Section 304(e) of the MSA describes how the Council must respond to overfishing and rebuild overfished stocks. Seven groundfish stocks (bocaccio, canary rockfish, cowcod, darkblotched rockfish, Pacific ocean perch, widow rockfish, and yelloweye rockfish) are currently being managed under rebuilding plans. An eighth stock, petrale sole, was declared overfished in 2009, based on the most recent stock assessment. As part of the proposed action, adopted rebuilding plans need to be evaluated and adjusted, if appropriate, based on the most recent stock assessments for these stocks. In addition, a new rebuilding plan for petrale sole will be adopted as part of the proposed action, and must be consistent with the MSA and the Pacific Coast Groundfish FMP. The Groundfish FMP must be amended to incorporate key elements of the new petrale sole rebuilding plan and adjustments to existing rebuilding plans. ACLs must be set consistent with these rebuilding plans and MSA §304(e), which requires overfished stocks to be rebuilt to the MSY biomass in a time period that is as short as possible, taking into account the status and biology of the overfished stocks, the needs of fishing communities, and the interaction of the overfished stock within the marine ecosystem.

1.2.3 Background to the Proposed Action

To utilize the "best scientific information available," and to specify harvest levels for the 2011-2012 biennial management cycle, the action needs to be taken to:

9 The revised NS1guidelines require ACLs for all stocks in a fishery and that the ACL is a limit not to be exceeded, attainment of which triggers accountability measures to ensure that ACLs are complied with.

- Evaluate maximum sustainable yield (MSY) estimates or proxies for specific stocks and stock complexes (management units) and specify an overfishing limit (OFL) corresponding to the estimated MSY harvest level;
- Estimate an appropriate buffer to accommodate the scientific uncertainty in estimating the OFL for specifying an acceptable biological catch (ABC) for major stocks and stock complexes;
- Identify those species or species groups which the Council proposes to be managed by the establishment of numerical harvest levels[10];
- Develop a stock rebuilding management strategy for those stocks determined to be below their overfished/rebuilding threshold; and
- Evaluate rebuilding plan progress for stocks that are currently overfished and revise as needed to rebuild the stock;
- Specify ACLs for actively managed stocks and stock complexes that are equal to or below the specified ABCs to limit the catch of stocks in order to achieve the objectives of the MSA, Groundfish FMP, and other applicable laws and policies governing the west coast groundfish fishery.

The proposed action is a management strategy, which is the sum of all the management measures selected to achieve the biological, ecological, economic and social objectives of the fishery. Current management measures must be evaluated to determine if they are adequate to keep the total catch within the proposed harvest levels; if not these management measures must be adjusted.

1.3 The Action Area

Federally-managed Pacific groundfish fisheries occurring within the EEZ off the coasts of Washington, Oregon, and California (WOC) establish the geographic context for the proposed action. West coast communities engaged in these fisheries are also part of the context (see Figure 3-21).

1.4 Issues of Note in the 2011-2012 Cycle

Numerous developments occurred during the 2011-2012 management cycle that affect the establishment of harvest specifications and management measures for groundfish fisheries in 2011–12. First, pursuant to the court order in *NRDC v. Locke*, NMFS is required to establish new specifications that are based on the “best scientific information available” and set rebuilding periods for three overfished species (yelloweye rockfish, cowcod, and darkblotched rockfish) that are as “short as possible” within the meaning of the MSA. Second, at the time the DEIS was published, several FMP amendments were proposed but still awaiting NMFS’ approval and implementation. In the time period between the publication of the DEIS and completion of the final EIS, NMFS took action on Amendment 16-5, Amendment 23, Amendment 20, and Amendment 21 to the FMP. The DEIS noted the status of the proposed FMP Amendments at the time and explicitly took into consideration how implementation of FMP Amendments, such as the trawl rationalization program under Amendment 20, could affect the alternative harvest specifications and management measures considered in the DEIS. Below is an update on relevant developments.

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[10] Currently referred to as ABCs/Optimum Yield (OYs). Amendment 23 to the Groundfish FMP, consistent with revised National Standard 1 guidelines at 50 CFR 600.310, changed the framework for determining these and the terminology to ABCs/ACLs, but the basic concept of a harvest limit is the same.

1.4.1 Court Order in NRDC v. Locke

One key consideration for establishing harvest specifications and management measures for the 2011-2012 biennium is the court's order in *NRDC v. Locke*, Case 3 :01-cv-00421-JL (N.D. Cal. 2010). In that case, the court held that the rebuilding plans for cowcod, yelloweye, and darkblotched rockfish in the 2009-2010 specifications did not rebuild those species in time periods that are "as short as possible" within the meaning of Section 304(e)(4)(A)(i) of the MSA. The court also held that NMFS' use of Impact Analysis for Planning (IMPLAN) data from 1998 rather than 2002 in the Fishery Economic Assessment Model (FEAM) violated National Standard 2 of the MSA, 16 U.S.C. § 1851(a)(2), by failing to use the best scientific information available on the economic status of fishing communities in the 2009-2010 specifications. Based on these holdings, the court ordered NMFS to establish new specifications for the groundfish fishery that are based on the best scientific information available, and that establish rebuilding periods for cowcod, yelloweye, and darkblotched rockfish that are as short as possible taking into account the status and biology of the overfished stocks, the needs of fishing communities, and the interaction of the overfished stock within the marine ecosystem. Specifications consistent with the court's order must be established by April 29, 2011.

1.4.2 New Stock Assessments, Rebuilding Analyses and Rebuilding Plans Including Amendment 16-5

In coordination with NMFS, the Council identifies groundfish stocks for which new stock assessments should be conducted to support the identification of biennial harvest specifications and for the periodic review of overfished species rebuilding plans (Groundfish FMP Section 4.5.3.6). For the 2011-2012 cycle the following assessments were conducted:

Bocaccio, *Sebastes paucispinis* (declared overfished in 1999);
Cabezon, *Scorpaenichthys marmoratus;*
Canary rockfish, *Sebastes pinniger* (declared overfished in 2000);
Cowcod, *Sebastes levis* (declared overfished in 2000);
Darkblotched rockfish, *Sebastes crameri* (declared overfished in 2000);
Greenstriped rockfish, *Sebastes elongates;*
Lingcod, *Ophiodon elongatus;*
Pacific ocean perch, *Sebastes alutus* (declared overfished in 1999);
Petrale sole, *Eopsetta jordani* (declared overfished in 2010);
Splitnose rockfish, *Sebastes diploproa;*
Widow rockfish, *Sebastes entomelas* (declared overfished in 2001); and
Yelloweye rockfish, *Sebastes ruberrimus* (declared overfished in 2002).

The Council reviewed these stock assessments and approved them for use in setting harvest specifications during their June and September 2009 meetings. The stock assessments and associated documents (including the rebuilding analyses referenced below) are available on the Council's website at http://www.pcouncil.org/groundfish/stock-assessments/current-stock-assessments/. Chapter 3 includes brief summaries of these stock assessment results.

Information from the new stock assessments were used to revise the rebuilding analyses for overfished groundfish stocks (bocaccio, canary rockfish, cowcod, darkblotched rockfish, Pacific ocean perch, widow rockfish, yelloweye rockfish, and petrale sole). At their November 2009 meeting the Council adopted new rebuilding analyses for the overfished species listed above for use in management decision-making for 2011-2012 groundfish fisheries. After careful deliberation, those key parameters of rebuilding plans that are specified in regulation may be updated as part of decision-making under the biennial harvest specifications process.

The Groundfish FMP establishes a framework for determining reference points, including F_{MSY} (defined as that level of fishing which produces the largest assured proportion of MSY) and B_{MSY} (defined as biomass that allows maximum sustainable yield to be taken) stock size. The F_{MSY} stock size is the threshold for determining overfishing. Under the FMP framework these reference points may be modified when scientifically valid information supports the use of a new value. In this regard under the current harvest specifications the Council also proposed the following new proxy biomass and harvest rate reference points recommended by the Scientific and Statistical Committee (SSC) for petrale sole and other west coast flatfish species:

1) a biomass target (i.e., B_{MSY}) of 25 percent of unfished biomass ($B_{25\%}$);
2) a minimum stock size threshold (the overfished designation threshold) of half that amount or $B_{12.5\%}$; and
3) a harvest rate predicted to achieve MSY (F_{MSY}) of $F_{30\%}$ (meaning a fishing mortality rate that results in spawning stock biomass at 30 percent of the unfished level).

Given this decision and the adopted current biomass estimate of petrale sole of 11.6 percent of unfished biomass, in early 2010 NMFS designated the petrale sole stock overfished, which requires development of a rebuilding plan consistent with the framework described in Chapter 4 of the Groundfish FMP. Adoption of a rebuilding plan is part of the 2011-2012 biennial specifications process, but requires the existing rebuilding plans in response to new information on the biology and population dynamics of a stock.

Amendment 16-5 would have amended the FMP to reflect the Council's final preferred alternative for 2011-2012 harvest specifications and rebuilding plan revisions as described in this EIS. More specifically, Amendment 16-5 would have revised rebuilding plans for Bocaccio south of 40° 10' north latitude, canary rockfish, cowcod south of 40°10' north latitude, darkblotched rockfish, Pacific Ocean Perch, widow rockfish, and yelloweye rockfish, and created a rebuilding plan for petrale sole. In addition, Amendment 16-5 would have modified status determination criteria for flatfish and established a new harvest control rule for flatfish consistent with the Council's FPA.

The Council submitted Amendment 16-5 for NMFS' approval subsequent to the publication of the DEIS. Section 304(a) of the MSA requires NMFS to approve, disapprove, or partially approve an FMP amendment within 90 days of NMFS publishing a notice in the Federal Register stating that the amendment is available for public comment; otherwise the amendment becomes effective as if it were approved. NMFS published a notice of availability of Amendment 16-5 and requested public comment on October 1, 2010. (75 FR 60709). In determining whether to approve an FMP amendment, the MSA requires NMFS to review the amendment for consistency with the MSA itself, as well as other applicable law. At the time of the statutory deadline for NMFS to take action on approving Amendment 16-5, this EIS had not yet been finalized to serve as a basis for approving the amendment. Therefore, NMFS' disapproved Amendment 16-5 on December 27, 2010. The analysis of alternatives in this EIS, and NMFS' final decision, will serve as the basis for establishing harvest specifications for overfished species, and accordingly the rebuilding plan parameters, such as T_{TARGET} and SPR harvest rates, that would have been included in the FMP through Amendment 16-5. NMFS' preferred alternative, which is described in detail in Chapter 2, also includes the status determination critera and harvest control rule for flatfish contained in the Council's FPA and Amendment 16-5.

Groundfish FMP Amendment 23, discussed below, modified the FMP framework with regard to reference points consistent with the revised National Standard 1 Guidelines. The changes to flatfish reference points discussed above are consistent with the proposed modifications to the FMP framework.

1.4.3 Complying with Revised National Standard 1 Guidelines (Amendment 23)

The Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006 (MSA) established several new provisions pertaining to National Standard 1 (NS1), MSA Section 301(a), "Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield (OY) from each fishery for the United States fishing industry." On January 16, 2009, the NMFS published a final rule in the Federal Register to implement the new MSA requirements and amend the guidelines for NS1 (74 FR 3178).

The revised NS1 guidelines introduce new fishery management concepts including overfishing limits (OFLs), acceptable biological catch (ABC) to incorporate a scientific uncertainty buffer in specifications, ACLs, annual catch targets (ACTs), and accountability measures (AMs) that are designed to better account for scientific and management uncertainty and to prevent overfishing. The MSA requires Councils to amend their FMPs to comply with the revised guidelines by 2011 for most species and by 2010 for those species designated as being subject to overfishing. There are no groundfish species currently subject to overfishing, so 2011 is the implementation goal. The required changes to the Groundfish FMP were incorporated through Amendment 23. The Council took final action on this amendment at their June 2010 meeting. Harvest specifications for the 2011-2012 biennial period have been developed consistent with the framework established by Amendment 23.[11]

Table 1-1 compares reference points that have been used in groundfish harvest specifications and those incorporated into the FMP by Amendment 23 and used in the 2011-2012 biennial harvest specifications.

Table 1-1. Comparison of the current harvest specifications framework with terms and concepts in revised NS1 guidelines.

Current Harvest Specification Framework		**Am. 23 Harvest Specification Framework**	
ABC	Overfishing Limit	OFL	Overfishing Limit
	Buffer accommodates scientific uncertainty, management uncertainty, socioeconomic concerns, rebuilding concerns, etc.		Buffer accommodates scientific uncertainty
		ABC	Buffer accommodates management uncertainty, socioeconomic concerns, rebuilding concerns, etc.
OY		ACL	
	Buffer accommodates ad hoc sector allocations and other management objectives		Buffer could accommodate inseason catch monitoring uncertainty, ad hoc sector allocations and other management objectives
HG		ACT	

[11] NFMS approved the general framework established by Amendment 23 but dispproved the proposed removal of dusky and dwarf red rockfish from the FMP.

Revised NS1 Guidelines emphasize explicitly accounting for scientific uncertainty when setting catch limits. As discussed in detail in Section 2.1, Amendment 23 established a framework to apply methods for accounting for scientific uncertainty, which is implemented through the biennial harvest specifications process.

1.4.4 Trawl Rationalization (Amendment 20)

Amendment 20 established the trawl rationalization program, which includes a system of individual fishing quotas (IFQs) for the shoreside component of the groundfish limited access trawl fishery. It also includes harvester cooperatives (co-ops) for the whiting at-sea mothership fishery and creates a permit endorsement to close the catcher-processor sector to new entrants. The Final Environmental Impact Statement (FEIS) for Amendment 20 to the groundfish FMP was published in June 2010. NMFS partially approved Amendment 20 on August 9, 2010. Several rulemakings occurred in 2010 to implement provisions of the Amendment 20 trawl rationalization program.

IFQs are a kind of tradable permit that rations access to a resource—the permit represents an exclusive right to use some increment of the resource (i.e., a pound of fish brought aboard a fishing vessel) (Tietenberg 2002). Once an ACL is established for a stock (or management unit combining or subdividing stocks), and an allocation established for the trawl sector, this aggregate amount is subdivided and allocated to individual groundfish trawl limited access permits.[12] IFQs are expressed in two forms: quota shares, which represent a long-term harvest privilege expressed as a claim on a percentage of the sector allocation, and quota pounds, which convert these percentages into a quantity, based on the allocation established as part of biennial harvest specifications. Under the trawl rationalization program quota pounds can only be used in the year for which they have been issued, although a provision allows a portion of unused quota pounds to be transferred between successive years. Quota shares and quota pounds are tradable so that individuals can buy and sell them according to need. However, the program puts a variety of limits on such transfers. Harvester co-ops are somewhat like IFQs except that the harvest privilege is assigned to a group, the co-op. The members of the group then decide how and when the collectively-held harvest privilege will be used. The trawl rationalization program establishes a set of rules for the formation of co-ops in the at-sea mothership sector that provide a strong incentive for catcher vessels to form co-ops associated with a mothership processor. In the case of the catcher-processor sector a single, a voluntary co-op has been in existence for some time. In that instance the allocation to the sector is essentially an allocation to the co-op. By creating a new permit endorsement, Amendment 20 essentially closes this sector to new entrants; a move intended to lend greater stability to the functioning of the current, voluntary co-op.

The action alternatives outlined in Chapter 2 of this FEIS and the analysis in Chapter 4 incorporate these new management measures for the limited entry trawl fishery. Some of the analysis in this FEIS includes alternatives that assume management strategies carried out with or without implementation of the trawl rationalization program under Amendment 20 because the amendment had not yet been approved prior to publication of the DEIS. As outlined above, these measures include a shoreside trawl IFQ program, and catcher-processor and mothership sector harvest cooperatives. With the exception of the trip limit management regime, most of the existing management measures for the trawl fishery will remain in regulation.

12 Allocations, when applied to ACLs, establish the level of harvest opportunity accorded to a specified group of fishery participants, termed a fishery sector.

1.4.5 Intersector Allocation (Amendment 21)

The FEIS for the Amendment 21 action was published concurrently with the Amendment 20 FEIS in June 2010. Similarly, NMFS partially approved Amendment 21 along with Amendment 20 on August 9, 2010. Amendment 21 deals with the long-term allocations between trawl and non-trawl fisheries and establishes the following:

- Long-term trawl/non-trawl allocations of selected groundfish stocks and stock complexes (or management units) to the combined limited entry trawl sectors (see Section 3.2 for more information on these groundfish fishery sectors);
- Elements of a formula for allocating IFQ to the shoreside fishery. This is needed because two, separately managed sectors—shoreside whiting and shoreside non-whiting—are being combined into a single sector for the purposes of IFQ management;
- Allocation of trawl-dominant overfished species among the four current trawl sectors. As noted, a single shoreside sector will be created and managed with IFQs so future allocations will be to just three trawl sectors;
- Allocation of a portion of the total allowable catch (TAC) for Pacific halibut in the west coast EEZ to the groundfish trawl fishery. Retention of Pacific halibut is prohibited in groundfish trawl fisheries. Under Amendment 20 Pacific halibut bycatch will be managed under a system of individual bycatch quotas (IBQs) analogous to IFQs.

Similar to the new management measures for the trawl fishery established under Amendment 20, the alternatives described in Chapter 2 and analyzed in Chapter 4 use the allocations established under Amendment 21 to identify harvest opportunity between trawl and non-trawl sectors. Two-year allocations would be established under the No Action Alternative based on Amendment 21.

1.5 Public Scoping

On November 3, 2009 (74 FR 56805), NMFS and the Council published a Notice of Intent (NOI) in the Federal Register announcing their intent to prepare an EIS in accordance with NEPA for the 2011–2012 biennial harvest specifications and management measures for the Pacific Coast groundfish fishery. The NOI described the proposed action and the way in which alternatives to be analyzed in the EIS would be formulated. The NOI also enumerated a preliminary list of potentially significant impacts that could result from implementing the proposed action.

The Council process, which is based on stakeholder involvement and allows for public participation and public comment on fishery management proposals during Council, subcommittee, and advisory body meetings, is the principal mechanism to scope the EIS. The advisory bodies involved in groundfish management include the Groundfish Management Team (GMT), with representation from state, Federal, and tribal fishery scientists; and the Groundfish Advisory Subpanel (GAP), whose members are drawn from the commercial, tribal, and recreational fisheries, fish processors, and environmental advocacy organizations. Meetings of the Council and its advisory bodies constitute the Council scoping process, involving the development of alternatives and consideration of the impacts of the alternatives.

In addition to Council-sponsored meetings, the Washington Department of Fish and Wildlife (WDFW), the Oregon Department of Fish and Wildlife (ODFW) and the California Department of Fish and Game (CDFG) held public hearings to solicit input on the formulation of management measures. Table 1-2 summarizes Council decision-making steps in developing biennial harvest specifications and management measures.

Table 1-2. Summary of Council decision-making during biennial harvest specifications process.

Event	Decision-making
June Council Meeting *June 13-18, 2009*	The Council and advisory bodies meet to adopt: 1. New stock assessments. 2. A schedule, process, and work plan for developing 2011-2012 groundfish harvest specifications and management measures.
September Council Meeting *September 12-17, 2009*	The Council and advisory bodies meet in Foster City, California to adopt new stock assessments.
November Council Meeting *October 31-November 5, 2009*	The Council and advisory bodies meet in Costa Mesa, California to adopt: 1. Remaining stock assessments and rebuilding analyses. 2. Updated observer data and proposed methodologies to model bycatch in trawl and fixed gear fisheries and other impact analyses. 3. A range of preliminary 2011-2012 harvest specifications (OFLs, ABCs, and ACLs) and, if possible, preferred ACLs for some stocks and complexes. 4. Adopt, or give guidance on, a preliminary range of management measures, including initial allocations.
April Council Meeting *April 10-15, 2010*	Council and advisory bodies meet to: 1. Adopt final recommendations on the 2011-2012 harvest specifications (OFLs, ABCs, and ACLs). 2. Adopt a range of refined management measures and, if possible, a tentative preferred alternative of management measures.
June Council Meeting *June 12-17, 2010*	Council and advisory bodies meet to take final action on the 2011-2012 groundfish management measures.

1.6 Related NEPA documents

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

- Final Environmental Impact Statement (FEIS) for the Proposed ABC/OY Specifications and Management Measures for the 2007-2008 Pacific Coast Groundfish Fishery. Prepared by the Pacific Fishery Management Council and NMFS and published in November 2006.
- Final Environmental Impact Statement (FEIS) for the Proposed ABC/OY Specifications and Management Measures for the 2009-2010 Pacific Coast Groundfish Fishery. Prepared by the Pacific Fishery Management Council and NMFS and published in January 2009.
- Rationalization of the Pacific Coast Groundfish Limited Entry Trawl Fishery; 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.
- Allocation of Harvest Opportunity Between Sectors of the Pacific Coast Groundfish Fishery; 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.
- Amendment 23: Considerations for a New Harvest Specification Framework That Incorporates Revised National Standard 1 Guidelines to Prevent Overfishing, Environmental Assessment.

Information is 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."

CHAPTER 2 ALTERNATIVES

This section describes the development of alternative actions that could be taken to set harvest specifications and management measures for the 2011 and 2012 Pacific Coast groundfish fishery. A holistic or integrated approach was taken in the development of alternatives in this EIS. Each alternative includes harvest specifications for all stocks managed under the Pacific Coast Groundfish FMP plus a suite of management measures that are intended to keep the total catch mortality of all groundfish stocks within the those specifications. The interrelated nature of the Pacific Coast groundfish stocks makes the consideration of holistic alternatives necessary. The degree of interaction between overfished species and other stocks is such that “rebuilding as quickly as possible while taking into account the needs of fishing communities” is not possible based solely on a species-by species approach.

The first step in constructing the integrated alternatives was to develop OFLs for all groundfish stocks and stock complexes using the best available scientific information. Section 2.1.1 of this chapter further describes the development of OFLs. The second step was the development of ABCs that incorporate scientific uncertainty buffers for all groundfish stocks and stock complexes and are based on Scientific and Statistical Committee (SSC) recommendations. Section 2.1.2 of this chapter describes the development of ABCs consistent with the Amendment 23 to the FMP and SSC recommendations. ACLs for all non-overfished groundfish stocks and stock complexes were then developed based on the proposed ABCs. A single ACL consistent with the Amendment 23 was considered for each non-overfished species, with some exceptions which were primarily for species where new scientific information was available. The ACLs proposed for non-overfished species with species specific specifications are further described in Section 2.1.4 and non-overfished species with ACLs that are included within a complex of stocks are further described in Section 2.1.5 of this Chapter. The OFLs and ABCs for all species and species complexes; and, the ACLs for non-overfished species and species complexes are the same in each integrated alternative.

The ACLs for each of the overfished species vary between the integrated alternatives, as do the management measures or AMs necessary to constrain the catch of all species, including overfished species to the specified ACLs. The ACLs for overfished species are described in detail Section 2.1.6 of this Chapter. Section 2.2 describes how the proposed ACLs would be allocated among the participants of the fishery. The allocations include those defined by the FMP as well as those recommended by the Council for the 2011 and 2012 biennial period.

Section 2.3 describes the management measures considered in the development of the integrated alternatives. Section 2.4 describes the integrated alternatives including No Action, the Council’s FPA, and three other alternatives (including the Council’s Preliminary Preferred Alternative, which is similar to the FPA). Section 2.4 also describes NMFS’ preferred alternative (Alternative 4). Each integrated alternative considers a suite of management measures that are designed to provide opportunities to harvest healthy target species within the constraints of alternative ACLs for overfished species. The integrated alternatives also considers rebuilding measures for petrale sole and revisions to the existing rebuilding plans for the remaining overfished species (Amendment 16-5). Appendix B contains a detailed description of the management measures that were considered under the Council’s FPA.

Section 2.6 describes those alternative harvest specifications and management measures that were initially considered for analysis, but ultimately rejected from detailed analysis in this EIS.

2.1 Alternative Harvest Specifications

The harvest specifications being considered for the 2011-2012 biennial fishing period are consistent with the provisions of Amendment 23 to the FMP, with the exception of the No Action Alternative. On January 16, 2009, NMFS published a final rule in the Federal Register to implement new requirements in the MSRA by amending the National Standard Guidelines for National Standard 1 (50 CFR 600.310). National Standard guidelines aid in the development and review of FMPs, FMP amendments, and regulations prepared by the regional Fishery Management Councils and the Secretary of Commerce. National Standard 1 establishes the relationship between conservation and management measures, preventing overfishing, and achieving OY from each stock, stock complex or fishery. The National Standard 1 guidelines also address the classification of stocks within a FMP, and the new requirement in the MSRA that FMPs include ACLs to prevent overfishing. Amendment 23 to the FMP modified the harvest specification framework in the FMP to be consistent with the revised National Standard 1 guidelines. NMFS approved Amendment 23, except for the proposed removal of dusky and dwarf red rockfish from the FMP, on December 27, 2010. The harvest specifications considered under the No Action Alternative are the 2010 ABCs and total catch OYs specified under the existing (pre-Amendment 23) harvest specification framework. For management purposes, ABCs and OYs under the pre-Amendment 23 framework are analogous to OFLs and ACLs, respectively, under Amendment 23.

2.1.1 Overfishing Limits (OFLs)

The OFL is the MSY harvest level associated with the current stock abundance. This is equivalent to the ABC specification under the No Action Alternative. Both specifications are the estimated or proxy MSY harvest levels, which are the harvest thresholds above which overfishing occurs. The methods for determining OFL are based on the best available science and the recommendation of the SSC, therefore alternatives are not developed for this reference point.

Amendment 23 revised the descriptions of species categories used in the development of harvest specifications. The first category (category 1) includes those species where relatively data-rich quantitative stock assessments can be conducted on the basis of catch-at-age, catch-at-length or other data. OFLs and overfished/rebuilding thresholds can generally be calculated for these species. The second category (category 2) includes species for which some biological indicators are available, including a relatively data-poor quantitative assessment or non-quantitative assessments. The third category (category 3) includes minor species which are caught and where the only available information is on the landed biomass. When setting the 2011 and 2012 OFLs for category 1 species, the F_{MSY} harvest rate or a proxy was applied to the estimated exploitable biomass. A policy of using a default harvest rate as a proxy for the fishing mortality rate that is expected to achieve the maximum sustainable yield is also referred to as the F_{MSY} control rule or maximum fishing mortality threshold (MFMT) harvest rate. For category 2 species, OFLs are typically set at a constant level and monitoring is necessary to determine if this level of catch is causing a slow decline in stock abundance. It is difficult to estimate overfished and overfishing thresholds for the category 2 species a priori, but indicators of long-term, potential overfishing can be identified. Average catches are generally used to determine the OFL for category 3 species.

New stock assessments, stock assessment updates and rebuilding analyses recommended by the SSC as the “best available science” and suitable for use in setting biennial harvest specifications were approved by the Council for setting the 2011 and 2012 biennial harvest specifications. Eight stock assessments and 4 stock assessment updates were prepared for the 2011 and 2012 harvest specifications. Full stock assessments, those that consider the appropriateness of the assessment model and that revise the model as necessary, were prepared for the following stocks: bocaccio, widow rockfish, lingcod, cabezon, yelloweye rockfish, petrale sole, splitnose rockfish and greenstriped rockfish. Stock assessment updates, those that run new data through existing models without changing the model, were prepared for: canary rockfish, cowcod, darkblotched rockfish, and POP. For species that did not have new stock assessments or updates prepared, the Council considered an OFL derived from the most recent stock assessment or update, the results of rudimentary stock assessments, or historical landings data.

For 2011 and 2012, the default harvest rates were used as a proxy for the fishing mortality rate that is expected to achieve the maximum sustainable yield (F_{MSY}). A proxy is used because there is insufficient information for most Pacific Coast groundfish stocks to establish a species-specific F_{MSY}. In 2011 and 2012, the following default harvest rate proxies, based on the Council's SSC recommendations, were used: F30% for flatfish, F40% for Pacific whiting, F50% for rockfish (including thornyheads), and F45% for other groundfish such as sablefish and lingcod. The FMP allows default harvest rate proxies to be modified as scientific knowledge improves for a particular species.

For flatfish, a new proxy of $F_{30\%}$ is being used for the 2011-2012 specifications. Following the 2009 scientific peer review of the petrale sole assessment by the Council's stock assessment review panel (STAR panel), the STAR panel prepared a report which recommended that the SSC review the estimates of F_{MSY} produced by the petrale sole assessment and investigate alternatives to the proxies of F40%. The SSCs groundfish sub-committee further considered the proxies produced by the petrale sole assessment and recommended that a proxy for F_{MSY} of $F_{30\%}$ be established for all west coast flatfish (PFMC E.2.c Supplemental SSC Report September 2009; Agenda Item E.2.c Supplemental SSC PowerPoint, September 2009). The full SSC endorsed the groundfish subcommittee's recommendation to establish a new proxy of $F_{30\%}$ for F_{MSY} for flatfish (PFMC G.2.b Supplemental SSC Report, November 2009). The values were based on a number of considerations, including evaluation of information on flatfish productivity (steepness) for assessed west coast flatfish, published meta-analyses of other flatfish stocks, and recommendations on appropriate proxies for F_{MSY} and B_{MSY} in the scientific literature. The SSC however did not endorse the use of a species-specific estimate of F_{MSY} for petrale sole because of high variability in the estimates between repeat assessments for other stocks and the sensitivity of the estimates to assumptions concerning stock structure.

For the 2011-2012 biennial specification process, two new methodologies were evaluated for determining OFL from data-poor stocks (unassessed category 2 species and category 3 species). In January 2010, the SSC Groundfish Subcommittee and Groundfish Management Team (GMT) examined yield estimates from the Depletion-Corrected Average Catch (DCAC) and the Depletion-Based Stock Reduction Analysis (DB-SRA) for 31 groundfish stock assessments (PFMC B.3.a Supplemental Attachment 7, June 2010). The DCAC and DB-SRA were developed by stock assessment scientists from the Northwest Fishery Science Center (NWFSC) and the Southwest Fishery Science Center. The DCAC provides an estimate of sustainable yield (the OFL) for data-poor stocks of uncertain status. DCAC adjusts historical average catch to account for one-time "windfall" catches that are the result of stock depletion, producing an estimate of yield that was likely to be sustainable over the same time period. Advantages of the DCAC approach to determining sustainable yield for data-poor stocks include: 1) minimal data requirements, 2) biologically-based adjustment to catch-based yield proxies with transparent assumptions about relative changes in abundance, and 3) simplicity in computing. The DB-SRA extends the DCAC by 1) restoring the temporal link between production and biomass and 2) evaluating and integrating alternative hypotheses regarding changes in abundance during the historical catch period. This method combines DCAC's distributional assumptions regarding life history characteristics and stock status with the dynamic models and simulation approach of stochastic stock reduction analysis. The SSC Groundfish Subcommittee endorsed application of DCAC and DB-SRA to derive the OFL for unassessed groundfish stocks. Although the Council would like further analysis, the Council did recognize that the DB-SRA and the DCAC methods used by the GMT were the best available scientific information for determining OFLs for category 2 and 3 stocks (PFMC I.2.b Supplemental SSC Report, April 2010).

Notable differences between the structure of the 2010 ABCs under the No Action Alternative and the proposed 2011 and 2012 OFLs are shown in Table 2-1. The OFLs remain the same between alternatives, other than the No Action Alternative. Therefore, the proposed 2011 and 2012 OFLs apply to all of the integrated alternatives, Alternative 1, 2, 3, 4 (NMFS-Preferred) and the FPA.

Table 2-1. Notable Differences Between the 2010 ABCs Under the No Action Alternative and the Proposed 2011 and 2012 OFLs.

Species or Species Complex	**2010 ABC No Action Alternative**	**2011-2012 OFL Integrated Alternatives 1-3 and the FPA**
Lingcod	Coastwide ABC	Specific OFLs for the area North and for the area South of 42° N. lat.
Stock complexes Other flatfish Minor rockfish Other fish	ABC based on historical landings data for the complex.	OFLs identify for individual species then summed. DB-SRA & DCAC approach used for unassessed stocks.
Chilipepper Rockfish	The ABC for the area south of 40°10' north latitude was actually the coastwide ABC.	The stock assessment results were used to specify an OFL for the area south of 40°10' N. lat. and to determine the contribution for the minor shelf rockfish north sub-complex contribution (area north 40°10' N. lat.)
Cabezon	The ABC for cabezon off Oregon was included within the other fish ABC	An OFL for cabezon off Oregon is specified
All Flatfish Stocks	F_{MSY} harvest rate of $F_{40\%}$ used to determine ABC	F_{MSY} harvest rate of $F_{30\%}$ used to determine OFL

Table 2-2 compares the 2011 and 2012 OFLs under the integrated alternatives (FPA and Alternatives 1-3) with the 2010 ABCs (No Action Alternative). The OFLs represent all the stocks and stock complexes actively managed in the fishery, as recommended by the SSC. The 2010 ABCs in Table 2-2 were projected from stock assessments done in 2007 or earlier, with the exception of Pacific whiting which is assessed annually with 2010 being the most recent stock assessment. The 2011 and 2012 OFLs in Table 2-2 include the results of stock assessments done in 2009. The OFL contributions for the cowcod stock south of 40°10' north latitude are shown as area-specific OFL contributions because they were derived using different methodologies. The Conception area OFLs were projected from the 2009 assessment (Dick, *et al.* 2009) and the Monterey area OFLs were derived using a depletion-based stock reduction analysis. Although the area-specific OFL contributions for cowcod are displayed in Table 2-2, the OFL is specified for the entire stock south of 40°10' north latitude and not for each area. The 2010 ABC and 2011 and 2012 OFL contributions of individual stocks within the minor rockfish, other flatfish and other fish complexes are shown in italics in Table 2-3. The OFLs for the individual stocks were summed to derive the complex OFLs.

Table 2-2. Specified 2010 ABCs (mt) and preferred 2011 and 2012 OFLs (mt) for stocks managed with stock-specific harvest specifications (overfished stocks in CAPS and stocks with new assessments in bold).

Stock	No Action Alternative	Integrated Alternatives 1-3, and the FPA	
	2010 ABC	2011 OFL	2012 OFL
OVERFISHED STOCKS			
BOCACCIO S. of 40°10' N. lat.	793	737	732
CANARY	940	614	622
COWCOD S. of 40°10' N. lat.	14	13	13
COWCOD (Conception)	NA	*6*	*6*
COWCOD (Monterey)		*7*	*7*
DARKBLOTCHED	440	508	497
PACIFIC OCEAN PERCH	1,173	1,026	1,007
WIDOW	6,937	5,097	4,923
YELLOWEYE	32	48	48
PETRALE SOLE	2,751	1,021	1,279
NON-OVERFISHED STOCKS			
Lingcod – coastwide	4,829	NA	NA
Lingcod N. of 42º N. lat. (OR & WA)	NA	2,438	2,251
Lingcod S. of 42º N. lat. (CA)	NA	2,523	2,597
Pacific Cod	3,200	3,200	3,200
Pacific Whiting (U.S. + Canada)	455,550	TBD in 2011	TBD in 2012
Sablefish (coastwide)	9,217	8,808	8,623
Shortbelly	6,950	6,950	6,950
Chilipepper S. of 40°10' N. lat.	2,576	2,073	1,872
Splitnose S. of 40°10' N. lat.	615	1,529	1,610
Yellowtail N. of 40°10' N. lat.	4,562	4,566	4,573
Shortspine Thornyhead (coastwide)	2,411	2,384	2,358
Longspine Thornyhead (coastwide)	3,671	3,577	3,483
Black Rockfish (WA)	464	445	435
Black Rockfish (OR-CA)	1,317	1,217	1,169
California scorpionfish	155	141	132
Cabezon (CA)	111	187	176
Cabezon (OR)	NA	52	50
Dover Sole	28,582	44,400	44,826
English Sole	9,745	20,675	10,620
Arrowtooth Flounder	10,112	18,211	14,460
Starry Flounder	1,578	1,802	1,813
Longnose skate	3,269	3,128	3,006

Table 2-3. Specified 2010 ABCs (mt) and preferred 2011 and 2012 OFLs (mt) for stock complexes (species contributions to a stock complex specification in italics, stocks with new assessments in bold).

Stock	**No Action Alternative**	**Integrated Alternatives 1-3, and the FPA**	
	2010 ABC	**2011 OFL**	**2012 OFL**
STOCK COMPLEXES			
Minor Rockfish North	3,678	3,767	3,821
Minor Nearshore Rockfish North	NA	116	116
Black and yellow		*0.0*	*0*
Blue (CA)	*28.0*	*27.7*	*27*
Blue (OR & WA)		*33.1*	*33*
Brown		*5.3*	*5*
Calico		*0.0*	*0*
China		*11.7*	*12*
Copper		*28.6*	*29*
Gopher	*0.0*	*0.0*	*0*
Grass		*0.6*	*1*
Kelp		*0.0*	*0*
Olive		*0.3*	*0*
Quillback		*8.7*	*9*
Treefish		*0.2*	*0*
Minor Shelf Rockfish North	NA	2,188	2,197
Bronzespotted		*0.0*	*0*
Bocaccio	*318.0*	*268.2*	*268*
Chameleon		*0.0*	*0*
Chilipepper		*156.0*	*140.9*
Cowcod		*0.0*	*0*
Flag		*0.1*	*0*
Freckled		*0.0*	*0*
Greenblotched		*1.4*	*1*
Greenspotted		*20.9*	*21*
Greenstriped		*1,208.0*	*1,232*
Halfbanded		*0.0*	*0*
Harlequin		*0.0*	*0*
Honeycomb		*0.0*	*0*
Mexican		*0.0*	*0*
Pink		*0.0*	*0*
Pinkrose		*0.0*	*0*
Puget Sound		*0.0*	*0*
Pygmy		*0.0*	*0*
Redstripe	*576.0*	*288.3*	*288*
Rosethorn		*15.2*	*15*
Rosy		*2.5*	*3*
Silvergray	*38.0*	*180.0*	*180*
Speckled		*0.2*	*0*
Squarespot		*0.1*	*0*
Starry		*0.0*	*0*
Stripetail		*35.3*	*35*
Swordspine		*0.0*	*0*
Tiger		*1.1*	*1*

Table 2-3. Specified 2010 ABCs (mt) and preferred 2011 and 2012 OFLs (mt) for stock complexes (species contributions to a stock complex specification in italics, stocks with new assessments in bold) (continued).

Stock	No Action Alternative	Integrated Alternatives 1-3, and the FPA	
	2010 ABC	2011 OFL	2012 OFL
Vermilion		*11.1*	*11*
Minor Slope Rockfish North	NA	1,462	1,507
Aurora		*17.3*	*17*
Bank		*19.7*	*20*
Blackgill	*0.0*	*4.7*	*5*
Redbanded		*51.7*	*52*
Rougheye		*78.3*	*78*
Sharpchin	*307.0*	*231.9*	*232*
Shortraker		*21.8*	*22*
Splitnose	*242.0*	*852.2*	*897*
Yellowmouth	*99.0*	*184.7*	*185*
Minor Rockfish South	3,382	4,302	4,291
Minor Nearshore Rockfish South	NA	1,156	1,145
Shallow Nearshore Species	NA	NA	NA
Black and yellow		*26.8*	*27*
China		*19.8*	*20*
Gopher (N of Point Conception)	*193.0*	*175.0*	*165*
Gopher (S of Point Conception)		*26.0*	*26*
Grass		*55.6*	*56*
Kelp		*25.9*	*26*
Deeper Nearshore Species	NA	NA	NA
Blue (assessed area)	*211.0*	*191.3*	*190*
Blue (S of 34°27' N. latitude)		*74.0*	*74*
Brown		*197.4*	*197*
Calico		*0.0*	*0*
Copper		*156.0*	*156*
Olive		*189.5*	*190*
Quillback		*6.3*	*6*
Treefish		*12.9*	*13*
Minor Shelf Rockfish South	NA	2,238	2,243
Bronzespotted		*6.7*	*7*
Chameleon		*0.0*	*0*
Flag		*26.6*	*27*
Freckled		*0.0*	*0*
Greenblotched		*24.6*	*25*
Greenspotted		*195.3*	*195*
Greenstriped		*221.0*	*226*
Halfbanded		*0.0*	*0*
Harlequin		*0.0*	*0*
Honeycomb		*7.8*	*8*
Mexican		*2.8*	*3*
Pink		*2.8*	*3*
Pinkrose		*0.0*	*0*
Pygmy		*0.0*	*0*

Table 2-3. Specified 2010 ABCs (mt) and preferred 2011 and 2012 OFLs (mt) for stock complexes (species contributions to a stock complex specification in italics, stocks with new assessments in bold) (continued).

Stock	No Action Alternative	Integrated Alternatives 1-3, and the FPA	
	2010 ABC	2011 OFL	2012 OFL
Redstripe		*0.5*	*1*
Rosethorn		*2.5*	*3*
Rosy		*36.9*	*37*
Silvergray		*0.6*	*1*
Speckled		*42.9*	*43*
Squarespot		*5.8*	*6*
Starry		*70.5*	*71*
Stripetail		*20.6*	*21*
Swordspine		*12.9*	*13*
Tiger		*0.0*	*0*
Vermilion		*308.4*	*308*
Yellowtail	*116.0*	*1,248.9*	*1,249*
Minor Slope Rockfish South	NA	907	903
Aurora		*29.4*	*29.4*
Bank	*350.0*	*574.8*	*574.8*
Blackgill	*282.0*	*279.0*	*275.0*
Pacific ocean perch		*0.0*	*0.0*
Redbanded		*11.9*	*11.9*
Rougheye		*0.5*	*0.5*
Sharpchin	*45.0*	*10.6*	*10.6*
Shortraker		*0.1*	*0.1*
Yellowmouth		*0.8*	*0.8*
Other Flatfish	6,731	10,146	10,146
Butter sole	*5*	*5*	*5*
Curlfin sole	*8*	*8*	*8*
Flathead sole	*123*	*35*	*35*
Pacific sanddab	*3,172*	*4,943*	*4,943*
Rex sole	*2,902*	*4,309*	*4,309*
Rock sole	*46*	*66*	*66*
Sand sole	*376*	*781*	*781*
Other Fish	11,200	11,150	11,150
Big skate	*No Species-Specific Basis or Contribution to the Stock Complex Harvest Specifications*		
California skate			
Leopard shark		*164*	*164*
Soupfin shark		*62*	*62*
Spiny dogfish		*2,200*	*2,200*
Finescale codling			
Pacific rattail		*1,178*	*1,178*
Ratfish			
Cabezon (OR in 2009-2010)			
Cabezon (WA)			
Kelp greenling (CA)		*111*	*111*
Kelp greenling (OR & WA)			

2.1.2 Acceptable Biological Catches

The proposed ABCs are consistent with the harvest specification framework under Amendment 23. Under Amendment 23, the term ABC is redefined to be an annual catch specification that is the stock or stock complex's OFL reduced by an amount associated with scientific uncertainty. Under the revised Magnuson-Stevens Act National Standard 1 guidelines, scientific advice that is relatively uncertain will result in ABCs that are relatively lower, all other things being equal, i.e., a precautionary reduction in catch will occur due purely to scientific uncertainty. The ABC is the catch level that ACLs may not exceed. As explained in more detail below, the SSC initially recommended a two-step approach referred to as the P* approach for stocks with relatively data-rich stock assessments and ultimately recommended this approach for the other stocks as well. In the P* approach, the SSC determines the amount of scientific uncertainty associated with stock assessments, referred to as sigma value. The Council chooses its preferred level of risk of overfishing, which is designated as the P*. The scientists then apply the P* value to the sigma value to determine the amount by which the OFL is reduced to establish the ABC.

The SSC's recommendations for sigma and the reductions from OFL associated with different P* values are science-based recommendations therefore alternatives to these values are not analyzed. The Council's choice of P* is a policy decision, thus alternative P* values and associated ABCs are described in this section. However, the ABC values proposed for the integrated alternatives are the same for each.

As discussed in section 2.1.1, the SSC assigned each species in the groundfish fishery to one of three categories based on the level of information available about the species. Table 2-4 shows the criteria used by the SSC to categorize stocks. The SSC's recommended sigma value for category 1 stocks is based on a statistical analysis of the variance within and among stock assessments. The analysis used stock assessments and stock assessment updates from 17 data rich stocks (meta-analysis). The general methodology used by the SSC subcommittees to assess among-assessment uncertainty was to compare previous stock assessments and stock assessment updates, and consider the logarithms of the ratios of the biomass estimates for each pair of assessments and their reciprocals using the last 20 years from an assessment. This provides a distribution of stock size differences in log-space and, if this variation is averaged over species, provides a general view of total biomass variation (represented as sigma - σ) that emerges among repeat assessments of stocks, while embracing a wide range of factors that affect variability in results. The SSC indicated that biomass is most likely the dominant source of uncertainty; however it is anticipated that other factors will need to be considered in the future.

Table 2-4. Criteria used by the SSC to categorize stocks based on the quantity and quality of data informing the estimate of OFL. Stock categories are used in deciding 2011 and 2012 ABCs that accommodate the uncertainty in estimating OFLs.

Category	Sub-category	Criteria
Category 1 - Data rich stocks. OFL based on F_{MSY} or F_{MSY} proxy from model output. ABC based on P* buffer.		
1	c	Age/size-structured assessment model with reliable estimation of the stock-recruit relationship.
1	b	As in 3a, but trend information also available from surveys. Age/size-structured assessment model.
1	a	Reliable compositional (age and/or size) data sufficient to resolve year-class strength and growth characteristics. Only fishery-dependent trend information available. Age/size-structured assessment model.
Category 2 - Data moderate. OFL derived from model output (or natural mortality).		
2	d	Full age-structured assessment, but results are substantially more uncertain than assessments used in the calculation of the P* buffer. The SSC will provide a rationale for each stock placed in this category. Reasons could include that assessment results are very sensitive to model and data assumptions, or that the assessment has not been updated for many years.
2	c	Historical catches, survey trend information, or at least one absolute abundance estimate. An aggregate population model is fit to the available information.
2	b	Historical catches, fishery-dependent trend information only. An aggregate population model is fit to the available information.
2	a	M*survey biomass assessment (as in Rogers 1996).
Category 3 - Data poor. OFL derived from historical catch.		
3	d	Reliable annual historical catches and approximate values for natural mortality and age at 50% maturity. Default analytical approach DB-SRA.
3	c	Reliable aggregate catches during period of fishery development and approximate values for natural mortality. Default analytical approach DCAC.
3	b	Reliable catch estimates only for recent years. OFL is average catch during a period when stock is considered to be stable and close to B_{MSY} equilibrium on the basis of expert judgment.
3	a	No reliable catch history. No basis for establishing OFL.

Based on this analysis, for category 1 stocks the SSC recommended using the biomass variance statistic of sigma=0.36. To set ABCs, the Council recommended using an approach where the GMT uses the recommended formulation to translate the SSC's recommended sigma to a range of P* values (the probability of overfishing). Each P* is then mapped to its corresponding buffer fraction. The Council then determines the preferred level of risk aversion by selecting an appropriate P* value. Amendment 23 sets the upper limit of P* at 0.45. The Council selected a P* value of 0.45 for category 1 stocks. With a P* value of 0.45, a sigma value of 0.36 corresponds with a reduction of 4.4 percent from the OFL when deriving the ABC.

Since there is greater scientific uncertainty for category 2 and 3 stocks relative to category 1 stocks, the scientific uncertainty buffer is generally greater than that recommended for category 1 stocks. The SSC indicated that ideally the approach recommended for setting ABCs for category 1 stocks should also be applied to category 2 and 3 stocks. However, there is presently no analysis available for determining the appropriate value of sigma (σ) to represent scientific uncertainty for stocks in these categories, unlike the situation for category 1 stocks. In the absence of such an analysis for category 2 and 3 stocks, the SSC suggested two interim approaches for computing ABCs from OFLs: use 25 percent and 50 percent reductions from the OFL for deciding the ABC for category 2 and 3 stocks (similar to No Action), respectively; or use the P* approach using the σ values for category 2 and 3 stocks recommended by the SSC. With a P* approach for deciding the ABC for category 2 and 3 stocks, the SSC recommended setting the value of sigma (σ) for category 2 and 3 stocks to 0.72 and 1.44 respectively (i.e., two and four times the σ for category 1 stocks). The difference between buffers determined using sigma values of 0.72 and 1.44 corresponds fairly closely to the difference between the buffers previously used for category 2 and 3 stocks (25 percent versus 50 percent) when P* is in the range 0.3 ~ 0.35. The specific values of 0.72 and 1.44 are recommended by the SSC and considered to be the best available scientific information, however, the values are not based on a formal analysis of assessment outcomes and could change substantially when the SSC reviews additional analyses in future management cycles. The Council adopted a general policy of using a P* of 0.4 for category 2 and 3 stocks.

As mentioned above, in its deliberations on Amendment 23 the Council chose a cap on P* of 0.45. A P* of 0.5 would result in no reduction from OFL to ABC. With respect to the 2011-12 specifications, for category 1 stocks, the Council chose a preferred alternative P* of 0.45. For category 2 and 3 stocks, the Council chose a preferred alternative P* of 0.4, however the Council recommended a P* of 0.45 in the case of category 2 and 3 stocks in the minor rockfish complexes. Combined with a sigma value of 0.36 for the category 1 stocks, the P* of 0.45 results in a reduction of 4.4 percent from the OFL. Combined with a sigma value of.72 for category 2 stocks, a P* of.4 results in a 16.7 percent reduction from OFL and a P* of 0.45 results in an 8.7 percent reduction from OFL. Combined with a sigma value of 1.44 for category 3 stocks, a P* of.4 results in a 30.6 percent reduction from OFL and a P* of 0.45 results in a 16.6 percent reduction from OFL. Table 2-5 shows the relationship between the proposed values for sigma and the buffer for a range of values for P*.

The Council considered P* values for category 2 and 3 stocks of 0.35 and 0.32, respectively. These P* values, in combination with the sigma values described above, would have resulted in an approximately 24 percent reduction from OFL for category 2 stocks, and an approximately 51 percent reduction from OFL for category 3 stocks. This alternative would have approximated the 25 percent and 50 percent reductions from former ABC that the Council used prior to this specification cycle. However, there was concern that these formerly used buffers were intended to account for more than just scientific uncertainty, and that using them to determine the ABC under the Amendment 23 framework would result in "double-counting" of uncertainty. The Council also considered a P* value of 0.45 for all stocks, regardless of category. This alternative reflects the view that the difference in scientific uncertainty between the different categories should be described entirely in terms of the sigma value, and that P* does not reflect an assessment of scientific uncertainty. In addition to the above-described alternatives, the Council had before it a range of ABC values for category 1 (and some category 2) stocks corresponding to P* values ranging between 0.45 and 0.15. Most of the individually managed stocks are Category 1 stocks (starry flounder, lingcod south, longspine thornyhead, arrowtooth flounder, shortbelly rockfish, and Pacific Cod are category 2 or 3 species). Table 2-6 shows the 2011 ABC values that would have resulted from each P* value in that range and Table 2-7 shows the resultant ABC values for 2012.

Table 2-5. Relationship between P* and the percent reduction of the OFL for deciding the 2011 and 2012 ABCs for category 1, 2, and 3 stocks based on σ values of 0.36, 0.72, and 1.44, respectively (values in bold font and outlined in bold borders are the preferred P* buffers a/).

P*	Assessment Uncertainty (σ)		
	Cat. 1 0.36	**Cat. 2 0.72**	**Cat. 3 1.44**
0.45	**4.4%**	8.7%	16.6%
0.44	5.3%	10.3%	19.5%
0.43	6.2%	11.9%	22.4%
0.42	7.0%	13.5%	25.2%
0.41	7.9%	15.1%	27.9%
0.4	8.7%	**16.7%**	**30.6%**
0.39	9.6%	18.2%	33.1%
0.38	10.4%	19.7%	35.6%
0.37	11.3%	21.3%	38.0%
0.36	12.1%	22.7%	40.3%
0.35	13.0%	24.2%	42.6%
0.34	13.8%	25.7%	44.8%
0.33	14.6%	27.1%	46.9%
0.32	15.5%	28.6%	49.0%
0.31	16.3%	30.0%	51.0%
0.3	17.2%	31.4%	53.0%
0.29	18.1%	32.9%	54.9%
0.28	18.9%	34.3%	56.8%
0.27	19.8%	35.7%	58.6%
0.26	20.7%	37.1%	60.4%
0.25	21.6%	38.5%	62.1%
0.24	22.5%	39.9%	63.8%
0.23	23.4%	41.3%	65.5%
0.22	24.3%	42.6%	67.1%
0.21	25.2%	44.0%	68.7%
0.2	26.1%	45.4%	70.2%
0.19	27.1%	46.9%	71.8%
0.18	28.1%	48.3%	73.2%
0.17	29.1%	49.7%	74.7%
0.16	30.1%	51.1%	76.1%
0.15	31.1%	52.6%	77.5%
0.14	32.2%	54.1%	78.9%
0.13	33.3%	55.6%	80.2%
0.12	34.5%	57.1%	81.6%
0.11	35.7%	58.7%	82.9%
0.1	37.0%	60.3%	84.2%
0.09	38.3%	61.9%	85.5%
0.08	39.7%	63.6%	86.8%
0.07	41.2%	65.4%	88.1%
0.06	42.9%	67.4%	89.3%
0.05	44.7%	69.4%	90.6%

a/ The Council recommended a P* of .45 in the case of category 2 and 3 stocks in the minor rockfish complexes.

Table 2-6. Projected 2011 OFLs in mt and ABCs in mt of assessed category 1 stocks under a range of overfishing (P*) values (assuming an assessment CV of σ=0.36).

Stock	Action Alternatives						
	2011 OFL	2011 ABC					
		Overfishing Probability (P*)					
		0.45	0.40	0.35	0.30	0.25	0.20	0.15
Lingcod - coastwide	4,961	4,742	4,529	4,318	4,108	3,891	3,664	3,416
Lingcod N. of 42° N latitude (OR & WA)	2,438	2,330	2,225	2,122	2,019	1,912	1,801	1,679
Lingcod S. of 42° N latitude (CA)	2,523	2,411	2,303	2,196	2,089	1,979	1,864	1,737
Sablefish - coastwide	8,808	8,418	8,040	7,667	7,293	6,909	6,506	6,065
PACIFIC OCEAN PERCH	1,026	981	937	893	849	805	758	706
WIDOW	5,097	4,872	4,653	4,437	4,220	3,998	3,765	3,510
CANARY	614	586	560	534	508	481	453	422
Chilipepper c/	2,229	2,130	2,035	1,940	1,846	1,748	1,646	1,535
BOCACCIO S. of 40°10' N latitude	737	704	673	642	610	578	544	507
Splitnose d/	2,381	2,276	2,173	2,073	1,971	1,868	1,759	1,640
Yellowtail N. of 40°10' N latitude	4,566	4,364	4,168	3,975	3,780	3,582	3,372	3,144
Shortspine Thornyhead - coastwide	2,384	2,279	2,176	2,075	1,974	1,870	1,761	1,642
Longspine Thornyhead - coastwide	3,577	3,419	3,265	3,114	2,962	2,806	2,642	2,463
DARKBLOTCHED	508	485	464	442	420	398	375	350
YELLOWEYE	48	46	44	42	40	37	35	33
Black Rockfish (WA)	445	426	406	388	369	349	329	307
Black Rockfish (OR-CA)	1,217	1,163	1,111	1,059	1,008	955	899	838
Greenstriped	1,429							
California scorpionfish	141	135	129	123	117	111	104	97
Cabezon (CA)	187	179	171	163	155	147	138	129
Cabezon (OR)	52	50	47	45	43	41	38	36
Dover Sole	44,400	42,436	40,530	38,649	36,762	34,828	32,794	30,573
English Sole	20,675	19,761	18,873	17,997	17,118	16,218	15,271	14,237
PETRALE SOLE (1,200 mt 2010 OY)	1,021	976	932	889	845	801	754	703
PETRALE SOLE (1,200 mt 2010 OY; no winter fishery)	1,170	1,118	1,068	1,018	969	918	864	806
Arrowtooth Flounder	18,211	17,406	16,624	15,852	15,078	14,285	13,451	12,540
Longnose skate	3,128	2,990	2,855	2,723	2,590	2,454	2,310	2,154

Table 2-7. Projected 2012 OFLs in mt and ABCs in mt of assessed category 1 stocks under a range of overfishing (P*) values (assuming an assessment CV of σ=0.36).

Stock	Action Alternatives							
	2012 OFL	2012 ABC						
		Overfishing Probability (P*)						
		0.45	0.40	0.35	0.30	0.25	0.20	0.15
Lingcod - coastwide	4,848	4,634	4,425	4,220	4,014	3,803	3,581	3,338
Lingcod N. of 42° N latitude (OR & WA)	2,251	2,151	2,055	1,959	1,864	1,766	1,663	1,550
Lingcod S. of 42° N latitude (CA)	2,597	2,482	2,371	2,261	2,150	2,037	1,918	1,788
Sablefish - coastwide	8,623	8,242	7,871	7,506	7,140	6,764	6,369	5,938
PACIFIC OCEAN PERCH	1,007	962	919	877	834	790	744	693
WIDOW	4,923	4,705	4,494	4,285	4,076	3,862	3,636	3,390
CANARY	622	594	567	541	515	488	459	428
Chilipepper c/	2,013	1,924	1,838	1,752	1,667	1,579	1,487	1,386
BOCACCIO S. of 40°10' N latitude	732	700	668	637	606	574	541	504
Splitnose d/	2,507	2,396	2,288	2,182	2,076	1,967	1,852	1,726
Yellowtail N. of 40°10' N latitude	4,573	4,371	4,174	3,981	3,786	3,587	3,378	3,149
Shortspine Thornyhead - coastwide	2,358	2,254	2,152	2,053	1,952	1,850	1,742	1,624
Longspine Thornyhead - coastwide	3,483	3,329	3,179	3,032	2,884	2,732	2,573	2,398
DARKBLOTCHED	497	475	454	433	411	390	367	342
YELLOWEYE	48	46	44	42	40	38	35	33
Black Rockfish (WA)	435	415	397	378	360	341	321	299
Black Rockfish (OR-CA)	1,169	1,117	1,067	1,018	968	917	863	805
Greenstriped	1,458	1,394	1,331	1,269	1,207	1,144	1,077	1,004
California scorpionfish	132	126	120	115	109	103	97	91
Cabezon (CA)	176	168	161	153	146	138	130	121
Cabezon (OR)	50	48	46	44	41	39	37	34
Dover Sole	44,826	42,843	40,919	39,020	37,114	35,162	33,109	30,867
English Sole	10,620	10,150	9,694	9,244	8,793	8,330	7,844	7,313
PETRALE SOLE (1,200 mt 2010 OY)	1,279	1,222	1,168	1,113	1,059	1,003	945	881
PETRALE SOLE (1,200 mt 2010 OY; no winter fishery)	1,369	1,308	1,250	1,192	1,133	1,074	1,011	943
Arrowtooth Flounder	14,460	13,820	13,200	12,587	11,972	11,343	10,680	9,957
Longnose skate	3,006	2,873	2,744	2,617	2,489	2,358	2,220	2,070

For healthy stocks, the P* of 0.45 is more risk averse than the policy used in the previous biennial management cycle (No Action Alternative) in which the OYs for most healthy stocks were set at 100 percent of the ABC. Further, the FMP includes an additional reduction (the "40/10 rule" and the "25/5 rule") for species in the precautionary zone. For overfished species, the rebuilding plans require substantial reductions from OFL to ACL, resulting in ACLs that are much lower than the ABCs calculated for these species. Therefore, the OFL to ABC reduction will serve as potentially the only reduction from OFL to ACL for only those stocks with a healthy biomass. Even for those species, additional reductions may be taken for a variety of reasons.

Table 2-8 shows the SSC stock categorizations and the Final Preferred ABCs for stocks managed with stock-specific harvest specifications.

Table 2-8. Species categories and preferred 2011 and 2012 ABCs (mt) for stocks managed with stock-specific harvest specifications (overfished stocks in CAPS and stocks with new assessments in bold).

Stock	No Action Alternative	Integrated Alternatives 1, 2, 3 and the FPA			
	2010 ABC	Category	Sub-category	2011 ABC	2012 ABC
OVERFISHED STOCKS					
BOCACCIO S. of 40°10' N. lat.	793	1		704	700
CANARY	940	1		586	594
COWCOD S. of 40°10' N. lat.	14			10	10
COWCOD (Conception)	NA	2	c	*5*	*5*
COWCOD (Monterey)		3	d	*5*	*5*
DARKBLOTCHED	440	1		485	475
PACIFIC OCEAN PERCH	1,173	1		981	962
WIDOW	6,937	1		4,872	4,705
YELLOWEYE	32	1		46	46
PETRALE SOLE	2,751	1		976	1,222
NON-OVERFISHED STOCKS					
Lingcod – coastwide	4,829	NA	NA	NA	NA
Lingcod N. of 42º N. lat. (OR & WA)	NA	1		2,330	2,151
Lingcod S. of 42º N. lat. (CA)	NA	2	d	2,102	2,164
Pacific Cod	3,200	3	b	2,222	2,222
Sablefish (coastwide)	9,217	1		8,418	8,242
Shortbelly	6,950	2	d	5,789	5,789
Chilipepper S. of 40°10' N. lat.	2,576	1		1,981	1,789
Splitnose S. of 40°10' N. lat.	615	1		1,461	1,538
Yellowtail N. of 40°10' N. lat.	4,562	1		4,364	4,371
Shortspine Thornyhead (coastwide)	2,411	1		2,279	2,254
Longspine Thornyhead (coastwide)	3,671	2	d	2,981	2,902
Black Rockfish (WA)	464	1		426	415
Black Rockfish (OR-CA)	1,317	1		1,163	1,117
California scorpionfish	155	1		135	126
Cabezon (CA)	111	1		179	168
Cabezon (OR)	NA	1		50	48
Dover Sole	28,582	1		42,436	42,843
English Sole	9,745	1		19,761	10,150
Arrowtooth Flounder	10,112	2	d	15,174	12,049
Starry Flounder	1,578	2	d	1,502	1,511
Longnose skate	3,269	1		2,990	2,873

Most category 2 and 3 stocks are managed as part of one of four complexes – minor rockfish north, minor rockfish south, other flatfish, and other fish. As is discussed elsewhere in this document, the GMT analyzed the vulnerability of the stocks currently managed in complexes and determined that the existing complexes are comprised of stocks with a range of vulnerabilities. It was recognized that the existing complexes were created prior to the revised National Standard 1 guidelines and are not organized in the best possible manner for taking into account scientific uncertainty and the relevant management issues. For this reason, it was recommended that the existing complexes be reconsidered for the next biennial cycle. The analysis needed to support such a reconsideration could not be completed in time for the current cycle.

For stock complexes, in particular for the minor rockfish complexes, the Council considered a number of approaches for determining the ABC. The SSC recommended that OFLs and ABCs be set "at the smallest groupings practicable," therefore, the Council set ABCs for individual stocks comprising the complexes, as well as for the subcomplexes within the minor rockfish complexes. Supplemental SSC Statement, Agenda Item B.3.b, June 2010. The Council considered several alternative approaches for setting ABCs within the complexes, or where appropriate the subcomplexes, which are described in some detail by the GMT. (PFMC Agenda Item I.2.b, Supplemental GMT Report, April 2010; PFMC Agenda item B.3.b. Supplemental GMT Report 1, June 2010). These alternatives included applying percentage reductions of 25 percent and 50 percent to stocks within the complexes, using the sigma value for category 3 stocks to determine the ABC for all stocks in the complexes regardless of their assigned category, using the SSC-assigned sigma values for each stock, and assigning P* values of either 0.4 or0.45 to all stocks in the complexes.

The Other Fish and Other Flatfish complexes consist entirely of category 3 stocks, accordingly, the Council's FPA applied a P* of 0.4 and a sigma value of 1.44 to derive component ABC values.

The minor rockfish complexes and subcomplexes consist of all categories of stocks. The Council ultimately chose to use the sigma values recommended by the SSC for the assigned categories for each stock, and to apply a P* value of 0.45 to determine the ABCs for the component stocks. The GMT presented the Council with a discussion of the potential benefits of applying a P* value of 0.45 to the component species of the minor nearshore rockfish north subcomplex rather than utilizing a more risk averse P* value. (PFMC Supplemental GMT Report, I.2.b April 2010). Historically, the OY for minor rockfish north has been shared between Oregon and California with no formal catch sharing agreements because the OY was generally high enough to prevent concerns over the allocation of catch between the states. The GMT noted the potential for 2011-12 ACLs to be significantly lower than the 2010 OY for the minor nearshore rockfish north subcomplex and the resulting potential struggle for fish. Applying a P* of 0.45 to determine the ABC for this subcomplex would result in an ABC lower than the 2010 OY, but higher than the other alternatives considered for determining the ABC. This option would constitute an interim approach to accounting for scientific uncertainty given the current organization of the complexes and the time needed to work out a sharing agreement between the states if necessary. Ultimately, the Council chose a P* of 0.45 for all of the minor rockfish subcomplex components. This approach reflects the fact that in contrast to the Other Fish and Other Flatfish complexes, the component stocks in the minor rockfish complexes are not all category 3 stocks. In addition, the Council's choice reflects the fact that the complexes are not ideally organized to account for scientific uncertainty, and represents a balance between the risk of overfishing due to scientific uncertainty and the risk of unnecessarily limiting fisheries in this biennium until a thorough analysis of the rockfish complexes can be completed.

Complex and where appropriate, sub-complex, ABCs were determined generally by summing ABC values of the component stocks. Table 2-9 shows the SSC stock categorizations and Final Preferred ABCs for those stocks managed in stock complexes. The ABC contributions of the stocks comprising the complexes are shown in Table 2-9 in italics and are not specified in regulations. These component ABCs are calculated using the buffers shown in the P* - σ relationship using the SSC stock categorizations and a P* value of 0.45 for the rockfish complex components and .4 for the Other Fish and Other Flatfish components (to the extent possible given the lack of information about some of the components). The 2011 and 2012 ABCs are based on Amendment 23 methodology for the actively managed stocks and stock complexes, including the rockfish sub-complexes, and have been endorsed by the SSC.

Table 2-9. Species categories and preferred 2011 and 2012 ABCs (mt) for stocks managed in stock complexes (species contributions to a stock complex specification in *italics*, stocks with new assessments in bold).

Stock	**No Action Alternatives**	**Integrated Alternatives 1, 2, 3 and the FPA**			
	2010 ABC	**Category**	**Sub-category**	**2011 ABC**	**2012 ABC**
STOCK COMPLEXES					
Minor Rockfish North	3,678			3,363	3,414
Minor Nearshore Rockfish North	NA			99	99
Black and yellow		3	d	*0.0*	*0.0*
Blue (CA)	*28.0*	2	d	*25.3*	*25.1*
Blue (OR & WA)		3	d	*27.6*	*27.6*
Brown		3	d	*4.5*	*4.5*
Calico		3	a	*0.0*	*0.0*
China		3	d	*9.8*	*9.8*
Copper		3	d	*23.9*	*23.9*
Gopher	*0.0*	3	a	*0.0*	*0.0*
Grass		3	d	*0.5*	*0.5*
Kelp		3	d	*0.0*	*0.0*
Olive		3	d	*0.2*	*0.2*
Quillback		3	d	*7.3*	*7.3*
Treefish		3	d	*0.2*	*0.2*
Minor Shelf Rockfish North	NA			1,940	1,948
Bronzespotted		3	d	*0.0*	*0.0*
Bocaccio	*318.0*	3	d	*223.8*	*223.8*
Chameleon		3	a	*0.0*	*0.0*
Chilipepper		1	d	*149.1*	*134.7*
Cowcod		3	a	*0.0*	*0.0*
Flag		3	d	*0.1*	*0.1*
Freckled		3	a	*0.0*	*0.0*
Greenblotched		3	c	*1.1*	*1.1*
Greenspotted		3	d	*17.4*	*17.4*
Greenstriped		2	d	*1103.5*	*1125.4*
Halfbanded		3	b	*0.0*	*0.0*
Harlequin		3	a	*0.0*	*0.0*
Honeycomb		3	c	*0.0*	*0.0*
Mexican		3	c	*0.0*	*0.0*
Pink		3	d	*0.0*	*0.0*
Pinkrose		3	b	*0.0*	*0.0*
Puget Sound		3	a	*0.0*	*0.0*
Pygmy		3	a	*0.0*	*0.0*
Redstripe	*576.0*	3	d	*240.6*	*240.6*
Rosethorn		3	d	*12.7*	*12.7*
Rosy		3	d	*2.1*	*2.1*
Silvergray	*38.0*	3	d	*150.2*	*150.2*
Speckled		3	d	*0.2*	*0.2*
Squarespot		3	c	*0.1*	*0.1*
Starry		3	d	*0.0*	*0.0*
Stripetail		3	d	*29.4*	*29.4*
Swordspine		3	d	*0.0*	*0.0*
Tiger		3	d	*0.9*	*0.9*

Table 2-9. Species categories and preferred 2011 and 2012 ABCs (mt) for stocks managed in stock complexes (species contributions to a stock complex specification in *italics*, stocks with new assessments in bold) (continued).

Stock	No Action Alternatives	Integrated Alternatives 1, 2, 3 and the FPA			
	2010 ABC	Category	Sub-category	2011 ABC	2012 ABC
Vermilion		3	c	*9.3*	*9.3*
Minor Slope Rockfish North	NA			1,324	1,367
Aurora		3	d	*14.5*	*14.5*
Bank		3	d	*16.4*	*16.4*
Blackgill	*0.0*	3	c	*3.9*	*3.9*
Redbanded		3	d	*43.1*	*43.1*
Rougheye		3	d	*65.3*	*65.3*
Sharpchin	*307.0*	3	d	*193.5*	*193.5*
Shortraker		3	d	*18.2*	*18.2*
Splitnose	*242.0*	1		*814.5*	*857.6*
Yellowmouth	*99.0*	3	d	*154.1*	*154.1*
Minor Rockfish South	3,382			3,723	3,712
Minor Nearshore Rockfish South	NA			1,001	990
Shallow Nearshore Species	NA	NA	NA	NA	NA
Black and yellow		3	c	*22.3*	*22.3*
China		3	c	*16.5*	*16.5*
Gopher (N of Point Conception)	*193.0*	1		*167.3*	*157.7*
Gopher (S of Point Conception)		3	c	*21.7*	*21.7*
Grass		3	d	*46.4*	*46.4*
Kelp		3	d	*21.6*	*21.6*
Deeper Nearshore Species	NA	NA	NA	NA	NA
Blue (assessed area)	*211.0*	2	d	*174.7*	*173.1*
Blue (S of 34°27' N. latitude)		3	c	*61.8*	*61.8*
Brown		3	d	*164.7*	*164.7*
Calico		3	b	*0.0*	*0.0*
Copper		3	d	*130.1*	*130.1*
Olive		3	d	*158.1*	*158.1*
Quillback		3	d	*5.3*	*5.3*
Treefish		3	d	*10.8*	*10.8*
Minor Shelf Rockfish South	NA			1,885	1,890
Bronzespotted		3	c	*5.6*	*5.6*
Chameleon		3	a	*0.0*	*0.0*
Flag		3	c	*22.2*	*22.2*
Freckled		3	a	*0.0*	*0.0*
Greenblotched		3	d	*20.5*	*20.5*
Greenspotted		3	d	*163.0*	*163.0*
Greenstriped		2	d	*201.9*	*206.5*
Halfbanded		3	b	*0.0*	*0.0*
Harlequin		3	a	*0.0*	*0.0*
Honeycomb		3	c	*6.5*	*6.5*
Mexican		3	c	*2.4*	*2.4*
Pink		3	d	*2.3*	*2.3*
Pinkrose		3	a	*0.0*	*0.0*

Table 2-9. Species categories and preferred 2011 and 2012 ABCs (mt) for stocks managed in stock complexes (species contributions to a stock complex specification in *italics*, stocks with new assessments in bold) (continued).

Stock	**No Action Alternatives**	**Integrated Alternatives 1, 2, 3 and the FPA**			
	2010 ABC	**Category**	**Sub-category**	**2011 ABC**	**2012 ABC**
Pygmy		3	a	*0.0*	*0.0*
Redstripe		3	d	*0.4*	*0.4*
Rosethorn		3	d	*2.1*	*2.1*
Rosy		3	d	*30.8*	*30.8*
Silvergray		3	d	*0.5*	*0.5*
Speckled		3	d	*35.8*	*35.8*
Squarespot		3	c	*4.8*	*4.8*
Starry		3	d	*58.9*	*58.9*
Stripetail		3	d	*17.2*	*17.2*
Swordspine		3	d	*10.8*	*10.8*
Tiger		3	d	*0.0*	*0.0*
Vermilion		3	d	*257.3*	*257.3*
Yellowtail	*116.0*	3	d	*1042.2*	*1042.2*
Minor Slope Rockfish South	NA			836	832
Aurora		3	c	*24.5*	*24.5*
Bank	*350.0*	2	a	*525.1*	*525.1*
Blackgill	*282.0*	1		*266.7*	*262.8*
Pacific ocean perch		3	a	*0.0*	*0.0*
Redbanded		3	d	*9.9*	*9.9*
Rougheye		3	d	*0.4*	*0.4*
Sharpchin	*45.0*	3	d	*8.9*	*8.9*
Shortraker		3	d	*0.1*	*0.1*
Yellowmouth		3	d	*0.7*	*0.7*
Other Flatfish	6,731			7,044	7,044
Butter sole	*5*	3	b	*3*	*3*
Curlfin sole	*8*	3	b	*6*	*6*
Flathead sole	*123*	3	b	*24*	*24*
Pacific sanddab	*3,172*	3	d	*3,432*	*3,432*
Rex sole	*2,902*	3	d	*2,992*	*2,992*
Rock sole	*46*	3	c	*46*	*46*
Sand sole	*376*	3	c	*542*	*542*
Other Fish	11,200	3		7,742	7,742
Big skate	*No Species-Specific Basis or Contribution to the Stock Complex Harvest Specifications*	3		*0*	*0*
California skate		3		*0*	*0*
Leopard shark		3	d	*164*	*164*
Soupfin shark		3	c	*62*	*62*
Spiny dogfish		3	d	*2,200*	*2,200*
Finescale codling		3		*Unknown*	*Unknown*
Pacific rattail		3	c	*1,178*	*1,178*
Ratfish		3		*Unknown*	*Unknown*
Cabezon (OR in 2009-2010)		1		*NA*	*NA*
Cabezon (WA)		3		*Unknown*	*Unknown*
Kelp greenling (CA)		3	d	*111*	*111*
Kelp greenling (OR & WA)		3		*Unknown*	*Unknown*

2.1.3 Annual Catch Limits (ACLs)

ACLs are specified for each stock and stock complex that is "in the fishery" as specified under the Amendment 23 framework. An ACL is a harvest specification set equal to the ABC or below the ABC to create a buffer that accommodates socioeconomic considerations, rebuilding considerations, or to meet any other management objectives. Sector-specific ACLs may be specified in cases where a sector has a formal, long-term allocation of the harvestable surplus of a stock or stock complex. The ACL counts all sources of fishing-related mortality including landed catch, discard mortalities, research catches, and yield set-asides for exempted fishing permits (EFPs). In this regard, the ACL is analogous to the total catch OY specified under the No Action Alternative. The ACLs specified for the integrated Alternatives in this EIS (Alternatives 1, 2, 3 and the FPA) are contrasted with the 2010 OYs under the No Action Alternative.

Under the FMP, the biomass level that produces MSY (B_{MSY}) is defined as the precautionary threshold. When the biomass for a category 1 stock or stock complex falls below the precautionary threshold, the harvest rate will be reduced to help the stock return to the B_{MSY} level. If a stock biomass is larger than B_{MSY}, the ACL may be set equal to or less than ABC. Because B_{MSY} is a long term average, the true biomass could be below B_{MSY} in some years and above B_{MSY} in other years. Even in the absence of overfishing, a biomass may decline to levels below B_{MSY} due to natural fluctuations. Decreasing harvest rates below the ABC level when a biomass is estimated to be below B_{MSY}, is a harvest control rule designed to prevent a stock or stock complex from becoming overfished.

The FMP defines the 40-10 harvest control rule, which has been applied to stocks with a B_{MSY} proxy of 40 percent ($B_{40\%}$) since 2000. A new harvest control rule referred to as the 25-5 harvest control rule is proposed for stocks with a B_{MSY} proxy of 25 percent ($B_{25\%}$). Consistent with the SSC recommendations described in Section 2.1.1, the new harvest control rule would be used for setting ACLs for flatfish species not managed under overfished species rebuilding plans when the biomass estimated from the stock assessment indicates that the stock has fallen below $B_{25\%}$. (PFMC, E.2.c Supplemental SSC Report September 2009). The 25-5 rule is analogous to the 40-10 rule except that the ACL adjustment begins when the stock's depletion drops below $B_{25\%}$ and at $B_{5\%}$, the ACL is set to zero. Like the 40-10 harvest control rule for stocks with a minimum stock size threshold (MSST) proxy of $B_{40\%}$, the 25-5 harvest control rule is designed to prevent stocks from becoming overfished. If a stock biomass is larger than the biomass needed to produce MSY (B_{MSY}), the ACL may be set equal to or less than the ABC. For further discussion on these specifications see Section 4.1.1.7. Alternative Status Determination Criteria for Petrale Sole and Other Flatfish Species.

Under these harvest policies, when a stocks depletion level falls below B_{MSY} (or the proxy for B_{MSY}), the stock is said to be in the "precautionary zone" or below the precautionary threshold. When a stock is below the precautionary threshold the harvest policies reduce the fishing mortality rate. The further the stock biomass is below the precautionary threshold, the greater the reduction in ACL relative to the ABC, until at $B_{10\%}$ for a stock with a B_{MSY} proxy of $B_{40\%}$ or $B_{5\%}$ for a stock with a B_{MSY} proxy of $B_{25\%}$, when the ACL would be set at zero. These harvest policies foster a quicker return to the B_{MSY} level and serve as an interim rebuilding policy for stocks that are below the overfished threshold (Below MSST - below $B_{25\%}$ for a stock with a B_{MSY} proxy of $B_{40\%}$ or $B_{12.5\%}$ for a stock with a B_{MSY} proxy of $B_{25\%}$). The Council may recommend setting the ACL higher than what the default ACL harvest control rule specifies as long as the ACL: does not exceed the ABC; complies with the requirements of the MSA; and is consistent with the National Standard Guidelines. On a case-by-case basis, additional precautionary adjustments may be made to an ACL if necessary to address management uncertainty.

Under Amendment 23, the ACL serves as the basis for invoking AMs. If ACLs are exceeded more often than 1 in 4 years, then AMs, such as catch monitoring and inseason adjustments to fisheries, need to improve or additional AMs may need to be implemented. Additional AMs may include setting an ACT, which is a specified level of harvest below the ACL. The use of ACTs may be especially important for a stock subject to highly uncertain inseason catch monitoring. A sector-specific ACT may serve as a harvest guideline for a sector or may be used strategically in a rebuilding plan to attempt to reduce mortality of an overfished stock more than the rebuilding plan limits prescribe.

The Council has the discretion to adjust the ACLs for uncertainty on a case-by-case basis. In cases where there is a high degree of uncertainty about the condition of the stock or stocks, the ACL may be reduced accordingly. Most category 3 species are managed in a stock complex (such as other flatfish, minor rockfish, and other fish) where harvest specifications are set for the complex in its entirety. For stock complexes, the ACL will be less than or equal to the sum of the individual component ABCs. The ACL may be adjusted below the sum of component ABCs as appropriate. For what are now being referred to as category 2 and 3 stocks, the Council's policy prior to this specification cycle was to set the OY at 75 percent of the ABC to account for stocks that have non-quantitative assessments and to set the OY at 50 percent of the ABC where the ABC is based on historical data. The previous adjustments were intended to address both scientific and management uncertainty.

Because the new ABC control rules described in Amendment 23 (e.g., the P* approach) were still being developed by the SSC when the initial range of ACL alternatives were adopted for analysis, some of the ACL alternatives initially considered were found to be higher than ABCs developed under the Amendment 23 framework. Therefore, ACLs alternatives that were determined to be higher than the ABCs under the Amendment 23 framework were not carried forward for full analysis. There was also a wider range of ACL alternatives for the overfished species adopted for analysis in November 2009 than the range the Council adopted for more detailed analysis in April 2010 (see Section 2.5, Alternatives Considered but Eliminated from Detailed Analysis).

The ACLs for non-overfished species were considered separate from the overfished species ACLs. Unlike the overfished species, the Council considered the alternative ACLs for the non-overfished species prior to developing integrated alternatives and recommended a single ACL for each species, with the exception of Dover sole (Alternatives 1, 2, and 3 considered 16,5000 and the FPA considered 25,000 to allow greater opportunity on a healthy stock in light of the petrale sole reductions) and Pacific whiting, that was then held constant between all of the alternatives, other than No Action.

The ACLs for the overfished species are included in the integrated alternatives, which link the harvest specifications decisions to the management measures necessary to keep catch within the ACLs for both non-overfished and overfished species as well as achieve other management objectives specified in the FMP. In previous cycles, the integrated alternatives were known as the strategic rebuilding alternatives. The overfished species ACLs are strategically arrayed to illuminate how each species might differentially constrain fishing opportunities by sector (or gear type) and region along the west coast, depending on the amount of allowable harvest of each species. In the current structure of the alternatives, the harvest limits for overfished species are integrated into the more comprehensive alternatives described here and include a link to the management measure alternatives.

2.1.4 Annual Catch Limits for Non-Overfished Species

The following section presents Alternative ACLs that were considered for non-overfished species. The ACL alternatives adopted for more detailed analysis, including the No Action and Final Preferred alternatives, are shown in Table 2-10 for 2011 fisheries and Table 2-11 for 2012 fisheries. For non-overfished species or species complexes where there was no new scientific information including stock assessments or a management guidance change in the harvest strategy, the Council considered only a single annual ACL for 2011 and 2012, These species and species complexes include Pacific cod; chilipepper rockfish, yellowtail rockfish, shortspine thornyhead north of 34º27' north. latitude, black rockfish (Washington), black rockfish (Oregon/California), longnose skate, other flatfish, and other fish. Alternative ACLs for the other flatfish and other fish complexes are presented in Section 2.1.5. Because there were new policies applicable or new information available, the Council considered alternative ACLs for the following stocks: lingcod north of 42º north latitude; lingcod south of 42º north latitude; sablefish; shortbelly rockfish; shortspine thornyhead south of 34º27' north latitude;

longspine thornyhead north of 34º27’ north. latitude; longspine thornyhead south of 34º27’ north latitude; California scorpionfish; cabezon (California); cabezon (Oregon); Dover sole; English sole; arrowtooth flounder; starry flounder; and minor rockfish complexes north and south of 40º10’ north latitude. Because Pacific whiting is assessed annually and is managed consistent with the U.S.-Canada Pacific Whiting agreement, this EIS for the 2011 and 2012 management measures considers a range for Pacific whiting ACLs and the resulting impacts.[13]

Table 2-10. 2011 ACL alternatives (mt) for NON-OVERFISHED species that are to be carried forward into the integrated alternatives (bold typeface denotes stocks with new assessments).

Stock	No Action Alternative	2011 Action Alternatives
	2010 OY	Integrated Alternatives 1, 2, 3, 4 and the FPA
Lingcod – coastwide	4,829	NA
Lingcod N. of 42º N. lat. (OR & WA)	NA	2,330
Lingcod S. of 42º N. lat. (CA)	NA	2,102
Pacific Cod	1,600	1,600
Pacific Whiting (U.S.)	193,935	b/
Sablefish N. of 36º N. lat.	6,471	5,515
Sablefish S. of 36º N. lat.	1,258	1,298
Shortbelly	6,950	50
Chilipepper S. of 40°10’ N. lat.	2,447	1,981
Splitnose S. of 40°10’ N. lat.	461	1,461
Yellowtail N. of 40°10’ N. lat.	4,562	4,364
Shortspine Thornyhead - N. of 34º27' N. lat.	1,591	1,573
Shortspine Thornyhead - S. of 34º27' N. lat.	410	405
Longspine Thornyhead - N. of 34º27' N. lat.	2,175	2,119
Longspine Thornyhead - S. of 34º27' N. lat.	385	376
Black Rockfish (WA)	464	426
Black Rockfish (OR-CA)	1,000	1,000
California Scorpionfish	155	135
Cabezon (CA)	79	179
Cabezon (OR)	NA	50
Dover Sole	16,500	16,500 for Alt 1, 2 & 3; 25,000 for Alt. 4 & FPA
English Sole	9,745	19,761
Arrowtooth Flounder	10,112	15,174
Starry Flounder	1,077	1,352
Longnose Skate	1,349	1,349
Minor Rockfish North	2,283	2,227
Minor Nearshore Rockfish North	155	99
Minor Shelf Rockfish North	968	968
Minor Slope Rockfish North	1,160	1,160
Minor Rockfish South	1,990	2,341
Minor Nearshore Rockfish South	650	1,001
Minor Shelf Rockfish South	714	714
Minor Slope Rockfish South	626	626
Other Flatfish	4,884	4,884
Other Fish	5,600	5,575

a/ The status quo alternative are the ACLs under the current SPR harvest rates prescribed in rebuilding plans as applied to the estimated biomass for the stock. This alternative applies only to the overfished species with adopted rebuilding plans and differs from the No Action Alternative, which is based on the 2010 OYs in regulation.
b/ The choice of the Pacific whiting ACL is made annually and as such a range is analyzed in order to analyze the impacts.

[13] The District Court for the Northern District of California, in a 2003 decision in the NRDC v. NMFS litigation, approved of the agency’s practice of carrying forward the prior year’s catch limit for species with no new stock assessment, and thus not considering alternatives other than the proposed action. 280 F. Supp. 2d 1007 (N.D. Cal. 2003) (reversed in part, 421 F.3d 872 (9th Cir. 2005). While in this round of biennial specifications, the No Action differs from the proposed action as a result of the new process for determining the ABC implemented here for the first time, considerations for determining the ACL for the non-overfished species with no new assessment information have not changed from the 2009-2010 specifications cycle thus there is no basis for developing additional alternative ACLs for those species.

Table 2-11. 2012 ACL alternatives (mt) for NON-OVERFISHED species that are to be carried forward into the integrated alternatives (bold typeface denotes stocks with new assessments).

Stock	No Action Alternative	2012 Action Alternatives
	2010 OY	Integrated Alternatives 1, 2, 3, 4 and the FPA
Lingcod – coastwide	4,829	NA
Lingcod N. of 42º N. lat. (OR & WA)	NA	2,151
Lingcod S. of 42º N. lat. (CA)	NA	2,164
Pacific Cod	1,600	1,600
Pacific Whiting (U.S.)	193,935	b/
Sablefish N. of 36º N. lat.	6,471	5,347
Sablefish S. of 36º N. lat.	1,258	1,298
Shortbelly	6,950	50
Chilipepper S. of 40°10' N. lat.	2,447	1,789
Splitnose S. of 40°10' N. lat.	461	1,538
Yellowtail N. of 40°10' N. lat.	4,562	4,371
Shortspine Thornyhead - N. of 34º27' N. lat.	1,591	1,556
Shortspine Thornyhead - S. of 34º27' N. lat.	410	401
Longspine Thornyhead - N. of 34º27' N. lat.	2,175	2,064
Longspine Thornyhead - S. of 34º27' N. lat.	385	366
Black Rockfish (WA)	464	415
Black Rockfish (OR-CA)	1,000	1,000
California Scorpionfish	155	126
Cabezon (CA)	79	168
Cabezon (OR)	NA	48
Dover Sole	16,500	16,500 for Alt 1, 2 & 3; 25,000 for Alt. 4 & FPA
English Sole	9,745	10,151
Arrowtooth Flounder	10,112	12,049
Starry Flounder	1,077	1,360
Longnose Skate	1,349	1,349
Minor Rockfish North	2,283	2,227
Minor Nearshore Rockfish North	155	99
Minor Shelf Rockfish North	968	968
Minor Slope Rockfish North	1,160	1,160
Minor Rockfish South	1,990	2,330
Minor Nearshore Rockfish South	650	990
Minor Shelf Rockfish South	714	714
Minor Slope Rockfish South	626	626
Other Flatfish	4,884	4,884
Other Fish	5,600	5,575

a/ The status quo alternative are the ACLs under the current SPR harvest rates prescribed in rebuilding plans as applied to the estimated biomass for the stock. This alternative applies only to the overfished species with adopted rebuilding plans and differs from the No Action Alternative, which is based on the 2010 OYs in regulation.
b/ The choice of the Pacific whiting ACL is made annually and as such a range is analyzed in order to analyze the impacts.

2.1.4.1 Lingcod north and south of the California-Oregon border at 42° north latitude

Lingcod is a coastwide stock for which two new area stock assessments were conducted in 2009 for the area north and the area south of the California-Oregon border (42° north latitude) (Hamel, *et al.* 2009). More detailed information is provided in Chapter 3 on the new stock assessment. The new stock assessment indicates the stock is healthy with the biomass estimate for lingcod off of Washington and Oregon (the northern portion of the coastwide stock) estimated to be at 62 percent of its unfished biomass, and lingcod off of California (the southern portion) estimated to be at 74 percent of its unfished biomass. The 2011 and 2012 OFLs for the northern and southern lingcod stocks were projected from the 2009 lingcod assessment with the proxy harvest rate of $F_{45\%}$ as recommended by the SSC to the estimated exploitable biomass in each area.

In contrast to the No Action Alternative, the SSC recommended establishing ACLs specifically for lingcod north of 42° north latitude and for lingcod south of 42° north latitude. Three alternative options were considered for each of the two areas. The alternative ACLs considered are presented in Table 2-12. Three ACL alternatives were considered for the north stock. Alternative 1 was based on the 2009 stock assessment base model with a 50 percent reduction from the OFL (48 percent reduction from the ABC) for assessment uncertainty and overfished species bycatch concerns. Alternative 2 was based on the low mortality model in the 2009 assessment. Alternative 3 was based on the 2009 stock assessment base model with the ACL set equal to the ABC. Because lingcod is a healthy stock the Council recommended the ACL be set equal to the ABC (Alternative 3) for development of the integrated alternatives.

Table 2-12. Alternative lingcod harvest specifications.

<table>
<tr><th rowspan="2">Alternative ACLs</th><th colspan="2">OFL</th><th colspan="2">ABC</th><th colspan="2">ACLs (mt)</th><th rowspan="2">Basis for ACL Options</th></tr>
<tr><th>2011</th><th>2012</th><th>2011</th><th>2012</th><th>2011</th><th>2012</th></tr>
<tr><td colspan="8">North of 42° north latitude</td></tr>
<tr><td>Option 1</td><td rowspan="3">2,438</td><td rowspan="3">2,251</td><td rowspan="3">2,330</td><td rowspan="3">2,151</td><td>1,219</td><td>1,126</td><td>2009 stock assessment base model with a 50 percent reduction from the OFL (48 percent reduction from the ABC) for assessment uncertainty and overfished species bycatch concerns.</td></tr>
<tr><td>Option 2</td><td>2,172</td><td>2,020</td><td>Low mortality model in the 2009 assessment</td></tr>
<tr><td>Option 3</td><td>2,330</td><td>2.151</td><td>2009 stock assessment base model with the ACL set equal to the ABC</td></tr>
<tr><td colspan="8">South of 42° north latitude</td></tr>
<tr><td>Option 1</td><td rowspan="3">2,523</td><td rowspan="3">2,597</td><td rowspan="3">2,102</td><td rowspan="3">2,164</td><td>1,262</td><td>1,299</td><td>2009 stock assessment base model with a 50 percent reduction from the OFL (48 percent reduction from the ABC) for assessment uncertainty and overfished species bycatch concerns.</td></tr>
<tr><td>Option 2</td><td>1,421</td><td>1,531</td><td>Low mortality model in the 2009 assessment</td></tr>
<tr><td>Option 3</td><td>2,102</td><td>2,164</td><td>2009 stock assessment base model with the ACL set equal to the ABC</td></tr>
</table>

For lingcod south, three ACLs were considered. Alternative 1 was based on the 2009 stock assessment base model with a 50 percent reduction from the OFL for assessment uncertainty and overfished species bycatch concerns. Alternative 2 was based on the low mortality model in the 2009 assessment. Alternative 3 was based on the 2009 stock assessment base model with the ACL set equal to the ABC. Because lingcod is a healthy stock, the Council recommended the ACL be set equal to the ABC (Alternative 3) for development of the integrated alternatives. The Council believed that it was more appropriate to consider assessment uncertainty in deciding the ABC specification rather than the ACL.

2.1.4.2 Pacific Cod

The west coast population of Pacific cod has never been formally assessed. Because waters off northern Washington are at the southern limit of the Pacific cod distribution, their availability for targeted fishing varies with them only periodically available in sufficient numbers. For development of the integrated alternatives, the Council recommended 2011 and 2012 ACL for Pacific cod is 1,600 mt, which is 50 percent of the OFL (28 percent less than the ABC) and equal to the 2010 OY (Table 2-10, Table 2-11). The total catch estimate of Pacific Cod in 2009 was 248 mt, well below the Council preferred ACL. An ACL of 1,600 mt provides for variation in catch between years and could provide northern fishers with an opportunity for targeting, while being sufficiently precautionary.

2.1.4.3 Pacific Whiting

Pacific whiting is managed consistent with the U.S.-Canada Pacific whiting agreement. ACLs for Pacific whiting are adopted on an annual basis after a stock assessment is completed just prior to the Council's March meeting. The most recent assessments conducted in 2010 (Martell 2010; Stewart and Hamel 2010) were used to determine stock status and 2010 harvest specifications. Martell (2010), using the TINSS (This is Not Stock Synthesis) model, estimated the stock's spawning biomass to be 38 percent of its unfished spawning biomass at the beginning of 2010. Stewart and Hamel (2010), using the SS3 (Stock Synthesis ver. 3) model, estimated the stock's spawning biomass to be 31 percent of its unfished spawning biomass at the beginning of 2010.

The 2011 and 2012 Pacific whiting harvest specifications are based on annual assessments and are analyzed in this EIS to understand the biological consequences including potential bycatch implications of future whiting fisheries and potential socio-economic effects. The analysis and discussion of the bycatch implications of future whiting fisheries in this EIS will serve to better understand effective management strategies to consider for future whiting fisheries. These analyses will also aid the Council in deciding the yields of the most constraining species in whiting-directed fisheries to set-aside when deciding 2011-2012 management measures for non-whiting fisheries, which collectively with 2011-2012 whiting fisheries, must stay under the ACLs for these constraining species.

For development of the integrated alternatives, the Council recommended a range of Pacific whiting ACLs for 2011 and 2012 that are considered in the EIS. The No Action OY is analyzed along with ACL alternatives that are 1.5 times higher and lower than No Action (Table 2-13). The range is significantly higher and lower than the Pacific whiting OYs implemented in the last ten years. However, the Pacific whiting stock is highly variable and the large range is necessary to encompass any potential stock assessment outputs. Although the EIS considers a range of ACLs, Adoption of final 2011 and 2012 ACLs will be delayed until the March 2011 and 2012 meetings, respectively.

Table 2-13. Alternative Pacific whiting harvest specifications.

Alternative ACLs	OFL		ABC		ACLs (mt)		Basis for ACL Options
	2011	2012	2011	2012	2011	2012	
Option 1	To be announced in 3/11 & 3/12		To be announced in 3/11 & 3/12		96,969		50 percent of the 2010 OY
Option 2					193,935		2010 OY
Option 3					290,903		150 percent of the 2010 OY

2.1.4.4 Sablefish

The coastwide sablefish stock was last assessed in 2007 (Schirripa 2008). The spawning stock biomass was estimated to be at 38.3 percent of its unfished biomass at the beginning of 2007. The assessment projected spawning stock depletion would decrease in the next five years if the full OY was annually taken based on somewhat erratic levels of estimated recruitment from 2001-2006. Projected sablefish depletion rates in 2011 and 2012 are 36 and 35.1 percent of unfished biomass, respectively. Alternative 2011 and 2012 sablefish harvest specifications were determined using the 2007 assessment and considered new survey data on the distribution of the stock north and south of 36° north latitude.

Since the sablefish stock is in the precautionary zone with a stock biomass below target MSY biomass (i.e., < $B_{40\%}$), the default harvest control rule specified in the FMP is an ACL adjustment called the 40-10 rule. The 40-10 rule applies a progressively larger downward adjustment of the ACL as depletion decreases below target biomass with the objective of more quickly rebuilding stock biomass to the target level. Table 2-14 presents the alternative harvest specifications for sablefish consistent with the application of the 40-10 control rule to the ABC, as described in Amendment 23 and the accompanying Environmental Assessment.

Table 2-14. Alternative sablefish harvest specifications.

<table>
<tr><th rowspan="2">Alternative ACLs</th><th colspan="2">OFL (mt)</th><th colspan="2">ABC [a/] (mt)</th><th colspan="2">ACL (mt)</th><th colspan="2">Area ACLs (mt)</th><th rowspan="2">Basis for ACL Options</th></tr>
<tr><th>2011</th><th>2012</th><th>2011</th><th>2012</th><th>2011</th><th>2012</th><th>2011</th><th>2012</th></tr>
<tr><td rowspan="2">Option 1</td><td rowspan="8">8,808</td><td rowspan="8">8,623</td><td rowspan="8">8,418</td><td rowspan="8">8,242</td><td colspan="2">Coastwide</td><td colspan="3">North of 36° north latitude</td></tr>
<tr><td rowspan="7">8,110</td><td rowspan="7">7,863</td><td>5,839</td><td>5,661</td><td>Average 2003-2006 swept area biomass- 72% of the coastwide biomass is north of 36° N. lat.</td></tr>
<tr><td>Option 2</td><td>5,515</td><td>5,347</td><td>Average 2003-2008 swept area biomass estimates - 68% of the coastwide biomass is north of 36° N. Lat</td></tr>
<tr><td>Option 3</td><td>5,190</td><td>5,032</td><td>Average 2003-2008 swept area biomass weighted by the variance of estimated biomass by year and area- 64% of the coastwide biomass is north of 36° N. Lat</td></tr>
<tr><td rowspan="2">Option 1</td><td colspan="3">South of 36° north latitude</td></tr>
<tr><td>2,271 (50% = 1,135)</td><td>2,202 (50%= 1,101)</td><td>Average 2003-2006 swept area biomass - 28% of the coastwide biomass is south of 36° N. lat. (50% reduction)</td></tr>
<tr><td>Option 2</td><td>2,595 (50% = 1,298)</td><td>2,516 (50% = 1,258)</td><td>Average 2003-2008 swept area biomass - 32% of the coastwide biomass is south of 36° N. lat (50% reduction)</td></tr>
<tr><td>Option 3</td><td>2,920 (50% = 1,460)</td><td>2,832 (50% = 1,415)</td><td>Average 2003-2008 swept area biomass weighted by the variance of estimated biomass by year and area- 36%t of the coastwide biomass is south of 36° N. lat. (50% reduction)</td></tr>
</table>

a/ Two alternatives for redefining how the 40-10 rule is applied to derive an ACL were contemplated during the Amendment 23
process. The ABC value in this table is based on the 40-10 adjustment made to the ABC.

All of the sablefish ACL options apportion the coastwide ACL north and south of 36° north latitude since all commercial allocations are currently based on the proportion of the harvestable surplus of sablefish north of 36° north latitude. Because new scientific data were available for apportioning the stock to the northern and southern areas, the 2011 and 2012 ACL alternatives for sablefish considered different methodology for including the new data and apportioning the estimated coastwide biomass north and south of 36° north latitude. The average of annual swept area biomass estimates from the NMFS Northwest Science Center west coast trawl survey are used as a proxy of the relative biomass north and south of the Conception-Monterey INPFC boundary at 36° north latitude. Alternative ACL apportionment used different methods for apportioning the biomass. Option 1 apportions the sablefish biomass based on the same survey data (2003-2006) that was used in the 2009-2010 cycle (i.e., data used in the No Action Alternative), while Option 2 incorporates the most recent data from the survey (2003-2008). Option 3 uses the most recent survey data (2003-2008) but incorporates a variance weighted approach that incorporates the variability as well as the mean to inform the relationship.

For south of 36° north latitude, further adjustments of the 2011 and 2012 ACLs were considered to account for the greater assessment uncertainty in the Conception area. This greater assessment uncertainty is largely due to the fact that a small proportion of the Conception area is surveyed in the NMFS trawl survey given the high proportion of untrawlable habitat and the prohibition of bottom trawling in the Cowcod Conservation Areas (CCAs). While higher scientific uncertainty would conceptually be accommodated in specifying the ABC, the higher scientific uncertainty in the Conception area is accommodated in consideration of the ACL for the sablefish stock south of 36° north latitude since the SSC recommended a coastwide OFL and ABC. A further 50 percent adjustment to account for this higher scientific uncertainty was considered for the Conception area sablefish ACL. For development of the integrated alternatives, the Council's preferred Conception area sablefish ACL includes this additional 50 percent adjustment, which was also used to determine the 2010 Conception area sablefish OY.

For development of the 2011-2012 integrated alternatives, the Council recommended sablefish ACL alternatives based on a 68:32 north:south apportionment using the 2003-2008 average swept area biomass by area estimated from the NMFS trawl survey, the option 2 40-10 rule, and application of an additional 50 percent uncertainty adjustment for the Conception area ACL. The 2011 and 2012 ACLs used in the integrated alternatives for the sablefish stock north of 36° north latitude are 5,515 and 5,347 mt, respectively. The 2011 and 2012 ACLs used in the integrated alternatives for the Conception area sablefish stock south of 36° north latitude are 1,298 and 1,258 mt, respectively.

2.1.4.5 Shortbelly Rockfish

A shortbelly rockfish assessment was done as an academic exercise in 2007 to understand the potential environmental determinants of fluctuations in the recruitment and abundance of an unexploited rockfish population in the California Current ecosystem (Field, *et al.* 2008). The results of the assessment indicated the shortbelly stock was healthy with an estimated spawning stock biomass at 67 percent of its unfished biomass in 2005.

Shortbelly rockfish is an abundant species that is not targeted in any commercial or recreational fisheries, or caught in significant amounts. However, shortbelly rockfish is a valuable forage fish species in the California Current system with fluctuations in stock recruitment and biomass driven by environmental conditions. The consequence of fisheries, including high and low estimates of plausible discards, were estimated to be negligible (<0.01) in all years with the exception of the foreign fisheries of the mid-1960s (Field, *et al.* 2008). Shortbelly rockfish were initially considered for an Ecosystem Component (EC) species[14] categorization under Amendment 23. Rather than classifying shortbelly rockfish as an EC species, the Council chose to recommend a very restrictive ACL for developing the integrated alternatives.

[14] The EC species are designated as such in the FMP and are those species that are not considered to be "in the fishery" or targeted in any fishery. EC species are not typically retained for sale or personal use. The EC species are not actively managed. The EC species are determined to not be subject to overfishing, approaching an overfished condition, or overfished, nor are they likely to become subject to overfishing or overfished in the absence of conservation and management measures.

For development of the integrated alternatives, the Council recommended the low ACL of 50 mt, which is intended to accommodate incidental catch while preventing the development of fisheries specifically targeting shortbelly rockfish. The SSC categorized shortbelly rockfish as a category 2 stock and recommended the assessment uncertainty (σ) value of 0.72 be used to determine ABCs following a P* approach. The Council recommended the overfishing probability (P*) of 0.4 for determining the preferred 2011 and 2012 ABC of 5,789 mt (Table 2-15).

The 2007 shortbelly assessment was not used to decide 2011 and 2012 harvest specifications since these estimates were not produced in the assessment. The 2010 ABC/OY of 6,950 mt is 50 percent of the 2008 shortbelly OY. The assessment author advised the Council in 2008 that the harvest rate predicting a 6,950 mt level of harvest would be expected to keep the stock in its current equilibrium. Given that MSY estimates were not produced in the 2007 assessment, the SSC recommended specifying the status quo ABC/OY of 6,950 mt as the 2011 and 2012 OFL for shortbelly rockfish.

Table 2-15. Alternative shortbelly rockfish harvest specifications.

Alternative ACLs	OFL		ABC		ACLs (mt)		Basis for ACL Options
	2011	2012	2011	2012	2011	2012	
Option 1	6,950		5,789		50	50	An amount that accommodates historical catch while preventing the development of a target fishery
Option 2					5,789	5,789	The ACL set equal to the ABC

2.1.4.6 Chilipepper Rockfish

The last full assessment of chilipepper rockfish was conducted in 2007 (Field 2008). The 2007 assessment indicated the stock was healthy with a spawning stock biomass estimated at 70 percent of its initial, unfished biomass in 2006. The projected spawning biomass depletion rates for 2011 and 2012 are 63 and 64 percent of estimated unfished biomass, respectively.

The 2007 assessment was first used in 2008 to decide 2009 and 2010 chilipepper harvest specifications. The Council consideration for 2011 and 2012 was whether or not to remove chilipepper rockfish from the minor rockfish north complex and manage it coastwide. Chilipepper rockfish are predominantly found south of 40°10' north latitude. Prior to 2007 they were only assessed in the area south of 40°10' north latitude (Ralston, *et al.* 1998). To date, chilipepper rockfish has been managed with stock-specific harvest specifications south of 40°10' north latitude and within the northern minor shelf rockfish sub-complex north of 40°10' north latitude. When the stock assessment area was extended for the 2007 chilipepper stock assessment it was extended to the stock's entire west coast range through waters off Oregon (chilipepper rockfish are not believed to occur in waters off Washington). From the 2007 stock assessment, it was estimated that 7 percent of the biomass is found in the area north of 40°10' north latitude. In part because the northern portion of the stock is currently managed as part of the minor rockfish north complex, for development of the integrated alternatives the Council recommended continuing the management of this species within the complex north of 40°10' north latitude for 2009-2010. The 2009 and 2010 chilipepper rockfish harvest specifications derived from the assessment were inadvertently applied to the area south of 40°10' north latitude without removing the contribution of the portion of the stock occurring in the north. This error is being corrected within all of the alternatives considered for the 2011-2012 biennial management cycle.

For 2011-2012, the Council recommended continuing to manage chilipepper rockfish with stock-specific specifications in the south and under the minor shelf rockfish sub-complex in the north (based on the average 1998-2008 assessed area catch this is 93 percent for the area south of 40°10' north latitude and 7 percent for the area north of 40°10' north latitude). The Council recommended the continuation of this management strategy for development of the integrated alternatives because this management strategy has implications relative to catch history by trawl permit and the initial allocations of trawl chilipepper quota shares for the IFQ program under Amendment 20. For development of the integrated alternatives, the 2011 and 2012 chilipepper ACLs for chilipepper south of 40°10' north latitude are being carried forward and are set equal to the ABCs as it is a healthy stock, and are 1,981 and 1,780 mt, respectively (Table 2-10, Table 2-11).

2.1.4.7 Splitnose Rockfish South of 40°10' north latitude

A new splitnose rockfish assessment was done in 2009 (Gertseva, *et al.* 2009). Splitnose rockfish is a healthy stock with spawning depletion estimated at 66 percent of its unexploited level at the beginning of 2009. More detailed information is provided in Chapter 3 on the new stock assessment. Alternative 2011 and 2012 splitnose rockfish harvest specifications are derived from the 2009 assessment. Splitnose rockfish have been taken incidentally in fisheries such as the trawl fisheries targeting for POP, mixed slope rockfish and other deepwater targets, but have not been a commercial target species.

The Council consideration for 2011 and 2012 was whether or not to remove Splitnose rockfish from the minor rockfish north complex and manage it coastwide. The No Action and Status Quo Alternatives for the portion of the splitnose rockfish stock south of 40°10' north latitude were derived using the Rogers (1994) assessment, which only assessed the stock south of 40°10' north latitude. Splitnose rockfish have been managed with stock-specific harvest specifications south of 40°10' north latitude and within the northern minor slope rockfish sub-complex north of 40°10' north latitude. For the integrated alternatives, the Council recommended that splitnose rockfish continue to be managed with stock-specific specifications in the south and under the minor slope rockfish sub-complex in the north. A north-south apportionment based on the average 1916-2008 assessed area catch would result in 64.2 percent stock-specific specification in the southern area and 35.8 percent for the contribution of the northern minor slope rockfish sub-complex. The Council recommended continuing this management strategy largely due to the implications of determining the uncertain catch history by trawl permit to initially allocate trawl splitnose quota shares under Amendment 20, since splitnose rockfish are not targeted and predominantly discarded at sea, little data would be available to determine catch history. For development of the integrated alternatives, the Council recommended the 2011 and 2012 ACLs for splitnose south of 40°10' north latitude be set equal to the ABCs, or 1,461 and 1,538 mt, respectively (Table 2-10, Table 2-11).

2.1.4.8 Shortspine Thornyhead

The most recent assessment of shortspine thornyhead was done in 2005 (Hamel 2006b). The results of the 2005 coastwide assessment indicated the shortspine thornyhead stock was healthy with an estimated spawning stock biomass at 62.9 percent of its initial, unfished biomass in 2005. The projected spawning stock biomass depletion rates in 2011 and 2012 are 58.8 and 57.9 percent of unfished biomass, respectively. The harvest specifications considered for shortspine thornyhead were derived from the 2005 assessment.

The Council has managed shortspine thornyhead with separate OYs north and south of Point Conception at 34°27' north latitude since 2007. Alternative shortspine thornyhead ACLs are based on projections from the 2005 stock assessment, with 66 percent of the coastwide ACL assumed to be north of Conception area and 34 percent in the Conception area. For development of the integrated alternatives, the Council's preferred 2011 and 2012 ACLs for the shortspine thornyhead stock north of 34°27' north latitude are 1,504 and 1,488 mt, respectively (Table 2-16).

Table 2-16. Alternative shortspine thornyhead specifications.

Alternative ACLs	OFL (mt)		ABC (mt)		ACL (mt)		Area ACLs (mt)		Basis for ACL Options
	2011	2012	2011	2012	2011	2012	2011	2012	
					Coastwide [a/]		North of 34°27' north latitude		
Option 1-North							1,504	1,488	Based on the estimate that 66 percent of the stock is in the northern area with the ACL set equal to the ABC
							South of 34°27' north latitude		
Option 1-South	2,384	2,358	2,279	2,254	2,279	2,254	405	401	Based on the estimate that 34 percent of the stocks OFL being in the southern with a 50 percent reduction.
Option 2-South							775	766	Based on the estimate that 34 percent of the stock being in the southern area with the ACL set equal to the ABC

a/ The coastwide ACL would not be established in regulation, but rather is a step in development of the area specific ACLs

Due to conservation concerns in the Conception area and the new specifications structure under Amendment 23, two ACL alternatives, based on projections from the 2005 stock assessment, were considered for shortspine thornyhead south. Option 1 represents 34 percent (the portion of the biomass estimated to occur south of Point Conception) of the coastwide OFL, reduced by 50 percent to account for management uncertainty. Under Option 1 the ACLs were 405 mt in 2011 and 401 mt in 2012. Option 2 ACLs represented 34 percent of the coastwide ABCs (ACLs are set equal to the ABCs) with no reductions for management uncertainty, and were 775 mt in 2011 and 766 mt in 2012. For development of the integrated alternatives, the Council recommended a continuation of the added precautionary adjustment included under Option 1, that is, ACLs of 405 mt in 2011 and 401 mt in 2012. The conservation concern is largely due to the fact that a small proportion of the Conception area is surveyed in the NMFS trawl survey given the high proportion of untrawlable habitat in the Conception area and the prohibition of bottom trawling in the Cowcod Conservation Areas. The conservation concern is specifically south of Point Conception (34º27' north latitude) and is accommodated in consideration of the ACL for the shortspine thornyhead stock for the Conception area.

2.1.4.9 Longspine Thornyhead

The most recent assessment of longspine thornyhead was done in 2005 (Fay 2006). The results of the 2005 coastwide assessment indicated the longspine thornyhead stock was healthy with an estimated spawning stock biomass at 71 percent of its initial, unfished biomass in 2005. Projected spawning biomass depletion rates in 2011 and 2012 are 62 and 61 percent, respectively. All 2009-2010 longspine thornyhead harvest specifications were derived from the 2005 assessment.

Longspine thornyhead has been managed with separate OYs north and south of Point Conception at 34°27' N. latitude since 2007. Two ACL alternatives, based on the most recent stock assessment (2005), were considered for longspine thornyhead north. Both ACL alternatives are based on the assumption that 79 percent of the coastwide biomass occurs north of Point Conception. The Option 1 ACLs for the northern stock were calculated as 79 percent of the coastwide ABCs (ACLs were set equal to the ABC), reduced by 10 percent to account for management uncertainty (equal to a 25 percent reduction from the OFL). Under Option 1, the ACLs were 2,119 mt in 2011 and 2,064 mt in 2012 (Table 2-17). The Option 2 ACLs for the northern stock are 79 percent of the coastwide ACL, without the 10 percent reduction. The ACLs under Alternative 2 were 2,355 mt in 2011 and 2,293 mt in 2012. For development of the integrated alternatives, the Council recommended a continuation of the added precautionary adjustment included under Alternative 1, resulting in ACLs of 2,119 mt in 2011 and

2,064 mt in 2012. A further adjustment of the 2011 and 2012 ACLs for the longspine thornyhead was considered to account for greater assessment uncertainty. The No Action Alternative OYs were adjusted from the ABC in both the north and south with a northern OY adjustment of 25 percent and a southern OY adjustment of 50 percent.

Table 2-17. Alternative longspine thornyhead harvest specifications.

<table>
<tr><th rowspan="2">Alternative ACLs</th><th colspan="2">OFL (mt)</th><th colspan="2">ABC (mt)</th><th colspan="2">ACL (mt)</th><th colspan="2">Area ACLs (mt)</th><th rowspan="2">Basis for ACL Options</th></tr>
<tr><th>2011</th><th>2012</th><th>2011</th><th>2012</th><th>2011</th><th>2012</th><th>2011</th><th>2012</th></tr>
<tr><td rowspan="2">Option 1-North</td><td rowspan="6">3,577</td><td rowspan="6">3,483</td><td rowspan="6">2,981</td><td rowspan="6">2,902</td><td colspan="2">Coastwide [a/]</td><td colspan="3">North of 34º27 north latitude</td></tr>
<tr><td rowspan="5">2,981</td><td rowspan="5">2,902</td><td>2,119</td><td>2,064</td><td>Based on the estimate that 79 percent of the stock is in the northern area with a 10% reduction from the ABC</td></tr>
<tr><td>Option 2-North</td><td>2,355</td><td>2,293</td><td>Based on the estimate that 79 percent of the stock is in the northern area with the ACL set equal to the ABC</td></tr>
<tr><td rowspan="2">Option 1-South</td><td colspan="3">South of 34º27 north latitude</td></tr>
<tr><td>313</td><td>305</td><td>Based on the estimate that 21 percent of the stocks OFL is in the southern area with a 50 percent from the OFL</td></tr>
<tr><td>Option 2-South</td><td>626</td><td>609</td><td>Based on the estimate that 21 percent of the stock is in the southern area with the ACL set equal to the ABC</td></tr>
</table>

a/ The coastwide ACL would not be established in regulation, but rather is a step in development of the area specific ACLs

Two ACL alternatives, based on the most recent stock assessment (2005), were considered for longspine thornyhead in the southern region. Both ACL alternatives are based on the assumption that 21 percent of the coastwide biomass occurs south of Point Conception and that it occurs at a constant density throughout the Conception area. The Option 1 ACLs for the southern stock were calculated as 21 percent of the coastwide ABC, reduced by 50 percent to account for management uncertainty, resulting in an ACL of 313 mt in 2011 and 305 mt in 2012 (Table 2-17). The Option 2 ACLs for the southern stock are 21 percent of the coastwide ACL, without the 50 percent reduction. The ACLs under Option 2 were 626 mt in 2011 and 609 mt in 2012. For development of the integrated alternatives, the Council recommended the added precautionary adjustment included under Option 1, resulting in ACLs of 313 mt in 2011 and 305 mt in 2012.

The greater assessment uncertainty for the portion of the stock south of Point Conception is largely due to the fact that a small proportion of the Conception area is surveyed in the NMFS trawl survey given the high proportion of untrawlable habitat and the prohibition of bottom trawling in the CCAs. While higher scientific uncertainty would conceptually be accommodated in specifying the ABC, the higher scientific uncertainty south of Point Conception is accommodated in consideration of the ACL for the longspine thornyhead stock south of 34°27' north latitude since the SSC recommended a coastwide OFL and ABC.

2.1.4.10 Black Rockfish off Washington

The last northern black rockfish assessment was done in 2007 for the area north of Cape Falcon, Oregon, to the U.S.-Canada border (Wallace, *et al.* 2008). The assessment indicated northern black rockfish are in a healthy status estimated to be at 53.4 percent of its initial, unfished biomass at the start of 2007. Spawning stock depletion is projected to be at 51.9 and 49.1 percent of unfished biomass in 2011 and 2012, respectively. Alternative harvest specifications for the stock of black rockfish north of Cape Falcon, Oregon were derived from the 2007 assessment.

Black rockfish in waters off Washington have been managed with separate harvest specifications than those used to manage the southern portion of the stock in waters off Oregon and California. For development of the integrated alternatives, the Council recommended 2011 and 2012 ACLs for black rockfish off Washington equal to the ABCs, or 426 and 415 mt, respectively (Table 2-10, Table 2-11). These ACLs are similar to the No Action Alternative, but differ in that they consider the Amendment 23 provisions. The stock is projected to remain healthy while accommodating the current level of catch.

2.1.4.11 Black Rockfish off California and Oregon

The last southern black rockfish assessment was done in 2007 for the area south of Cape Falcon, Oregon to the southern limit of the stock's distribution off central California (Sampson 2008). The assessment indicated that black rockfish off California and Oregon are in a healthy status estimated to be at 70 percent of its initial, unfished biomass at the start of 2007. Spawning stock depletion is projected to be at 64.9 and 60.6 percent of unfished biomass in 2011 and 2012, respectively under the 1,000 mt constant catch OY. Alternative harvest specifications for the black rockfish stock south of the Columbia River were derived from the 2007 assessment.

Black rockfish in the southern area have been managed with separate harvest specifications than those used to manage the northern portion of the stock in waters off Washington (see previous section). The 2011 and 2012 southern black rockfish ABCs are 1,163 and 1,117 mt, respectively. For development of the integrated alternatives, the Council recommended continuing the constant catch strategy for southern black rockfish by specifying a 1,000 mt ACL in 2011 and 2012 (Table 2-10, Table 2-11). These ACLs are similar to the No Action Alternative, but differ in that they consider Amendment 23 provisions. The stock is projected to remain healthy while accommodating the current level of catch.

2.1.4.12 California Scorpionfish

California scorpionfish were assessed in 2005 (Maunder, *et al.* 2006). In most years, 99 percent or more of the landings occur in the southern California ports. Therefore, only the stock off of southern California south of Point Conception at 34°27' north latitude to the U.S.-Mexico border was assessed. This assessment indicated the California scorpionfish stock was healthy with an estimated spawning stock biomass of 79.8 percent of its initial, unfished biomass in 2005. Projected spawning biomass depletion rates in 2011 and 2012 are 53 and 51 percent, respectively.

Two alternative ACLs were considered for managing scorpionfish in 2011 and 2012 (Table 2-18). ACL Option 1 assumes the California state precautionary 60-20 harvest control rule, which results in a slightly lower ACL (133 and 124 mt in 2011 and 2012, respectively) since the stock is below $B_{60\%}$.[15] For development of the integrated alternatives, the Council recommended ACL Option 2 which sets the 2011 and 2012 ACLs equal to the ABCs, or 135 and 126 mt, respectively. California scorpionfish only exist in waters of California. The California Nearshore Management Plan requirements (60-20 harvest control rule) were considered, but not

[15] The California state 60-20 harvest control rule is analogous to the federal 40-10 rule. ACLs are progressively decreased as spawning stock biomass depletion decreases below 60% of unfished biomass.

recommended by the Council. Because the stock is healthy the Council did not recommend the slightly more precautionary ACL in Option 1.

Table 2-18. Alternative California scorpionfish harvest specifications.

Alternative ACLs	OFL		ABC		ACLs (mt)		Basis for ACL Option
	2011	2012	2011	2012	2011	2012	
Option 1	141	132	135	126	133	124	California State Nearshore Management Plan - F_{MSY} proxy of $_{F50\%}$ and a 60-20 precautionary adjustment for stocks below $B_{60\%}$
Option 2					135	126	ACL set equal to the ABC

2.1.4.13 Cabezon off California

A new cabezon assessment was done in 2009 for stocks occurring in waters off California and Oregon (Cope and Key 2009). The new assessment retains the two California sub-stocks, and also evaluated the population as a coastwide California stock. The assessment was also extended to a third cabezon sub-stock in the waters off of Oregon. The SSC recommended combining the results of the area models for the two California sub-stocks of cabezon for use in deciding statewide harvest specifications. The assessment results for the Oregon cabezon sub-stock were recommended to be used to decide statewide Oregon harvest specifications. The new assessment estimates a healthy spawning biomass of cabezon off California at the start of 2009 of 48.3 percent of unfished biomass. Projected spawning biomass depletion rates for cabezon off California in 2011 and 2012 are 50.9 and 47.5 percent of unfished biomass, respectively. More detailed information is provided in Chapter 3 on the new stock assessment.

Two alternative ACLs were considered for managing cabezon off California in 2011 and 2012 (Table 2-19). ACL Option 1, 2011 and 2012 ACLs of 102 and 105 mt, respectively, assumes the less likely and more risk-averse low natural mortality (M) model in the 2009 assessment. For development of the integrated alternatives, the Council recommended the Option 2 ACL, which sets the 2011 and 2012 ACLs equal to the ABCs, or 179 and 168 mt, respectively. The stock is healthy and projected to remain healthy under either option. Option 1 was developed prior to Amendment 23 and considers scientific uncertainty which is now considered in the ABC specification.

Table 2-19. Alternative cabezon south of 42° N. lat. harvest specifications.

Alternative ACLs	OFL (mt)		ABC (mt)		ACLs (mt)		Basis for ACL Options
	2011	2012	2011	2012	2011	2012	
Option 1	187	176	179	168	102	105	Assumes the less likely and more risk-averse low natural mortality (M) model in the 2009 assessment
Option 2					179	168	ACL set equal to the ABC

2.1.4.14 Cabezon off Oregon

The new 2009 assessment of cabezon in waters off Oregon is the first ever for this sub-stock (Cope and Key 2009). The new assessment estimates a healthy spawning biomass of cabezon off Oregon at the start of 2009 of 52.4 percent of unfished biomass. Projected spawning biomass depletion rates for cabezon off Oregon in 2011 and 2012 are 51 and 47 percent of unfished biomass, respectively.

All 2011-2012 cabezon harvest specifications were derived from the new 2009 assessment. Two alternative ACLs were considered for managing cabezon off Oregon in 2011 and 2012. ACL Option 1, a 2011 and 2012 ACL of 29 mt, assumes the less likely and more risk-averse low natural mortality (M) model in the 2009 assessment (Table 2-20). For the development of integrated alternatives, the Council recommended Option 2, which sets the 2011 and 2012 ACLs equal to the ABCs, or 50 and 48 mt, respectively (Table 2-20). The stock is healthy and projected to remain healthy under either option. Option 1 was developed prior to Amendment 23 and considers scientific uncertainty which is now considered in the ABC specification.

Table 2-20. Alternative cabezon off Oregon harvest specifications.

Alternative ACLs	OFL		ABC		ACLs (mt)		Basis for ACL Options
	2011	2012	2011	2012	2011	2012	
Option 1	52	50	50	48	29	29	Risk-averse low natural mortality model in the 2009 stock assessment.
Option 2					50	48	ACL set equal to ABC

2.1.4.15 Dover Sole

The last full Dover sole assessment was done in 2005 (Sampson 2005), and indicated the stock was above healthy and had an increasing abundance trend. The projected 2011 spawning stock biomass depletion is 79 percent of unfished biomass assuming the full removal of 2010 OYs.

Four 2011 and 2012 Dover sole ACL alternatives were considered (Table 2-21). ACL Option 1 (16,500 mt) is the 2010 status quo OY and is based on the equilibrium harvest level when the stock is at $B_{40\%}$ (the old B_{MSY} target) under the old proxy MSY harvest rate of $F_{40\%}$. An ACL of 16,500 mt is considerably larger than the coastwide catches in any recent years. Option 2 (17,560 mt) is based on the equilibrium harvest level when the stock is at $B_{25\%}$ (the new B_{MSY} target) under the new proxy MSY harvest rate of $F_{30\%}$. Option 2 reflects the change in the F_{MSY} harvest proxy from $F_{40\%}$ to $F_{30\%}$ for flatfishes. ACL Option 3 sets the ACLs equal to the ABCs of 42,436 and 42,843 mt, respectively. The stock is projected to remain healthy even under the higher ACL under option 3. For development of the integrated alternatives 1, 2 and 3, the Council recommended the Option 3 ACLs. For development of the FPA, the Council recommended 2011 and 2012 ACL of 25,000 mt. An ACL of 25,000 mt is higher than recent harvests yet substantially lower than the ABC. This is anticipated to provide increased harvest opportunities on healthy stocks for the new trawl ITQ program.

Table 2-21. Alternative Dover sole harvest specifications.

Alternative ACLs	OFL		ABC		ACLs (mt)		Basis for ACL Options
	2011	2012	2011	2012	2011	2012	
Option 1	44,400	44,826	42,436	42,843	16,500	16,500	Based on the results of the 2005 assessment with an FMSY proxy of $F_{40\%}$ and the MSY harvest level.
Option 2					17,560	17,560	Based on the results of the 2005 assessment with an FMSY proxy of $F_{30\%}$ and the MSY harvest level.
Option 3					42,436	42,843	based on the results of the 2005 assessment with an FMSY proxy of $F_{30\%}$ with the ACL set equal to the ABC
Option 4					25,000	25,000	A level that is higher than recent harvests yet substantially lower than the ABC

2.1.4.16 English Sole

The last assessment of English sole was done in 2007 (Stewart 2008a). The 2007 assessment was an update of the full assessment done in 2005 (Stewart 2006), which modeled a single coastwide stock. The spawning biomass at the beginning of 2007 was estimated to be at 116 percent of the exploited equilibrium level. However, the influence of the strong 1999 year class on projected spawning biomass is rapidly diminishing through natural and fishing mortality, leading to a projected depletion rate of 54 percent of unfished biomass at the start of 2011 assuming the entire OY is taken in 2009 and 2010.

There are two 2011 and 2012 English sole ACL alternatives analyzed in this EIS (Table 2-22). ACL Option 1 is based on application of the old proxy $F_{40\%}$ MSY harvest rate, which projects 2011 and 2012 ACLs of 7,158 and 5,790 mt, respectively. ACL Option 2 is the preferred alternative and sets the ACLs equal to the ABCs of 19,761 and 10,150 mt in 2011 and 2012, respectively. For development of the integrated alternatives, the Council-recommended ACLs are intended to provide greater fishing opportunities for English sole under trawl rationalization.

Table 2-22. Alternative English sole harvest specifications.

Alternative ACLs	OFL		ABC		ACLs (mt)		Basis for ACL Options
	2011	2012	2011	2012	2011	2012	
Option 1	20,675	10,620	19,761	10,150	7,158	5,790	ACL is set equal to the ABC, with the application of the F_{MSY} proxy of $F_{40\%}$.
Option 2					19,761	10,150	ACL is set equal to the ABC, with the application of the F_{MSY} proxy of $F_{30\%}$.

2.1.4.17 Arrowtooth Flounder

The last full stock assessment of arrowtooth flounder was done in 2007 (Kaplan and Helser 2008). The spawning biomass at the beginning of 2007 was estimated to be at 79 percent of the estimated unfished spawning biomass. Projected spawning biomass depletion at the start of 2011 is 66 percent of unfished biomass assuming the entire 2009 and 2010 OYs are taken.

Two 2011 and 2012 arrowtooth flounder ACL alternatives are analyzed in this EIS (Table 2-23). ACL Option 1 is based on application of the old proxy $F_{40\%}$ MSY harvest rate, which projects 2011 and 2012 ACLs of 9,109 and 8,241 mt, respectively. ACL Option 2 is based on application of the new proxy $F_{30\%}$ MSY harvest rate and sets the ACLs equal to the ABCs of 15,174 and 12,049 mt in 2011 and 2012, respectively. For development of the integrated alternatives, the Council recommended the Option ACLs, which are intended to provide greater fishing opportunities for arrowtooth flounder under trawl rationalization.

Table 2-23. Alternative arrowtooth flounder harvest specifications.

Alternative ACLs	OFL		ABC		ACLs (mt)		Basis for ACL Options
	2011	2012	2011	2012	2011	2012	
Option 1	18,211	14,460	15,174	12,049	9,109	8,241	ACL is set equal to the ABC, with the application of the F_{MSY} proxy of $F_{40\%}$. [a/]
Option 2					15,174	12,049	ACL is set equal to the ABC, with the application of the F_{MSY} proxy of $F_{30\%}$.

a/ The OFL and ABC values shown in this table are based on the application of an F_{MSY} proxy of $F_{30\%}$. With the application of the F_{MSY} proxy of $F_{40\%}$, the OFL and ABC values would differ from what is shown in this table.

2.1.4.18 Starry Flounder

Starry flounder was assessed in 2005 (Ralston 2006). Both the northern and southern populations were estimated to be above the target level of 40 percent of unfished spawning biomass (44 percent of B_0 in Washington-Oregon and 62 percent in California), although the status of this data-poor species remains fairly uncertain compared to that of many other groundfish species. Projected spawning biomass depletions at the start of 2011 for the Washington-Oregon and California substocks are 27.7 and 28.5 percent of unfished biomass, respectively assuming the entire 2009 and 2010 OYs are taken.

Three 2011 and 2012 starry flounder ACL alternatives were considered (Table 2-24). ACL Option 1 is based on application of the old proxy $F_{40\%}$ MSY harvest rate with a 25 percent reduction from the ABC to account for management uncertainty; Option 1 projects 2011 and 2012 ACLs of 1,130 and 1,166 mt, respectively. ACL Option 2 is the preferred alternative for development of the integrated alternatives, and is based on a 25 percent reduction of the 2011 and 2012 ABCs to account for management uncertainty; Option 2 projects 2011 and 2012 ACLs of 1,352 and 1,360 mt, respectively. ACL Option 3 sets the ACLs equal to the ABCs of 1,502 and 1,511 mt in 2011 and 2012, respectively.

Table 2-24. Alternative starry flounder harvest specifications.

Alternative ACLs	OFL		ABC		ACLs (mt)		Basis for ACL Option
	2011	2012	2011	2012	2011	2012	
Option 1	1,802	1,813	1,502	1,511	1,130	1,166	F_{MSY} proxy of $F_{40\%}$ and a 25 percent precautionary reduction from the ABC to account for management uncertainty a/
Option 2					1,352	1,360	F_{MSY} harvest proxy or $F_{30\%}$ with a 10 percent reduction from the ABC as a precautionary measure.
Option 3					1,502	1,511	F_{MSY} harvest proxy or $F_{30\%}$ with the ACL set equal to the ABC.

a/ The OFL and ABC values shown in this table are based on the application of an F_{MSY} proxy of $F_{30\%.}$ With the application of the F_{MSY} proxy of $F_{40\%,}$ the OFL and ABC values would differ from what is shown in this table.

There is relatively higher scientific and management uncertainty in the management of starry flounder than for many of the assessed groundfish stocks on the west coast. The SSC categorized starry flounder as a category 2 stock due to a very uncertain catch history, a lack of age or size composition data, and poor tracking in the NMFS trawl survey. Management uncertainty is also relatively high due to a significant recreational catch.

ACL Option 1 was not a compelling choice since it is based on the old $F_{40\%}$ F_{MSY} harvest rate used to manage flatfish. Although ACL Option 3 is based on the new $F_{30\%}$ FMSY harvest rate, this was also not a preferred alternative because setting the ACLs equal to the ABCs was not judged to be adequately precautionary given the higher management uncertainty for the starry flounder stock. ACL Option 2 is preferred because it is based on the SSC-recommended $F_{30\%}$ F_{MSY} harvest rate and incorporates a further 25 percent reduction to account for greater management uncertainty. Scientific uncertainty is addressed in the ABC buffer from OFL as this is a category 2 stock.

2.1.4.19 Longnose Skate

The west coast longnose skate stock was assessed in 2007 (Gertseva and Schirripa 2008). The spawning stock biomass was estimated to be at 66 percent of its unfished biomass at the start of 2007. Spawning stock depletion is projected to remain at 66 percent of its unfished biomass at the start of 2011 assuming the entire 2009 and 2010 OYs are taken.

Two 2011 and 2012 longnose skate ACL alternatives are analyzed in this EIS (Table 2-25). ACL Option 1 was recommended by the Council for development of the integrated alternatives and is the 2010 OY of 1,349 mt, which is based on a 50 percent increase in the average 2004-2006 landings and discard mortality. ACL Option 2 sets the ACLs equal to the 2011 and 2012 ABCs of 2,990 and 2,873 mt, respectively. Both ACL options for longnose skate are within a level of harvest projected to maintain the population at a healthy level as projected in the 10-year forecast for longnose skate in the 2007 assessment by Gertseva and Schirripa 2007. ACL Option 1 is preferred over ACL Option 2 given the higher uncertainty associated with managing this stock. There was no new science or new management issues that compelled the Council to change the management strategy for longnose skate, which compelled adopting the 2010 OY as the preferred ACL alternative.

Table 2-25. Alternative longnose skate specifications.

Alternative ACLs	OFL		ABC		ACLs (mt)		Basis for ACL Option
	2011	2012	2011	2012	2011	2012	
Option 1	3,128	3,006	2,990	2,873	1,349	1,349	50 percent increase in the 2004-2006 landings (2010 OY)
Option 2					2,990	2,873	ACL set equal to the ABC

2.1.5 Harvest Specifications for Stock Complexes

There are four stock complexes for which 2010 ABCs and OYs are specified under the No Action Alternative. These include the “minor rockfish” north and south of 40°10’ north latitude, “Other Flatfish”, and “Other Fish” complexes. Each of the north and south minor rockfish complexes are comprised of three sub-complexes for nearshore, shelf, and slope rockfish. OYs have been specified for the rockfish sub-complexes under the No Action Alternative. However, ABCs were not specified at the sub-complex level in 2010 and are not specified under the No Action Alternative.

For development of the integrated alternatives for stock complexes and sub-complexes, the Council recommended ACL values that are less than or equal to the summed ABC contribution of each component stock in the complex and sub-complex. The following sections describe each complex, the component stocks for each complex and the recommended ACL values. In the development of integrated alternatives, consideration was given to reorganizing the minor rockfish complexes (both north and south) and grouping them by stock vulnerability based on the PSA analysis prepared by the GMT. Section 2.5 of this chapter further explains why this was not possible for the 2011-2012 biennial specification process.

2.1.5.1 Minor Rockfish North of 40°10’ north latitude

The Minor Rockfish North complex is the aggregate assemblage of three sub-complexes of nearshore, shelf and slope rockfish species that occur north of 40°10’ north latitude. In 2010 (No Action Alternative), the ABC for each minor rockfish complex (north and south) was the sum of the ABCs of the component stocks. To obtain the total catch OY for the complex, the ABC for the “remaining rockfish” (species that have been assessed by less rigorous methods or stock assessments) were reduced by 25 percent and ABC for the “other rockfish” (species that do not have quantifiable stock assessments) were reduced by 50 percent. The complex OYs were then based on the sum of the OYs for the remaining and other rockfish contributions. For 2011 and 2012, substantial changes in minor nearshore north and minor shelf north harvest specifications are considered as a result of Amendment 23 specifications; the application of DB-SRA and the DCAC methods for determining OFLs for stocks that have not been assessed; new stock assessments for splitnose rockfish, chilipepper rockfish, greenstriped rockfish and the apportionment of catch north and south of 40°10’ north latitude to derive component species OFLs; and the application of scientific uncertainty buffers in the calculation of ABCs.

Similar to the No Action alternative, where total catch HGs were set for each of the sub-complexes north and south, harvest specifications are considered for each of the sub-complexes for 2011-2012. Under the Amendment 23 specifications, ACLs are considered for each of the sub-complexes, set at a level that keeps catch from exceeding the best estimate of ABC for each component stock in the sub-complex.

Consideration was given to removing the splitnose and greenstriped rockfish stocks from the complex because they are non-targeted species with low or medium vulnerability that contribute a large proportion (over 30%) of the overall OFL, which makes the other stocks in the complex more vulnerable to overfishing. However, removing a stock from a complex creates substantial complications for the management system. New sorting and reporting programs would be required for industry and the states. The implementation of the trawl shoreside IFQ program and initial allocation of minor slope rockfish under Amendment 21 would also be affected. Historical data collected at the complex level would be unreliable for deriving IFQ catch history at the species level. Additional observer monitoring under an IFQ program would provide much needed data for allocations at the species level. The Council recommended leaving splitnose and greenstriped rockfish in the minor rockfish north complexes at this time. For the minor rockfish north complex, the Council recommended a single ACL for the development of the integrated alternatives other than the No Action Alternative. The ACL of 2,227 mt for 2011 and 2012 (Table 2-10, Table 2-11) is the summed contributions of ACLs for the northern minor nearshore, shelf, and slope rockfish sub-complexes as described in the following sections. The ACL of 2,227 represents a 42 percent reduction from the OFL. This is in contrast to the 2010 minor rockfish north OY which represented a reduction from the 2010 ABC (now referred to as the OFL) of 38 percent.

Minor Nearshore Rockfish North

The minor nearshore rockfish sub-complex north of 40°10' north latitude is composed of the following species: black and yellow rockfish (*Sebastes chrysomelas*); blue rockfish (*S. mystinus*); brown rockfish (*S. auriculatus*); calico rockfish (*S. dalli*); China rockfish (*S. nebulosus*); copper rockfish (*S. caurinus*); gopher rockfish (*S. carnatus*); grass rockfish (*S. rastrelliger*); kelp rockfish (*S. atrovirens*); olive rockfish (*S. serranoides*); quillback rockfish (*S. maliger*); and treefish (*S. serriceps*). With the exception of the portion of the blue rockfish stock occurring in waters off California (i.e., 40°10' north latitude to the California-Oregon border at 42° north latitude), the component species of the minor nearshore rockfish sub-complex north are all unassessed species.

The sub-complex ACL is set equal to the ABC. In this case, past experience has shown that the Council has managed the groundfish fishery to prevent overfishing in the overwhelming majority of cases. In addition, the monitoring program for the groundfish fishery provides information throughout the year to guide managers. Finally, the FMP provides a responsive inseason management system that allows managers to react to conservation problems and prevent long term conservation issues. The resulting 2011 and 2012 ACLs for the minor nearshore rockfish north is approximately 15 percent less than the sub-complex OFL (Table 2-26). Because the specifications are based on historical catch, they do not vary between years.

Table 2-26. Minor nearshore rockfish north sub-complex harvest specifications, 2011-2012.

Stock Complex and Component Stocks	**Alternatives 1, 2, 3, 4 and FPA**							
	2011 OFL	**2012 OFL**	**Cat.**	**Sub-cat.**	**2011 ABC**	**2012 ABC**	**2011 ACL**	**2012 ACL**
Minor Nearshore Rockfish N	116	116			99	99	99	99
Black and yellow	*0.0*	*0.0*	3	d	*0.0*	*0.0*		
Blue (CA)	*27.7*	*27.5*	2	d	*25.3*	*25.1*		
Blue (OR & WA)	*33.1*	*33.1*	3	d	*27.6*	*27.6*		
Brown	*5.3*	*5.3*	3	d	*4.5*	*4.5*		
Calico	*0.0*	*0.0*	3	a	*0.0*	*0.0*		
China	*11.7*	*11.7*	3	d	*9.8*	*9.8*		
Copper	*28.6*	*28.6*	3	d	*23.9*	*23.9*		
Gopher	*0.0*	*0.0*	3	a	*0.0*	*0.0*		
Grass	*0.6*	*0.6*	3	d	*0.5*	*0.5*		
Kelp	*0.0*	*0.0*	3	d	*0.0*	*0.0*		
Olive	*0.3*	*0.3*	3	d	*0.2*	*0.2*		
Quillback	*8.7*	*8.7*	3	d	*7.3*	*7.3*		
Treefish	*0.2*	*0.2*	3	d	*0.2*	*0.2*		

Minor Shelf Rockfish North

The minor shelf rockfish sub-complex north of 40°10' north latitude is comprised of the following species: bronzespotted rockfish (*Sebastes gilli*); bocaccio (*Sebastes paucispinis*); chameleon rockfish (*S. phillipsi*); cowcod (*S. levis*); flag rockfish (*S. rubrivinctus*); freckled rockfish (*S. lentiginosus*); greenblotched rockfish (*S. rosenblatti*); greenspotted rockfish (*S. chlorostictus*); greenstriped rockfish (*S. elongatus*); halfbanded rockfish (*S. semicinctus*); harlequin rockfish (*S. variegatus*); honeycomb rockfish (*S. umbrosus*); Mexican rockfish (*S. macdonaldi*); pink rockfish (*S. eos*); pinkrose rockfish (*S. simulator*); pygmy rockfish (*S. wilsoni*); redstripe rockfish (*S. proriger*); rosethorn rockfish (*S. helvomaculatus*); rosy rockfish (*S. rosaceus*); silvergray rockfish (*S. brevispinis*); speckled rockfish (*S. ovalis*); squarespot rockfish (*S. hopkinsi*); starry rockfish (*S. constellatus*); stripetail rockfish (*S. saxicola*); swordspine rockfish (*S. ensifer*); tiger rockfish (*S. nigrocinctus*); and vermilion rockfish (*S. miniatus*). Dusky (*S. ciliatus*) and dwarf-red rockfish (*S. rufianus*) are managed under this complex under the No Action Alternative. With the exception of chilipepper rockfish, which was assessed in 2007 (Field 2008), and greenstriped rockfish, which was assessed in 2009 (Hicks, *et al.* 2009), the minor shelf rockfish sub-complex north consists of unassessed stocks. More detailed information on the new stock assessment for greenstriped rockfish is provided in Chapter 3.

The greenstriped assessment was a coastwide assessment and the harvest specifications were apportioned using the mean of the 2003-2008 swept area biomass estimates north of 40°10’ north latitude (84.5 percent) from the NMFS trawl survey. The Council recommended continuing to manage greenstriped rockfish within the minor shelf rockfish complexes due to the complications associated with managing this species with IFQs. Species pulled out of a complex must be converted into an IFQ management unit under the Amendment 20 rules. Greenstriped rockfish is a trawl-dominant bycatch species that is rarely landed due to their diminutive size and low market desirability. An initial allocation of quota share for greenstriped would be less than straightforward given the unreliable catch history.

As previously mentioned, the Council also decided to continue to manage chilipepper rockfish within the northern minor shelf rockfish sub-complex in 2011 and 2012. All trawl IQ analyses and initial issuance regulations have been completed based on current management of chilipepper north of $40^0$10’ N. lat. within the northern minor shelf rockfish complex. Removing chilipepper from the northern minor shelf rockfish complex and designating a coastwide species-specific specification would require modifications to initial issuance rules, and control and vessel limits (for individual species and aggregate QS) for chilipepper and minor shelf rockfish. Determining the permit catch histories of chilipepper separately from the other northern minor shelf rockfish catch histories would likely be a very difficult task and was not considered possible for a January 1, 2011 implementation of trawl rationalization. For these reasons, and considering the relatively small estimated biomass of chilipepper north of $40^{o}10'$ north latitude, the GMT recommended the Council continue to manage chilipepper within the northern minor shelf complex for 2011-2012.

The final preferred 2011 and 2012 ACL for the minor shelf rockfish north sub-complex of 968 mt is the same as the No Action 2010 OY and is less than the preferred ABC for the sub-complex. The resulting ACLs for minor shelf rockfish north represent a 56 percent reduction from the OFL (Table 2-27).

Table 2-27. The 2011 and 2012 harvest specifications for the minor shelf rockfish north sub-complex.

Stock Complex and Component Stocks	**Alternatives 1, 2, 3, and FPA**							
	2011 OFL	**2012 OFL**	**Cat.**	**Sub-cat.**	**2011 ABC**	**2012 ABC**	**2011 ACL**	**2012 ACL**
Minor Shelf Rockfish N	2,188	2,197			1,940	1,948	968	968
Bronzespotted	*0.0*	*0.0*	3	d	*0.0*	*0.0*		
Bocaccio	*268.2*	*268.2*	3	d	*223.8*	*223.8*		
Chameleon	*0.0*	*0.0*	3	a	*0.0*	*0.0*		
Chilipepper	*156.0*	*140.9*	1	d	*149.1*	*134.7*		
Cowcod	*0.0*	*0.0*	3	a	*0.0*	*0.0*		
Flag	*0.1*	*0.1*	3	d	*0.1*	*0.1*		
Freckled	*0.0*	*0.0*	3	a	*0.0*	*0.0*		
Greenblotched	*1.4*	*1.4*	3	c	*1.1*	*1.1*		
Greenspotted	*20.9*	*20.9*	3	d	*17.4*	*17.4*		
Greenstriped	*1,208.0*	*1,232.0*	2	d	*1,103.5*	*1,125.4*		
Halfbanded	*0.0*	*0.0*	3	b	*0.0*	*0.0*		
Harlequin	*0.0*	*0.0*	3	a	*0.0*	*0.0*		
Honeycomb	*0.0*	*0.0*	3	c	*0.0*	*0.0*		
Mexican	*0.0*	*0.0*	3	c	*0.0*	*0.0*		
Pink	*0.0*	*0.0*	3	d	*0.0*	*0.0*		
Pinkrose	*0.0*	*0.0*	3	b	*0.0*	*0.0*		
Puget Sound	*0.0*	*0.0*	3	a	*0.0*	*0.0*		
Pygmy	*0.0*	*0.0*	3	a	*0.0*	*0.0*		
Redstripe	*288.3*	*288.3*	3	d	*240.6*	*240.6*		
Rosethorn	*15.2*	*15.2*	3	d	*12.7*	*12.7*		
Rosy	*2.5*	*2.5*	3	d	*2.1*	*2.1*		
Silvergray	*180.0*	*180.0*	3	d	*150.2*	*150.2*		
Speckled	*0.2*	*0.2*	3	d	*0.2*	*0.2*		
Squarespot	*0.1*	*0.1*	3	c	*0.1*	*0.1*		
Starry	*0.0*	*0.0*	3	d	*0.0*	*0.0*		
Stripetail	*35.3*	*35.3*	3	d	*29.4*	*29.4*		
Swordspine	*0.0*	*0.0*	3	d	*0.0*	*0.0*		
Tiger	*1.1*	*1.1*	3	d	*0.9*	*0.9*		
Vermilion	*11.1*	*11.1*	3	c	*9.3*	*9.3*		

Minor Slope Rockfish North

The northern minor slope rockfish sub-complex north of 40°10' north latitude is comprised of the following species: aurora rockfish (*Sebastes aurora*); bank rockfish (*S. rufus*); blackgill rockfish (*S. melanostomus*); redbanded rockfish (*S. babcocki*); rougheye rockfish (*S. aleutianus*); sharpchin rockfish (*S. zacentrus*); shortraker rockfish (*S. borealis*); splitnose rockfish (*S. diploproa*); and yellowmouth rockfish (*S. reedi*).

These are all unassessed species except for splitnose rockfish, which was newly assessed in 2009 (Gertseva, *et al.* 2009).

Splitnose rockfish have been managed with stock-specific harvest specifications south of 40°10’ north latitude and within the northern minor slope rockfish sub-complex north of 40°10’ north latitude. The Council recommended that splitnose rockfish continue to be managed with stock-specific specifications in the south and under the minor slope rockfish sub-complex in the north. The new splitnose rockfish assessment was used as the basis for this species’ contribution to the northern minor slope rockfish complex. A north-south apportionment of the splitnose stock was based on the average 1916-2008 assessed area catch, which indicated 64.2 percent of the catch occurred south of $40^0$10’ north latitude Therefore, the remaining 35.8 percent represents the contribution of the splitnose stock to the northern minor slope rockfish sub-complex. The Council recommended continuing this management strategy largely due to the implications of determining the uncertain catch history by trawl permit to initially allocate trawl splitnose quota shares under Amendment 20, since splitnose rockfish are not targeted and predominantly discarded at sea. Therefore, there is very sparse data available to determine catch history.

The final preferred ACL for minor slope rockfish north of 1,160 mt is the same as the No Action 2010 OY and less than the preferred ABCs for the sub-complex. The resulting 2011 and 2012 ACLs for minor slope rockfish north represent a 23 percent reduction from the OFL (Table 2-28).

Table 2-28. The 2011 and 2012 harvest specifications for the minor slope rockfish north sub-complex.

Stock Complex and Component Stocks	**Alternatives 1, 2, 3, and FPA**							
	2011 OFL	**2012 OFL**	**Cat.**	**Sub-cat.**	**2011 ABC**	**2012 ABC**	**2011 ACL**	**2012 ACL**
Minor Slope Rockfish N	1,462	1,507			1,324	1,367	1,160	1,160
Aurora	*17.3*	*17.3*	3	d	*14.5*	*14.5*		
Bank	*19.7*	*19.7*	3	d	*16.4*	*16.4*		
Blackgill	*4.7*	*4.7*	3	c	*3.9*	*3.9*		
Redbanded	*51.7*	*51.7*	3	d	*43.1*	*43.1*		
Rougheye	*78.3*	*78.3*	3	d	*65.3*	*65.3*		
Sharpchin	*231.9*	*231.9*	3	d	*193.5*	*193.5*		
Shortraker	*21.8*	*21.8*	3	d	*18.2*	*18.2*		
Splitnose	*852.2*	*897.3*	1		*814.5*	*857.6*		
Yellowmouth	*184.7*	*184.7*	3	d	*154.1*	*154.1*		

2.1.5.2 Minor Rockfish South of 40°10’ north latitude

The southern minor rockfish complex is the aggregate assemblage of three sub-complexes of nearshore, shelf and slope rockfish species that occur south of 40°10’ north latitude. In 2010 (No Action Alternative), the ABC for each minor rockfish complex was the sum of the ABCs of the component stocks. To obtain the total catch OY for the complex, the ABC for the “remaining rockfish” (species that have been assessed by less rigorous methods or stock assessments) were reduced by 25 percent and ABCs for the “other rockfish” (species that do not have quantifiable stock assessments) were reduced by 50 percent. The complex OYs were then based on the sum of the OYs for the component species contributions. For 2011 and 2012, substantial changes in minor nearshore north and minor shelf north harvest specifications are considered as a result of the Amendment 23 specifications; the application of DB-SRA and the DCAC methods for determining OFLs for stocks that have not been assessed; new stock assessments for Splitnose rockfish, chilipepper rockfish, greenstriped rockfish and the apportionment of catch north and south of 40°10’ north latitude to derive component species OFLs; and the application of scientific uncertainty buffers in the calculation of ABCs.

Similar to minor rockfish north, consideration was given to the potential for a target species within a complex becoming overfished. However, removing a stock from a complex creates substantial complications for the management system. New sorting and reporting programs would be required for industry and the states. The implementation of the trawl shoreside IFQ program and initial allocation of minor slope rockfish under Amendment 21 would also be affected. Historical data collected at the complex level would be unreliable for deriving IFQ catch history at the species level. Additional observer monitoring under an IFQ program is expected to provide much needed data for allocations at the species level.

A single annual ACL for the minor rockfish south complex of 2,341 for 2011 and 2,330 mt for 2012 was considered (Table 2-10, Table 2-11). The ACLs for the minor rockfish south complex are the summed contributions of the ACLs for the southern minor nearshore, shelf, and slope sub-complexes. None of the ACLs recommended for the minor rockfish south complex and sub-complexes exceed the ABC contributions of the sub-complex component stocks. The resulting 2011 and 2012 ACLs for the minor rockfish south represent a 45 percent (nearshore-14 percent, shelf-68 percent, and slope–31 percent) reduction from the OFL. This is in contrast to the 2010 minor rockfish south OY reduction from the 2010 ABC (now referred to as the OFL) of 41 percent in 2010.

Minor Nearshore Rockfish South

The southern minor nearshore rockfish sub-complex south of 40°10' north latitude is further subdivided into the following management categories: 1) shallow nearshore rockfish [comprised of black and yellow rockfish (*Sebastes chrysomelas*); China rockfish (*S. nebulosus*); gopher rockfish (*S. carnatus*); grass rockfish (*S. rastrelliger*), and kelp rockfish (*S. atrovirens*)]; and 2) deeper nearshore rockfish: [comprised of black rockfish (*S. melanops*), blue rockfish (*S. mystinus*); brown rockfish (*S. auriculatus*); calico rockfish (*S. dalli*); copper rockfish (*S. caurinus*); olive rockfish (*S. serranoides*); quillback rockfish (*S. maliger*); and treefish (*S. serriceps*)]. With the exception of blue rockfish stock occurring in waters off California north of Point Conception (i.e., 34°27’ north latitude to 40°10’ N. latitude) and gopher rockfish north of Point Conception (34°27’ north latitude) all of the minor nearshore rockfish south stocks are unassessed. The blue rockfish stock was estimated to be at 29.7 percent of its unfished biomass in 2007; therefore, the stock is considered to be in the precautionary zone.

During the 2009 and 2010 biennial specification process, the Council contemplated removing blue rockfish from the minor rockfish complex. Blue rockfish was managed within the minor nearshore complex because of scientific uncertainty and management needs, given the interaction of blue rockfish with other nearshore species. When blue rockfish occur offshore they can be targeted separately from other nearshore rockfish, but those that occur inshore mix with other nearshore rockfish stocks. Blue rockfish are managed under the California State nearshore management plan which has mandatory sorting requirements for landed catch. Landings are routinely tracked and monitored, thereby reducing management uncertainty. For more efficient state management, blue rockfish remains within the minor rockfish complex (PFMC I2 b Supplemental GMT statement April 2010).

The resulting 2011 and 2012 ACLs for the minor nearshore rockfish south represent a 14 percent reduction from the sub-complex OFL (Table 2-29). Because the specifications are based on historical catch, they do not vary between years.

The preferred southern minor nearshore rockfish ACLs are equal to the ABCs. Management and catch accounting under the California State nearshore program is expected to reduce management uncertainty.

Table 2-29. The 2011 and 2012 harvest specifications for the minor nearshore rockfish south sub-complex.

Stock Complex and Component Stocks	**Alternatives 1, 2, 3, and FPA**							
	2011 OFL	**2012 OFL**	**Cat.**	**Sub-cat.**	**2011 ABC**	**2012 ABC**	**2011 ACL**	**2012 ACL**
Minor Nearshore Rockfish S	1,156	1,145			1,001	990	1,001	990
Shallow NS Species:	NA	NA	NA	NA	NA	NA		
Black and yellow	*26.8*	*26.8*	3	c	*22.3*	*22.3*		
China	*19.8*	*19.8*	3	c	*16.5*	*16.5*		
Gopher (N of Point Con.)	*175.0*	*165.0*	1		*167.3*	*157.7*		
Gopher (S of Point Con.)	*26.0*	*26.0*	3	c	*21.7*	*21.7*		
Grass	*55.6*	*55.6*	3	d	*46.4*	*46.4*		
Kelp	*25.9*	*25.9*	3	d	*21.6*	*21.6*		
Deeper NS Species:	NA	NA	NA	NA	NA	NA		
Blue (assessed area)	*191.3*	*189.5*	2	d	*174.7*	*173.1*		
Blue (S of 34°27' N. latitude)	*74.0*	*74.0*	3	c	*61.8*	*61.8*		
Brown	*197.4*	*197.4*	3	d	*164.7*	*164.7*		
Calico	*0.0*	*0.0*	3	b	*0.0*	*0.0*		
Copper	*156.0*	*156.0*	3	d	*130.1*	*130.1*		
Olive	*189.5*	*189.5*	3	d	*158.1*	*158.1*		
Quillback	*6.3*	*6.3*	3	d	*5.3*	*5.3*		
Treefish	*12.9*	*12.9*	3	d	*10.8*	*10.8*		

Minor Shelf Rockfish South

The southern minor shelf rockfish sub-complex south of 40°10' north. latitude is composed of the following species: bronzespotted rockfish (*Sebastes gilli*); chameleon rockfish (*S. phillipsi*); dusky rockfish (*S. ciliatus*); dwarf-red rockfish (*S. rufianus*); flag rockfish (*S. rubrivinctus*); freckled rockfish (*S. lentiginosus*); greenblotched rockfish (*S. rosenblatti*); greenspotted rockfish (*S. chlorostictus*); greenstriped rockfish (*S. elongatus*); halfbanded rockfish (*S. semicinctus*); harlequin rockfish (*S. variegatus*); honeycomb rockfish (*S. umbrosus*); Mexican rockfish (*S. macdonaldi*); pink rockfish (*S. eos*); pinkrose rockfish (*S. simulator*); pygmy rockfish (*S. wilsoni*); redstripe rockfish (*S. proriger*); rosethorn rockfish (*S. helvomaculatus*); rosy rockfish (*S. rosaceus*); silvergray rockfish (*S. brevispinis*); speckled rockfish (*S. ovalis*); squarespot rockfish (*S. hopkinsi*); starry rockfish (*S. constellatus*); stripetail rockfish (*S. saxicola*); swordspine rockfish (*S. ensifer*); tiger rockfish (*S. nigrocinctus*); vermilion rockfish (*S. miniatus*); and yellowtail rockfish (*S. flavidus*). With the exception of greenstriped rockfish, which was newly assessed in 2009 (Hicks, *et al.* 2009) none of the minor shelf rockfish south stocks have been assessed. The greenstriped rockfish stock is recommended as a category 2 stock based on relatively high assessment uncertainty due to uncertain estimates of historical discards (greenstriped rockfish are rarely landed due to their small size and lack of market value and desirability). The greenstriped assessment was a coastwide assessment and the harvest specifications were apportioned using the mean of the 2003-2008 swept area biomass estimates south of 40°10' north latitude (15.5 percent) from the NMFS trawl survey.

The Council recommended continuing to manage greenstriped rockfish within the minor shelf rockfish complexes due to the complications associated with managing this species with IFQs. Species pulled out of a complex must be converted into an IFQ management unit under the Amendment 20 rules. Greenstriped rockfish is a trawl-dominant bycatch species that is rarely landed due to their diminutive size and low market desirability. An initial allocation of quota share for greenstriped would be less than straightforward given the unreliable catch history.

For development of the 2011 and 2012 integrated alternatives, the Council recommended an ACL for minor shelf rockfish south of 714 mt, which is the same as the No Action 2010 OY and is less than the preferred ABC for the sub-complex. The resulting 2011 and 2012 ACLs for the minor shelf rockfish south represents a 68 percent reduction from the OFL (Table 2-30).

Table 2-30. 2011 and 2012 harvest specifications for the minor shelf rockfish south sub-complex.

Stock Complex and Component Stocks	**Alternatives 1, 2, 3, and FPA**							
	2011 OFL	**2012 OFL**	**Cat.**	**Sub-cat.**	**2011 ABC**	**2012 ABC**	**2011 ACL**	**2012 ACL**
Minor Shelf Rockfish S	2,238	2,243			1,885	1,890	714	714
Bronzespotted	*6.7*	*6.7*	3	c	*5.6*	*5.6*		
Chameleon	*0.0*	*0.0*	3	a	*0.0*	*0.0*		
Flag	*26.6*	*26.6*	3	c	*22.2*	*22.2*		
Freckled	*0.0*	*0.0*	3	a	*0.0*	*0.0*		
Greenblotched	*24.6*	*24.6*	3	d	*20.5*	*20.5*		
Greenspotted	*195.3*	*195.3*	3	d	*163.0*	*163.0*		
Greenstriped	*221.0*	*226.0*	2	d	*201.9*	*206.5*		
Halfbanded	*0.0*	*0.0*	3	b	*0.0*	*0.0*		
Harlequin	*0.0*	*0.0*	3	a	*0.0*	*0.0*		
Honeycomb	*7.8*	*7.8*	3	c	*6.5*	*6.5*		
Mexican	*2.8*	*2.8*	3	c	*2.4*	*2.4*		
Pink	*2.8*	*2.8*	3	d	*2.3*	*2.3*		
Pinkrose	*0.0*	*0.0*	3	a	*0.0*	*0.0*		
Pygmy	*0.0*	*0.0*	3	a	*0.0*	*0.0*		
Redstripe	*0.5*	*0.5*	3	d	*0.4*	*0.4*		
Rosethorn	*2.5*	*2.5*	3	d	*2.1*	*2.1*		
Rosy	*36.9*	*36.9*	3	d	*30.8*	*30.8*		
Silvergray	*0.6*	*0.6*	3	d	*0.5*	*0.5*		
Speckled	*42.9*	*42.9*	3	d	*35.8*	*35.8*		
Squarespot	*5.8*	*5.8*	3	c	*4.8*	*4.8*		
Starry	*70.5*	*70.5*	3	d	*58.9*	*58.9*		
Stripetail	*20.6*	*20.6*	3	d	*17.2*	*17.2*		
Swordspine	*12.9*	*12.9*	3	d	*10.8*	*10.8*		
Tiger	*0.0*	*0.0*	3	d	*0.0*	*0.0*		
Vermilion	*308.4*	*308.4*	3	d	*257.3*	*257.3*		
Yellowtail	*1,248.9*	*1,248.9*	3	d	*1042.2*	*1042.2*		

Minor Slope Rockfish South

The southern minor slope rockfish sub-complex south of 40°10' north latitude is composed of the following species: aurora rockfish (*Sebastes aurora*); bank rockfish (*S. rufus*); blackgill rockfish (*S. melanostomus*); Pacific ocean perch (*S. alutus*); redbanded rockfish (*S. babcocki*); rougheye rockfish (*S. aleutianus*); sharpchin rockfish (*S. zacentrus*); shortraker rockfish (*S. borealis*); and yellowmouth rockfish (*S. reedi*).

With the exception of bank rockfish, which was assessed in 2000 (Piner, *et al.* 2000), and blackgill rockfish, which was assessed in 2005 (Helser 2006) none of the minor slope rockfish south stocks have been assessed. The final preferred ACL for the minor slope rockfish south of 626 mt is the same as the No Action 2010 OY and less than the preferred ABCs for the sub-complex. The resulting 2011 and 2012 ACLs for the minor slope rockfish south represent a 31 percent reduction from the OFL (Table 2-31).

Table 2-31. The 2011 and 2012 harvest specifications for the minor slope rockfish south sub-complex.

Stock Complex and Component Stocks	Alternatives 1, 2, 3, and FPA							
	2011 OFL	2012 OFL	Cat.	Sub-cat.	2011 ABC	2012 ABC	2011 ACL	2012 ACL
Minor Slope Rockfish S	907	903			836	832	626	626
Aurora	*29.4*	*29.4*	3	c	*24.5*	*24.5*		
Bank	*574.8*	*574.8*	2	a	*525.1*	*525.1*		
Blackgill	*279.0*	*275.0*	1		*266.7*	*262.8*		
Pacific ocean perch	*0.0*	*0.0*	3	a	*0.0*	*0.0*		
Redbanded	*11.9*	*11.9*	3	d	*9.9*	*9.9*		
Rougheye	*0.5*	*0.5*	3	d	*0.4*	*0.4*		
Sharpchin	*10.6*	*10.6*	3	d	*8.9*	*8.9*		
Shortraker	*0.1*	*0.1*	3	d	*0.1*	*0.1*		
Yellowmouth	*0.8*	*0.8*	3	d	*0.7*	*0.7*		

2.1.5.3 Other Flatfish

The Other Flatfish complex contains all the unassessed flatfish species in the Groundfish FMP. These species include butter sole (*Isopsetta isolepis*), curlfin sole (*Pleuronichthys decurrens*), flathead sole (*Hippoglossoides elassodon*), Pacific sanddab (*Citharichthys sordidus*), rex sole (*Glyptocephalus zachirus*), rock sole (*Lepidopsetta bilineata*), and sand sole (*Psettichthys melanostictus*). The other flatfish complex is the most reasonably constructed complex since all the species have similar life history characteristics, distributions, and low relative vulnerabilities to overfishing. Table 2-32.

The final preferred 2011 and 2012 ACL for the other flatfish complex of 4,884 mt is the No Action 2010 OY and is recommended given there has been no significant change in the status or management of stocks managed within the complex. The Council recommended ACL is 16 percent lower than the ABC and is a precautionary approach to address management uncertainty resulting from the lack of data. For sanddabs and rex sole, the available trawl survey data, along with the sizes of selectivity and maturity leads to the assumption that the stocks are above B_{MSY}. The reduction is expected to adequately address management uncertainty.

Table 2-32. The 2011 and 2012 harvest specifications for the Other Flatfish complex.

Stock Complex and Component Stocks	Alternatives 1, 2, 3, and FPA							
	2011 OFL	2012 OFL	Cat.	Sub-cat.	2011 ABC	2012 ABC	2011 ACL	2012 ACL
Other Flatfish	10,146	10,146			7,044	7,044	4,884	4,884
Butter sole	*5*	*5*	3	b	*3*	*3*		
Curlfin sole	*8*	*8*	3	b	*6*	*6*		
Flathead sole	*35*	*35*	3	b	*24*	*24*		
Pacific sanddab	*4,943*	*4,943*	3	d	*3,432*	*3,432*		
Rex sole	*4,309*	*4,309*	3	d	*2,992*	*2,992*		
Rock sole	*66*	*66*	3	c	*46*	*46*		
Sand sole	*781*	*781*	3	c	*542*	*542*		

2.1.5.4 Other Fish

The Other Fish stock complex contains all the unassessed groundfish FMP species that are neither rockfish (family *Scorpaenidae*) nor flatfish. These species include big skate (*Raja binoculata*), California skate (*Raja inornata*), leopard shark (*Triakis semifasciata*), soupfin shark (*Galeorhinus zyopterus*), spiny dogfish (*Squalus acanthias*), finescale codling (*Antimora microlepis*), Pacific rattail (*Coryphaenoides acrolepis*), ratfish (*Hydrolagus colliei*), cabezon (*Scorpaenichthys marmoratus*) (off Washington), and kelp greenling (*Hexagrammos decagrammus*). The cabezon stock off Oregon is managed under the Other Fish complex under the No Action Alternative. A new assessment of the cabezon stock off Oregon was done in 2009 (Cope and Key 2009) and the stock is proposed to be managed with stock-specific harvest specifications in the integrated alternative other than the No Action Alternative.

The Other Fish complex is an aggregation of unassessed non-rockfish, non-flatfish species managed under the FMP. This complex consists of species with different life history characteristics and depth distribution, many with poor information on historical catches. Some species within the "Other fish" complex do not have any record of landings on the west coast. The SSC recommended re-evaluating the formation of this complex for the next management cycle and give consideration to adding new species related to the component species of the complex into the FMP and re-grouping species with similar vulnerabilities, ecological interactions, and distributions. The recommended OFL for the 2011-2012 management cycle is 11,150 (the current OFL for this complex minus the OFL for cabezon off Oregon, which should be removed from the complex). Cabezon will not be part of the rationalized trawl fishery, but is managed by the state of Oregon in its nearshore fishery. It is also currently managed with harvest limits and species specific trip limits set by the state of Oregon. The other species in the Other Fish complex are very dissimilar in their vulnerability to the fishery and there seems little reason to continue managing the cabezon stock off of Oregon within the other species complex (PFMC I2b Supplemental GMT statement April 2010).

The final preferred ACL for the Other Fish complex (5,575 mt) is based on the No Action 2010 OY of 5,600 mt minus half the OFL contribution of the Oregon stock of cabezon. The ACL is a 28 percent reduction from the ABC (Table 2-33). The reduction is expected to adequately address management uncertainty.

Table 2-33. The preferred 2011 and 2012 harvest specifications for the Other Fish complex.

Stock Complex and Component Stocks	Final Preferred Alternatives							
	2011 OFL	2012 OFL	Cat.	Sub-cat.	2011 ABC	2012 ABC	2011 ACL	2012 ACL
Other Fish	11,150	11,150	3		7,742	7,742	5,575	5,575
Big skate			3					
CA skate			3					
Leopard shark	*164*	*164*	3	d				
Soupfin shark	*62*	*62*	3	c				
Spiny dogfish	*2,200*	*2,200*	3	d				
Finescale codling			3					
Pacific rattail	*1,178*	*1,178*	3	c				
Ratfish			3					
Cabezon (OR in 2009-2010)			1					
Cabezon (WA)			3					
Kelp greenling (CA)	*111*	*111*	3	d				
Kelp greenling (OR & WA)			3					

2.1.6 Harvest Specifications for Overfished Species and Rebuilding Concerns

Section 4.5.3 of the FMP states the Council's general policies on rebuilding overfished stocks. Section 4.5.3.1 of the FMP specifies the overall goals of rebuilding programs are to (1) achieve the population size and structure that will support the maximum sustainable yield within a specified time period that is as short as possible, taking into account the status and biology of the stock, the needs of fishing communities, and the interaction of the stock of fish within the marine ecosystem; (2) minimize, to the extent practicable, the adverse social and economic impacts associated with rebuilding, including adverse impacts on fishing communities; (3) fairly and equitably distribute both the conservation burdens (overfishing restrictions) and recovery benefits among commercial, recreational, and charter fishing sectors; (4) protect the quantity and quality of habitat necessary to support the stock at healthy levels in the future; and (5) promote widespread public awareness, understanding and support for the rebuilding program. These overall goals are derived from and consistent with the requirements of the Magnuson-Stevens Act (MSA). The first goal embodies MSA national standard 1 (NS1) and the requirements for rebuilding overfished stocks found at MSA section 304(e)(4)(A). The third goal is required by MSA section 304(e)(4)(B). The fourth and fifth goals represent additional policy preferences of the Council that recognize the importance of habitat protection to the rebuilding of some fish stocks and the desire for public outreach and education on the complexities—biological, economic, and social issues—involved with rebuilding overfished stocks. Overfished groundfish species are those with spawning biomasses that have dropped below the Council's MSST (i.e., 25 percent of initial spawning biomass or $B_{25\%}$ for all groundfish species other than flatfish where the proposed MSST is $B_{12.5\%}$). The FMP requires these stocks to be rebuilt to a target biomass that supports maximum sustainable yield (i.e., B_{MSY} or $B_{40\%}$ for all groundfish species other than flatfish where the proposed target is $B_{25\%}$).

On April 29, 2010, the District Court for the Northern District of California ruled that the 2009-2010 harvest specifications for three overfished species (cowcod, darkblotched, and yelloweye rockfish) violated the MSA and ordered that NMFS apply its 2008 harvest levels for these species in 2010. (Natural Resources Defense Council v. Locke (N.D. Cal., 2010) here after referred to as NRDC v. Locke). The Court ordered NMFS to apply its 2008 harvest levels for darkblotched rockfish and cowcod in 2010. For yelloweye, the Court ordered NMFS to apply the harvest level that it set for 2010 in its original "ramp-down" plan approved in the 2007-2008 specifications. Finally, the Court ordered NMFS to publish new specifications within one year of its order.

On July 8, 2010, NMFS revised the harvest specifications for yelloweye rockfish, cowcod and darkblotched rockfish to be consistent with the court order (75 FR 38030). The 2010 cowcod OY was left unchanged since the same 4 mt OY specified under Amendment 16-4 was re-specified for 2009 and 2010. For darkblotched rockfish, NMFS noted that modifying the current 2010 OY of 291 mt by increasing it to the 2008 OY of 330 mt, as required by the court order, did not appear to be consistent with the court's underlying reasoning in its opinion. Thus, although NMFS modified the 2010 OY to be consistent with the court's order (an OY of 330 mt), NMFS recommended that the Council's management measures be designed to keep the fishery within the 290 mt, which is equivalent to the 2007 OY level for darkblotched rockfish. The original harvest rate ramp-down strategy for rebuilding yelloweye decided under Amendment 16-4 specified a 14 mt OY in 2010 before resuming a constant harvest rate in 2011. The Council's decision to depart from that strategy by adopting a 17 mt yelloweye rockfish OY in 2010 was overturned by the court and NMFS subsequently changed the 2010 OY to 14 mt (No Action Alternative).

New full and updated assessments and rebuilding analyses done in 2009 inform the 2011 and 2012 harvest specifications for overfished species. Seven rockfish species (bocaccio south of 40°10' north latitude, canary, cowcod south of 40°10' north latitude, darkblotched, Pacific ocean perch (POP), widow, and yelloweye rockfish) are currently managed under rebuilding plans adopted under Amendment 16-4 as amended in regulations decided for the 2009-2010 biennial management cycle. An eighth species, petrale sole, is below the MSST and was therefore declared overfished by NMFS on February 9, 2010 based on the results of the new full assessment done in 2009 (Haltuch and Hicks 2009b). A rebuilding plan is required for petrale sole within one year.

Progress towards rebuilding for the 7 overfished rockfish species was reviewed in relation to the current year to rebuild (T_{TARGET}) and the spawning biomass per recruit (SPR) harvest rate specified in the respective rebuilding plans (Table 2-34). Rebuilding is occurring for all species based on relative depletion (i.e., spawning biomass relative to estimated unfished spawning biomass) trends (Figure 2-1).

Two stocks (i.e., canary rockfish and POP) are behind schedule and are very unlikely to rebuild by the current T_{TARGET} as specified in their respective rebuilding plans. Canary rockfish is six years behind schedule, with a 26 percent probability of rebuilding by the current T_{TARGET} (2021) under the adopted harvest rate. The deviation from T_{TARGET} is due primarily to changes in our understanding of stock productivity and depletion due to re-estimation of the time-series of historical catches. The historical catch data used in the 2009 stock assessment update was significantly different from that used in previous assessments. This change caused a relatively large change in the unfished and terminal year (2009) biomass estimates. When compared to the results of the 2007 stock assessment, the depletion level in recent years is lower in the 2009 stock assessment. The perception of the relative status and productivity of canary rockfish has changed and the stock cannot be rebuilt with at least a 50 percent probability by the current T_{TARGET} (2021) even in the absence of fishing, therefore the rebuilding plan must be modified. POP is only three years behind schedule. The new $T_{F=0}$ (i.e., time to recover if harvest ceased in 2011) is 2018 and is greater than the adopted T_{TARGET} (2017). The revised POP 2009 stock assessment update changed the perception of stock status. Although the population dynamics were similar to those described in the 2007 assessment, the scale of the terminal year (2009) biomass estimate changed such that the T_{TARGET} (2017) in the current rebuilding plan cannot be attained even in the absence of fishing. Because POP and canary rockfish cannot be rebuild by T_{TARGET} with at least a 50 percent probability even in the absence of fishing (F=0) the integrated alternatives include modifications to the canary rockfish and POP rebuilding plans by revising the T_{TARGET}. To maintain a T_{TARGET} of 2084 a slight lowering of the harvest rate in the yelloweye rebuilding plan would be necessary.

Table 2-34. Projected median year to rebuild each of the seven overfished rockfish species based on new 2009 rebuilding analyses at current SPR harvest rates specified in rebuilding plans.

Species	**Total Catch / Total Cumulative OY During Rebuilding** [a/]	**Current SPR HR Adopted in Rebuilding Plan**	**Current T_{TARGET}**	**New $T_{F=0}$** [b/]	**Median Year to Rebuild Under Adopted SPR HR**	**Difference in Years Between Current T_{TARGET} and New Median Year to Rebuild** [c/]	**New T_{MAX}** [d/]
Bocaccio	50% (2000-2008)	77.7%	2026	2018	2022	4	2031
Canary	114% (2000-2007)	88.7%	2021	2024	2027	**-6**	2046
Cowcod	44% (2002-2007)	79.0%	2072	2060	2071	1	2097
Darkblotched	97% (2001-2007)	62.1%	2028	2016	2027	1	2037
POP	47% (2000-2008)	86.4%	2017	2018	2020	**-3**	2045
Widow	45% (2002-2007)	95.0%	2015	2010	2010	5	2025
Yelloweye	63% (2002-2007)	71.9%	2084	2047	2087	**-3**	2089

a/ Years with reliable catch data since the stock was designated overfished and has been under rebuilding.
b/ New $T_{F=0}$ is the shortest time to rebuild and assumes all fishing-related mortality is eliminated beginning in 2011.
c/ Positive values reflect rebuilding being ahead of schedule, while negative values reflect delays. **Values which are bolded indicate a substantial difference indicating a low probability of rebuilding by T_{TARGET} (<40%).**
d/ New T_{MAX} is the new legal maximum time to rebuild based on the new stock assessment and rebuilding analysis.

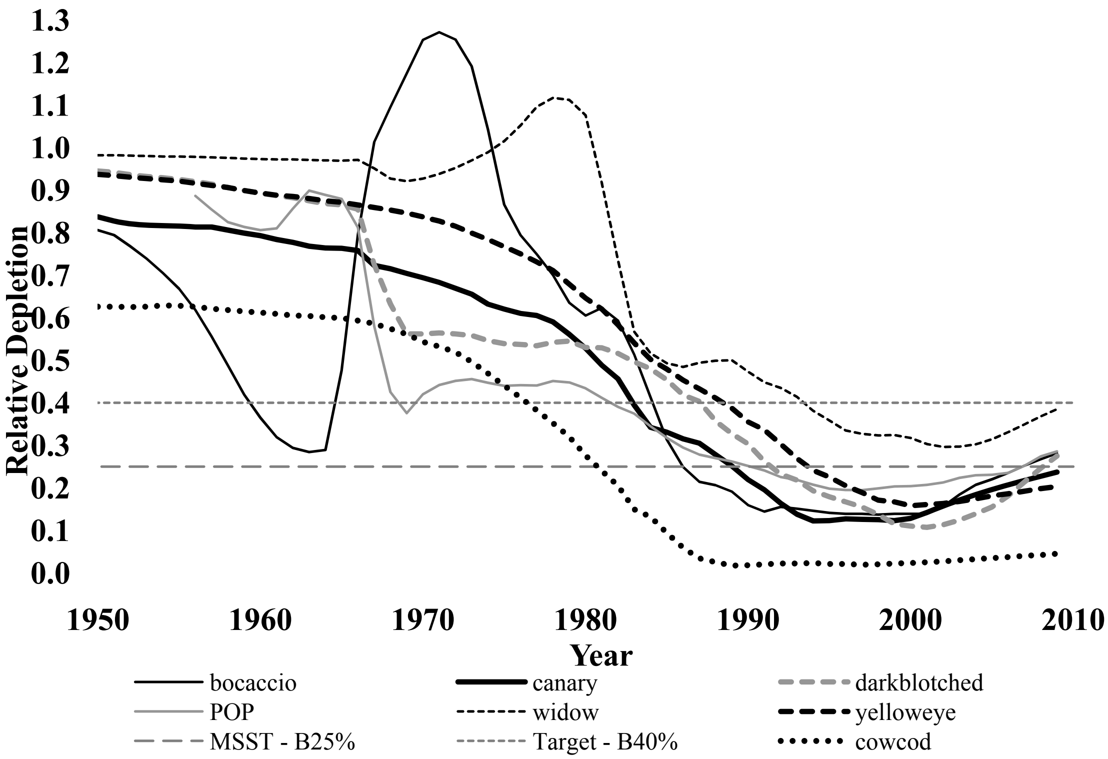


Figure 2-1. Relative depletion trends from 1950 to present for the seven overfished west coast rockfish species in relation to the MSST of $B_{25\%}$ and the B_{MSY} target of $B_{40\%}$.

A new stock assessment for petrale sole was prepared in 2009 (Haltuch and Hicks 2009a), which was used to develop the ACL alternatives for 2011 and 2012. The results of the 2009 stock assessment estimated the petrale sole biomass to be at 11.6 percent of its unfished biomass. The proposed action includes the adoption of a rebuilding plan for the petrale sole stock using information from the new assessment and rebuilding analysis.

Table 2-35 shows the estimated median time to rebuild, current T_{TARGET}, and the SPR harvest rates relative to alternative 2011-2012 ACLs for overfished west coast groundfish stocks. The discussion that follows details the basis for the overfished species ACL alternatives recommended for development of integrated alternatives. Alternatives for the 7 overfished rockfish stocks currently managed under rebuilding plans are contrasted with the No Action alternative, and against $T_{F=0}$ (absence of fishing beginning in 2011), which is the shortest time to rebuild the stock at this point by (i.e., SPR harvest rate is specified as 100 percent). Table 2-36 depicts the current rebuilding plan specifications adopted in June 2008. Table 2-37 depicts the revised rebuilding plan specifications adopted under the NMFS preferred alternative (Table 2-37a) and under the Council's preferred alternative (Table 2-37b).

Table 2-35. Estimated time to rebuild, current target year to rebuild (T_{TARGET}), and SPR harvest rate relative to Alternative 2011-2012 ACLs (and ACTs for POP and yelloweye) for overfished west coast groundfish stocks.

Stock	Current T_{TARGET}	ACL Alt.	Median Time to Rebuild	ACLs (mt)		SPR HR [a/]
				2011	2012	
Bocaccio S of 40°10' N. lat.	2026		2019	0	0	F100%
		1	2019	53	56	F95%
		2	2020	109	115	F90%
		3; FPA; 4 (NMFS Pref. Alt.)	2022	263	274	F77.7%
			2024	373	384	F70%
			2028	539	545	F60%
			2031	605	609	F56%
Canary	2021		2024	0	0	F100%
		1	2025	49	51	F94.4%
			2026	69	72	F92.2%
		2	2026	94	99	F89.5%
		3; FPA; (NMFS Pref. Alt.)	2027	102	107	F88.7%
			2027	129	135	F86%
			2028	155	162	F83.4%
			2031	253	263	F74.4%
			2035	308	318	F70%
			2043	396	408	F63.4%
			2046	415	426	F62.1%
Cowcod	2072		2060	0	0	F100%
		1	2064	2	2	F90%
		2; 4 (NMFS Pref. Alt.)	2068	3	3	F82.7%
		3; FPA	2071	4	4	F79%
			2074	5	5	F74.2%
			2097	9	9	F59.7%
Darkblotched	2028		2016	0	0	F100%
			2018	130	131	F81.8%
		1	2022	222	222	F71.9%
		2; FPA; 4 (NMFS Pref. Alt.)	2025	298	296	F64.9%
		3	2027	332	329	F62.1%
			2028	364	360	F59.6%
			2037	461	453	F52.8%

Table 2-35. Estimated time to rebuild, current target year to rebuild (T_{TARGET}), and SPR harvest rate relative to Alternative 2011-2012 ACLs (and ACTs for POP and yelloweye) for overfished west coast groundfish stocks (continued).

Stock	Current T_{TARGET}	ACL Alt.	Median Time to Rebuild	ACLs (mt)		SPR HR
POP	2017		2018	0	0	F100%
		1	2019	80	80	F93.6%
		2	2019	111	113	F91.2%
		FPA ACT; 4 ACT (NMFS Pref. Alt.)	2020	157	157	F88.0%
		3; FPA ACL; 4 (NMFS Pref. Alt.)	2020	180	183	F86.4%
			2021	204	208	F84.8%
			2021	265	269	F81.1%
			2024	404	408	F73.6%
			2031	635	635	F63.6%
			2038	751	747	F59.5%
			2045	836	829	F56.8%
Widow	2015		2010	0	0	
		1	2010	200	200	
		2	2010	400	400	
		3; FPA; 4	2010	600	600	F91.7% [a/]
			2010	1,000	1,000	
			2010	3,000	3,000	
Yelloweye	2084		2047	0	0	F100%
			2058	9	9	F86%
		1	2065	13	13	F80.7%
			2067	14	14	F79.6%
		2; FPA ACT; 4 (NMFS Pref. Alt.)	2074	17	17	F76%
		3; FPA ACL	2084	20	20	F72.8%
			2087	20	21	F71.9%
			2092	21	22	F70.9%
Petrale	NA		2014	0	0	F100%
		1	2014	459	624	F50%
		2	2015	776	1,160	25:5 rule
		3; FPA; 4 (NMFS Pref. Alt.)	2016	976	1,160	ABC in 2011; 25:5 rule thereafter
			2017	1,021	1,279	F30%

a/ The preferred ACL alternative for 2011-2012 is a constant catch of 600 mt. This level of catch corresponds to an SPR harvest rate of F91.7% in 2011

Table 2-36. Rebuilding plan specifications for seven depleted groundfish species adopted in June 2008 under the Council's preferred alternative for 2009-2010 harvest specifications and rebuilding plan revisions.

Species	**B_0**	**B_{MSY}**	**T_{MIN} a/**	**T_{MAX}**	**$T_{F=0}$ a/**	**P_{MAX}**	**T_{TARGET}**	**Harvest Control Rule (SPR Harvest Rate)**
Bocaccio	13,572 B eggs	4,549 B eggs	2019	2033	2020	77.7%	2026	F77.7%
Canary	32,561 mt	13,024 mt	2019	2035	2019	75.0%	2021	F88.7%
Cowcod	2,488 mt	995 mt	2060	2098	2061	66.2%	2072	F79.0%
Darkblotched	30,640 units of spawning output b/	12,256 units of spawning output b/	2015	2040	2018	80.3%	2028	F62.1%
POP	36,983 mt	14,793 mt	2009	2037	2010	94.4%	2017	F86.4%
Widow	50746 M eggs	20,298 M eggs	2013	2033	2009	100%	2015	F95.0%
Yelloweye	3,062 mt	1,225 mt	2046	2090	2049	68.6%	2084	F71.9% c/

a/ T_{MIN} is the shortest time to rebuild from the onset of the rebuilding plan or from the first year of a rebuilding plan, which is usually the year after the stock was declared overfished. The shortest possible time to rebuild the stocks with rebuilding plans under consideration in June 2008 was $T_{F=0}$, which was the median time to rebuild the stock if all fishing-related mortality were eliminated beginning in 2009.
b/ Darkblotched spawning output is defined in units of 100 million eggs.
c/ The yelloweye rebuilding plan specifies a harvest rate ramp-down strategy before resuming a constant harvest rate in 2011. F71.9% is the constant harvest rate beginning in 2011.

Table 2-37a. Rebuilding plan specifications for eight depleted groundfish species under the NMFS preferred alternative (Alternative 4) for 2011-2012 harvest specifications and rebuilding plan revisions.

Species	**B_{0Ryan}**	**B_{MSY}**	**T_{MIN} a/**	**T_{MAX}**	**$T_{F=0}$ a/**	**P_{MAX}**	**T_{TARGET}**	**Harvest Control Rule (SPR Harvest Rate)**
Bocaccio	7,946 B eggs	3,178 B eggs	2018	2031	2019	86.8%	2022	F77.7%
Canary	25,993 mt	10,397 mt	2024	2046	2024	75.0%	2027	F88.7%
Cowcod	2,183 mt	873 mt	2059	2097	2060	d/	2068	F82.7%
Darkblotched	32,800 mt	13,112 mt	2012	2037	2016	85.2%	2025	F64.9%
POP	37,780 mt	15,112 mt	2017	2045	2018	89.7%	2020	F86.4%
Widow	40,547 M eggs	16,219 M eggs	2008	2035	2010	100%	2015	F91.7% b/
Yelloweye	994 M eggs	398 M eggs	2044	2089	2047	d/	2074	F76.0%
Petrale	25,334 mt	6,334 mt	2014	2021	2014	82.0%	2016	NA c/

a/ T_{MIN} is the shortest time to rebuild from the onset of the rebuilding plan or from the first year of a rebuilding plan, which is usually the year after the stock was declared overfished. The shortest possible time to rebuild the stocks with rebuilding plans under consideration in June 2010 was $T_{F=0}$, which was the median time to rebuild the stock if all fishing-related mortality were eliminated beginning in 2011.
b/ The preferred ACL alternative for 2011-2012 is a constant catch of 600 mt. This level of catch corresponds to an SPR harvest rate of F91.7% in 2011.
c/ The preferred rebuilding plan for petrale sole is to apply a variable harvest rate strategy after 2012 using the 25-5 harvest control rule.
d/ Values not available.

Table 2-37b. Rebuilding plan specifications for eight depleted groundfish species adopted in June 2010 under the Council's preferred alternative for 2011-2012 harvest specifications and rebuilding plan revisions.

Species	B_0	B_{MSY}	T_{MIN} a/	T_{MAX}	$T_{F=0}$ a/	P_{MAX}	T_{TARGET}	Harvest Control Rule (SPR Harvest Rate)
Bocaccio	7,946 B eggs	3,178 B eggs	2018	2031	2019	86.8%	2022	F77.7%
Canary	25,993 mt	10,397 mt	2024	2046	2024	75.0%	2027	F88.7%
Cowcod	2,183 mt	873 mt	2059	2097	2060	66.2%	2071	F79.0%
Darkblotched	32,800 mt	13,112 mt	2012	2037	2016	85.2%	2025	F64.9%
POP	37,780 mt	15,112 mt	2017	2045	2018	89.7%	2020	F86.4%
Widow	40,547 M eggs	16,219 M eggs	2008	2035	2010	100%	2015	F91.7% b/
Yelloweye	994 M eggs	398 M eggs	2044	2089	2047	52.3%	2084	F72.8%
Petrale	25,334 mt	6,334 mt	2014	2021	2014	82.0%	2016	NA c/

a/ T_{MIN} is the shortest time to rebuild from the onset of the rebuilding plan or from the first year of a rebuilding plan, which is usually the year after the stock was declared overfished. The shortest possible time to rebuild the stocks with rebuilding plans under consideration in June 2010 was $T_{F=0}$, which was the median time to rebuild the stock if all fishing-related mortality were eliminated beginning in 2011.
b/ The preferred ACL alternative for 2011-2012 is a constant catch of 600 mt. This level of catch corresponds to an SPR harvest rate of F91.7% in 2011.
c/ The preferred rebuilding plan for petrale sole is to apply a variable harvest rate strategy after 2012 using the 25-5 harvest control rule.

When a stock has been declared overfished, a rebuilding plan must be developed and the stock must be managed in accordance with the rebuilding plan. An overfished groundfish stock is considered rebuilt once its biomass reaches B_{MSY}. Rebuilding plans are based on the results of rebuilding analyses. Life history characteristics (e.g., age of reproductive maturity, relative productivity at different ages and sizes, etc.) and the effects of environmental conditions on its abundance (e.g., relative productivity under inter-annual and inter-decadal climate variability, availability of suitable feed and habitat for different life stages, etc.) are taken into account in the stock assessment and the rebuilding analysis. A rebuilding analysis for an overfished species uses the information in its stock assessment to determine T_{MIN}, the minimum time to rebuild to B_{MSY} in the absence of fishing. For each stock, T_{MIN} is dependent on a variety of physical and biological factors. The rebuilding analyses are used to predict T_{MIN} for each overfished species and, in doing so, answer the question of what is "as quickly as possible" for each of the overfished species. To rebuild a stock by the T_{MIN} date would require elimination of human-induced mortality on a stock (the complete absence of fishing mortality is referred to as F=0). However, the absence of fishing mortality does not necessarily result in the complete absence of human-induced fishing mortality.

The relative level of depletion, combined with other biological characteristics of the stock, influences the sensitivity of a stock's rebuilding time to changes to long-term harvest rates generally used to set ACLs. From a biological view due to the differences in productivity between species, one year of delay of rebuilding for yelloweye rockfish (the slowest of the overfished species to rebuild) is not equivalent to a one year of delay in rebuilding for petrale sole (the quickest overfished species to rebuild). The estimate of mean generation time recommended in the National Standard guidelines for the calculation of T_{MAX} captures these biological differences, but it is not incorporated into the other rebuilding parameters.

2.1.6.1 Bocaccio South of 40°10' north latitude

The 2011 and 2012 OFLs were projected from the 2009 bocaccio assessment by applying the proxy harvest rate of $F_{50\%}$ recommended by the SSC to the estimated exploitable biomass. The new bocaccio assessment extended the stock assessment north of 40°10' north latitude to Cape Blanco, Oregon at approximately 43° N. latitude. The Council recommended, as a preliminary preferred alternative (PPA), not to extend the bocaccio rebuilding plan north of 40°10' north latitude to Cape Blanco based on SSC and GMT advice. Therefore, all of the integrated alternatives use the same structure for the bocaccio stock. Extending the rebuilding plan further north would not aid stock recovery and would only complicate current management. The stock assessment team (STAT) determined that six percent of the assessed biomass occurs north of 40°10' north latitude and the projected OFLs from the assessment were adjusted accordingly. The OFLs for bocaccio are 737 and 732 mt for 2011 and 2012 fisheries, respectively (Table 2-2). The SSC categorized bocaccio as a category 1 stock and recommended the assessment uncertainty (σ) value of 0.36 be used to determine ABCs following a P* approach. The Council recommended the overfishing probability (P*) of 0.45 for determining preferred 2011 and 2012 ABCs of 704 and 700 mt, respectively (Table 2-8).

Three alternative bocaccio ACLs were recommended for development of the integrated alternatives (Table 2-35). These ACL alternatives were derived from the 2009 rebuilding analysis (Field and He 2009), which used results from the new assessment. Alternative 1, 53 and 56 mt for 2011 and 2012, respectively, applies an F95 percent SPR harvest rate and has a predicted median time to rebuild of 2019, which equals $T_{F=0}$ (i.e., the shortest time to rebuild the stock at this point). Alternative 2 would apply an F90 percent SPR harvest rate to determine 2011 and 2012 ACLs of 109 and 115 mt, respectively, with a predicted median time to rebuild the stock in 2020 or one year longer than $T_{F=0}$. Alternative 3 is the same as the FPA and is based on application of the F77.7 percent SPR harvest rate specified in the rebuilding plan to determine 2011 and 2012 ACLs of 263 and 274 mt, respectively. This alternative has a predicted median time to rebuild of 2022 or three years longer than $T_{F=0}$. The three ACL alternatives are predicted to rebuild the stock 7, 6, and 4 years, respectively before the current T_{TARGET} specified in the rebuilding plan (Table 2-35). The SSC did not recommend a change to the current rebuilding plan. However, for the FPA alternative, the Council recommended changing the target rebuilding year in the rebuilding plan from 2026 to 2022 while maintaining the SPR harvest rate of F77.7 percent. NMFS' preferred alternative is the same as the Council's FPA for Bocaccio.

2.1.6.2 Canary Rockfish

The 2011 and 2012 OFLs under the FPA were determined from the 2009 update assessment by applying the F_{MSY} proxy harvest rate of $F_{50\%}$ recommended by the SSC to the estimated exploitable biomass. The recommended 2011 and 2012 OFLs are 614 and 622 mt, respectively (Table 2-2).

The SSC categorized canary rockfish as a category 1 stock and recommended the assessment uncertainty (σ) value of 0.36 be used to determine ABCs following a P* approach. The Council recommended the overfishing probability (P*) of 0.45 for determining preferred 2011 and 2012 ABCs of 586 and 594 mt, respectively (Table 2-8).

Three canary ACL alternatives were adopted for development of integrated alternatives (Table 2-35). These ACL alternatives were derived from the 2009 rebuilding analysis (Stewart 2009c), which used results from the 2009 stock assessment. Our current understanding of canary rockfish stock status and productivity leads to the result that $T_{F=0}$ is longer than the current T_{TARGET}. Therefore, all ACL alternatives contemplate a change in the median time to rebuild the stock greater than the current T_{TARGET}. Alternative 1, 49 and 51 mt for 2011 and 2012, respectively, applies an F94.4 percent SPR harvest rate and has a predicted median time to rebuild of 2025, which is one year longer than $T_{F=0}$ (Table 2-34). Alternative 2 would apply an F89.5 percent SPR harvest rate to determine 2011 and 2012 ACLs of 94 and 99 mt, respectively, with a predicted median time to rebuild the stock of 2026 or two years longer than $T_{F=0}$. Alternative 3 is the FPA derived by applying the F88.7 percent SPR harvest rate specified in the rebuilding plan to determine 2011 and 2012 ACLs of 102 and 107 mt, respectively. This alternative has a predicted median time to rebuild of 2027 or three years longer than $T_{F=0}$. The three ACL alternatives are predicted to rebuild the stock 4, 5, and 6 years longer, respectively than the current T_{TARGET} specified in the rebuilding plan (Table 2-35). The SSC did recommend modifying the rebuilding plan out of the necessity to extend the current T_{TARGET} based on our changed understanding of stock status and productivity. In the FPA, the Council recommended a new T_{TARGET} of 2027 while maintaining the SPR harvest rate of F88.7 percent in the canary rebuilding plan. NMFS' preferred alternative is the same as the Council's FPA for canary rockfish.

2.1.6.3 Cowcod South of 40°10' north latitude

The 2011 and 2012 cowcod OFLs under the FPA were determined from the 2009 assessment by applying the F_{MSY} proxy harvest rate of $F_{50\%}$ recommended by the SSC to the estimated exploitable biomass for the assessed portion of the stock in the Conception area. The OFLs for the Monterey area portion of the stock were determined using a depletion-based stock reduction analysis (DB-SRA) approach. The OFLs for the Conception and the Monterey areas were summed to determine an OFL specification of 13 mt for 2011 and 2012 for the entire stock south of 40°10' north. latitude (Table 2-2).

The SSC categorized the assessed portion of the stock (Conception area) as category 2 and recommended the assessment uncertainty (σ) value of 0.72 be used to determine the ABC following a P* approach. The Council used the overfishing probability (P*) of 0.4 for determining the Conception area contribution to the ABC. The Monterey portion of the stock was categorized as a category 3 stock since a catch-based approach was used to determine the ABC contribution. These ABC contributions were summed to determine an ABC of 10 mt for cowcod south of 40°10' north latitude (Table 2-8).

Three cowcod ACL alternatives were adopted for development of integrated alternatives (Table 2-35). The ACL alternatives were derived from the 2009 rebuilding analysis for the Conception area contribution (Dick and Ralston 2009), which used results from the 2009 updated assessment. The default policy for setting the cowcod OY from 2000 through 2010 has been to assign a combined OY for the Monterey and Conception INPFC areas that is twice the OY from the assessment (Conception area only). The GMT-recommended convention of doubling the assessed area ACLs to incorporate an appropriate harvest contribution for the unassessed Monterey area was done to develop alternative ACLs. Alternative 1, 2 mt for 2011 and 2012, applies an F90 percent SPR harvest rate and has a predicted median time to rebuild of 2064, which is four years longer than $T_{F=0}$ (Table 2-35). Alternative 2 would apply an F82.7 percent SPR harvest rate to determine a 2011 and 2012 ACL of 3 mt, with a predicted median time to rebuild the stock of 2068 or eight years longer than $T_{F=0}$. Alternative 3 is the FPA and is derived by applying the F79 percent SPR harvest rate specified in the rebuilding plan to determine a 2011 and 2012 ACL of 4 mt. This alternative has a predicted median time to rebuild of 2071 or eleven years longer than $T_{F=0}$. The three ACL alternatives are predicted to rebuild the stock 8, 4, and 1 year(s), respectively, prior to the current T_{TARGET} (2072) specified in the rebuilding plan (Table 2-35). The SSC did not recommend a change to the current rebuilding plan. However, for the FPA the Council recommended changing T_{TARGET} from 2072 to 2071 while maintaining the F79 percent SPR harvest rate in the cowcod rebuilding plan. NMFS' preferred alternative adopts the Alternative 2 cowcod ACL of 3 mt for 2011 and 2012, and rebuilds the stock three years faster than the Council's FPA.

2.1.6.4 Darkblotched Rockfish

The 2011 and 2012 OFLs under the FPA were determined from the 2009 updated assessment by applying the F_{MSY} proxy harvest rate of $F_{50\%}$ recommended by the SSC to the estimated exploitable biomass. The recommended 2011 and 2012 OFLs are 508 and 497 mt, respectively (Table 2-2).

The SSC categorized darkblotched rockfish as a category 1 stock and recommended the assessment uncertainty (σ) value of 0.36 be used to determine ABCs following a P* approach. The Council decided the overfishing probability (P*) of 0.45 for determining preferred 2011 and 2012 ABCs of 485 and 475 mt, respectively (Table 2-8).

Three darkblotched ACL alternatives were adopted for development of integrated alternatives (Table 2-35). These ACL alternatives were derived from the 2009 rebuilding analysis (Wallace 2009), which used results from the new updated assessment. Alternative 1, 130 and 131 mt for 2011 and 2012, respectively, applies an F81.8 percent SPR harvest rate and has a predicted median time to rebuild of 2018, which is two years longer than $T_{F=0}$ (Table 2-35). Alternative 2 would apply an F71.9 percent SPR harvest rate to determine a 2011 and 2012 ACL of 222 mt, with a predicted median time to rebuild the stock of 2022 or six years longer than $T_{F=0}$. Alternative 3 is the FPA and is derived by applying the F62.1 percent SPR harvest rate specified in the rebuilding plan to determine 2011 and 2012 ACLs of 332 and 329 mt, respectively. This alternative has a predicted median time to rebuild of 2027 or eleven years longer than $T_{F=0}$. The three ACL alternatives are predicted to rebuild the stock 10, 6, and 1 year(s), respectively before the current T_{TARGET} specified in the rebuilding plan (Table 2-35). The SSC did not recommend any changes to the current darkblotched rockfish rebuilding plan. However, for the FPA the Council did recommend modify the darkblotched rebuilding plan by changing T_{TARGET} from 2028 to 2025 and reducing the SPR harvest rate from F62.1 percent to F64.9 percent. NMFS' preferred alternative is the same as the Council's FPA for darkblotched rockfish.

2.1.6.5 Pacific Ocean Perch

The 2011 and 2012 OFLs for POP under the FPA were determined from the 2009 updated assessment by applying the F_{MSY} proxy harvest rate of $F_{50\%}$ recommended by the SSC to the estimated exploitable biomass. The recommended 2011 and 2012 OFLs are 1,026 and 1,007 mt, respectively (Table 2-2).

The SSC categorized POP as a category 1 stock and recommended the assessment uncertainty (σ) value of 0.36 be used to determine ABCs following a P* approach. The Council decided the overfishing probability (P*) of 0.45 for determining preferred 2011 and 2012 ABCs of 981 and 962 mt, respectively (Table 2-8).

There are three POP ACL alternatives that were adopted for development of integrated alternatives. These ACL alternatives were derived from the 2009 rebuilding analysis (Hamel 2009a), which used results from the new updated assessment. Our current understanding of POP stock status and productivity leads to the result that $T_{F=0}$ is longer than the current T_{TARGET}. Therefore, all ACL alternatives contemplate a change in the median time to rebuild the stock greater than the current T_{TARGET}. Alternative 1 is 80 mt for 2011 and 2012 and is determined by applying an F93.6 percent SPR harvest rate and has a predicted median time to rebuild of 2019, which is one year longer than $T_{F=0}$ (Table 2-35). Alternative 2 would apply an F91.2 percent SPR harvest rate to determine 2011 and 2012 ACLs of 111 and 113 mt, respectively with a predicted median time to rebuild the stock of 2019 or one year longer than TF=0. Alternative 3 is the FPA derived by applying the F86.4 percent SPR harvest rate specified in the rebuilding plan to determine 2011 and 2012 ACLs of 180 and 183 mt, respectively. This alternative has a predicted median time to rebuild of 2020 or two years longer than $T_{F=0}$. The three ACL alternatives are predicted to rebuild the stock 2-3 years longer than the current T_{TARGET} specified in the rebuilding plan (Table 2-35). The SSC did recommend modifying the rebuilding plan out of the necessity to extend the current T_{TARGET} based on our changed understanding of stock status and productivity. For the FPA, the Council proposed changing T_{TARGET} from 2017 to 2020 while maintaining the F86.4 percent SPR harvest rate under their preferred alternative for revising the POP rebuilding plan. The Council also recommended specifying an ACT of 157 mt for POP in 2011 and 2012 under the preferred alternative to further reduce fishing-related mortality. The POP ACT of 157 mt has a predicted median time to rebuild of 2020, or two years longer than $T_{F=0}$, the same as the preferred ACL alternative. NMFS' preferred alternative is the same as the Council's FPA for POP.

2.1.6.6 Widow Rockfish

The 2011 and 2012 OFLs for widow rockfish under the FPA were determined from the 2009 assessment by applying the FMSY proxy harvest rate of F50% recommended by the SSC to the estimated exploitable biomass.The recommended 2011 and 2012 OFLs are 5,097 and 4,923 mt, respectively (Table 2-2). The SSC categorized widow rockfish as a category 1 stock and recommended the assessment uncertainty (σ) value of 0.36 be used to determine ABCs following a P* approach. The Council decided the overfishing probability (P*) of 0.45 for determining preferred 2011 and 2012 ABCs of 4,872 and 4,705 mt, respectively (Table 2-8).

Three widow rockfish ACL alternatives were adopted for development of integrated alternatives (Table 2-35). These ACL alternatives were derived from the 2009 rebuilding analysis (He, *et al.* 2009b) recommended by the SSC, which used results from the new assessment. All ACL alternatives are based on constant catch scenarios that are well below the estimated MSY in the assessment and the ABCs preferred by the Council. All the ACL alternatives assume the stock is rebuilt in 2010 as projected in the assessment and rebuilding analysis; therefore, no median time to rebuild estimates are provided. Alternatives 1, 2, and 3 are constant catch scenarios of 200, 400, and 600 mt for 2011 and 2012, respectively. Because the stock is projected to rebuild in 2010, using a constant catch approach accommodates incidental catch until the next stock assessment without changing the time to rebuild. Applying the harvest rate specified in the current rebuilding plan would result in 2011 and 2012 ACLs of 352 and 339 mt, respectively. This level of harvest is lower than the FPA ACL of 600 mt and lower than the 400 mt Alternative 2 ACLs. However, successful rebuilding is predicted by 2010 and all alternatives are predicted to accommodate a sustainable harvest of widow given the estimated MSY of about 3,000 mt.

2.1.6.7 Yelloweye Rockfish

The 2011 and 2012 OFL for yelloweye rockfish under the preferred alternative was determined from the 2009 assessment by applying the F_{MSY} proxy harvest rate of $F_{50\%}$ recommended by the SSC to the estimated exploitable biomass. The resulting OFL is 48 mt for 2011 and 2012 (Table 2-2). The SSC categorized yelloweye rockfish sole as a category 1 stock and recommended the assessment uncertainty (σ) value of 0.36 be used to determine ABCs following a P* approach. The Council decided the overfishing probability (P*) of 0.45 for determining a preferred 2011 and 2012 ABC of 46 mt (Table 2-8).

The yelloweye ACL alternatives that were adopted for development of integrated alternatives 1, 2, 3 and the FPA were derived from the 2009 rebuilding analysis (Stewart 2009a), which used results from the new assessment. Alternative 1 is 13 mt for 2011 and 2012 and is determined by applying an F80.7 percent SPR harvest rate and has a predicted median time to rebuild of 2065, which is 19 years before the current T_{TARGET} and 18 years longer than $T_{F=0}$ (Table 2-35). Alternative 2 would apply an F76 percent SPR harvest rate to determine an ACL of 17 mt for 2011 and 2012 and a predicted median time to rebuild the stock of 2074 or 10 years before the current T_{TARGET} and 27 years longer than $T_{F=0}$. Alternative 3 is the FPA and would apply an F72.8 percent SPR harvest rate to determine an ACL of 20 mt for 2011 and 2012 and a predicted median time to rebuild the stock of 2084, the current T_{TARGET} and 37 years longer than $T_{F=0}$. By applying the F71.9 percent SPR harvest rate specified in the current rebuilding plan results in ACLs of 20 and 21 mt, respectively. This alternative has a predicted median time to rebuild of 2087 or three longer than the current T_{TARGET} and 40 years longer than $T_{F=0}$, which is why the Council recommended a lower harvest rate (SPR = F72.8 percent) than is currently specified in the rebuilding plan for development of the FPA. Lowering the harvest rate to maintain the current T_{TARGET} of 2084 is the only modification to the yelloweye rebuilding plan under the Council's preferred alternative. For the FPA, the Council recommended an ACT of 17 mt for 2011 and 2012 to further reduce yelloweye fishing mortality. Setting an ACT also addresses the higher uncertainty associating with predicting recreational fishery impacts on yelloweye. Precisely tracking recreational catch inseason, especially in the California recreational fishery, has been a challenge, which led the Council to recommend an ACT for this stock. NMFS' preferred alternative (Alternative 4) is the same as Alternative 2 for yelloweye rockfish and adopts an ACL of 17 mt and rebuilds the stock 10 years faster than the Council's FPA ACL of 20 mt. NMFS' preferred alternative does not include an ACT. Although an ACT is one way to address the uncertainty in predicting recreational fishery impacts, even in the absence of an ACT, other accountability measures can be utilized to ensure that the yelloweye ACL is not exceeded.

On July 8, 2010, NMFS revised the harvest specifications for yelloweye rockfish consistent with the court order (75 FR 38030). The original harvest rate ramp-down strategy for rebuilding yelloweye decided under Amendment 16-4 specified a 14 mt OY in 2010. The Council departed from that strategy by adopting a 17 mt yelloweye rockfish OY in 2010. That OY was overturned by the court and NMFS subsequently changed the 2010 OY to 14 mt (No Action Alternative).

Although NMFS changed the 2010 OY to 14 mt, Dr. Ian Stewart, NMFS NWFSC, the lead author of the 2009 assessment and rebuilding analysis showed that no significant difference in estimates of median year to rebuild the stock occurred as a result from lowering the 2010 OY across all the alternatives considered for 2011 and 2012 ACLs. Table 2-38. Estimated time to rebuild and SPR harvest rate relative to Alternative 2011-2012 ACLs for yelloweye rockfish that vary the 2010 OY by 3 mt.

Table 2-38. Estimated time to rebuild and SPR harvest rate relative to Alternative 2011-2012 ACLs for yelloweye rockfish that vary the 2010 OY by 3 mt.

ACL Alt.	Median Time to Rebuild	ACLs (mt)		SPR HR
		2011	2012	
Assuming a 17 mt OY in 2010				
	2047	0	0	F100%
	2058	9.0	9.0	F86%
1	2065	12.8	13.1	F80.7%
2	2074	16.7	17.0	F76%
3; PPA	2084	19.6	19.9	F72.8%
	2087	20.4	20.7	F71.9%
Assuming a 14 mt OY in 2010				
	2047	0	0	F100%
	2058	8.8	9.0	F86%
1	2065	12.8	13.1	F80.7%
	2067	14.0	14.0	F79.6%
2	2074	16.7	17.0	F76%
3; PPA	2084	19.6	19.9	F72.8%
	2087	20.4	20.8	F71.9%

2.1.6.8 Petrale Sole

Alternative Status Determination Criteria for Petrale Sole and Other Flatfish Species

Status Determination Criteria (SDC) are the proxy or deterministic biomass and harvest rate reference points used to manage a stock. The current No Action reference points for petrale sole and other flatfish species are a proxy F_{MSY} harvest rate of $F_{40\%}$ (i.e., maximum fishing mortality threshold or MFMT which is applied to the estimated exploitable biomass to determine the OFL; a B_{MSY} target of $B_{40\%}$, and a MSST of $B_{25\%}$, below which the stock is considered overfished. Based on a meta-analysis of the relative productivity of assessed west coast flatfish species and other assessed Pleuronectid species internationally, the SSC recommended a change in these reference points used to manage west coast flatfish species. The preferred reference points for flatfish are an F_{MSY} proxy of $F_{30\%}$, a B_{MSY} target of $B_{25\%}$, and an MSST of $B_{12.5\%}$. Figure 2-2 depicts the depletion of petrale sole from 1945 to present relative to the No Action and preferred biomass reference points. The level of depletion estimated at the beginning of 2009 for the coastwide petrale sole stock is 11.6 percent of its unfished biomass, which is below the MSST under the SDC currently used to manage flatfish ($B_{25\%}$), as well as the new proposed MSST of $B_{12.5\%}$ for flatfish. Therefore, a new rebuilding plan for petrale sole (with 2011-2012 ACLs consistent with a new proposed rebuilding plan) is contemplated under Amendment 16-5 and analyzed in this EIS.

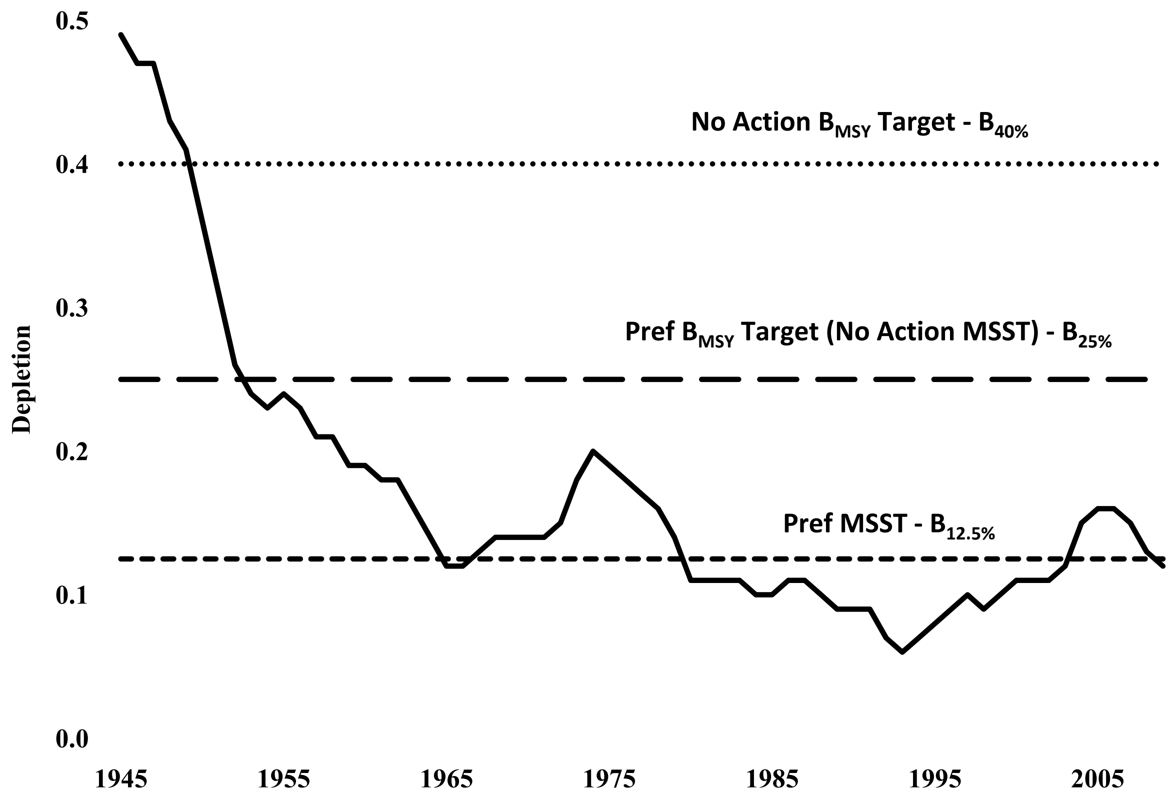


Figure 2-2. Petrale sole depletion time series, 1945 - present, relative to No Action and Preferred biomass reference points proposed for petrale sole and other assessed flatfish species.

The shortest time to rebuild is T_{MIN} (2014), which is the estimated rebuilding period if all sources of fishing-related mortality are eliminated beginning in 2011. Table 2-35 shows that the petrale stock is predicted to successfully rebuild by T_{MIN} with some allowable harvest. Section 304(e)(4) of the MSA requires that the specified time for rebuilding "not exceed 10 years, except in cases where the biology of the stock of fish, other environmental conditions, or management measures under an international agreement in which the United States participates dictates otherwise." All the petrale sole ACL alternatives adopted for development of integrated alternatives are projected to rebuild the stock to the $B_{25\%}$ within 10 years (2021 or T_{MAX}).

Considerations for the Rebuilding Plan for Petrale Sole

When a stock has been declared overfished a rebuilding plan must be developed and the stock must then be managed in accordance with the rebuilding plan. When developing a rebuilding plan for a species managed under the groundfish FMP, the following elements are to be incorporated into each rebuilding plan:

1. A brief description of the status of the stock and fisheries affected by stock rebuilding measures at the time the rebuilding plan was prepared.
2. The methods used to calculate stock rebuilding parameters.
3. An estimate of:
   • Unfished biomass ($B_{unfished}$) and target biomass (B_{MSY});
   • The year the stock would be rebuilt in the absence of fishing (T_{MIN});
   • The year the stock would be rebuilt if the maximum time period permissible under National Standard Guidelines were applied (T_{MAX}) and the estimated probability that the stock would be rebuilt by this date based on the application of stock rebuilding measures; and

• The year in which the stock would be rebuilt based on the application of stock rebuilding measures (T_{TARGET}).

4. A description of the harvest control rule (e.g., constant catch or harvest rate) and the specification of this parameter. The types of management measures that will be used to constrain harvests to the level implied by the control rule will also be described (see also FMP Section 4.5.3.4, Updating Key Rebuilding Parameters). These two elements, the harvest control rule and a description of management measures, represent the rebuilding strategy intended to rebuild the stock by the target year.

Analysis of the specific management measures necessary to maintain catch within the ACLs from these rebuilding alternatives is provided later in this Chapter and vary between the integrated alternatives.

Alternative Petrale Sole Harvest Specifications

The 2011 and 2012 OFLs for petrale sole under the preferred alternative were determined from the 2009 assessment by applying the F_{MSY} proxy harvest rate of $F_{30\%}$ recommended by the SSC to the estimated exploitable biomass. The recommended 2011 and 2012 OFLs are 1,021 and 1,279 mt, respectively (Table 2-2).

The SSC categorized petrale sole as a category 1 stock and recommended the assessment uncertainty (σ) value of 0.36 be used to determine ABCs following a P* approach. The Council decided the overfishing probability (P*) of 0.45 for determining preferred 2011 and 2012 ABCs of 976 and 1,222 mt, respectively (Table 2-8).

All the petrale sole ACL alternatives adopted for detailed analysis are predicted to rebuild the stock to the $B_{25\%}$ target well in advance of T_{MAX} (2021), which is the legal maximum rebuilding period of ten years. The shortest time to rebuild is T_{MIN} (2014), which is the estimated rebuilding period if all sources of fishing-related mortality were eliminated beginning in 2011. Table 2-35 shows that the petrale stock is predicted to successfully rebuild by T_{MIN} with some allowable harvest. The Alternative 1 ACL is 459 and 624 mt in 2011 and 2012, respectively and is determined using an F50 percent SPR harvest rate. The median year estimated to rebuild the stock under Alternative 1 is 2014, which is T_{MIN}. Alternative 2 would apply the 25-5 precautionary harvest control rule in 2011 and results in ACLs of 776 and 1,160 mt in 2011 and 2012, respectively. Alternative 2 is estimated to rebuild the stock by 2015 or 1 year longer than $T_{MIN.}$ Alternative 3 would specify the ABC of 976 mt in 2011 and apply the 25-5 precautionary adjustment beginning in 2012, resulting in a 1,160 mt ACL in 2012. Alternative 3 is estimated to rebuild the stock by 2016 or two years longer than T_{MIN}. The Council adopted a T_{TARGET} of 2016 and the strategy of using the 25-5 harvest control rule after 2011 to set harvest levels under the preferred petrale sole rebuilding plan. NMFS' preferred alternative for petrale sole is the same as the FPA.

Table 2-39 and Table 2-40 summarize the discussions above, presenting the 2011 and 2012 ACL alternatives for each species. These ACL alternatives were carried forward into the integrated alternatives for analysis in this EIS.

Table 2-39. 2011 ACL alternatives (mt) for OVERFISHED species that are to be carried forward into the integrated alternatives. NMFS' preferred ACLs for overfished species are presented in bold font.

Stock	No Action Alternative	2011 Action Alternatives			
	2010 OY	Council's FPA ACL	Alt 1 ACL	Alt 2 ACL	Alt 3 ACL
OVERFISHED SPECIES					
BOCACCIO S. of 40°10' N. lat.	288	**263**	53	109	263
CANARY	105	**102**	49	94	102
COWCOD S. of 40°10' N. lat.	4	4	2	**3**	4
DARKBLOTCHED	330	**298**	222	298	332
PACIFIC OCEAN PERCH	200	**180**	80	111	180
WIDOW	509	**600**	200	400	600
YELLOWEYE	14	20	13	**17**	20
PETRALE SOLE	1,200	**976**	459	776	976

Table 2-40. 2012 ACL alternatives (mt) for OVERFISHED species that are to be carried forward into the integrated alternatives. NMFS' preferred ACLs for overfished species are presented in bold font.

Stock	No Action Alternative	2012 Action Alternatives			
	2010 OY	Council's FPA ACL	Alt 1 ACL	Alt 2 ACL	Alt 3 ACL
OVERFISHED SPECIES					
BOCACCIO S. of 40°10' N. lat.	274	**274**	56	115	274
CANARY	107	**107**	51	99	107
COWCOD S. of 40°10' N. lat.	4	4	2	**3**	4
DARKBLOTCHED	330	**296**	222	296	329
PACIFIC OCEAN PERCH	200	**183**	80	113	183
WIDOW	509	**600**	200	400	600
YELLOWEYE	14	20	13	**17**	20
PETRALE SOLE	1,200	**1,160**	624	1,160	1,160

2.2 ACL and ACT Adjustments

2.2.1 Deductions from the ACL and ACT

Regulations at 50 CFR §600.55 describe the calculation of a fishery harvest guideline, which is used to make fishery allocations. The regulations are consistent with FMP Amendment 23, in that it allows all sources of fishing-related mortality to be accounted for within the ACL. Deductions to the ACL or ACT are made to account for fishing-related mortality resulting from Pacific Coast treaty Indian tribal harvest; scientific research, non-groundfish fisheries, and, as necessary, exempted fishing permits (EFPs). Other than EFPs, the Council and NMFS do not have direct management control over these fishing related activities, but nevertheless, must account for the mortality. NMFS has direct control over the terms and conditions of the EFP permits that result in removals, however if EFPs are to be approved the Council must have set aside enough of the ACL or ACT to accommodate the EFP catch. These deductions are important accountability measures that increase the probability that catches will remain below the ACLs or ACTs. If the Council discovers that the off-the-top deductions are mis-specified due to changes in anticipated catch in tribal fisheries, research activities, EFP, or incidental open access fisheries, management measures for fisheries may need to be adjusted inseason to attain but not exceed ACLs.

The fishery harvest guideline (the ACL minus the off-the-top deductions for tribal fisheries, research activities, EFP, or incidental open access fisheries) is divided between the trawl fishery and non-trawl fisheries (recreational, limited entry fixed gear, and directed open access) based on the percentages adopted under Amendment 21 to the FMP. The distribution of harvest among the non-trawl fisheries is established during the biennial specifications process. In order to implement the recommended IFQ and co-op programs for the trawl fishery, it is necessary for each trawl sectors to have a specific allocation of catch that could be divided among participants. These allocations are further divided into quota pounds (QPs) for the shoreside sector and co-op allocations for the at-sea sectors.

Off-the-top deductions for fully prescribed species, like the overfished species, are important to the decision process. If the off-the-top deduction is higher than necessary, a residual amount that could allow for additional fishing opportunities remains unused at the end of the year. The residual poundage could be assigned to non-trawl fisheries and management measures adjusted inseason to allow for harvest, but additional catch cannot be reassigned to the trawl fishery without recalculating quota pounds for the year. If the off-the-top deduction is too low, the burden of restrictions to keep total catch within the ACL or ACT would fall first on the non-trawl fisheries.

The EFP amounts will be specified as set-asides, which are not available to other fisheries. The Council's Operating Procedures (available online at http://www.pcouncil.org/wp-content/uploads/cop19.pdf) specify that final approval of EFPs occurs in November of the year prior to the start of the EFP. As such, estimates specified at the June 2010 Council meeting may not accommodate all potential applications. The Council, through routine inseason action, will be able to re-specify the EFP set-asides for stocks where there is very low probability of attaining the harvestable surplus (e.g., chilipepper and yellowtail). For these species, an inseason adjustment of the EFP set-asides from the non-trawl allocation would not constrain non-trawl fishing opportunities. The remaining estimates of catch in tribal fisheries, incidental open access fisheries, and research will be listed in the footnotes of the regulation tables (i.e., Tables 1a and 1b of 50 CFR 660 subpart C) in order to track the removals from the ACL. Since yelloweye rockfish greatly limits access to commercial and recreational fisheries, the Council recommended a lower EFP amount, compared to recent removals.
Table 2-41 details the off-the-top deductions to the ACL for overfished species. Off-the-top deductions for non-overfished species are presented in Table 2-42 (for 2011) and Table 2-43 (for 2012). Detailed calculations of each portion of the off-the-top deductions are provided in Appendix B. These set-asides are deducted from the ACL (or ACT if specified) and used in the analysis of the integrated alternatives.

Table 2-41. Off-the-top deductions for overfished species for 2011 and 2012, Alternatives 1, 2, 3, and the FPA.

Category	Bocaccio South 40'10 N. lat.	Canary	Cowcod South 40'10 N. lat.	DRK	Petrale	POP	Widow	YE
Tribal Whiting Trawl		4.3		0.1		7.2	5	0
Tribal Mid-water Trawl		3.6				0	40	0
Tribal Bottom Trawl		0.8			45.4	3.7	0	0
Tribal Troll		0.5				0		0
Tribal Fixed Gear		0.3				0	0	2.3
Open Access Incidental	0.7	2	0	15	1	0.1	3.3	0.2
Research	1.7	7.2	0.1	2.1	17	1.8	1.6	3.3
EFP	11	1.3	0.2	1.5	2	0.1	11	0.1
Subtotal	**13.4**	**20**	**0.3**	**18.7**	**65.4**	**12.9**	**60.9**	**5.9**

Table 2-42. Off-the-top deductions for non-overfished species for 2011, Alternatives 1, 2, 3, and the FPA.

Species/Species Group/Area	2011 ACL	Tribal	EFP	Research	Inc. OA
Lingcod N. of 42º N. lat. (OR & WA)	2,330	250	0	5	16
Lingcod S. of 42º N. lat. (CA)	2,102	0	0	0	7
Pacific Cod	1,600	400	0	0	0
Sablefish N. of 36º N. lat.	5,515	552	39		
Sablefish S. of 36º N. lat.	1,298	0	26	2	6
Dover sole	25,000	1,497	0	38	55
English sole	19,761	91	0	5	4
Arrowtooth flounder	15,174	2,041	0	7	30
Starry Flounder	1,352	2	0	0	5
Other flatfish	4,884	60	0	13	125
Chilipepper S. of 40°10' N. lat.	1,882	1		9	5
Splitnose S. of 40°10' N. lat.	1,461	0	0	7	0
Yellowtail N. of 40°10' N. lat.	4,364	490	2	4	3
Shortspine Thornyhead N. of 34°27' N. lat.	1,573	38	0	5	2
Shortspine Thornyhead S. of 34°27' N. lat.	405	0	0	1	41
Longspine Thornyhead N. of 34°27' N. lat.	2,119	30	0	13	1
Longspine Thornyhead S. of 34°27' N. lat.	376	0	0	1	2
Minor Slope Rockfish N. of 40°10' N. lat.	1,160	36	2	11	19
Minor Slope Rockfish S. of 40°10' N. lat.	626	0	2	8	17
Minor Shelf Rockfish N. of 40°10' N. lat.	968	9	4	4	26
Minor Shelf Rockfish S. of 40°10' N. lat.	714	0	2	2	9
Black Rockfish N. of 46°16' N. lat. (WA)	426	14	0	0	0
Black Rockfish S. of 46°16' N. lat. (OR & CA)	1,000	0	0	0	0
Pacific Whiting	TBD	50,000	0	0	2,000
Cabezon N. of 42º N. lat. (OR)	50	0	0	0	0
Cabezon S. of 42º N. lat. (CA)	179	0	0	0	0
Shortbelly	50	0	0	1	0
California Scorpionfish	135	0	0	0	2
Longnose Skate	1,349	56	0	8	65
Other Fish	5,575	none	none	none	None

Table 2-43. Off-the-top deductions for non-overfished species for 2012, Alternatives 1, 2, 3, and the FPA.

Species/Species Group/Area	2012 ACL	Tribal	EFP	Research	Inc. OA
Lingcod N of 42º N. lat. (OR & WA)	2,151	250	0	5	16
Lingcod S of 42º N. lat. (CA)	2,164	0	0	0	7
Pacific Cod	1,600	400	0	0	0
Sablefish N of 36º N. lat.	5,347	535	39		
Sablefish S of 36º N. lat.	1,258	0	26	2	6
Dover sole	25,000	1,497	0	38	55
English sole	10,150	91	0	5	4
Arrowtooth flounder	12,049	2,041	0	7	30
Starry Flounder	1,360	2	0	0	5
Other flatfish	4,884	60	0	13	125
Chilipepper S of 40°10' N. lat.	1,700	1		9	5
Splitnose S of 40°10' N. lat.	1,538		0	7	0
Yellowtail N of 40°10' N. lat.	4,371	490	2	4	3
Shortspine Thornyhead N of 34°27' N. lat.	1,556	38	0	5	2
Shortspine Thornyhead S of 34°27' N. lat.	401		0	1	41
Longspine Thornyhead N of 34°27' N. lat.	2,064	30	0	13	1
Longspine Thornyhead S of 34°27' N. lat.	366	0	0	1	2
Minor Slope Rockfish N of 40°10' N. lat.	1,160	36	2	11	19
Minor Slope Rockfish S of 40°10' N. lat.	626	0	2	8	17
Minor Shelf Rockfish N of 40°10' N. lat.	968	9	4	4	26
Minor Shelf Rockfish S of 40°10' N. lat.	714	0	2	2	9
Black Rockfish N of 46°16' N. lat. (WA)	415	14	0	0	0
Black Rockfish S of 46°16' N. lat. (OR and CA)	1,000	0	0	0	0
Pacific Whiting	TBD	50,000	0	49	2,000
Cabezon N of 42º N. lat. (OR)	48	0	0	0	0
Cabezon S of 42º N. lat. (CA)	168	0	0	0	0
Shortbelly	50	0	0	1	0
California Scorpionfish	126	0	0	0	2
Longnose Skate	1,349	56	0	8	65
Other Fish	5,575	none	none	none	none

2.2.2 Allocations

Two amendments to the FMP have considered formal allocations - Amendments 6 and 21. Amendment 6, implemented in 1994, specified allocations of groundfish stocks to limited entry and open access sectors (Table 2-44). Additionally formal sector allocations exist for Pacific whiting and sablefish north of 36° N. latitude (described in Figure 2-3 and applied to sablefish specifications in Table 2-42, Table 2-43, and Table 2-45). While these allocations have been specified in Federal regulations for many years, they are now incorporated in the FMP under Amendment 21.

Table 2-44. Limited entry and open access allocations established by FMP Amendment 6.

Stock or Stock Complex	Limited Entry Share	Open Access Share
Lingcod	81%	19%
Minor Rockfish South (including Chilipepper Rockfish)	55.7%	44.3%
Minor Rockfish North (including Yellowtail Rockfish)	91.7%	8.3%
Shortspine Thornyhead (north of Conception Area)	99.73%	0.27%

Amendment 21 to the PCGFMP modified the FMP framework by specifying formal, long-term allocations for the following species: lingcod, Pacific cod, sablefish south of 36° north latitude, POP, widow rockfish, chilipepper rockfish, splitnose rockfish, yellowtail rockfish north of 40°10’ north latitude, shortspine thornyhead (north and south of 34°27’ north latitude), longspine thornyhead north of 34°27’ north latitude, darkblotched rockfish, minor slope rockfish (north and south of 40°10’ north latitude), Dover sole, English sole, petrale sole, arrowtooth flounder, starry flounder, and other flatfish (Table 2-46 and Table 2-47). Because Amendment 21 has been approved, the harvest specifications being considered for 2011 and 2012 are consistent with the provisions of Amendment 21. Long-term, formal allocations are expected to provide more stability to the trawl fishery sectors by reducing the risk of the trawl sector being closed as a result of a non-trawl or recreational fishery exceeding an allocation or harvest guideline.

Species that are not formally allocated under Amendment 21 will continue to be addressed through short-term allocations that are to be decided through the biennial harvest specifications and management measure process. IFQ species with trawl and non-trawl allocations established through the biennial harvest specifications include the following species: canary rockfish, bocaccio, cowcod, yelloweye rockfish, and minor shelf rockfish north and south. In addition to allocations specified under the Amendment 21 provisions for 2011 and 2012, trawl and non-trawl allocations are being specified through the biennial harvest specifications for the following: minor nearshore rockfish north and south, and longnose skate. Species being managed under trip limits and without trawl and non-trawl allocations are: shortbelly rockfish, longspine thornyhead south of 34° 27’ north latitude, black rockfish (Washington-Oregon), California scorpionfish, cabezon (California only), kelp greenling, and the “other fish” complex.

For any stock that has been declared overfished, the formal trawl/non-trawl and open access/limited entry allocation established under provisions of the FMP and regulations (50 CFR 660.50) could be applied to the fishery harvest guideline or the allocations may be temporarily revised for the duration of the rebuilding period by amending the regulations. Because the integrated alternatives consider different ACLs for overfished species, sector allocations vary between alternatives. The differences in allocations to the sectors for overfished species with formal allocations specified under Amendment 21 are shown in Table 2-48 (for 2011) and Table 2-49 (for 2012). Only petrale sole under the FPA considers suspending the formal allocation during 2011 and 2012.

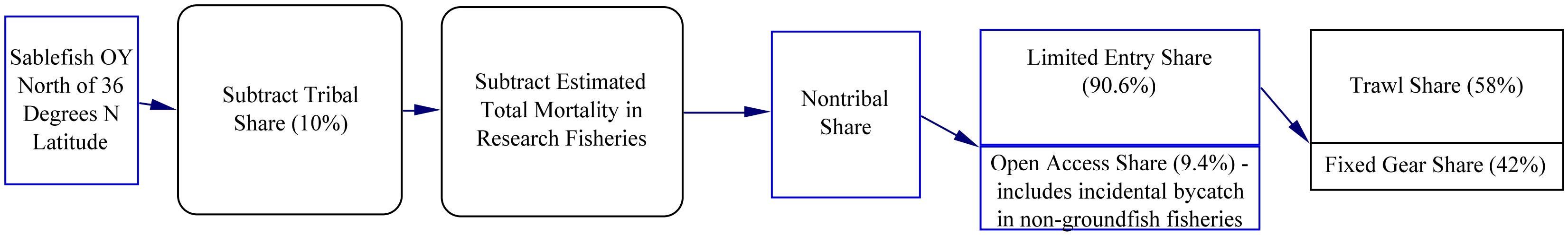


Figure 2-3. The formal allocation of sablefish north of 36° N. latitude.

Table 2-45. Sablefish ACLs north of 36° N. latitude and associated sector allocations for 2011-2012 in mt, No Action, Alternatives 1, 2, 3, and the FPA.

Year	OY/ ACL	Tribal Share a/	Research, Rec., EFP b/	Non-Tribal Comm Share	LE Share	LE Trawl			LE FG			Open Access		
						LE Trawl Share	At-sea Whiting	Shore-based IFQ	LE FG Share	LE FG Primary	LE FG DTL	OA HG	Incidental OA	OA Final
2010 c/	6,471	647	200	5,624	5,095	2,955			2,140	1,819	321	529		
2011	5,515	552	22.1	4,941	4,477	2,597	50	2,547	1,880	1,598	282	464	17	447
2012	5,347	535	22.1	4,790	4,340	2,517	50	2,467	1,823	1,549	273	450	17	433

a/ This is the total tribal share, which is reduced by 1.6% to account for discard mortality in order to calculate the tribal landing limit.
b/ In 2009 and 2010 the incidental open access removals were deducted off the top. In 11-12 the removals are deducted from the OA share.
c/ 2010 represents No Action.

Table 2-46. Amendment 21 allocations for non-overfished species in 2011, Alternatives 1, 2, 3, and the FPA.

Species/Species Group/Area	2011 ACL	2011 ACT	Fishery HG b/	Trawl A21%	Non-trawl A21%	Trawl A21 mt	At-sea whiting set asides	Trawl after at-sea set asides	Non-Whiting	Whiting	Non-Whiting	Whiting	SS	CP	MS	Non-trawl A21 mt
									A21 %	A21 %	A21 mt	A21 mt				
Lingcod N of 42º N. lat. (OR & WA)	2,330		2,059	45%	55%	927	6	921	99.7%	0.3%	918	3				1,132
Lingcod S of 42º N. lat. (CA)	2,102		2,095	45%	55%	943	0	943	99.7%	0.3%	940	3				1,152
Pacific Cod	1,600		1,200	95%	5%	1,140	5	1,135	99.9%	0.1%	1,134	1				60
Sablefish S of 36º N. lat.	1,298		1,264	42%	58%	531	0	531	100.0%		531	0				733
Dover sole (FPA)	25,000		23,410	95%	5%	22,240	5	22,235	100.0%		22,235	0				1,171
Dover sole (Alt 1, 2, & 3)	42,436		40,846	95%	5%	38,804	5	38,799	100.0%		38,799	0				2,042
English sole	19,761		19,661	95%	5%	18,678	5	18,673	99.9%	0.1%	18,654	19				983
Arrowtooth flounder	15,174		13,096	95%	5%	12,441	10	12,431	100.0%		12,431	0				655
Starry Flounder	1,352		1,345	50%	50%	673	5	668	100.0%		668	0				673
Other flatfish	4,884		4,686	90%	10%	4,217	20	4,197	99.9%	0.1%	4,193	4				469
Chilipepper S of 40°10' N. lat.	1,882		1,867	75%	25%	1,400	0	1,400	100.0%		1,400	0				467
Splitnose S of 40°10' N. lat.	1,461		1,454	95%	5%	1,381	0	1,381	100.0%		1,381	0				73
Yellowtail N of 40°10' N. lat.	4,364		3,865	88%	12%	3,401	300	3,101	The rest	300	2,801	300				464
Shortspine thornyhead N of 34 27' N. lat.	1,573		1,528	95%	5%	1,452	20	1,432	99.9%	0.1%	1,430	1				76
Shortspine Thornyhead S of 34 27' N. lat.	405		363	50 mt	The Rest	50	0	50	100.0%		50	0				313
Longspine thornyhead N of 34 27' N. lat.	2,119		2,075	95%	5%	1,971	5	1,966	100.0%		1,966	0				104
Minor Slope Rockfish N of 40°10' N. lat.	1,160		1,092	81%	19%	885	55	830	98.6%	1.4%	818	12				207
Minor Slope Rockfish S of 40°10' N. lat.	626		599	63%	37%	377	0	377	100.0%		377	0				222

a/ Under the FPA, the Council temporarily suspended the Amendment 21 allocation between trawl and non-trawl. The values in this table represent a two year allocation.
b/ The Fishery Harvest Guideline represents the amount of the ACL, after subtracting the off-the-top amounts, that is available for allocations. Off-the-top amounts include total mortality estimates for scientific research, tribal fisheries, incidental open access and set asides for EFPs.

Table 2-47. Amendment 21 allocations for non-overfished species in 2012, Alternatives 1, 2, 3, and the FPA.

Species/Species Group/Area	2012 ACL	2012 ACT	Fishery HG [b/]	Trawl A21%	Non-trawl A21%	Trawl A21 mt	At-sea whiting set asides	Trawl after at-sea set asides	Non-Whiting A21 %	Whiting A21 %	Non-Whiting A21 mt	Whiting A21 mt	SS	CP	MS	Non-trawl A21 mt
Lingcod N of 42º N. lat. (OR & WA)	2,151		1,880	45%	55%	846	6	840	99.7%	0.3%	837	3				1,034
Lingcod S of 42º N. lat. (CA)	2,164		2,157	45%	55%	971		971	99.7%	0.3%	968	3				1,186
Pacific Cod	1,600		1,200	95%	5%	1,140	5	1,135	99.9%	0.1%	1,134	1				60
Sablefish S of 36º N. lat.	1,258		1,224	42%	58%	514		514	100.0%		514	0				710
Dover sole (FPA)	25,000		23,410	95%	5%	22,240	5	22,235	100.0%		22,235	0				1,171
Dover sole (Alt. 1,2,and 3)	42,843		41,253	95%	5%	39,190	5	39,185	100.0%		39,185					2,063
English sole	10,150		10,050	95%	5%	9,548	5	9,543	99.9%	0.1%	9,533	10				503
Arrowtooth flounder	12,049		9,971	95%	5%	9,472	10	9,462	100.0%		9,462	0				499
Starry Flounder	1,360		1,353	50%	50%	677	5	672	100.0%		672	0				677
Other flatfish	4,884		4,686	90%	10%	4,217	20	4,197	99.9%	0.1%	4,193	4				469
Chilipepper S of 40°10' N. lat.	1,700		1,685	75%	25%	1,264		1,264	100.0%		1,264	0				421
Splitnose S of 40°10' N. lat.	1,538		1,531	95%	5%	1,454		1,454	100.0%		1,454	0				77
Yellowtail N of 40°10' N. lat.	4,371		3,872	88%	12%	3,407	300	3,107	The rest	300	2,807	300				465
Shortspine thornyhead N of 34 27' N. lat.	1,556		1,511	95%	5%	1,435	20	1,415	99.9%	0.1%	1,414	1				76
Shortspine Thornyhead S of 34 27' N. lat.	401		359	50 mt	The Rest	50		50	100.0%		50	0				309
Longspine thornyhead N of 34 27' N. lat.	2,064		2,020	95%	5%	1,919	5	1,914	100.0%		1,914	0				101
Minor Slope Rockfish N of 40°10' N. lat.	1,160		1,092	81%	19%	885	55	830	98.6%	1.4%	817	12				207
Minor Slope Rockfish S of 40°10' N. lat.	626		599	63%	37%	377		377	100.0%		377	0				222

a/ Under the FPA, the Council temporarily suspended the Amendment 21 allocation between trawl and non-trawl. The values in this table represent a two year allocation.

b/ The Fishery Harvest Guideline represents the amount of the ACL, after subtracting the off-the-top amounts, that is available for allocations. Off-the-top amounts include total mortality estimates for scientific research, tribal fisheries, incidental open access and set asides for EFPs.

Table 2-48. Amendment 21 Overfished species allocations for 2011, Alternatives 1, 2, 3, and the FPA.

Species/Species Group/Area	2011 ACL	2011 ACT	Fishery HG [b/]	Trawl A21%	Non-trawl A21%	Trawl A21 mt	At-sea whiting set asides	Trawl after at-sea set asides	Non-Whiting Trawl A21 %	Whiting Trawl A21 %	Non-Whiting Trawl A21 mt	Whiting Trawl A21 mt	SS	CP	MS	Non-trawl A21 mt
ALTERNATIVE 1																
Petrale sole	459		394	95%	5%	374	5	369	100.0%	0%	369	0				20
Pacific ocean perch	80		67	95%	5%	64	allocation	64	The rest	17% or 30 mt	34	30	13	10	7	3
Widow	200		139	91%	9%	126	allocation	126	The rest	52%	60	66	28	22	16	13
Darkblotched	222		203	95%	5%	193	allocation	193	The rest	9% or 25 mt	168	25	11	9	6	10
ALTERNATIVE 2																
Petrale sole	776		711	95%	5%	675	5	670	100.0%	0%	670	0				36
Pacific ocean perch	111		98	95%	5%	93	allocation	93	The rest	17% or 30 mt	63	30	13	10	7	5
Widow	400		339	91%	9%	308	allocation	308	The rest	52%	148	160	67	54	38	31
Darkblotched	298		279	95%	5%	265	allocation	265	The rest	9% or 25 mt	240	25	11	9	6	14
ALTERNATIVE 3																
Petrale sole	976		911	95%	5%	865	5	860	100.0%	0%	860	0				46
Pacific ocean perch	180		167	95%	5%	159	allocation	159	The rest	17% or 30 mt	129	30	13	10	7	8
Widow	600		539	91%	9%	490	allocation	490	The rest	52%	235	255	107	87	61	49
Darkblotched	332		313	95%	5%	297	allocation	297	The rest	9% or 25 mt	270	27	11	9	6	16
FPA																
Petrale sole [a/]	976		911			876	5	871	100.0%	0%	871	0				35
Pacific ocean perch	180	157	144	95%	5%	137	allocation	137	The rest	17% or 30 mt	107	30	13	10	7	7
Widow	600		539	91%	9%	490	allocation	490	The rest	52%	235	255	107	87	61	49
Darkblotched	298		279	95%	5%	265	allocation	265	The rest	9% or 25 mt	240	25	11	9	6	14

a/ Under the FPA, the Council temporarily suspended the Amendment 21 allocation between trawl and non-trawl. The values in this table represent a two year allocation.

b/ The Fishery Harvest Guideline represents the amount of the ACL, after subtracting the off-the-top amounts, that is available for allocations. Off-the-top amounts include total mortality estimates for scientific research, tribal fisheries, incidental open access and set asides for EFPs.

Table 2-49. Amendment 21 Overfished species allocations for 2012, Alternatives 1, 2, 3, and the FPA.

Species/Species Group/Area	2012 ACL	2012 ACT	Fishery HG [b/]	Trawl A21%	Non-trawl A21%	Trawl A21 mt	At-sea whiting set asides	Trawl after at-sea set asides	Non-Whiting Trawl	Whiting Trawl	Non-Whiting Trawl	Whiting Trawl	SS	CP	MS	Non-trawl A21 mt
									A21 %	A21 %	A21 mt	A21 mt				
ALTERNATIVE 1																
Petrale sole	624		559	95%	5%	531	5	526	100.0%	0%	526	0				28
Pacific ocean perch	80		67	95%	5%	64	allocation	64	The rest	17% or 30 mt	34	30	13	10	7	3
Widow	200		139	91%	9%	126	allocation	126	The rest	52%	60	66	28	22	16	13
Darkblotched	222		203	95%	5%	193	allocation	193	The rest	9% or 25 mt	168	25	11	9	6	10
ALTERNATIVE 2																
Petrale sole	1,160		1,095	95%	5%	1,040	5	1,035	100.0%	0%	1,035	0				55
Pacific ocean perch	113		100	95%	5%	95	allocation	95	The rest	17% or 30 mt	65	30	13	10	7	5
Widow	400		339	91%	9%	308	allocation	308	The rest	52%	148	160	67	54	38	31
Darkblotched	296		277	95%	5%	263	allocation	263	The rest	9% or 25 mt	238	25	11	9	6	14
ALTERNATIVE 3																
Petrale sole	1,160		1,095	95%	5%	1,040	5	1,035	100.0%	0%	1,035	0				55
Pacific ocean perch	183		170	95%	5%	162	allocation	162	The rest	17% or 30 mt	132	30	13	10	7	8
Widow	600		539	91%	9%	490	allocation	490	The rest	52%	235	255	107	87	61	49
Darkblotched	329		310	95%	5%	295	allocation	295	The rest	9% or 25 mt	268	27	11	9	6	15
FPA																
Petrale sole [a/]	1,160		1,095			1,060	5	1,055	100.0%	0%	1,055	0				35
Pacific ocean perch	183	157	144	95%	5%	137	allocation	137	The rest	17% or 30 mt	107	30	13	10	7	7
Widow	600		539	91%	9%	490	allocation	490	The rest	52%	235	255	107	87	61	49
Darkblotched	296		277	95%	5%	263	allocation	263	The rest	9% or 25 mt	238	25	11	9	6	14

a/ Under the FPA, the Council temporarily suspended the Amendment 21 allocation between trawl and non-trawl. The values in this table represent a two year allocation.
b/ The Fishery Harvest Guideline represents the amount of the ACL, after subtracting the off-the-top amounts, that is available for allocations. Off-the-top amounts include total mortality estimates for scientific research, tribal fisheries, incidental open access and set asides for EFPs.

2.2.2.1 Two-Year Trawl and Non-Trawl Allocations

Biennial harvest specifications can be used to establish 2-year allocations for stocks and stock complexes without formal allocations or for overfished species where the formal allocation is suspended during rebuilding (Table 2-50). Biennial harvest specifications may also be used to establish 2-year allocations for species without formal allocations or for those species where the formal allocation is suspended if they have the potential to constrain fishing opportunities for one or more sectors. Prior to 2011 (No Action Alternative), the catch sharing for both non-overfished and overfished species were more flexible such that the Council had the ability to modify management measures inseason which had the effect of moving fish between sectors. The rationalized trawl fishery implemented in 2011 reduces the inseason flexibility to move fish between the trawl and non-trawl sectors because of the new trawl non-trawl allocations. The trawl allocation will be converted into quota pounds and co-op allocations making it very difficult, if not impossible, to reduce the trawl allocation mid-year in response to overages in the non-trawl sector. Within the non-trawl sectors, the Council will have inseason flexibility to move fish between sectors (e.g., recreational and fixed gear commercial).

Table 2-50. Stocks and stock complexes without formal allocation in 2011 and 2012.

Stocks or Stock Complexes	Allocation Structure for 2011 and 2012
Stock Complexes Where Formal Long-term Allocations Are Not Being Applied for 2011 and 2012	
Black Rockfish N of 46°16’ N. lat.	Managed and allocated by the state of WA
Black Rockfish S of 46°16’ N. lat.	Managed and allocated by the states of OR and CA
Bocaccio S of 40^{0}10’ N. lat.	Formal allocation suspended during rebuilding
Canary Rockfish	Formal allocation suspended during rebuilding
Cowcod	Formal allocation suspended during rebuilding
Yelloweye Rockfish	Formal allocation suspended when declared overfished
Minor nearshore rockfish N 40°10’ N. lat.	Managed and allocated by the states
Minor nearshore rockfish S of 40°10’ N. lat.	Managed and allocated by the states
Minor shelf rockfish N 40°10’ N. lat.	2-year allocation with harvest specifications
Minor shelf rockfish S of 40°10’ N. lat.	2-year allocation with harvest specifications
Shortbelly rockfish	Unallocated
Stocks Without Specified Allocations in the FMP or Regulation	
CA scorpionfish	Managed and allocated by the state of CA
Cabezon off CA	Managed and allocated by the state of CA
Cabezon off OR	Managed and allocated by the state of OR
Longspine Thornyhead S of 34°27’ N. lat.	Unallocated
Longnose Skate	2-year allocation with harvest specifications
Minor nearshore rockfish N of 40°10 N. lat.	2-year allocation with harvest specifications
Minor nearshore rockfish S of 40°10 N. lat.	2-year allocation with harvest specifications
Other Fish	Unallocated

Overfished Species

Deciding the two-year allocation between the trawl and non-trawl sectors for yelloweye, canary, cowcod, and bocaccio is a challenge because the trawl sector has not yet operated under a rationalized system and it is difficult to precisely estimate the predicted overfished species impacts. While one objective of the rationalized fishery is to promote practices that reduce bycatch and discard mortality, it is expected that there will be a learning curve as the fleet adjusts to this new management regime. Further, while rationalized fisheries have a worldwide history of success, the west coast groundfish trawl fishery has the unique challenge of interacting with eight overfished stocks. The available yields for quota pounds and co-op allocations for the overfished species are expected to be scarce, especially for yelloweye and canary rockfish. The 2-year trawl allocation is somewhat of a performance standard and thus the fleet allocation should reasonably accommodate fishing operations.

For 2011 and 2012, overfished species allocations cannot be reallocated to or from the trawl sector inseason (e.g., the at-sea whiting sector harvests all of their whiting allocation and has remaining overfished species quota). Unused trawl IFQ quota pounds to permits will roll over (if 10 percent or less) for the second year of the biennium (2012) or remain stranded in the trawl sector in the final year of the biennial cycle. As such, the non-trawl sector must have a sufficient allocation to reasonably accommodate fishing operations or management measure must constrain the fishery such that the non-trawl allocations are not exceeded.

At its November 2009 and April 2010 meetings, the Council considered a wide range of two-year allocations for bocaccio, cowcod, canary rockfish and yelloweye rockfish between the trawl and non-trawl sectors (PFMC G9b Supplemental GMT statement 2, November 2009; PFMC I6b Supplemental GMT statement, April 2010). Further, the Council considered non-trawl apportionments that are the basis by which sharing of overfished species occurs within the non-trawl sector (e.g., fixed gear commercial and recreational). These apportionments are not harvest guidelines, but an amount available to the non-trawl sectors for the start of the biennium. As part of routine inseason management, the Council could decrease or increase the non-trawl portions based on updated projected impacts. This wide range of allocations and apportionments was narrowed in April 2010 for detailed analysis of integrated Alternatives 1-3 (PFMC I6b Supplemental GMT statement, April 2010). At its June 2010 meeting, the Council adopted final preferred trawl and non-trawl two year allocations and within non-trawl apportionments for bocaccio (Table 2-51), canary rockfish (Table 2-52), cowcod (Table 2-53), and yelloweye rockfish (Table 2-54). The right-hand panel of each table details the calculations used to determine the amounts available to fisheries (i.e., setting ACT, subtracting the off-the-top amounts).

Table 2-51. Two-year trawl and non-trawl allocations for bocaccio rockfish, south of 40°10' N. latitude, by Alternative and year.

<table>
<tr><th colspan="6">Bocaccio - 2011</th></tr>
<tr><th>Sector</th><th>No Action
288 mt [a/]</th><th>Alt. 1
52 mt</th><th>Alt. 2
109 mt</th><th>Alt. 3
263 mt</th><th>FPA
263 mt</th></tr>
<tr><td>Off the top ACL deductions</td><td>14.3 [b/]</td><td>13.4 [c/]</td><td>13.4 [c/]</td><td>13.4 [c/]</td><td>13.4 [c/]</td></tr>
<tr><td>Fishery Harvest Guideline</td><td>273.7</td><td>38.6</td><td>95.6</td><td>249.6</td><td>249.6</td></tr>
<tr><td>Limited Entry Non-Whiting Trawl</td><td>16.1</td><td>4.7</td><td>11.3</td><td>29.6</td><td>60</td></tr>
<tr><td colspan="6">Non-nearshore</td></tr>
<tr><td>LE FG</td><td rowspan="3">5.3</td><td rowspan="2">5.1</td><td rowspan="2">12.3</td><td rowspan="2">32.2</td><td rowspan="2">57.9</td></tr>
<tr><td>OA DTL</td></tr>
<tr><td>Nearshore Fixed Gear</td><td>4.1</td><td>9.9</td><td>26.0</td><td>0.7</td></tr>
<tr><td>Washington Recreational</td><td>--</td><td>--</td><td>--</td><td>--</td><td>--</td></tr>
<tr><td>Oregon Recreational</td><td>--</td><td>--</td><td>--</td><td>--</td><td>--</td></tr>
<tr><td>California Recreational</td><td>67.3</td><td>25.6</td><td>61.9</td><td>161.8</td><td>131</td></tr>
<tr><td colspan="6">Limited Entry Whiting Trawl</td></tr>
<tr><td>Catcher Processor</td><td>--</td><td>--</td><td>--</td><td>--</td><td>--</td></tr>
<tr><td>Mothership</td><td>--</td><td>--</td><td>--</td><td>--</td><td>--</td></tr>
<tr><td>Shoreside</td><td>--</td><td>--</td><td>--</td><td>--</td><td>--</td></tr>
<tr><th colspan="6">Bocaccio - 2012</th></tr>
<tr><th>Sector</th><th>No Action
288 mt</th><th>Alt. 1
56 mt</th><th>Alt. 2
115 mt</th><th>Alt. 3
274 mt</th><th>FPA
274 mt</th></tr>
<tr><td>Off the top ACL deductions [a/]</td><td>14.3 [b/]</td><td>13.4</td><td>13.4</td><td>13.4</td><td>13.4</td></tr>
<tr><td>Fishery Harvest Guideline</td><td>273.7</td><td>42.6</td><td>101.6</td><td>260.6</td><td>260.6</td></tr>
<tr><td>Limited Entry Non-Whiting Trawl</td><td>16.1</td><td>5.0</td><td>12.0</td><td>30.9</td><td>60</td></tr>
<tr><td colspan="6">Non-nearshore</td></tr>
<tr><td>LE FG</td><td rowspan="3">5.3</td><td rowspan="2">5.5</td><td rowspan="2">13.1</td><td rowspan="2">33.6</td><td rowspan="2">57.9</td></tr>
<tr><td>OA DTL</td></tr>
<tr><td>Nearshore Fixed Gear</td><td>4.4</td><td>10.6</td><td>27.1</td><td>0.7</td></tr>
<tr><td>Washington Recreational</td><td>--</td><td>--</td><td>--</td><td>--</td><td>--</td></tr>
<tr><td>Oregon Recreational</td><td>--</td><td>--</td><td>--</td><td>--</td><td>--</td></tr>
<tr><td>California Recreational</td><td>67.3</td><td>27.6</td><td>65.8</td><td>168.9</td><td>131</td></tr>
<tr><td colspan="6">Limited Entry Whiting Trawl</td></tr>
<tr><td>Catcher Processor</td><td>--</td><td>--</td><td>--</td><td>--</td><td>--</td></tr>
<tr><td>Mothership</td><td>--</td><td>--</td><td>--</td><td>--</td><td>--</td></tr>
<tr><td>Shoreside</td><td>--</td><td>--</td><td>--</td><td>--</td><td>--</td></tr>
</table>

a/ Assumes that the application of new Amendment 21 allocation structure specified at 50 CFR 660.55
b/ Breakdown for off-the –top deductions – EFP, 11 mt; tribal, 0 mt; OA incidental, 1.3 mt; research, 2.0 mt
c/ Breakdown for off-the –top deductions – EFP, 11 mt; tribal, 0 mt; OA incidental, 0.7 mt; research, 1.7 mt

Table 2-52. Two-year trawl and non-trawl allocations for canary rockfish by alternative and year.

Canary Rockfish- 2011					
Sector	**No Action 105 mt**	**Alt. 1 49 mt**	**Alt. 2 94 mt**	**Alt. 3 102 mt**	**FPA 102 mt**
Off the top ACL deductions [a/]	18.9	20	20	20	20
Fishery Harvest Guideline	*123.9*	29	*74*	82	*82*
Limited Entry Non-Whiting Trawl	21.3	8.0	19.3	21.3	20
Non-nearshore					
LE FG / OA DTL	2.5	0.9	2.3	2.5	2.3
Nearshore Fixed Gear	3.6	1.4	3.3	3.6	4.0
Washington Recreational	4.9	1.8	4.4	4.9	2
Oregon Recreational	16.0	6.0	14.5	16.0	7
California Recreational	22.9	8.6	20.7	22.9	14.5
Limited Entry Whiting Trawl					
Catcher Processor	4.8	1.8	4.3	4.8	4.8
Mothership	3.3	1.3	3.0	3.4	3.4
Shoreside	5.9	2.2	5.3	5.9	5.9
Canary Rockfish- 2012					
Sector	**No Action 105 mt**	**Alt. 1 51 mt**	**Alt. 2 99 mt**	**Alt. 3 107 mt**	**FPA 107 mt**
Off the top ACL deductions [a/]	18.9	20	20	20	20
Fishery Harvest Guideline	*123.9*	*31*	*79*	*87*	*87*
Limited Entry Non-Whiting Trawl	21.3	8.5	20.5	22.5	20
Non-nearshore					
LE FG / OA DTL	2.5	1.0	2.4	2.6	2.3
Nearshore Fixed Gear	3.6	1.4	3.5	3.8	4.0
Washington Recreational	4.9	2.0	4.7	5.2	2
Oregon Recreational	16.0	6.4	15.4	16.9	7
California Recreational	22.9	9.1	22.0	24.2	14.5
Limited Entry Whiting Trawl					
Catcher Processor	4.8	1.9	4.6	5.0	5
Mothership	3.3	1.3	3.2	3.6	3.6
Shoreside	5.9	2.4	5.7	6.2	6.2

a/ Assumes that the application of new Amendment 21 allocation structure specified at 50 CFR 660.55

b/ Breakdown for off-the –top deductions – EFP, 2.7 mt; tribal, 7.3 mt; OA incidental, 0.9 mt; research, 8.0 mt

c/Breakdown for off-the –top deductions – EFP, 1.3 mt; tribal, 9.5 mt; OA incidental, 2.0 mt; research, 7.2 mt

Table 2-53. Two-year trawl and non-trawl allocations for cowcod rockfish by alternative and year.

Cowcod- 2011					
Sector	**No Action 4 mt** [a/]	**Alt. 1 2 mt**	**Alt. 2 3 mt**	**Alt. 3 4 mt**	**FPA 4 mt**
Off the top ACL deductions	0.44 [b/]	0.3 [c/]	0.3 [c/]	0.3 [c/]	0.3 [c/]
Fishery Harvest Guideline	*3.56*	*1.7*	*2.7*	*3.7*	*3.7*
Limited Entry Non-Whiting Trawl	1.5	0.9	1.4	1.9	1.8
Non-nearshore					
LE FG	--	--	--	--	--
OA DTL	--	--	--	--	--
Nearshore Fixed Gear	--	--	--	--	--
Washington Recreational	--	--	--	--	--
Oregon Recreational	--	--	--	--	--
California Recreational	0.3	0.9	1.4	1.9	0.9
Limited Entry Whiting Trawl					
Catcher Processor	--	--	--	--	--
Mothership	--	--	--	--	--
Shoreside	--	--	--	--	--
Cowcod- 2012					
Sector	**No Action 4 mt**	**Alt. 1 2 mt**	**Alt. 2 3 mt**	**Alt. 3 4 mt**	**FPA 4 mt**
Off the top ACL deductions [a/]	0.44	0.3	0.3	0.3	0.3
Fishery Harvest Guideline	*3.56*	*1.7*	*2.7*	*3.7*	*3.7*
Limited Entry Non-Whiting Trawl	1.5	0.9	1.4	1.9	--
Non-nearshore					
LE FG	--				
OA DTL	--				
Nearshore Fixed Gear	--				
Washington Recreational	--	--	--	--	--
Oregon Recreational	--	--	--	--	--
California Recreational	0.3	0.9	1.4	1.9	0.9
Limited Entry Whiting Trawl					
Catcher Processor	--	--	--	--	--
Mothership	--	--	--	--	--
Shoreside	--	--	--	--	--

a/ Assumes that the application of new Amendment 21 allocation structure specified at 50 CFR 660.55
b/ Breakdown for off-the –top deductions – EFP, 0.24 mt; tribal, 0 mt; OA incidental, 0 mt; research, 0.20 mt
c/ Breakdown for off-the –top deductions – EFP, 0.2 mt; tribal, 0 mt; OA incidental, 0 mt; research, 0.1 mt

Table 2-54. Two-year trawl and non-trawl allocations for yelloweye rockfish by alternative and year.

Yelloweye Rockfish- 2011					
Sector	**No Action 14 mt**	**Alt. 1 13 mt**	**Alt. 2 17 mt**	**Alt. 3 20 mt**	**FPA 20 mt/ 17 mt ACT**
Off the top ACL deductions [a/]	3.63	5.9	5.9	5.9	5.9
Fishery Harvest Guideline	*10.4*	*7.1*	*11.1*	*14.1*	*11.1*
Limited Entry Non-Whiting Trawl	0.3	0.4	0.6	0.7	0.6
Non-nearshore					
LE FG	0.8	1.6	2.3	3.0	2.4
OA DTL	1.2				
Nearshore Fixed Gear					
Washington Recreational	2.6	1.6	2.6	3.3	2.6
Oregon Recreational	2.3	1.5	2.4	3.0	2.4
California Recreational	2.7	1.6	2.6	3.4	3.1
Limited Entry Whiting Trawl					
Catcher Processor	--	--	--	--	--
Mothership	--	--	--	--	--
Shoreside	--	--	--	--	--
Yelloweye Rockfish- 2012					
Sector	**No Action 14 mt**	**Alt. 1 13 mt**	**Alt. 2 17 mt**	**Alt. 3 20 mt**	**FPA 20 mt/ 17 mt ACT**
Off the top ACL deductions [a/]	3.63	5.9	5.9	5.9	5.9
Fishery Harvest Guideline	*10.4*	*7.1*	*11.1*	*14.1*	*11.1*
Limited Entry Non-Whiting Trawl	0.3	0.4	0.6	0.7	0.6
Non-nearshore					
LE FG	0.8	1.6	2.3	3.0	2.4
OA DTL	1.2				
Nearshore Fixed Gear					
Washington Recreational	2.6	1.6	2.6	3.3	2.6
Oregon Recreational	2.3	1.5	2.4	3.0	2.4
California Recreational	2.7	1.6	2.6	3.4	3.1
Limited Entry Whiting Trawl					
Catcher Processor	--	--	--	--	--
Mothership	--	--	--	--	--
Shoreside	--	--	--	--	--

a/ Assumes that the application of new Amendment 21 allocation structure specified at 50 CFR 660.55
b/ Breakdown for off-the –top deductions – EFP, 0 mt; tribal, 2.3 mt; OA incidental, 0.3 mt; research, 2.8 mt
c/ Breakdown for off-the –top deductions – EFP, 0.1 mt; tribal, 2.3 mt; OA incidental, 0.2 mt; research, 3.3 mt

Non-Overfished Species

Minor Shelf Rockfish North and South of 40°10 north latitude

Historical data for the minor shelf rockfish complex north and south of 40°10 north latitude was analyzed to inform two-year trawl and non-trawl allocations (see Appendix B). Further, in order to support the initial allocation for Amendment 20 (proposed rule available online at 75FR32994), data was analyzed in order to determine an appropriate within-trawl allocation between whiting and non-whiting. For the development of the integrated alternatives, the Council recommended preferred allocations for minor shelf rockfish based on the average catches from 2005-2008 as reported in the WCGOP Total Mortality Reports (Table 2-55).

Table 2-55. For development of the integrated alternatives (Alternatives 1, 2, 3 and the FPA) The Council's recommended two-year allocations of minor shelf rockfish north and south of 40°10' N. latitude for the trawl and non-trawl sectors.

Complex	Trawl	Non-trawl
Minor shelf rockfish north of 40°10 N. lat.	60.2%	39.8%
Within-trawl Allocation of northern minor shelf rockfish [a/]	Whiting: 17.4% Non-Whiting: 82.6%	
Minor shelf rockfish south of 40°10 N. lat.	12.2%	87.8%

a/ The within trawl allocation (whiting and non-whiting) occurs only once in order to support the Amendment 20 initial allocation of minor shelf rockfish north of 40°10 N. latitude.

<u>Longnose Skate</u>

Available data (Pacific Coast Fisheries Information Network (PacFIN), WCGOP reports, stock assessments, etc.) were reviewed in order to inform two-year trawl and non-trawl allocations for longnose skate; however there were few species-specific records. Prior to March 6, 2009, longnose skate was not required to be sorted and many were landed as unspecified skate, making it difficult to reconstruct historical landings. Longnose skate is caught primarily as bycatch in trawl fisheries, where most are discarded. The WCGOP 2009 Total Mortality Report is anticipated to document landings and discard mortalities of longnose skate by sector since it reflects data since the sorting requirement was implemented; however, this report has not yet been published.

For trawl-dominant species under Amendment 21, the trawl and non-trawl allocations were set at 95 percent and 5 percent, respectively. 95 percent is the highest allocation to trawl sectors considered for any species for the development of the integrated alternatives, the Council recommendation was to remain consistent with Amendment 21 and employ this same ratio for longnose skate in 2011-2012. No within-trawl allocation is necessary since longnose skate is not recommended to be managed with IFQs or bycatch limits for at-sea whiting sectors under Amendment 20.

2.2.3 Harvest Guidelines

Harvest guidelines are used as an accountability measure. The regulatory definition of a harvest guideline is "…a specified numerical harvest objective that is not a quota. Attainment of a harvest guideline does not require closure of a fishery." The implementation and use of the harvest guidelines for 2011-2012 is described below.

2.2.3.1 Recreational Harvest Guidelines for Non-overfished Species

Black Rockfish Harvest Guidelines for Oregon and California

The southern component of black rockfish was first assessed in 2003. Beginning in 2004, the Council allocated 58 percent of the optimum yield (OY; now referred to as an ACL) to Oregon and 42 percent to California based on recent year landings. This allocation, implemented by specifying state-specific harvest guidelines, was also used in adopting biennial harvest guidelines for the two states starting with the 2004-2005 cycle and continuing through 2010. The Oregon Department of Fish and Wildlife and California Department of Fish and Game proposed and the Council recommended for development of the integrated alternatives the sharing arrangement of the black rockfish ACL be used again in 2011-2012 (see the joint ODFW/CDFG report from the June 2010 Council meeting - available online at Agenda

Item B.3.b, Joint ODFW/CDFG Report, June 2010).Agenda Item B.3.b, Joint ODFW/CDFG Report, June 2010).

Blue Rockfish (CA)

In 2009-2010, blue rockfish was managed with a harvest guideline for California fisheries to prevent overfishing of a stock in the precautionary zone. The 40-10 default harvest policy proposed to be revised under Amendment 23 reduces the ACL below the ABC for species that are in the precautionary zone (below B_{MSY}) under Amendment 23 (the option 2 40-10 rule; (PFMC 2010b)). Table 2-56 shows the OFL, ABC, and 40-10 adjusted values for both the assessed and unassessed portions of the stock both north and south of 40° 10' north latitude within California. For development of the integrated alternatives the Council recommended specifying 2011 and 2012 blue rockfish HGs of 242 and 239 mt, respectively for California fisheries. These HGs are calculated from the 2007 assessment (Key, *et al.* 2008), which was conducted for the portion of the stock in waters off California north of Point Conception at 34°27' north latitude. The OFLs were derived from the assessment. The ABCs were derived using a P* of 0.45 for a category 2 stocks, which was then adjusted using the 40-10 default harvest policy. The HG contribution for the unassessed portion of the stock south of Point Conception was calculated by first estimating an OFL using the Depletion-corrected average catch (DCAC) methodology and then applying an ABC adjustment (using a P* of 0.45 for a category 3 stock). The HG contribution for the unassessed area was set equal to the ABC. The 2011 and 2012 blue rockfish HG contributions for the assessed and unassessed areas are then summed to determine the HGs.

Table 2-56. Blue rockfish harvest guideline calculations for both the assessed and unassessed areas within California by year.

Area	OFL contribution by area		ABC contribution by area		40-10 adjusted HG contribution by area	
	2011	2012	2011	2012	2011	2012
North of 34°27' N. lat. (assessed area)	219	217	200	198	179	177
South of 34°27' N. lat. (unassessed area)	74	74	62	62	62	62
Total for California	293	291	262	260	241	239

2.3 Description of Management Measures

Management measures are necessary to prevent overfishing and the resulting adverse biological, social and economic impacts. Management measures may be imposed for habitat protection, resource conservation, or social or economic reasons consistent with the criteria, procedures, goals, and objectives set forth in the FMP. The principal measures available to the Council to control fishing mortality are:

- Measures to reduce bycatch and bycatch mortality.
- Defining authorized fishing gear and regulating the configuration and deployment of fishing gear, including mesh size in nets and escape panels or ports in traps.
- Restricting catches by defining prohibited species and establishing landing, trip frequency, bag, and size limits.
- Establishing fishing seasons and closed areas.
- Limiting fishing capacity or effort through permits, licenses and endorsements, and quotas, or by means of input controls on fishing gear, such as restrictions on trawl size/shape or longline

length or number of hooks or pots. Fishing capacity may be further limited through programs that reduce participation in the fishery by retiring permits and/or vessels.

Amendment 23 defines AMs and ACTs. AMs are management controls, such as inseason adjustments to fisheries or ACTs, used to prevent annual catch limits, including sector-specific annual catch limits, from being exceeded, and to correct or mitigate overages of the annual catch limit if they occur. Accountability measures should address and minimize both the frequency and magnitude of overages and correct the problems that caused the overage in as short a time as possible. This section details AMs including ACTs and management measures not previously analyzed or implemented in regulation.

2.3.1 Accountability Measures

Accountability measures (AMs) are management controls to prevent the ACL from being exceeded. The new NS1 guidelines identify two primary sources of management uncertainty: 1) uncertainty in the ability of managers to constrain catch so the ACL is not exceeded; and, 2) uncertainty in quantifying the true catch amounts. In other words, management uncertainty involves consideration of the effectiveness of management measures at limiting catch to desired levels, and at the same time, an examination of the accuracy and precision of the estimates used to quantify catch. The new NS1 guidelines recommend consideration of the ACT, which can be set below the ACL if there is uncertainty in the ability of the management system to effectively keep total fishing mortality below the prescribed ACL.

Systems for monitoring groundfish mortalities (landings plus discard mortalities) on the west coast vary in their effectiveness depending on whether the species is primarily caught in commercial or recreational fisheries and how well at-sea discards are monitored. In general, fishing-related mortalities of commercially caught species are better known than those for stocks primarily caught by recreational fisheries. This is because commercial landings are recorded on fish receiving tickets, which are used to document the weight and ex-vessel value of landed catch, while recreational catches are mostly monitored using a random, stratified census of anglers. The degree of at-sea monitoring of discards also varies by fishing sector with the limited entry at-sea whiting trawl sector having the highest at-sea observer rates; followed by limited entry bottom trawl (including shoreside whiting); limited entry fixed gear; open access; California commercial passenger fishing vessels (CPFV or California recreational charter); and California (non-CPFV), Oregon, and Washington recreational. The treaty tribes report that their fisheries are observed at a high rate because their fisheries are full retention fisheries for rockfish species.

Perhaps the greatest source of uncertainty in managing to commercial total catch targets is the fact that discard rates are not known for a particular year until well afterward (there is approximately a year and a half lag in reconciling total mortality estimates in the current West Coast Groundfish Observer Program (WCGOP). Thus, even in circumstances where landings are effectively constrained, taking into account expected discards, total catch may later be found to have exceeded specified targets, if realized discards exceeded those expectations. Some amount of uncertainty also arises from sampling uncertainty in the observation of discards and landings species composition for rockfish. Recreational fisheries have traditionally been more difficult to monitor and some fishing modes lack direct observation of discards.

The monitoring system under Amendment 20, will be greatly enhanced relative to the 2010 fishery (PFMC 2010c). The proposed program incorporates 100 percent at-sea monitoring of catch and bycatch and an enhanced shoreside monitoring program. This expanded level of observation should reduce uncertainty in total catch estimates in the shoreside trawl fisheries. Additionally, under the current management system, trip limits do not provide an automatic mechanism for ceasing harvest at the appropriate time. The product of trip limit amounts times the number of permits vastly exceeds the available amount of landed catch. Under individual quotas, if no individual exceeds their quota poundage, the fleet target cannot be exceeded thus reducing the probability of exceeding the trawl allocation and ultimately the ACL.

The total harvest of selected non-overfished target species and overfished species are projected using the GMT's impact projection models (Appendix A). For the 2011-2012 cycle, there are five impact projection models: nearshore fixed gear, non-nearshore fixed gear, and three recreational models for each state. In the event trawl rationalization could not be implemented January 1, 2011 a trawl model was used to structure trip limits, RCA configurations, and overfished species impacts. The GMT, in coordination with the WCGOP, began some initial scoping to address uncertainty in quantifying the true catch amounts as it relates to projection model inputs. The current formulation of fishery projection models assumes several inputs are known without error. These include total landing estimates, allocation of landing by depth strata, bycatch ratios, and discard mortality. Treating these quantities as known decreases the amount of uncertainty admitted in the model and ultimately influences the realization of model outputs (i.e., projected catches). Improvements to these models would address characterizing the uncertainty in each of the input quantities and is currently underway for potential use in 2013-2014. Appendix A contains detailed model descriptions along with a summary of the initial scoping for reducing uncertainty in the next management cycle.

2.3.1.1 Annual Catch Targets (ACTs)

The performance of the current management measures relative to the total mortality of FMP species and their annual OYs in recent years were considered in light of the NS 1 requirement to examine where ACTs might be appropriate (PFMC 2010b). The Council's current system of managing the commercial fishery, cumulative vessel landing limits combined with frequent monitoring and evaluation, has generally proven effective in preventing commercial catch targets from being substantially or serially exceeded. Recreational fisheries have traditionally been more difficult to monitor and some fishing modes lack scientific observation of discards.

The Council considered a report that evaluated the effectiveness of the current groundfish management system (Agenda Item E.4.a, Attachment 4, March 2010). This report outlined the differences in the reporting systems for commercial and recreational fisheries as well as provided information on the instances from 1999-2007 where total mortality exceeded the OY. Council guidance to the GMT was to focus on OY overages that occurred in the last 5 years, since management systems have improved in more recent years. Those species include canary rockfish, Dover sole, and POP. Projecting canary rockfish impacts has been problematic, especially in the limited entry trawl sector. Under a rationalized fishery, there is individual accountability and real time reporting that will substantially improve performance relative to the 2010 fishery (i.e., ability to stay within the ACL). For recreational fisheries, the Council recommended the use of HGs as an accountability measure to increase the probability that total catch will stay within the ACL. Dover sole is trawl dominant and management performance is also expected to improve under a rationalized fishery structure. Under the FPA, the Council chose to implement an ACT for POP (details described below).

For development of the integrated alternatives, the Council recommended ACTs for POP and yelloweye rockfish for the FPA in order to increase the probability that catches will remain below the ACL. An ACT for POP was specified in response to the 2007 OY having been exceeded. The OY was exceeded because of unexpectedly high incidental catch in the Pacific whiting shoreside fishery. The 2007 Pacific whiting fisheries were closed in July because the widow rockfish bycatch catch limit was reached prior to attaining whiting quotas (72FR46176). In October, the widow rockfish bycatch limit was increased through an inseason action and the fishery was re-opened with waters between the shore and 150 fm being closed to the fishery. The 150 fm depth restriction was intended to reduce the incidental catch of canary rockfish. Because the shoreside fleet was operating in unfamiliar waters and at a time of year when the shoreside whiting fishery historically has not been open it resulted higher than anticipated POP catch at a time of year when inseason adjustment to the fishery could not be made. Because of fishery constraints to avoid incidental catch of overfished or protected species could result in a similar unexpectedly large catch event, specifying an ACT for POP is expected to keep total fishing mortality below the ACL. NFMS' preferred alternative includes an ACT for POP.

The Council also recommended an ACT for yelloweye rockfish to address management uncertainty and increase the probability that total catch will remain below the ACL. Setting an ACT addresses the higher uncertainty associated with predicting recreational fishery impacts on yelloweye. Precisely tracking recreational catch inseason, especially in the California recreational fishery, has been a challenge, which led the Council to recommend an ACT for this stock. Although an ACT is one way to address the uncertainty in predicting recreational fishery impacts, even in the absence of an ACT, other accountability measures can be utilized to ensure that the yelloweye ACL is not exceeded. NMFS' preferred alternative adopts a lower ACL for yelloweye rockfish than the Council's FPA rather than adopting an ACT.

2.3.2 New Management Measures for 2011-2012

This section briefly describes the new management measures being considered for use in 2011-2012. These measures carried forward into the integrated alternatives include adjustments to coordinates for the RCAs which would be implemented under all of the integrated alternatives. Detailed analysis of the RCA adjustments, including the proposed coordinates can be found in Appendix B.

2.3.2.1 Revise Coordinates for Rockfish Conservation Areas as Necessary for Trawl and Non-Trawl Gears

Staff from Oregon and California reviewed selected RCA coordinates and proposed changes that more closely approximate the RCA boundaries with depth contours, which should result in better estimates of overfished species bycatch and provide improved and more efficient access to target species while protecting overfished species.

The 100 fm, 125 fm, and 200 fm latitude and longitude coordinates defining the lines at the southwest corner of Heceta Bank in Oregon are proposed to be moved to better follow the bathymetry. In this area the existing 100 and 125 fm lines are, in many cases, extremely shallow and reported to allow fishing in areas of high yelloweye rockfish bycatch by members of the industry. While the impacts to yelloweye rockfish from refining the 100 fm and 125 fm line waypoints are not quantifiable in the Heceta Bank area, it is likely that the modifications would reduce yelloweye rockfish impacts over the existing line structure. Modifications to the 200 fm line are proposed because the current line is deeper than the 250 fm line and in some cases extends across the 400 fm depth line.

Changes to the boundary lines in California are proposed to reduce cross-overs with existing lines, better approximate depth contours resulting in more accurate bycatch information, and better align with EFH boundaries. For development of the FPA, the Council recommended the RCA modifications proposed by the states. Table 2-57 summarizes the areas affected by the RCA modifications. Detailed analysis, including proposed coordinates, can be found in Appendix B.

Table 2-57. Summary of RCA adjustments.

State	Geographic Region	Boundary
Oregon	SW Hecate Bank	125 fm
Oregon	SW Hecate Bank	100 fm
Oregon	Hecate Bank	200 fm
California	Cape Mendocino	100 fm, 125 fm, 150 fm, 180 fm, 200 fm
California	Big Sur	40 fm, 50 fm, 60 fm, 75 fm
California	CCAs	30 fm
California	San Diego	50 fm, 60 fm

2.4 Description of the Integrated Alternatives

This section contains a description of the integrated alternatives that link the harvest specifications described in Sections 2.1 to 2.2 to specific management measures described Sections 2.3. The management measures are intended to keep total catch mortality within the ACLs or ACTs if specified (both non-overfished and overfished) while achieving management objectives specified in the FMP. In previous cycles, the integrated alternatives were referred to as the strategic rebuilding alternatives. The overfished species ACLs (Table 2-58 and Table 2-59) are strategically arrayed to illuminate how rebuilding overfished species within the complex structure of a fishery constrains fishing opportunities by sector (or gear type) and region and how those constraints affect communities along the west coast.

Table 2-58. Overfished species ACLs for 2011 for more development of integrated alternatives.

Species	No Action 2010 OY (mt)	Alt 1 Low (mt)	Alt 2 Intermediate (mt)	Alt 3 PPA (mt)	FPA (mt)
Bocaccio	288	53	109	263	263
Canary	105	49	94	102	102
Cowcod	4	2	3	4	4
Darkblotched	330/290[a]	222	298	332	298
Petrale	1,200	459	776	976	976
POP	200	80	111	180	180/157[b]
Widow	509	200	400	600	600
YE	14	13	17	20	20/17[b]

a/ The 2010 darkblotched rockfish OY is 330 mt. NMFS guidance to the Council is to manage to 290 mt.
b/ The first value is the ACL, the second the ACT.

Table2-59. Overfished species ACLs for 2012 for more development of integrated alternatives.

Species	No Action 2010 OY (mt)	Alt 1 Low (mt)	Alt 2 Intermediate (mt)	Alt 3 PPA (mt)	FPA (mt)
Bocaccio	288	56	115	274	274
Canary	105	51	99	107	107
Cowcod	4	2	3	4	4
Darkblotched	330/290[a]	222	296	329	296
Petrale	1,200	624	1,160	1,160	1,160
POP	200	80	113	183	183/157[b]
Widow	509	200	400	600	600
YE	14	13	17	20	20/17[b]

a/ The 2010 darkblotched rockfish OY is 330 mt. NMFS guidance to the Council is to manage to 290 mt.
b/ The first value is the ACL, the second the ACT.

The alternatives for the 2011-2012 groundfish fisheries are structured such that they integrate the following elements

- strategic combinations of overfished rockfish species ACLs,
- ranges of petrale sole ACLs,
- non-overfished species ACLs that do not vary between Alternatives 1-3, except Pacific whiting and Dover sole.
- management measures (e.g., alternative seasons, size and bag limits, trip limits, gear restrictions, etc.) by sector (trawl, limited entry fixed gear, open access fixed gear, and recreational), and
- Sector allocations under Amendment 21 and 2-year allocations for overfished species.

The No Action Alternative displays the impacts if no new harvest specifications were implemented by the Council and the 2010 OYs and management measures in place on July 16, 2010 (75FR41383) and specified in Federal regulations prevailed for the 2011-2012 fisheries. The remaining alternatives were developed by combining and arranging (low to high) the various overfished species ACLs. The integrated overfished species ACL alternatives were narrowed from the wider range of overfished species ACLs and combinations of overfished species ACLs (Agenda Item I.4.a, Attachment 1, April 2010). For example, the Council rejected the zero-harvest alternative to ACLs as unrealistic since eliminating fishing mortality would cause too much harm to fishing communities. The Council also rejected higher ACLs for overfished species because, in the Council's best judgment, they extended rebuilding too far to meet the Council's conservation objective to rebuild the stocks in the shortest time possible while taking into account the status and biology of the overfished stock, the needs of the fishing communities, and the interaction of the overfished stock within the marine ecosystem. For development of the integrated alternatives, the range of ACL alternatives initially considered in November 2009 was narrowed for more development of integrated alternatives and detailed analysis. Section 2.5 further describes alternative values that did not get carried forward as part of the integrated alternatives.

Alternatives 1-3 were analyzed using the Council's preliminary preferred ACLs for non-overfished species, except for Pacific whiting, while the FPA was analyzed using the final preferred ACLs. The choice of the Pacific whiting ACL is made annually consistent with the US-Canada Pacific Whiting treaty provisions therefore a range of Pacific whiting ACLs were considered in this EIS. The analysis considers the biological and economic impacts relative to the choice of Pacific whiting and overfished species

ACLs. The EIS analysis (Appendix B & Chapter 4) points out the relation of overfished species to Pacific whiting.

Amendments 20 and 21 were implemented on January 1, 2011. The integrated alternatives include management measures necessary to support Amendment 20. The integrated alternatives 1, 2, and 3 and the FPA consider the trawl fishery under cumulative limit management as well as trawl rationalization. For The alternatives in Chapter 4 considers the effects under both a rationalized fishery under Amendment 20 and the continuation of trip limit management. The integrated alternatives also incorporate Amendment 21 allocations.

2.4.1 The No Action Alternative

If no action were taken by the Council, the 2010 OYs and management measures currently specified in Federal regulations would prevail for the 2011-2012 fisheries. For the purposes of this analysis, currently specified in regulation refers to the regulations as of July 16, 2010 (75FR41383). This alternative does not consider the implementation of the trawl rationalization program under Amendment 20 or the allocations under Amendment 21.

2.4.1.1 Harvest Specifications – No Action

The ABC harvest specifications considered under the No Action Alternative for all groundfish species and species groups are the 2010 ABCs. ABCs are the estimated or proxy MSY harvest levels, which are the harvest thresholds above which overfishing is occurring. The 2010 ABCs under the No Action Alternative are described in Section 2.1 and shown in Table 2-2.

The OY harvest specifications considered under the No Action Alternative are the 2010 total catch OYs specified under the existing (pre-Amendment 23) harvest specification framework. Under the No Action Alternative scientific uncertainty, management uncertainty, socioeconomic considerations and rebuilding of overfished stocks are considered in the buffer between the ABC specification and the total catch OY. The ACLs specified for the integrated Alternatives in this EIS (Alternatives 1, 2, 3 and the FPA) are analogous to the total catch OY specified under the No Action Alternative. Unlike the FPA and Alternatives 1-3, there is no harvest specification between the MSY harvest level and the OY in which scientific uncertainty can be addressed.

The harvest specification proposed under the No Action Alternative are consistent with NRDC v. Locke in which the court vacated the 2010 OYs for darkblotched rockfish, cowcod, and yelloweye rockfish and ordered the 2007-2008 OY to be reinstated resulting in an OY of 330 mt for darkblotched, 4 mt for cowcod, and 14 mt for yelloweye rockfish. Table 2-60 summarizes the No Action Alternative overfished species ACLs under the No Action Alternative.

Table 2-60. No Action Alternative: 2011-2012 overfished species harvest specifications.

Species	T_{TARGET} FMP	ACL Alts. 2011, 2012	Median time to rebuild given ACL [a/]
Bocaccio	2026	288 mt	2022
Canary	2021	105 mt	[2027]
Cowcod	2072	4 mt	2071
Darkblotched [b/]	2028	330 mt	2027
POP	2017	200 mt	[2021]
Petrale	TBD	1,200 mt	TBD
Widow	2015	509 mt	2010
Yelloweye	2084	14 mt	2067

a/ Brackets indicate times to rebuild that are longer than the T_{TARGET} year specified in the FMP.
b/ The 2010 OY is specified at 330 mt. NMFS guidance is to manage to 290 mt, which is consistent with the court's ruling in NRDC v. Locke.

2.4.1.2 Harvest Specification Allocations – No Action

Deductions to the OY are made to account for fishing-related mortality resulting from Pacific Coast treaty Indian tribal harvest; scientific research, non-groundfish fisheries and recreational fisheries. The remaining portion of the OY (commercial OY) after the deductions are made is then made available to the commercial fisheries. Formal allocations for sablefish, Pacific whiting were defined in the FMP prior to Amendment 21 and are in place in 2010. Formal allocations between the limited entry and open access fisheries are also defined in the FMP for overfished species and many target species. However due to the constraints of rebuilding measures, most formal allocations were not applied for the 2010 harvest specifications. Under the No Action Alternative, the catch sharing between fisheries of both non-overfished and overfished species is more flexible than those proposed for use under the FPA and Alternatives 1-3. Under the No Action Alternative, the Council has the ability to make management measure recommendations inseason which have the effect of moving fish between sectors. The rationalized trawl fishery implemented in 2011 will greatly reduce the inseason flexibility to move fish between the trawl and non-trawl sectors because of the new trawl non-trawl allocations. Table 2-61 shows the harvest guidelines and set-asides that were in place in 2010 for overfished species.

Table 2-61. Overfished Species Harvest Guidelines and Set-asides by Fishery Under the No Action Alternative.

Sector	Bocaccio	Canary	Cowcod	DKB	POP	Petrale	Widow	Yellow-eye
2011								
Off the top ACL deductions [a/]	14.3	18.9	0.44	18.7	23	0	60.9	3.63
Fishery Harvest Guideline	*273.7*	*123.9*	3.56	*279.3*	*144*	*1,200*	539.1	*10.4*
Limited Entry Non-Whiting Trawl	16.1	21.3	1.5	230.0	100.8	1,200	21.6	0.3
Non-nearshore								
LE FG	5.3	2.2	--					0.8
OA DTL		2.5	--					1.2
Nearshore Fixed Gear		3.6	--					
Washington Recreational	--	4.9	--					2.6
Oregon Recreational	--	16.0	--					2.3
California Recreational	67.3	22.9	0.3					2.7
Limited Entry Whiting Trawl								
Catcher Processor	--	4.8	--	8.5			95.0	--
Mothership	--	3.3	--	6.0			67.0	--
Shoreside	--	5.9	--	15.5			117.0	--
2012								
Sector	**Bocaccio**	**Canary**	**Cowcod**	**DKB**	**POP**	**Petrale**	**Widow**	**Yellow-eye**
Off the top ACL deductions [a/]	14.3	19.9	0.44	18.7	26	0	60.9	3.63
Fishery Harvest Guideline	*273.7*	*87*	3.56	*277.3*	*144*	*1,200*	539.1	*10.4*
Limited Entry Non-Whiting Trawl	16.1	21.3	1.5	230.0	100.8	1,200	21.6	0.3
Non-nearshore								
LE FG	5.3	2.2	--					0.8
OA DTL		2.5	--					1.2
Nearshore Fixed Gear		3.6	--					
Washington Recreational	--	4.9	--					2.6
Oregon Recreational	--	16.0	--					2.3
California Recreational	67.3	22.9	0.3					2.7
Limited Entry Whiting Trawl								
Catcher Processor	--	4.8	--	8.5			95.0	--
Mothership	--	3.3	--	6.0			67.0	--
Shoreside	--	5.9	--	15.5			117.0	--

a/ Assumes that the application of new Amendment 21 allocation structure specified at 50 CFR 660.55
b/ Breakdown for off-the –top deductions – EFP, 2.7 mt; tribal, 7.3 mt; OA incidental, 0.9 mt; research, 8.0 mt
c/Breakdown for off-the –top deductions – EFP, 1.3 mt; tribal, 9.5 mt; OA incidental, 2.0 mt; research, 7.2 mt

2.4.1.3 Management Measures – No Action

The management measures specified for the No Action Alternative are those measures that were in regulation as of July 16, 2010. In July 2010, the management measures were revised in response to the Court order in NRDC v. Locke. On July 8, 2010 a final rule was published to reduce the 2010 OY for yelloweye rockfish from 17 mt to 14 mt, specify a 2010 darkblotched OY of 330 mt (2008 level) and a 2010 cowcod OY of 4 mt (75 FR 39178).

A Pacific whiting OY of 193,935 mt was used to manage the 2010 west coast whiting fisheries and forms the basis for the No Action Alternative (May 4, 2010; 75 FR 23620). The 2010 tribal allocation was set at 49,939 mt, based on an interim formula for tribal allocations for the 2010 season. An additional 3,000 mt of whiting was set aside from the U.S. OY to accommodate research catch and incidental bycatch in non-whiting fisheries. This left approximately 140,996 mt for the non-tribal whiting fleets. Under the fixed allocations for these fleets specified in the FMP and in Federal regulations, the 2010 whiting quotas were 59,218 mt (42 percent) for the shoreside whiting sector, 33,839 mt (24 percent) for the at-sea mothership sector, and 47,939 mt (34 percent) for the at-sea catcher-processor sector.

Limited Entry Trawl Fishery Management Measures – No Action

Implementation of Rationalized Fishery

Unlike Alternatives 1, 2, 3 and the FPA, the No Action alternative assumes that trawl rationalization is not in place.

Non-rationalized Fishery Management

The limited entry trawl fishery management is divided into two broad sectors: a multi-species trawl fishery, which most often uses bottom trawl gear (hereafter called the non-whiting sector), and the Pacific whiting fishery, which uses midwater trawl gear. The non-whiting trawl fishery is principally managed through 2-month cumulative landing limits along with closed areas to limit overfished species bycatch. Non-whiting trawlers target the range of species described above with the exception of Pacific whiting. The Pacific whiting fishery almost exclusively catches that species, although overfished species bycatch is constrained through bycatch limits specified for each of the three sectors of the fishery. The No Action Alternative assumed that trawl rationalization is not implemented. Principal management measures for non-whiting trawl fisheries are:

- Two-month cumulative landing limits are the principal catch control tool. These 2-month limits apply to each vessel and are specified for various species or species categories. Once a vessel reaches a limit, that type of fish can no longer be landed.

- NMFS implemented an at-sea observer program in 2002 in response to the need to accurately account for bycatch mortality. Currently approximately 20 percent of non-whiting trawl fishing is covered by observers. This level of coverage is thought large enough to be able to make accurate statistical estimates of total catch (landed catch plus bycatch).

- Gear restrictions have been a basic feature of the management regime since the implementation of the groundfish FMP. In recent years restrictions focused on discouraging or prohibiting gear that may be used in rocky habitat, where some overfished species lived. These restrictions have also helped to prevent fishing-related damage to these habitats. The use of bycatch-reducing trawl nets has also been required in some areas.

- Groundfish Conservation Areas - Closed areas to keep vessels away from depth ranges where overfished species are more abundant. These closed areas, include Rockfish Conservation Areas (RCAs) and are used for coastwide management. Though not much bottom trawling is done south of Point Conception at 34°27' north latitude in the Southern California Bight, bottom trawling and other bottom fishing activities are prohibited in two discrete areas called the CCAs (Figure 2-4). Closed EFH areas are used to protect bottom habitat from the adverse effects of trawl gear. Off the Washington coast, South Coast Area A was a voluntary "area to be avoided" for commercial groundfish fisheries, while South Coast Area B was closed to fishing (Figure 2-5). North Coast Area B was closed to commercial fishing in 2009-2010.

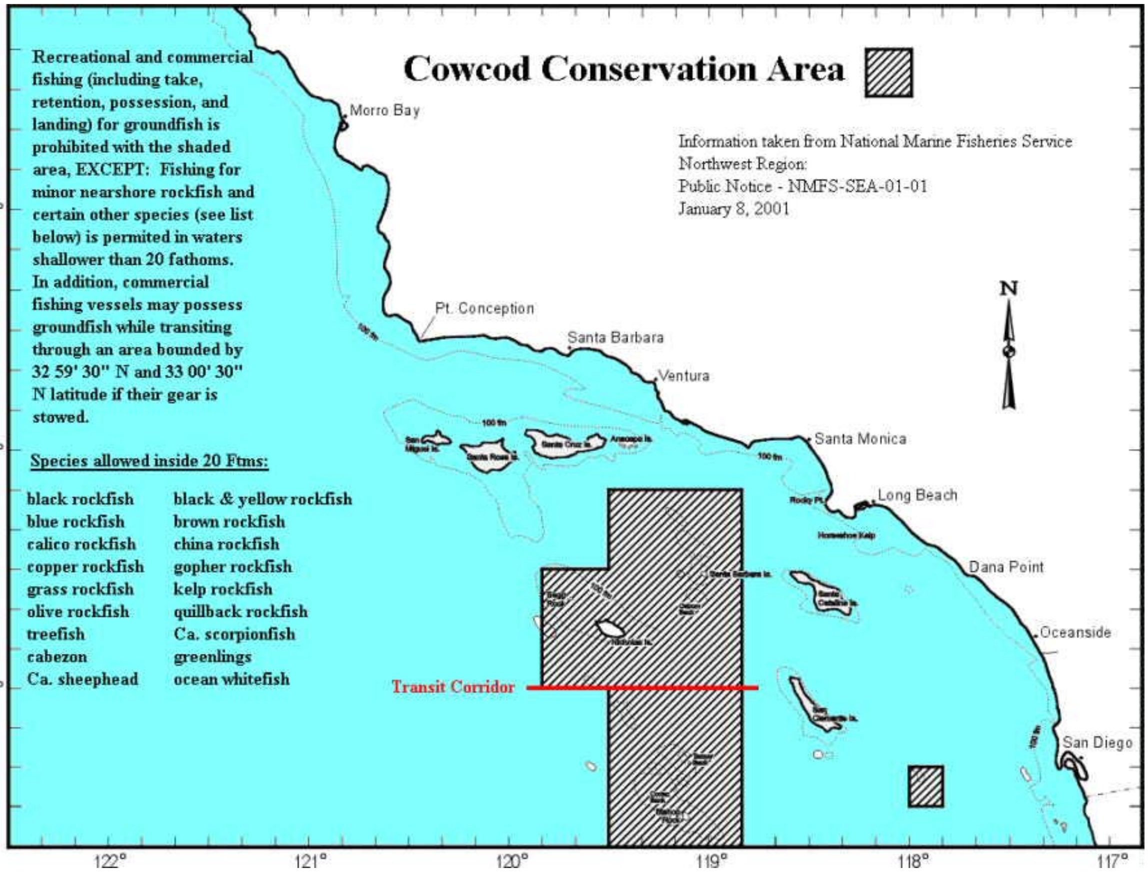


Figure 2-4. The current Cowcod Conservation Areas located in the Southern California Bight.

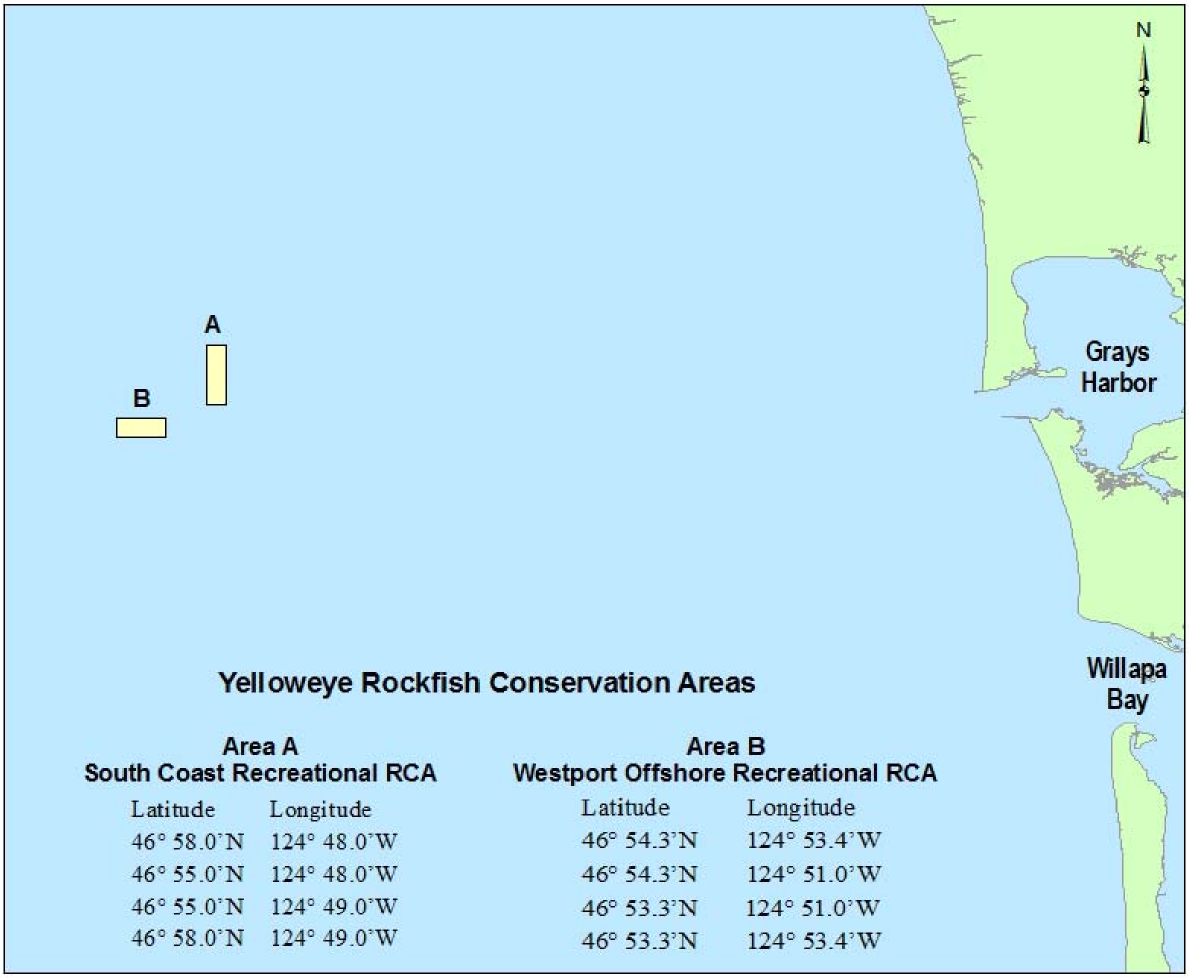


Figure 2-5. Two Yelloweye Rockfish Conservation Areas (WA South Coast Area A and Area B) in waters off the Washington south coast. In 2009-2010, participants in commercial fisheries were asked to voluntarily avoid this area. WA South Coast Area B, the southernmost YRCA in the figure, was closed to recreational and Pacific halibut fisheries in 2009-2010.

The 2010 trawl trip limits and seasonal RCA configurations in effect on July 16, 2010 describe the No Action Alternative and are shown in Table 2-62 (north of 40°10' north latitude) and Table 2-63 (south of 40°10' north latitude). The 2010 trawl trip limits and seasonal RCA configurations have been designed to allow targeting of healthy stocks while reducing the incidental catch of overfished species through the following strategies:

- Requiring the use of selective flatfish trawls in the fishery operating shoreward of the trawl RCA north of 40°10' N. latitude. The selective flatfish trawl, is designed to reduce rockfish bycatch while efficiently catching flatfish.

- Minimizing the trawl bycatch of canary and yelloweye rockfish north of 40°10' north latitude by eliminating trawl fishing opportunity north of Cape Alava at 48°10' north latitude in depths less than 150 fm and by restricting fishing shoreward of the RCA to depths shallower than 75 fm for five of the six fishing periods between 48°10 and 40°10 north latitude.

- Encouraging vessels north of 40°10 north latitude to avoid canary rockfish by fishing seaward of the RCAs through the use of differential trip limits. Cumulative limits are larger in the areas seaward of the RCAs and where vessels using multiple gears are subject to lower limits.

- Encouraging vessels south of 40°10 north latitude to avoid canary rockfish by primarily allowing slope fishing opportunity.

- Allowing some chilipepper fishing with midwater trawl gear due to relatively low bycatch of overfished species (some bocaccio).

- Allowing Scottish seine gear to be exempt from trawl RCA closures in the area between 38° north latitude and 36° north latitude and depths less than 100 fm where low bycatch rates of overfished species were previously demonstrated through a gear specific EFP and through subsequent WCGOP monitoring.

- Allowing only minor landing limits for overfished species that are incidentally caught with healthy stocks.

- Allowing reduced access to winter aggregations of petrale sole through the use of RCA that are modified to shallower depths during the winter months North of 40°10 north latitude.

Table 2-62. No Action: Limited entry trawl trip limits and RCA restrictions north of 40°10' N. latitude as of July 16, 2010.

		JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
	Rockfish Conservation Area (RCA)[6/]:						
1	North of 48°10' N. lat.	shore - modified[7/] 200 fm line[6/]	shore - 200 fm line[6/]	shore - 150 fm line[6/]		shore - 200 fm line[6/]	shore - modified[7/] 200 fm line[6/]
2	48°10' N. lat. - 45°46' N. lat.	75 fm line[6/] - modified[7/] 200 fm line[6/]	75 fm line[6/] - 200 fm line[6/]	75 fm line[6/] - 150 fm line[6/]	100 fm line[6/] - 150 fm line[6/]	75 fm line[6/] - 200 fm line[6/]	75 fm line[6/] - modified[7/] 200 fm line[6/]
3	45°46' N. lat. - 40°10' N. lat.			75 fm line[6/] - 200 fm line[6/]	100 fm line[6/] - 200 fm line[6/]		
	Selective flatfish trawl gear is required shoreward of the RCA; all trawl gear (large footrope, selective flatfish trawl, and small footrope trawl gear) is permitted seaward of the RCA. Large footrope and small footrope trawl gears (except for selective flatfish trawl gear) are prohibited shoreward of the RCA. Midwater trawl gear is permitted only for vessels participating in the primary whiting season.						
	See § 660.370 and § 660.381 for Additional Gear, Trip Limit, and Conservation Area Requirements and Restrictions. See §§ 660.390-660.394 and §§ 660.396-660.399 for Conservation Area Descriptions and Coordinates (including RCAs, YRCA, CCAs, Farallon Islands, Cordell Banks, and EFHCAs).						
	State trip limits and seasons may be more restrictive than federal trip limits, particularly in waters off Oregon and California.						
4	**Minor slope rockfish[3/] & Darkblotched rockfish**	6,000 lb/ 2 months		2,000 lb/ 2 months			
5	**Pacific ocean perch**	1,500 lb/ 2 months					
6	**DTS complex**						
7	Sablefish						
8	large & small footrope gear	20,000 lb/ 2 months		24,000 lb/ 2 months	21,000 lb/ 2 months		
9	selective flatfish trawl gear	9,000 lb/ 2 months					
10	multiple bottom trawl gear[8/]	9,000 lb/ 2 months					
11	Longspine thornyhead						
12	large & small footrope gear	24,000 lb/ 2 months					
13	selective flatfish trawl gear	5,000 lb/ 2 months					
14	multiple bottom trawl gear[8/]	5,000 lb/ 2 months					
15	Shortspine thornyhead						
16	large & small footrope gear	18,000 lb/2 months					
17	selective flatfish trawl gear	5,000 lb/ 2 months					
18	multiple bottom trawl gear[8/]	5,000 lb/ 2 months					
19	Dover sole						
20	large & small footrope gear	110,000 lb/ 2 months		100,000 lb/ 2 months			
21	selective flatfish trawl gear	65,000 lb/ 2 months					
22	multiple bottom trawl gear[8/]	65,000 lb/ 2 months					

TABLE 3 (North)

Table 2-62. No Action: Limited entry trawl trip limits and RCA restrictions north of 40°10' N. latitude as of July 16, 2010 (continued).

		JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
23	**Whiting**						
24	midwater trawl	Before the primary whiting season: CLOSED. -- During the primary season: mid-water trawl permitted in the RCA. See §660.373 for season and trip limit details. -- After the primary whiting season: CLOSED.					
25	large & small footrope gear	Before the primary whiting season: 20,000 lb/trip. -- During the primary season: 10,000 lb/trip. -- After the primary whiting season: 10,000 lb/trip.					
26	**Flatfish** (except Dover sole)						
27	Arrowtooth flounder						
28	large & small footrope gear	150,000 lb/ 2 months					
29	selective flatfish trawl gear	90,000 lb/ 2 months					
30	multiple bottom trawl gear[8/]	90,000 lb/ 2 months					
31	Other flatfish[3/], English sole, starry flounder, & Petrale sole						
32	large & small footrope gear for Other flatfish[3/], English sole, & starry flounder	110,000 lb/ 2 months	110,000 lb/ 2 months, no more than 9,500 lb/ 2 months of which may be petrale sole.		100,000 lb/ 2 months, no more than 6,300 lb/ 2 months of which may be petrale sole.		100,000 lb/ 2 months
33	large & small footrope gear for Petrale sole	9,500 lb/ 2 months					6,300 lb/ 2 months
34	selective flatfish trawl gear for Other flatfish[3/], English sole, & starry flounder	90,000 lb/ 2 months, no more than 9,500 lb/ 2 months of which may be petrale sole.	60,000 lb/ 2 months, no more than 9,500 lb/ 2 months of which may be petrale sole.		60,000 lb/ 2 months, no more than 6,300 lb/ 2 months of which may be petrale sole. **Effective at 0001 hours local time on July 16, 2010.**		
35	selective flatfish trawl gear for Petrale sole						
36	multiple bottom trawl gear[8/]	90,000 lb/ 2 months, no more than 9,500 lb/ 2 months of which may be petrale sole.	60,000 lb/ 2 months, no more than 9,500 lb/ 2 months of which may be petrale sole.		60,000 lb/ 2 months, no more than 6,300 lb/ 2 months of which may be petrale sole. **Effective at 0001 hours local time on July 16, 2010.**		
37	**Minor shelf rockfish[1/], Shortbelly, Widow & Yelloweye rockfish**						
38	midwater trawl for Widow rockfish	Before the primary whiting season: CLOSED. -- During primary whiting season: In trips of at least 10,000 lb of whiting, combined widow and yellowtail limit of 500 lb/ trip, cumulative widow limit of 1,500 lb/ month. Mid-water trawl permitted in the RCA. See §660.373 for primary whiting season and trip limit details. -- After the primary whiting season: CLOSED.					
39	large & small footrope gear	300 lb/ 2 months					
40	selective flatfish trawl gear	300 lb/ month		1,000 lb/ month, no more than 200 lb/ month of which may be yelloweye rockfish			300 lb/ month
41	multiple bottom trawl gear[8/]	300 lb/ month		300 lb/ 2 months, no more than 200 lb/ month of which may be yelloweye rockfish			300 lb/ month

TABLE 3 (North) con't

Table 2-62. No Action: Limited entry trawl trip limits and RCA restrictions north of 40°10' N. latitude as of July 16, 2010 (continued).

#		JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
42	**Canary rockfish**						
43	large & small footrope gear	CLOSED					
44	selective flatfish trawl gear	100 lb/ month		300 lb/ month		100 lb/ month	
45	multiple bottom trawl gear [8/]	CLOSED					
46	**Yellowtail**						
47	midwater trawl	Before the primary whiting season: CLOSED. – During primary whitng season: In trips of at least 10,000 lb of whiting: combined widow and yellowtail limit of 500 lb/ trip, cumulative yellowtail limit of 2,000 lb/ month. Mid-water trawl permitted in the RCA. See §660.373 for primary whiting season and trip limit details. – After the primary whiting season: CLOSED.					
48	large & small footrope gear	300 lb/ 2 months					
49	selective flatfish trawl gear	2,000 lb/ 2 months					
50	multiple bottom trawl gear [8/]	300 lb/ 2 months					
51	**Minor nearshore rockfish & Black rockfish**						
52	large & small footrope gear	CLOSED					
53	selective flatfish trawl gear	300 lb/ month					
54	multiple bottom trawl gear [8/]	CLOSED					
55	**Lingcod** [4/]						
56	large & small footrope gear	1,200 lb/ 2 months		4,000 lb/ 2 months			
57	selective flatfish trawl gear			1,200 lb/2 months			
58	multiple bottom trawl gear [8/]						
59	**Pacific cod**	30,000 lb/ 2 months		70,000 lb/ 2 months			30,000 lb/ 2 months
60	**Spiny dogfish**	200,000 lb/ 2 months		150,000 lb/ 2 months	100,000 lb/ 2 months		
61	**Other Fish** [5/]	Not limited					

TABLE 3 (North) cont'd

1/ Bocaccio, chilipepper and cowcod are included in the trip limits for minor shelf rockfish.
2/ Splitnose rockfish is included in the trip limits for minor slope rockfish.
3/ "Other flatfish" are defined at § 660.302 and include butter sole, curlfin sole, flathead sole, Pacific sanddab, rex sole, rock sole, and sand sole.
4/ The minimum size limit for lingcod is 22 inches (56 cm) total length North of 42° N. lat. and 24 inches (61 cm) total length South of 42° N. lat.
5/ "Other fish" are defined at § 660.302 and include sharks, skates (including longnose skate), ratfish, morids, grenadiers, and kelp greenling. Cabezon is included in the trip limits for "other fish."
6/ The Rockfish Conservation Area is an area closed to fishing by particular gear types, bounded by lines specifically defined by latitude and longitude coordinates set out at §§ 660.391-660.394. This RCA is not defined by depth contours, and the boundary lines that define the RCA may close areas that are deeper or shallower than the depth contour. Vessels that are subject to the RCA restrictions may not fish in the RCA, or operate in the RCA for any purpose other than transiting.
7/ The "modified" fathom lines are modified to exclude certain petrale sole areas from the RCA.
8/ If a vessel has both selective flatfish gear and large or small footrope gear on board during a cumulative limit period (either simultaneously or successively), the most restrictive cumulative limit for any gear on board during the cumulative limit period applies for the entire cumulative limit period.

To convert pounds to kilograms, divide by 2.20462, the number of pounds in one kilogram.

Table 2-63. No Action: Limited entry trawl trip limits and RCA restrictions south of 40°10' N. latitude as of July 16, 2010.

		JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
	Rockfish Conservation Area (RCA)[6/]:						
1	South of 40°10' N. lat.	100 fm line[6/] - 150 fm line[6/ 7/]					
	All trawl gear (large footrope, selective flatfish trawl, midwater trawl, and small footrope trawl gear) is permitted seaward of the RCA. Large footrope trawl gear and midwater trawl gear are prohibited shoreward of the RCA.						
	See § 660.370 and § 660.381 for Additional Gear, Trip Limit, and Conservation Area Requirements and Restrictions. See §§ 660.390-660.394 and §§ 660.396-660.399 for Conservation Area Descriptions and Coordinates (including RCAs, YRCA, CCAs, Farallon Islands, Cordell Banks, and EFHCAs).						
	State trip limits and seasons may be more restrictive than federal trip limits, particularly in waters off Oregon and California.						
2	**Minor slope rockfish[2/] & Darkblotched rockfish**						
3	40°10' - 38° N. lat.	15,000 lb/ 2 months					
4	South of 38° N. lat.	55,000 lb/ 2 months					
5	**Splitnose**						
6	40°10' - 38° N. lat.	15,000 lb/ 2 months					
7	South of 38° N. lat.	55,000 lb/ 2 months					
8	**DTS complex**						
9	Sablefish	22,000 lb/ 2 months			21,000 lb/ 2 months		
10	Longspine thornyhead	24,000 lb/ 2 months					
11	Shortspine thornyhead	18,000 lb/ 2 months					
12	Dover sole	110,000 lb/ 2 months			100,000 lb/ 2 months		
13	**Flatfish** (except Dover sole)						
14	Other flatfish[3/], English sole, & starry flounder	110,000 lb/ 2 months	110,000 lb/ 2 months, no more than 9,500 lb/ 2 months of which may be petrale sole.		100,000 lb/ 2 months, no more than 6,300 lb/ 2 months of which may be petrale sole.		100,000 lb/ 2 months
15	Petrale sole	9,500 lb/ 2 months					6,300 lb/ 2 months
16	Arrowtooth flounder	10,000 lb/ 2 months					
17	**Whiting**						
18	midwater trawl	Before the primary whiting season: CLOSED. – During the primary season: mid-water trawl permitted in the RCA. See §660.373 for season and trip limit details. – After the primary whiting season: CLOSED.					
19	large & small footrope gear	Before the primary whiting season: 20,000 lb/trip. – During the primary season: 10,000 lb/trip. -- After the primary whiting season: 10,000 lb/trip.					

TABLE 3 (South)

Table 2-63. No Action: Limited entry trawl trip limits and RCA restrictions south of 40°10' N. latitude as of July 16, 2010 (continued).

		JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
20	**Minor shelf rockfish[1/], Chilipepper, Shortbelly, Widow, & Yelloweye rockfish**						
21	large footrope or midwater trawl for Minor shelf rockfish & Shortbelly	300 lb/ month					
22	large footrope or midwater trawl for Chilipepper	12,000 lb/ 2 months					
23	large footrope or midwater trawl for Widow & Yelloweye	CLOSED					
24	small footrope trawl for Minor Shelf, Shortbelly, Widow & Yelloweye	300 lb/ month					
25	small footrope trawl for Chilipepper	12,000 lb/ 2 months					
26	**Bocaccio**						
27	large footrope or midwater trawl	300 lb/ 2 months					
28	small footrope trawl	CLOSED					
29	**Canary rockfish**						
30	large footrope or midwater trawl	CLOSED					
31	small footrope trawl	100 lb/ month		300 lb/ month		100 lb/ month	
32	**Cowcod**	CLOSED					
33	**Bronzespotted rockfish**	CLOSED					
34	**Minor nearshore rockfish & Black rockfish**						
35	large footrope or midwater trawl	CLOSED					
36	small footrope trawl	300 lb/ month					
37	**Lingcod[4/]**						
38	large footrope or midwater trawl	1,200 lb/ 2 months		4,000 lb/ 2 months			
39	small footrope trawl			1,200 lb/ 2 months			
40	**Pacific cod**	30,000 lb/ 2 months		70,000 lb/ 2 months			30,000 lb/ 2 months
41	**Spiny dogfish**	200,000 lb/ 2 months		150,000 lb/ 2 months	100,000 lb/ 2 months		
42	**Other Fish[5/] & Cabezon**	Not limited					

TABLE 3 (South) con't

1/ Yellowtail is included in the trip limits for minor shelf rockfish. Bronzespotted rockfish have a species specific trip limit.
2/ POP is included in the trip limits for minor slope rockfish
3/ "Other flatfish" are defined at § 660.302 and include butter sole, curlfin sole, flathead sole, Pacific sanddab, rex sole, rock sole, and sand sole.
4/ The minimum size limit for lingcod is 24 inches (61 cm) total length South of 42° N. lat.
5/ Other fish are defined at § 660.302 and include sharks, skates (including longnose skate), ratfish, morids, grenadiers, and kelp greenling.
6/ The Rockfish Conservation Area is an area closed to fishing by particular gear types, bounded by lines specifically defined by latitude and longitude coordinates set out at §§ 660.391-660.394. This RCA is not defined by depth contours, and the boundary lines that define the RCA may close areas that are deeper or shallower than the depth contour. Vessels that are subject to the RCA restrictions may not fish in the RCA, or operate in the RCA for any purpose other than transiting.
7/ South of 34°27' N. lat., the RCA is 100 fm line - 150 fm line along the mainland coast; shoreline - 150 fm line around islands.
To convert pounds to kilograms, divide by 2.20462, the number of pounds in one kilogram.

Whiting Trawl Fishery – No Action

Implementation of Rationalized Fishery

Unlike Alternatives 1, 2, 3 and the FPA, the No Action alternative assumes that trawl rationalization is not in place.

Non-rationalized Fishery Management

The Pacific whiting fishery is managed by an annual quota. A season start date is set by regulation, usually in mid-May, and the fishery proceeds until the quota is taken, a bycatch limit is reached or fishing operations stop for economic reasons (vessels moving to other fisheries, whiting moving offshore). Because of the low OYs for overfished species in recent years, sector specific bycatch limits, applicable to all whiting sectors, have been imposed for widow, canary, and darkblotched rockfish (the main overfished species caught in the fishery). The No Action Alternative would continue to apportion bycatch limits for canary, darkblotched, and widow rockfish using the same distribution as is used for whiting in 2010 with 34 percent of the available yields of these species' bycatch limits allocated to the catcher-processor sector, 24 percent to the mothership sector, and 42 percent to the shoreside sector.

For canary rockfish, the bycatch limit of 14 mt would be used to balance an increasing canary rockfish bycatch rate in the whiting fishery and the needs of the non-whiting sectors. Similarly, the whiting fishery has seen an increasing widow rockfish bycatch rate as the widow rockfish stock rebuilds. The Council's recommendation of 279 mt for widow rockfish was based on a linear interpolation of widow rockfish bycatch rates from 2006-2009 that resulted in an estimate of 279 mt. For darkblotched rockfish the 25 mt bycatch limit (25 mt) is a high value that should be available to the fleet to prevent shutting down the fishery during the season. Given the recommendation to reduce the amount of canary rockfish available to the fleet (from 18 mt in 2009 to 14 mt in 2010), the 25 mt darkblotched bycatch limit for the 2010 fisheries would allow the fishery to move deeper to avoid canary rockfish. The sector-specific bycatch limits for the No Action Alternative are shown in Table 2-64.

Table 2-64. No Action. Non-tribal limited entry Pacific whiting trawl bycatch limits for 2011-2012.

Species	Total	Shoreside (42%)	Catcher-Processor (34%)	Mothership (24%)
Canary	14 mt	5.9 mt	4.8 mt	3.3 mt
Darkblotched	25 mt	10.5 mt	8.5 mt	6.0 mt
Widow	279 mt	117 mt	95 mt	67 mt

A reapportionment provision is also available for unused bycatch limit yields, such that when a whiting sector is closed by attaining its whiting allocation or if it is closed by projected attainment of a sector-specific bycatch limit, any remaining yield of the bycatch limit is distributed to the other non-tribal whiting sectors using the same pro-rata apportionment used to allocate whiting quota and sector-specific bycatch limits. On a sector-specific basis, NMFS has the authority to restrict the non-tribal whiting vessels to fishing depths greater than any of the specified management lines between the 75 fm and 150 fm lines. Management measures also maintain the authority for NMFS to implement the Ocean Salmon Conservation Zone (i.e., fishing restricted to depths seaward of the 100 fm line) if the Chinook HG is projected to be attained inseason.

Catcher vessels in the shore-based fishery primarily fish under EFPs and do not sort at sea. All EFP catch is monitored at-sea by electronic video monitoring systems and the deliveries are required to have 100% catch monitor coverage and electronic fish ticket reporting. Shore-based catcher vessels fishing in the RCA during the primary season may sort at sea providing they carry at least one observer. Vessels less than 75 feet in length are exempt from the at-sea processing rules and are allowed to freeze and remove the tails of their whiting for value-added product delivery. Catcher vessels in the mothership sectors must retain all their catch for delivery to the processor. Catch is then monitored by observers on the motherships. Likewise, vessels in the catcher-processor sector carry at-sea observers to monitor the catch when brought aboard. Pacific whiting fishery catch data is received in real time.

Limited Entry and Open Access Fixed Gear Management – No Action

Table 2-65 provides a summary of the limited entry fixed gear management measures under the No Action Alternative and Table 2-66 provides a summary of the open access fixed gear management measures under the No Action Alternative. Under the No Action Alternative, the principal management measures for the fixed gear fisheries are two-month cumulative landing limits, tier limits and seasons for the primary sablefish fishery, and non-trawl RCAs.

Table 2-65. Summary of limited entry fixed gear fishery management measures under the No Action Alternative.

Cumulative limits	• Cumulative trip limits for most species, specific to geographic area (See trip limit Tables 2-68 and 2-69) Average annual limits by target species are: • Primary sablefish fishery managed with tier limits Tier 1 at 56,081 lb, Tier 2 at 25,492 lb, and Tier 3 at 14,567 lb • Canary and yelloweye landings prohibited coastwide • South of 40°10 N. latitude landings of cowcod and bronzespotted rockfish prohibited
Size limits	Lingcod • North of 42° N. lat. minimum size limit 22 inches total length • South of 42° N. lat. minimum size limit 24 inches total length
Gear restrictions	• Longline, trap or pot marked at the surface, at each terminal end, with a pole, flag, light, radar reflector, and a buoy • Must be attended at least once every 7 days • Traps must have biodegradable escape panels
Seasons	• Primary sablefish fishery from 4/1 to 10/31 • Permit stacking of up to 3 permits is allowed in primary sablefish fishery. • Additional seasonal restrictions may be implemented via routine action or the fishery may "close" for some species or some areas during the year through inseason action.
GCAs	YRCA • North Coast Commercial YRCA (WA) closed to commercial fixed gears. • North Coast Recreational YRCA (WA) is a voluntary area to be avoided. • Westport Offshore Recreational YRCA (WA) is a voluntary area to be avoided.
	CCA Fishing is prohibited in CCAs with the following exceptions: • Fishing for "other flatfish" when using no more than 12 hooks, #2 or smaller • Fishing for rockfish and lingcod shoreward of the 20 fm
	Farallon Islands commercial fishing for groundfish is prohibited shoreward of 10 fm with the following exceptions: Fishing for "other flatfish" when using no more than 12 hooks, #2 or smaller Cordell Banks Commercial fishing for groundfish is prohibited in depths less than 100 fm
	EFH Fishing with all bottom contact gear, including longline and pot/trap gear, is prohibited within the following EFH conservation areas: Thompson Seamount, President Jackson Seamount, Cordell Bank (50 fm (91 m) isobath), Harris Point, Richardson Rock, Scorpion, Painted Cave, Anacapa Island, Carrington Point, Judith Rock, Skunk Point, Footprint, Gull Island, South Point, and Santa Barbara. Fishing with bottom contact gear is also prohibited within the Davidson Seamount
Non-trawl RCAs	• North of 46°16 N. lat. Shoreline to 100 fm • 46°16-45°03.83 N. lat. 30 to 100 fm • 45°03.83 - 43° N. lat. 30 to 125 fm • 43°-42° N. lat. 20 to 100 fm • 42°-40°10 N. lat. 20 fm to 100 fm • 40°10-34°27 N. lat. – 30 to 150 fm • South of 34°27 N. lat. – 60 to 150 fm Fishing is prohibited in non-trawl RCAs with the following exception: Fishing for "other flatfish" when using no more than 12 hooks, #2 or smaller
Monitoring	• VMS required • WCGOP observer coverage when requested
Reporting	• VMS declarations

Table 2-66. Summary of open access fishery management measures under the No Action Alternative.

Cumulative limits	• Cumulative trip limits for most species, specific to trawl type and geographic area, (See trip limit Tables 2-70 and 2-71). • Canary and yelloweye landings prohibited coastwide • South of 40°10 N. latitude landings of cowcod and bronzespotted rockfish prohibited
Gear restrictions	• Longline, trap, pot, hook-and-line (fixed or mobile), setnet (anchored gillnet or trammel net (south of 38° N. lat. only), spear, and non-groundfish trawl gear for: pink shrimp, ridgeback prawn, and California halibut or sea cucumbers (south of Pt. 38°57.50' N. lat.) <u>Non-groundfish trawl gear:</u> • Is exempt from the limited entry trawl gear restrictions • Footrope (>19") prohibited in EFH <u>Fixed gear:</u> • Must be marked at the surface, at each terminal end, with a pole, flag, light, radar reflector, and a buoy; vertical hook-and-line gear that is closely tended may be marked only with a single buoy of sufficient size to float the gear. • Must be attended at least once every 7 days. • Fishing for groundfish with set nets is prohibited in the fishery management area north of 38°00.00' N. lat. • Traps must have biodegradable escape panels • Spears may be propelled by hand or by mechanical means
Seasons	Seasonal restrictions may be implemented via routine action or the fishery may "close" for some species or some areas during the year through inseason action.
GCAs	<u>YRCA</u> • North Coast Commercial YRCA (WA) closed to commercial fixed gears. • North Coast Recreational YRCA (WA) is a voluntary area to be avoided. • Westport Offshore Recreational YRCA (WA) is a voluntary area to be avoided. • Salmon Troll YRCA. Fishing for salmon is prohibited
	<u>CCA</u> Fishing is prohibited in CCAs with the following exceptions: • Fishing for "other flatfish" when using no more than 12 hooks, #2 or smaller • Fishing for rockfish and lingcod shoreward of the 20 fm
Open Access non-trawl RCAs	• <u>North of 46°16 N. lat</u>. Shoreline to 100 fm • <u>46°16-45°03.83 N. lat</u>. 30 to 100 fm • <u>45°03.83 - 43° N. lat.</u> 30 to 125 fm • <u>43°-42° N. lat.</u> 20 to 100 fm • <u>42°-40°10 N. lat.</u> 20 fm to 100 fm • <u>40°10-34°27 N. lat</u>. – 30 to 150 fm • <u>South of 34°27 N. lat</u>. – 60 to 150 fm Fishing is prohibited in non-trawl RCAs with the following exception: Fishing for "other flatfish" when using no more than 12 hooks, #2 or smaller
Monitoring	• VMS required • WCGOP observer coverage when requested
Reporting	• VMS declarations

<u>Non-Nearshore Fixed Gear – No Action</u>

The non-nearshore fixed gear sector is composed of limited entry and open access vessels targeting species seaward of the non-trawl RCA. These directed groundfish vessels operate on the shelf and slope, primarily targeting sablefish, shortspine thornyhead, and slope rockfish species. The limited entry fixed gear fishery includes vessels that hold a Federal limited entry permit with or without a sablefish endorsement that allows them to participate in the primary sablefish fishery. Further, the limited entry permits are endorsed by gear type – pot or longline. The open access sablefish fishery is part of the directed open access fisheries, which is composed of vessels without a Federal limited entry permit (trawl or fixed gear) that target groundfish. Other open access vessels target nearshore species and those conditions are described below. Under the No Action Alternative, the 2010 sablefish OY and allocations specified in regulation are carried forward for 2011-2012 (Table 2-67).

Table 2-67. No Action Alternative: Sablefish north of 36° N. latitude limited entry fixed gear and open access allocations for 2011-2012.

<table>
<tr><th>Species</th><th>ACL (mt)</th><th>Fishery</th><th>Allocation (mt)</th></tr>
<tr><td rowspan="4">Sablefish N. 36° N. Lat.</td><td rowspan="4">6,471</td><td>LE Fixed Gear Primary</td><td>1,819</td></tr>
<tr><td>LE Fixed Gear Daily Trip Limit</td><td>321</td></tr>
<tr><td>LE Fixed Gear Total</td><td>2,140</td></tr>
<tr><td>Open Access</td><td>529</td></tr>
</table>

Non-Nearshore Limited Entry Fixed Gear

The 2010 limited entry fixed gear trip limits and the non-trawl RCA configuration in effect on July 16, 2010, describe the No Action Alternative and are shown in Table 2-68 (north of 40°10’ north latitude) and Table 2-69 (south of 40°10’ north latitude). The 2010 limited entry fixed gear trip limits and seasonal RCA configurations have been designed to allow targeting of healthy stocks while reducing the incidental catch of overfished species through the following strategies:

- Prohibiting the landing of canary and yelloweye rockfish coastwide and cowcod and bronzespotted rockfish south of 40°10 north latitude to eliminate targeting and thereby reduce catch.

- Allowing permit stacking in the primary sablefish fishery, where the sablefish tier limits from one to three permits may be used on a single vessel during the primary sablefish season. Limited entry permits with sablefish endorsements are assigned to one of three different cumulative trip limit tiers, based on the qualifying catch history of the permit. The 2010 sablefish tier limits are as follows: tier 1 = 56,081 lb, tier 2 = 25,492 lb, and tier 3 = 14,567 lb. Although a vessel may have sablefish tier limits from one to three permits stacked on a single vessel, the vessel cannot stack trip limits for species other than sablefish, which has reduced the overall bycatch of other species.

- Reducing canary and yelloweye rockfish catch by fixed gear fishermen targeting sablefish and other target groundfish by defining a seaward non-trawl RCA boundaries that eliminate fishing in depths and areas where canary and yelloweye rockfish are most abundant. The non-trawl RCAs include a 100 fm line in waters off northern California (north of 40°10' north latitude) to 43° north latitude. From 43° north latitude to Cascade Head (45°03.83' north latitude) the non-trawl RCA is set at 125 fm, except on days when the directed halibut fishery is open, when the fishery is then restricted to waters seaward of the 100 fm line. North of Cascade Head to the U.S.-Canada border the seaward boundary returns to 100 fm.

- Allowing for routine RCA adjustments for four northern subareas bounded by Cape Mendocino at 40°10' north latitude, 43° north latitude, Cascade Head, Point Chehalis at 46.888° north latitude, and the U.S.-Canada border. These adjustments maybe necessary inseason to reduce projected impacts to overfished species, typically yelloweye and canary rockfish.

- The non-trawl RCA seaward boundary south of 40°10' north latitude under the No Action Alternative is defined by management lines specified with waypoints at roughly 150 fm to avoid areas where bocaccio, canary and yelloweye rockfish are most abundant.

Table 2-68. No Action: Limited entry fixed gear trip limits and RCA restrictions north of 40°10' N. latitude as of July 16, 2010.

		JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
Rockfish Conservation Area (RCA)[6/]:							
1	North of 46°16' N. lat.	shoreline - 100 fm line[6/]					
2	46°16' N. lat. - 45°03.83' N. lat.	30 fm line[6/] - 100 fm line[6/]					
3	45°03.83' N. lat. - 43°00' N. lat.	30 fm line[6/] - 125 fm line[6/ 7/]					
4	43°00' N. lat. - 42°00' N. lat.	20 fm line[6/] - 100 fm line[6/]					
5	42°00' N. lat. - 40°10' N. lat.	20 fm depth contour - 100 fm line[6/]					
See § 660.370 and § 660.382 for Additional Gear, Trip Limit, and Conservation Area Requirements and Restrictions. See §§ 660.390-660.394 and §§ 660.396-660.399 for Conservation Area Descriptions and Coordinates (including RCAs, YRCA, CCAs, Farallon Islands, Cordell Banks, and EFHCAs).							
State trip limits and seasons may be more restrictive than federal trip limits, particularly in waters off Oregon and California.							
6	**Minor slope rockfish [2/] & Darkblotched rockfish**	4,000 lb/ 2 months					
7	**Pacific ocean perch**	1,800 lb/ 2 months					
8	**Sablefish**	1,750 lb per week, not to exceed 7,000 lb/ 2 months					
9	**Longspine thornyhead**	10,000 lb/ 2 months					
10	**Shortspine thornyhead**	2,000 lb/ 2 months					
11	**Dover sole**	5,000 lb/ month South of 42° N. lat., when fishing for "other flatfish," vessels using hook-and-line gear with no more than 12 hooks per line, using hooks no larger than "Number 2" hooks, which measure 11 mm (0.44 inches) point to shank, and up to two 1 lb (0.45 kg) weights per line are not subject to the RCAs.					
12	**Arrowtooth flounder**						
13	**Petrale sole**						
14	**English sole**						
15	**Starry flounder**						
16	**Other flatfish**[1/]						
17	**Whiting**	10,000 lb/ trip					
18	**Minor shelf rockfish**[2/]**, Shortbelly, Widow, & Yellowtail rockfish**	200 lb/ month					
19	**Canary rockfish**	CLOSED					
20	**Yelloweye rockfish**	CLOSED					
21	**Minor nearshore rockfish & Black rockfish**						
22	North of 42° N. lat.	5,000 lb/ 2 months, no more than 1,200 lb of which may be species other than black or blue rockfish [3/]					
23	42° - 40°10' N. lat.	6,000 lb/ 2 months, no more than 1,200 lb of which may be species other than black or blue rockfish [3/]	7,000 lb/ 2 months, no more than 1,200 lb of which may be species other than black rockfish [3/]				
24	**Lingcod**[4/]	CLOSED		800 lb/ 2 months			400 lb/ month | CLOSED
25	**Pacific cod**	1,000 lb/ 2 months					
26	**Spiny dogfish**	200,000 lb/ 2 months		150,000 lb/ 2 months	100,000 lb/ 2 months		
27	**Other fish**[5/]	Not limited					

TABLE 4 (North)

1/ "Other flatfish" are defined at § 660.302 and include butter sole, curlfin sole, flathead sole, Pacific sanddab, rex sole, rock sole, and sand sole.
2/ Bocaccio, chilipepper and cowcod are included in the trip limits for minor shelf rockfish and splitnose rockfish is included in the trip limits for minor slope rockfish.
3/ For black rockfish north of Cape Alava (48°09.50' N. lat.), and between Destruction Is. (47°40' N. lat.) and Leadbetter Pnt. (46°38.17' N. lat.), there is an additional limit of 100 lb or 30 percent by weight of all fish on board, whichever is greater, per vessel, per fishing trip.
4/ The minimum size limit for lingcod is 22 inches (56 cm) total length North of 42° N. lat. and 24 inches (61 cm) total length South of 42° N. lat.
5/ "Other fish" are defined at § 660.302 and include sharks, skates (including longnose skates), ratfish, morids, grenadiers, and kelp greenling. Cabezon is included in the trip limits for "other fish."
6/ The Rockfish Conservation Area is an area closed to fishing by particular gear types, bounded by lines specifically defined by latitude and longitude coordinates set out at §§ 660.391-660.394. This RCA is not defined by depth contours (with the exception of the 20-fm depth contour boundary south of 42° N. lat.), and the boundary lines that define the RCA may close areas that are deeper or shallower than the depth contour. Vessels that are subject to RCA restrictions may not fish in the RCA, or operate in the RCA for any purpose other than transiting.
7/ The 125 fm line restriction is in place all year, except on days when the directed halibut fishery is open. On those days the 100 fm line restriction is in effect.

To convert pounds to kilograms, divide by 2.20462, the number of pounds in one kilogram.

Table 2-69. No Action: Limited entry fixed gear trip limits and RCA restrictions south of 40°10' N. latitude as of July 16, 2010.

		JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
	Rockfish Conservation Area (RCA)[5/]:						
1	40°10' - 34°27' N. lat.	30 fm line[5/] - 150 fm line[5/]					
2	South of 34°27' N. lat.	60 fm line[5/] - 150 fm line[5/] (also applies around islands)					
	See § 660.370 and § 660.382 for Additional Gear, Trip Limit, and Conservation Area Requirements and Restrictions. See §§ 660.390-660.394 and §§ 660.396-660.399 for Conservation Area Descriptions and Coordinates (including RCAs, YRCA, CCAs, Farallon Islands, Cordell Banks, and EFHCAs).						
	State trip limits and seasons may be more restrictive than federal trip limits, particularly in waters off Oregon and California.						
3	**Minor slope rockfish[2/] & Darkblotched rockfish**	40,000 lb/ 2 months					
4	**Splitnose**	40,000 lb/ 2 months					
5	**Sablefish**						
6	40°10' - 36° N. lat.	1,750 lb per week, not to exceed 7,000 lb/ 2 months					
7	South of 36° N. lat.	400 lb/ day, or 1 landing per week of up to 1,500 lb				3,000 lb per week	
8	**Longspine thornyhead**	10,000 lb / 2 months					
9	**Shortspine thornyhead**						
10	40°10' - 34°27' N. lat.	2,000 lb/ 2 months					
11	South of 34°27' N. lat.	3,000 lb/ 2 months					
12	**Dover sole**	5,000 lb/ month South of 42° N. lat., when fishing for "other flatfish," vessels using hook-and-line gear with no more than 12 hooks per line, using hooks no larger than "Number 2" hooks, which measure 11 mm (0.44 inches) point to shank, and up to two 1 lb (0.45 kg) weights per line are not subject to the RCAs.					
13	**Arrowtooth flounder**						
14	**Petrale sole**						
15	**English sole**						
16	**Starry flounder**						
17	**Other flatfish[1/]**						
18	**Whiting**	10,000 lb/ trip					
19	**Minor shelf rockfish[2/], Shortbelly, Widow rockfish, and Bocaccio (including Chilipepper between 40°10' - 34°27' N. lat.)**						
20	40°10' - 34°27' N. lat.	Minor shelf rockfish, shortbelly, widow rockfish, bocaccio & chilipepper: 2,500 lb/ 2 months, of which no more than 500 lb/ 2 months may be any species other than chilipepper.					
21	South of 34°27' N. lat.	3,000 lb/ 2 months	CLOSED	3,000 lb/ 2 months			
22	**Chilipepper rockfish**						
23	40°10' - 34°27' N. lat.	Chilipepper included under minor shelf rockfish, shortbelly, widow and bocaccio limits -- See above					
24	South of 34°27' N. lat.	2,000 lb/ 2 months, this opportunity only available seaward of the nontrawl RCA					
25	**Canary rockfish**	CLOSED					
26	**Yelloweye rockfish**	CLOSED					
27	**Cowcod**	CLOSED					
28	**Bronzespotted rockfish**	CLOSED					
29	**Bocaccio**						
30	40°10' - 34°27' N. lat.	Bocaccio included under Minor shelf rockfish, shortbelly, widow & chilipepper limits – See above					
31	South of 34°27' N. lat.	300 lb/ 2 months	CLOSED	300 lb/ 2 months			

TABLE 4 (South)

Table 2-69. No Action: Limited entry fixed gear trip limits and RCA restrictions south of 40°10' N. latitude as of July 16, 2010 (continued).

		JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
32	**Minor nearshore rockfish & Black rockfish**						
33	Shallow nearshore	600 lb/ 2 months	CLOSED	800 lb/ 2 months	900 lb/ 2 months	800 lb/ 2 months	600 lb/ 2 months
34	Deeper nearshore						
35	40°10' - 34°27' N. lat.	700 lb/ 2 months	CLOSED	700 lb/ 2 months		800 lb/ 2 months	
36	South of 34°27' N. lat.	500 lb/ 2 months	CLOSED	600 lb/ 2 months		800 lb/ 2 months	
37	California scorpionfish	600 lb/ 2 months	CLOSED	600 lb/ 2 months	1,200 lb/ 2 months		
38	Lingcod[3/]	CLOSED		800 lb/ 2 months			400 lb/ month; CLOSED
39	Pacific cod	1,000 lb/ 2 months					
40	Spiny dogfish	200,000 lb/ 2 months		150,000 lb/ 2 months	100,000 lb/ 2 months		
41	Other fish[4/] & Cabezon	Not limited					

TABLE 4 (South)

1/ "Other flatfish" are defined at § 660.302 and include butter sole, curlfin sole, flathead sole, Pacific sanddab, rex sole, rock sole, and sand sole.
2/ POP is included in the trip limits for minor slope rockfish. Yellowtail is included in the trip limits for minor shelf rockfish. Bronzespotted rockfish have a species specific trip limit.
3/ The minimum size limit for lingcod is 24 inches (61 cm) total length South of 42° N. lat.
4/ "Other fish" are defined at § 660.302 and include sharks, skates (including longnose skates), ratfish, morids, grenadiers, and kelp greenling.
5/ The Rockfish Conservation Area is an area closed to fishing by particular gear types, bounded by lines specifically defined by latitude and longitude coordinates set out at §§ 660.391-660.394. This RCA is not defined by depth contours (with the exception of the 20-fm depth contour boundary south of 42° N. lat.), and the boundary lines that define the RCA may close areas that are deeper or shallower than the depth contour. Vessels that are subject to RCA restrictions may not fish in the RCA, or operate in the RCA for any purpose other than transiting.
To convert pounds to kilograms, divide by 2.20462, the number of pounds in one kilogram.

In Washington, the North Coast Area B YRCA (Figure 2-6) has been closed to commercial fixed gears (both limited entry and open access) since 2007. The South Coast Areas A and B Yelloweye Rockfish Conservation Area (YRCA) (Figure 2-5) and the "C-shaped" YRCA in waters off northern Washington (Figure 2-7) were voluntary "areas to be avoided." Fishing is not allowed in the CCAs (Figure 2-4) under the No Action Alternative, except for some nearshore commercial fishing opportunities described in the next section.

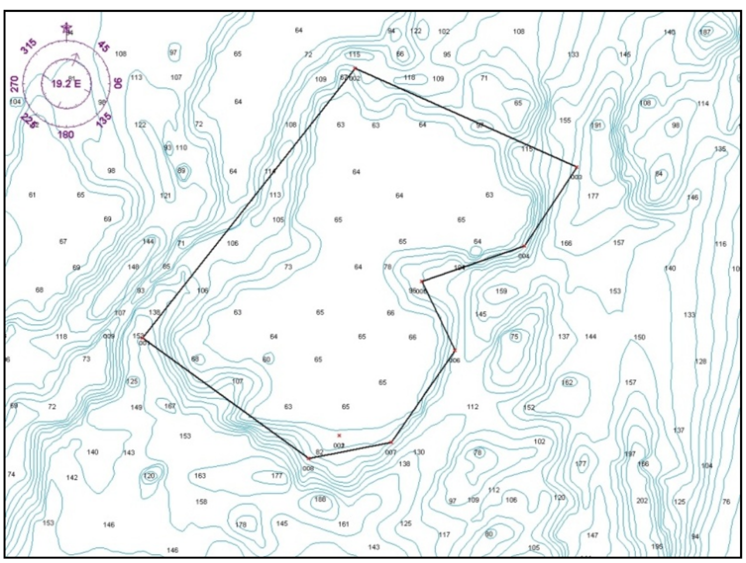


Figure 2-6. A Yelloweye Rockfish Conservation Area (North Coast B) in waters off the Washington north coast where limited entry and open access fixed gear fishing was prohibited in 2009-2010.

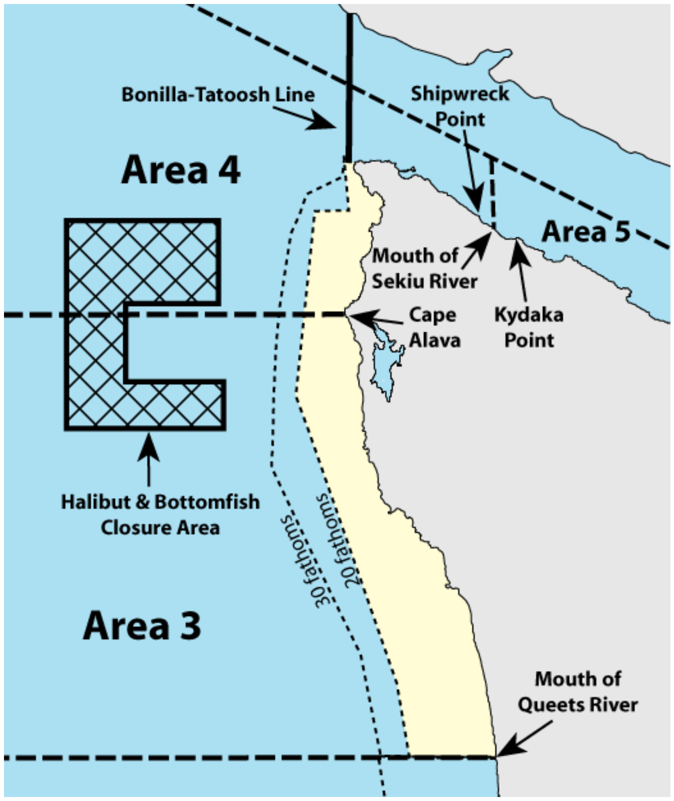


Figure 2-7. The current "C-shaped" Yelloweye Rockfish Conservation Area in waters off northern Washington where recreational groundfish and Pacific halibut fishing was prohibited. Commercial limited entry and open access fixed gear fleets were asked to voluntarily avoid fishing in this YRCA in 2009-2010.

Non-Nearshore Open Access Fishery

The second component of the non-nearshore fisheries is the open access daily trip limit fishery, which is composed of vessels without a Federal limited entry permit (trawl or fixed gear) that target groundfish. These directed groundfish vessels operate on the shelf and slope, primarily targeting sablefish (daily-trip-limit or DTL fishery), shortspine thornyhead, and slope rockfish species.

Open access trip limits and the non-trawl RCA structure as of July 16, 2010 apply to the No Action Alternative and are shown in Table 2-70 (north of 40°10' north latitude) and Table 2-71 (south of 40°10' north latitude). These trip limits apply in both the open access sablefish DTL fishery and the nearshore fishery (described below). The 2010 open access trip limits and seasonal RCA configurations relative to the non-nearshore fixed gear fisheries have been designed to allow targeting of healthy stocks while reducing the incidental catch of overfished species through the following strategies:

- Prohibiting the landing of canary and yelloweye rockfish coastwide and cowcod and bronzespotted rockfish south of 40°10' north latitude to prevent any targeting opportunity to fill a trip limit and also to encourage changes in fishing behavior to avoid capture and discards of these species because retention is prohibited.

- Maintaining the same non-trawl RCA and closed areas as described above for limited entry fixed gears because impacts are modeled using the same non-nearshore model as used for the limited entry fixed gear fishery, and because having a single set of non-trawl RCA boundaries that apply to both the limited entry fixed gear and open access fixed gear commercial fishers is simpler and easier to enforce.

Table 2-70. No Action: Open access trip limits and RCA restrictions north of 40°10' N. latitude as of July 16, 2010.

TABLE 5 (North)

		JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
	Rockfish Conservation Area (RCA)[6/]:						
1	North of 46°16' N. lat.	shoreline - 100 fm line[5/]					
2	46°16' N. lat. - 45°03.83' N. lat.	30 fm line[5/] - 100 fm line[5/]					
3	45°03.83' N. lat. - 43°00' N. lat.	30 fm line[5/] - 125 fm line[5/ 7/]					
4	43°00' N. lat. - 42°00' N. lat.	20 fm line[5/] - 100 fm line[5/]					
5	42°00' N. lat. - 40°10' N. lat.	20 fm depth contour - 100 fm line[5/]					
	See § 660.370 and § 660.383 for Additional Gear, Trip Limit, and Conservation Area Requirements and Restrictions. See §§ 660.390-660.394 and §§ 660.396-660.399 for Conservation Area Descriptions and Coordinates (including RCAs, YRCA, CCAs, Farallon Islands, Cordell Banks, and EFHCAs).						
	State trip limits and seasons may be more restrictive than federal trip limits, particularly in waters off Oregon and California.						
6	Minor slope rockfish[1/] & Darkblotched rockfish	Per trip, no more than 25% of weight of the sablefish landed					
7	Pacific ocean perch	100 lb/ month					
8	Sablefish	300 lb/ day, or 1 landing per week of up to 800 lb, not to exceed 2,400 lb/ 2 months			300 lb/ day, or 1 landing per week of up to 950 lb, not to exceed 2,750 lb/ 2 months		
9	Thornyheads	CLOSED					
10	Dover sole	3,000 lb/month, no more than 300 lb of which may be species other than Pacific sanddabs. South of 42° N. lat., when fishing for "other flatfish," vessels using hook-and-line gear with no more than 12 hooks per line, using hooks no larger than "Number 2" hooks, which measure 11 mm (0.44 inches) point to shank, and up to two 1 lb (0.45 kg) weights per line are not subject to the RCAs.					
11	Arrowtooth flounder						
12	Petrale sole						
13	English sole						
14	Starry flounder						
15	Other flatfish[2/]						
16	Whiting	300 lb/ month					
17	Minor shelf rockfish[1/], Shortbelly, Widow, & Yellowtail rockfish	200 lb/ month					
18	Canary rockfish	CLOSED					
19	Yelloweye rockfish	CLOSED					
20	Minor nearshore rockfish & Black rockfish						
21	North of 42° N. lat.	5,000 lb/ 2 months, no more than 1,200 lb of which may be species other than black or blue rockfish [3/]					
22	42° - 40°10' N. lat.	6,000 lb/ 2 months, no more than 1,200 lb of which may be species other than black or blue rockfish [3/]	7,000 lb/ 2 months, no more than 1,200 lb of which may be species other than black rockfish [3/]				
23	Lingcod[4/]	CLOSED		400 lb/ month			CLOSED
24	Pacific cod	1,000 lb/ 2 months					
25	Spiny dogfish	200,000 lb/ 2 months		150,000 lb/ 2 months	100,000 lb/ 2 months		
26	Other Fish[5/]	Not limited					

Table 2-70. No Action: Open access trip limits and RCA restrictions north of 40°10' N. latitude as of July 16, 2010 (continued).

		JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
27	**PINK SHRIMP NON-GROUNDFISH TRAWL** *(not subject to RCAs)*						
28	North	**Effective April 1 - October 31:** Groundfish: 500 lb/day, multiplied by the number of days of the trip, not to exceed 1,500 lb/trip. The following sublimits also apply and are counted toward the overall 500 lb/day and 1,500 lb/trip groundfish limits: lingcod 300 lb/month (minimum 24 inch size limit); sablefish 2,000 lb/month; canary, thornyheads and yelloweye rockfish are PROHIBITED. All other groundfish species taken are managed under the overall 500 lb/day and 1,500 lb/trip groundfish limits. Landings of these species count toward the per day and per trip groundfish limits and do not have species-specific limits. The amount of groundfish landed may not exceed the amount of pink shrimp landed.					
29	**SALMON TROLL**						
30	North	Salmon trollers may retain and land up to 1 lb of yellowtail rockfish for every 2 lbs of salmon landed, with a cumulative limit of 200 lb/month, both within and outside of the RCA. This limit is within the 200 lb per month combined limit for minor shelf rockfish, widow rockfish and yellowtail rockfish, and not in addition to that limit. Salmon trollers may retain and land up to 1 lingcod per 15 Chinook, plus 1 lingcod up to a trip limit of 10 lingcod, both within and outside of the RCA. This limit is within the 400 lb per month limit for lingcod, and not in addition to that limit. All groundfish species are subject to the open access limits, seasons, size limits and RCA restrictions listed in the table above.					

TABLE 5 (North) con't

1/ Bocaccio, chilipepper and cowcod rockfishes are included in the trip limits for minor shelf rockfish.
Splitnose rockfish is included in the trip limits for minor slope rockfish.

2/ "Other flatfish" are defined at § 660.302 and include butter sole, curlfin sole, flathead sole, Pacific sanddab, rex sole, rock sole, and sand sole.

3/ For black rockfish north of Cape Alava (48°09.50' N. lat.), and between Destruction Is. (47°40' N. lat.) and Leadbetter Pnt. (46°38.17' N. lat.), there is an additional limit of 100 lbs or 30 percent by weight of all fish on board, whichever is greater, per vessel, per fishing trip.

4/ The minimum size limit for lingcod is 22 inches (56 cm) total length North of 42° N. lat. and 24 inches (61 cm) total length South of 42° N. lat.

5/ "Other fish" are defined at § 660.302 and include sharks, skates (including longnose skates), ratfish, morids, grenadiers, and kelp greenling.
Cabezon is included in the trip limits for "other fish."

6/ The Rockfish Conservation Area is an area closed to fishing by particular gear types, bounded by lines specifically defined by latitude and longitude coordinates set out at §§ 660.391-660.394. This RCA is not defined by depth contours (with the exception of the 20-fm depth contour boundary south of 42° N. lat.), and the boundary lines that define the RCA may close areas that are deeper or shallower than the depth contour. Vessels that are subject to RCA restrictions may not fish in the RCA, or operate in the RCA for any purpose other than transiting.

7/ The 125 fm line restriction is in place all year, except on days when the directed halibut fishery is open. On those days the 100 fm line restriction is in effect.

To convert pounds to kilograms, divide by 2.20462, the number of pounds in one kilogram.

Table 2-71. No Action: Open access trip limits and RCA restrictions south of 40°10' N. latitude as of July 16, 2010.

TABLE 5 (South)

		JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
	Rockfish Conservation Area (RCA)[5/]:						
1	40°10' - 34°27' N. lat.	30 fm line[5/] - 150 fm line[5/]					
2	South of 34°27' N. lat.	60 fm line[5/] - 150 fm line[5/] (also applies around islands)					
	See § 660.370 and § 660.383 for Additional Gear, Trip Limit, and Conservation Area Requirements and Restrictions. See §§ 660.390-660.394 and §§ 660.396-660.399 for Conservation Area Descriptions and Coordinates (including RCAs, YRCA, CCAs, Farallon Islands, Cordell Banks, and EFHCAs).						
	State trip limits and seasons may be more restrictive than federal trip limits, particularly in waters off Oregon and California.						
3	**Minor slope rockfish[1/] & Darkblotched rockfish**						
4	40°10' - 38° N. lat.	Per trip, no more than 25% of weight of the sablefish landed					
5	South of 38° N. lat.	10,000 lb/ 2 months					
6	**Splitnose**	200 lb/ month					
7	**Sablefish**						
8	40°10' - 36° N. lat.	300 lb/ day, or 1 landing per week of up to 800 lb, not to exceed 2,400 lb/ 2 months			300 lb/ day, or 1 landing per week of up to 950 lb, not to exceed 2,750 lb/ 2 months		
9	South of 36° N. lat.	400 lb/ day, or 1 landing per week of up to 1,500 lb, not to exceed 8,000 lb/ 2 months				400 lb/ day, or 1 landing per week of up to 2,500 lb	
10	**Thornyheads**						
11	40°10' - 34°27' N. lat.	CLOSED					
12	South of 34°27' N. lat.	50 lb/ day, no more than 1,000 lb/ 2 months					
13	**Dover sole**	3,000 lb/month, no more than 300 lb of which may be species other than Pacific sanddabs. South of 42° N. lat., when fishing for "other flatfish," vessels using hook-and-line gear with no more than 12 hooks per line, using hooks no larger than "Number 2" hooks, which measure 11 mm (0.44 inches) point to shank, and up to two 1 lb (0.45 kg) weights per line are not subject to the RCAs.					
14	**Arrowtooth flounder**						
15	**Petrale sole**						
16	**English sole**						
17	**Starry flounder**						
18	**Other flatfish[2/]**						
19	**Whiting**	300 lb/ month					
20	**Minor shelf rockfish[1/], Shortbelly, Widow & Chilipepper rockfish**						
21	40°10' - 34°27' N. lat.	300 lb/ 2 months	CLOSED	200 lb/ 2 months		300 lb/ 2 months	
22	South of 34°27' N. lat.	750 lb/ 2 months		750 lb/ 2 months			
23	**Canary rockfish**	CLOSED					
24	**Yelloweye rockfish**	CLOSED					
25	**Cowcod**	CLOSED					
26	**Bronzespotted rockfish**	CLOSED					
27	**Bocaccio**						
28	40°10' - 34°27' N. lat.	200 lb/ 2 months	CLOSED	100 lb/ 2 months		200 lb/ 2 months	
29	South of 34°27' N. lat.	100 lb/ 2 months		100 lb/ 2 months			

Table 2-71. No Action: Open access trip limits and RCA restrictions south of 40°10' N. latitude as of July 16, 2010 (continued).

		JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
32	**Minor nearshore rockfish & Black rockfish**						
33	Shallow nearshore	600 lb/ 2 months	CLOSED	800 lb/ 2 months	900 lb/ 2 months	800 lb/ 2 months	600 lb/ 2 months
34	Deeper nearshore						
35	40°10' - 34°27' N. lat.	700 lb/ 2 months	CLOSED	700 lb/ 2 months		800 lb/ 2 months	
36	South of 34°27' N. lat.	500 lb/ 2 months		600 lb/ 2 months			
37	California scorpionfish	600 lb/ 2 months	CLOSED	600 lb/ 2 months	1,200 lb/ 2 months		
38	**Lingcod**[3/]	CLOSED		800 lb/ 2 months			400 lb/ month; CLOSED
39	**Pacific cod**	1,000 lb/ 2 months					
40	**Spiny dogfish**	200,000 lb/ 2 months		150,000 lb/ 2 months	100,000 lb/ 2 months		
41	**Other fish**[4/] **& Cabezon**	Not limited					

TABLE 4 (South)

1/ "Other flatfish" are defined at § 660.302 and include butter sole, curlfin sole, flathead sole, Pacific sanddab, rex sole, rock sole, and sand sole.
2/ POP is included in the trip limits for minor slope rockfish. Yellowtail is included in the trip limits for minor shelf rockfish. Bronzespotted rockfish have a species specific trip limit.
3/ The minimum size limit for lingcod is 24 inches (61 cm) total length South of 42° N. lat.
4/ "Other fish" are defined at § 660.302 and include sharks, skates (including longnose skates), ratfish, morids, grenadiers, and kelp greenling.
5/ The Rockfish Conservation Area is an area closed to fishing by particular gear types, bounded by lines specifically defined by latitude and longitude coordinates set out at §§ 660.391-660.394. This RCA is not defined by depth contours (with the exception of the 20-fm depth contour boundary south of 42° N. lat.), and the boundary lines that define the RCA may close areas that are deeper or shallower than the depth contour. Vessels that are subject to RCA restrictions may not fish in the RCA, or operate in the RCA for any purpose other than transiting.
To convert pounds to kilograms, divide by 2.20462, the number of pounds in one kilogram.

Nearshore Fixed Gear – No Action

The majority of vessels participating in nearshore commercial fisheries do not hold Federal limited entry permits, and the most common gear used is jig gear. However, some vessels use longline gear to target nearshore species and, in rare instances, pots or traps are used in the nearshore fishery. California and Oregon limit entry to the nearshore groundfish fishery by requiring a state limited entry permit to take commercial quantities of nearshore groundfish species. Washington does not allow a nearshore commercial fishery. More conservative state harvest targets or guidelines than those specified in Federal regulations exist for most nearshore species and state trip limits supersede Federal limits in these cases. State trip limits are designed to stay within nearshore species limits while providing a year-round opportunity, if possible. Federal management measures for west coast nearshore commercial groundfish fisheries are typically stratified north and south of 40°10' north latitude.

In Oregon, those limited entry permit holders may land commercial quantities of black and blue rockfish under state cumulative trip limits (currently 2 month periods), with an additional total of 15 lbs per day of any combination of other nearshore groundfish species and two rockfish species with Federal designation as shelf rockfish (tiger and vermillion). Vessels that also have a nearshore endorsement permit, in addition to the black/blue limited entry permit may land commercial quantities of other nearshore groundfish species up to the state's cumulative trip limits and the Federal limits for tiger and vermilion rockfish. For vessels that do not hold a state permit or endorsement, an incidental landing limit of no more than 15 pounds per day of any combination of black rockfish, blue rockfish, and/or other nearshore fish is allowed, with a few exceptions. Salmon trollers with a valid troll permit may land 100 pounds of black rockfish, blue rockfish, or a combination thereof in the same landing in which a salmon is landed. These rockfish may only be landed dead. If the cumulative landing of black and blue rockfish combined in the salmon troll fishery reaches 3,000 pounds in any calendar year, then each salmon troll vessel is limited to 15 pounds of black rockfish, blue rockfish, or a combination thereof per troll landing for the remaining calendar year. Trawlers may land up to 1,000 pounds of black rockfish, blue rockfish, or a combination thereof per calendar year and these fish must be 25 percent or less of the total poundage of each landing and must be landed dead.

In California, those limited entry permit holders who also have either a shallow nearshore fishery or deeper nearshore fishery permit administered by CDFG may land minor nearshore rockfish from either the shallow nearshore or deeper nearshore complexes. Trip limits for shallow nearshore rockfish, deeper nearshore rockfish, cabezon, and California scorpionfish vary by period.

Open access trip limits and the non-trawl RCA structure as of July 16, 2010, describe the No Action Alternative and are shown in Table 2-70 (north of 40°10' north latitude) and Table 2-71 (south of 40°10' north latitude). These trip limits apply in both the nearshore fishery and the open access sablefish Daily Trip Limit (DTL) fishery (described above). The 2010 open access trip limits and seasonal RCA configurations relative to the nearshore fixed gear fisheries have been designed to allow targeting of healthy stocks while reducing the incidental catch of overfished species through the following strategies:

- Prohibiting the landing of canary and yelloweye rockfish coastwide and cowcod and bronzespotted rockfish south of 40°10 north latitude to eliminate targeting and thereby reduce catch.

- Maintaining the same non-trawl RCA shoreward boundary north of 40°10' north latitude at roughly 20 fm in waters off northern California to 43° north latitude to reduce yelloweye rockfish catch by fixed gear fishermen targeting nearshore species. Yelloweye rockfish is the most constraining species off northern California. From 43° north latitude to 46°16' N. latitude the line returns to 30 fm; north of 46°16' north latitude (Washington border) the RCA is set at the shoreline (i.e., the shoreward area is closed to fishing). The line is set at 30 fm in Oregon north of 43° because that area has the lowest YE bycatch rate on the coast, according to a WCGOP report. In Washington, there is no commercial fishing allowed in the nearshore therefore it's closed to shore.

- Maintaining a 30 fm shoreward non-trawl RCA south of 40°10' north latitude and north of Point Conception at 34°27' north latitude to avoid canary and yelloweye rockfish. There is an additional closure between zero fm and 10 fm around the Farallon Islands to reduce impacts on shallow nearshore rockfish in that area. The shoreward non-trawl RCA south of Point Conception is at roughly 60 fm given minimal occurrence of canary rockfish in the Southern California Bight.

There is some nearshore commercial fishing allowed in the CCAs (Figure 2-4) in depths shallower than 20 fm under the No Action Alternative. Only southern minor nearshore rockfish, (both shallow and deeper nearshore rockfish), California scorpionfish, cabezon, greenlings, California sheephead, and ocean whitefish are allowed to be retained in depths less than 20 fm in the CCAs.

<u>Incidental Open Access – No Action</u>

West coast commercial fishing vessels targeting non-groundfish species, but landing groundfish under open access limits are included in the category of incidental open access fisheries. In some cases, such as the ridgeback prawn trawl fishery south of 34°27' north latitude, the northern pink shrimp fishery, and the salmon troll fishery, there are specific exemptions from non-trawl RCA restrictions while landing some groundfish species.

Under the No Action Alternative, the ridgeback prawn trawl fishery south of 34°27' north latitude is allowed to operate out to the 100 fm line regardless of the non-trawl RCA configuration south of Point Conception. This exemption is allowed because ridgeback prawn trawling occurs over soft mud substrates where depleted rockfish species do not occur and ridgeback prawns are found largely adjacent to the 100 fm isobath in this area. The pink shrimp trawl fishery is not restricted by an RCA, but approved bycatch reduction devices or fish excluders in shrimp trawls are mandated to minimize incidental groundfish bycatch. The salmon troll fishery is exempted from RCA restrictions, but groundfish species are generally not allowed to be retained while fishing in the non-trawl RCA. The two exemptions to this regulation under the No Action Alternative is an incidental landing allowance of up to 1 pound of yellowtail rockfish per 2 pounds of salmon landed with a cumulative monthly landing limit of 200 pounds of yellowtail rockfish, both within and outside the RCA. Additionally, salmon trollers may retain and land up to 1 lingcod per 15 Chinook, plus 1 lingcod up to a trip limit of 10 lingcod, inside the non-trawl RCA. Otherwise, non-trawl RCA restrictions apply to incidental groundfish fisheries if groundfish are to be legally retained and landed under the open access limits.

Since 2007, commercial salmon trolling has been prohibited in YRCAs off northern Washington (Figure 2-8).

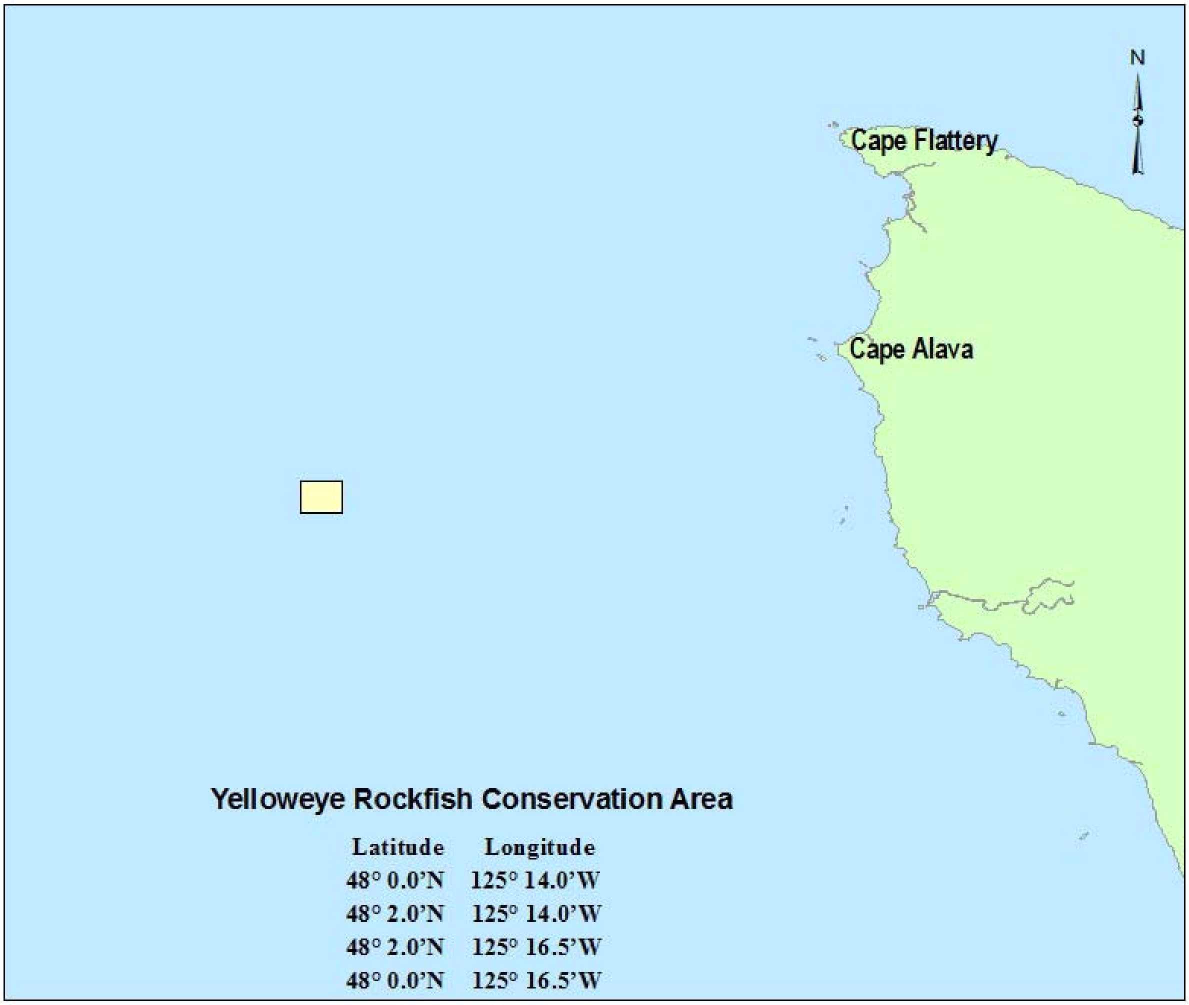


Figure 2-8. A Yelloweye Rockfish Conservation Area off the north Washington coast where commercial salmon trolling was prohibited in 2009-2010.

Tribal Fishery Management Measures – No Action

The Washington coastal tribes (Makah, Quileute, Hoh, and Quinault) conducted their groundfish fisheries in 2010 with the trip limits shown in Table 2-72 and the following allocations:

- Sablefish 10 percent of the total catch OY (for the portion of the stock north of 36° north latitude) or 6,471 mt. The allocation of 647 mt was further reduced by 1.6 percent for discard mortality, to produce landed catch allocations of 637 mt for 2010.

- Black rockfish was managed with a harvest guideline of 30,000 pounds north of Cape Alava, Washington at 48°09'30" north latitude, and 10,000 pounds between Destruction Island, Washington at 47°40' north latitude and Leadbetter Point, Washington at 46°38'10" north latitude. There were no harvest restrictions on black rockfish between Cape Alava and Destruction Island. The harvest guideline to 30,000 pounds north of Cape Alava for 2010 was to accommodate a developing live-fish fishery.

- Lingcod was a 250 mt harvest guideline.

- Pacific cod had a 400 mt tribal harvest guideline.

- Longspine and shortspine thornyheads were managed to the limited entry cumulative limits in place at the beginning of the year, but with those limits were accumulated across vessels into a cumulative fleetwide harvest target for the year.

- For yellowtail rockfish the entire Makah tribal fleet (the only tribal fleet that participated in a midwater fishery) was subject to a cumulative landing limit of 180,000 pounds/two months. To reduce widow rockfish impacts while providing harvest flexibility, for 2010, the associated widow limit was no more than 10 percent of the cumulative weight of yellowtail rockfish for an individual vessel for the year.

- In 2010 the U.S. OY of 193,935 mt resulted in a tribal allocation of 33,939 mt that NMFS based on the percentage requested by Makah (17.5 percent of the U.S. OY) and an additional amount estimated to help accommodate Quileute's developing fishery (75FR11829).

All midwater landing limits were subject to inseason adjustments to minimize the take of both canary and widow rockfish. Full rockfish retention programs, where all overfished and marketable rockfish are retained, as well as a Makah trawl observer program, were in place to provide catch accountability.

Table 2-72. The No Action Alternative tribal fishery.

Cumulative limits	Shortspine thornyhead: • Small and large footrope trawl gear-17,000 lb per 2 months. • Selective flatfish trawl gear- 3,000 lb per 2 months. • Multiple bottom trawl gear- 3,000 lb per 2 months. • Fixed gear -2,000 lb per 2 months. Longspine thornyhead cumulative trip limits are as follows: • Small and large footrope trawl gear- 22,000 lb per 2 months. • Selective flatfish trawl gear-5,000-lb per 2 months. • Multiple bottom trawl gear-5,000-lb per 2 months. • Fixed gear 10,000 lb per 2 months. Canary rockfish 300 lb per trip. Yelloweye rockfish 100 lb per trip. Makah Tribe midwater trawl fisheries: Yellowtail rockfish with mid-water trawl are subject to a cumulative limit of 180,000 lb per 2 months for the entire fleet. Widow rockfish must not exceed 10 percent of the weight of yellowtail rockfish landed, for a given vessel, throughout the year. Other rockfish, including minor nearshore, minor shelf, and minor slope rockfish 300 lb per trip limit per species or species group, or to the non-tribal limited entry trip limit for those species if those limits are less restrictive than 300 lb (136 kg) per trip. Rockfish taken during open competition tribal commercial fisheries for Pacific halibut will not be subject to trip limits. Lingcod. subject to an overall catch of 250 mt for all treaty fishing. Flatfish and other fish (bottom trawl). • Dover sole, English sole, rex sole, arrowtooth flounder, and other flatfish limited entry trip limits in place at the beginning of the season. The limits will be combined across periods and the fleet to create a cumulative harvest target. The limits available to individual vessels will be adjusted inseason to stay within the overall harvest target as well as estimated impacts to overfished species. • Petrale sole - 50,000 lb per 2 month limit for the entire year. Trawl vessels are restricted to small footrope trawl gear. Pacific whiting -The tribal allocation for 2010 is 49,939 mt. Pacific cod - Managed to the tribal HG of 400 mt. Spiny dogfish - limited entry trip limits for the non-tribal fisheries apply
Monitoring	• The Makah Tribe shoreside observer program to monitor and enforce Makah limits.
Reporting	• VMS declarations for trawl only

Recreational Fishery Management Measures – No Action

Washington Recreational – No Action

Harvest Guidelines

Washington and Oregon shared harvest guidelines for canary and yelloweye rockfish of 20.9 mt and 5.1 mt, respectively in 2009-2010. Washington's share of the canary harvest guideline was 4.9 mt. The Washington share of the yelloweye harvest guideline was originally specified as 2.7 mt but was revised downward to 2.6 mt on July 1, 2010. If either of these harvest guidelines is projected to be attained inseason, the WDFW and ODFW would consult and decide if inseason state actions would be needed to maintain impacts within these harvest guidelines. Such state management actions would include closing recreational fisheries, restricting recreational fishery seasons, and/or restricting the depths where the fishery was allowed to continue.

Season Structure

The following recreational seasons applied in 2009 and 2010 and would remain in place under the No Action Alternative. Table 2-73 summarizes the season structure. Under the No Action Alternative, the Washington recreational fishery would be open year-round for groundfish except lingcod. Under the No Action Alternative, the following lingcod seasons and size limits for 2011 and 2012 would be as follows:

- Marine Areas 1-3: open from March 12 through October 15 in 2011 and March 17 through October 13 in 2012.
- Marine Area 4: open from April 16 to October 15 in 2011 and April 16 to October 13 in 2012.

Table 2-73. No Action: Washington recreational groundfish season for 2011-2012.

Marine Area	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
3 & 4 (N. Coast)	Open all depths				Open <20 fm May 21-Sep 30 [a/]					Open all depths		
2 (S. Coast)	Open all depths		Open <30 fm Mar 15 - June 15 [b/],c/				Open all depths except lingcod prohibited on Fri. and Sat. >30 fm [d/]		Open all depths			
1 (Col. R.)	Open all depths				Open all depths [e/]					Open all depths		

a/ Groundfish retention allowed >20 fm on days when Pacific halibut is open.
b/ Retention of sablefish and Pacific cod allowed seaward of 30 fm from May 1- June 15.
c/ Retention of lingcod allowed on days that the primary halibut season is open.
d/ Retention of lingcod prohibited >30 fm, south of 46°58 on Fri. and Sat. from July 1 – August 31.
e/ Retention of groundfish, except sablefish and Pacific cod, prohibited with Pacific halibut on board.

Bag Limits and Size Limits

The recreational groundfish bag limit would be 15 fish per day including rockfish and lingcod. Of the 15 recreational groundfish allowed to be landed per day, sub limits of 10 rockfish and 2 lingcod would apply. Washington would continue to prohibit the retention of canary and yelloweye rockfish in all areas. The lingcod minimum size limit during the open lingcod season would be 22 inches in Marine Areas 1-3 and 24 inches in Marine Area 4.

Area Restrictions
Under the No Action Alternative the Washington recreational groundfish and Pacific halibut fisheries would continue to be prohibited from fishing for, retention of, or possession of groundfish and halibut in the C-shaped yelloweye rockfish conservation area in the north coast (Figure 2-7) and South Coast and Westport YRCAs in the south coast (Figure 2-4). The following area restrictions apply:

- <u>North Coast (Marine Areas 3 and 4)</u> - Prohibit the retention of groundfish seaward of a line approximating 20 fm from May 21- September 30, except on days that halibut fishing is open.
- <u>South Coast (Marine Area 2)</u> - Prohibit the retention of groundfish seaward of a line approximating 30 fm from March 15-June 15. Prohibit the retention of groundfish, except sablefish and Pacific cod seaward of a line approximating 30 fm from May 1-June 15. Lingcod retention allowed seaward of 30 fm on days that the primary halibut season is open. Prohibit the retention of lingcod south of 46°58' north latitude and seaward of 30 fm on Fridays and Saturdays from July 1 through August 31.
- <u>Columbia River (Marine Area 1)</u> - Prohibit the retention of groundfish, except sablefish and Pacific cod, with halibut onboard from May 1 through September 30.

<u>Oregon Recreational – No Action</u>

Harvest Guidelines
Oregon and Washington shared harvest guidelines for canary and yelloweye rockfish of 20.9 mt and 5.1 mt, respectively in 2009-2010. Oregon's share of the canary harvest guideline was 16.0 mt. The Oregon share of the yelloweye harvest guideline was originally specified as 2.4 mt but was revised downward to 2.3 mt on July 1, 2010. If either of these harvest guidelines are projected to be attained inseason, the WDFW and ODFW would consult and decide if inseason state actions would be needed to maintain impacts within these harvest guidelines. Such state management actions would include closing recreational fisheries, restricting recreational fishery seasons, and/or restricting the depths where the fishery was allowed to continue.

Following the June 2010 Council meeting and subsequent reduction to the Oregon yelloweye rockfish harvest guideline, the Oregon Department of Fish and Wildlife took inseason action to reduce impacts to yelloweye rockfish and cabezon. Specifically on July 24, 2010 the bottomfish fishery was restricted to inside of 20 fm in order to reduce impacts to yelloweye rockfish. Retention of cabezon by boat anglers and divers was prohibited since the state harvest cap had been met. Anglers and divers from the beach and banks may still retain cabezon. Due to time constraints relative to the 2011-2012 harvest specifications and management measures process, the No Action alternative for Oregon recreational was not updated to reflect the inseason action on July 24, 2010.

ODFW met with its Sport Advisory Committee (SAC) prior to taking this inseason action. Members of SAC agreed that action was necessary to prevent a complete closure of the Oregon recreational bottomfish fishery. Members of SAC expressed their concern over how moving the fishery into 20 fm would affect their ports. Most members of SAC would have preferred only restricting the fishery to inside of 25 fm; however, they agreed that due to the yelloweye impacts, the 20 fathom restriction was necessary.

Season Structure
Figure 2-9 summarizes the season structure under the No Action Alternative. Detailed information on the bag limits, size limits, and area restrictions for the Oregon recreational groundfish fisheries under the No Action Alternative follow.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Open all depths			Open < 40 fm						Open all depths		

Figure 2-9. No Action Alterative: Oregon recreational groundfish season structure for 2011-2012.

Bag and Size Limits

Under the No Action Alternative, the marine fish daily bag limit of 10 fish in aggregate that was allowed in 2009-2010 Oregon recreational fisheries would carry forward for 2011-2012. The marine bag included all species other than lingcod; salmon; steelhead; Pacific halibut; flatfish; surfperch; sturgeon; striped bass; pelagic tuna and mackerel species; and bait fish such as herring, anchovy, sardine and smelt. A flatfish daily bag limit of 25, which includes all soles and flounders except Pacific halibut, was allowed in addition to the marine fish daily bag limit. Additionally a three-fish bag limit was allowed for lingcod. Retention of canary and yelloweye rockfish was prohibited in 2009-2010 and would also be prohibited under the No Action Alternative.

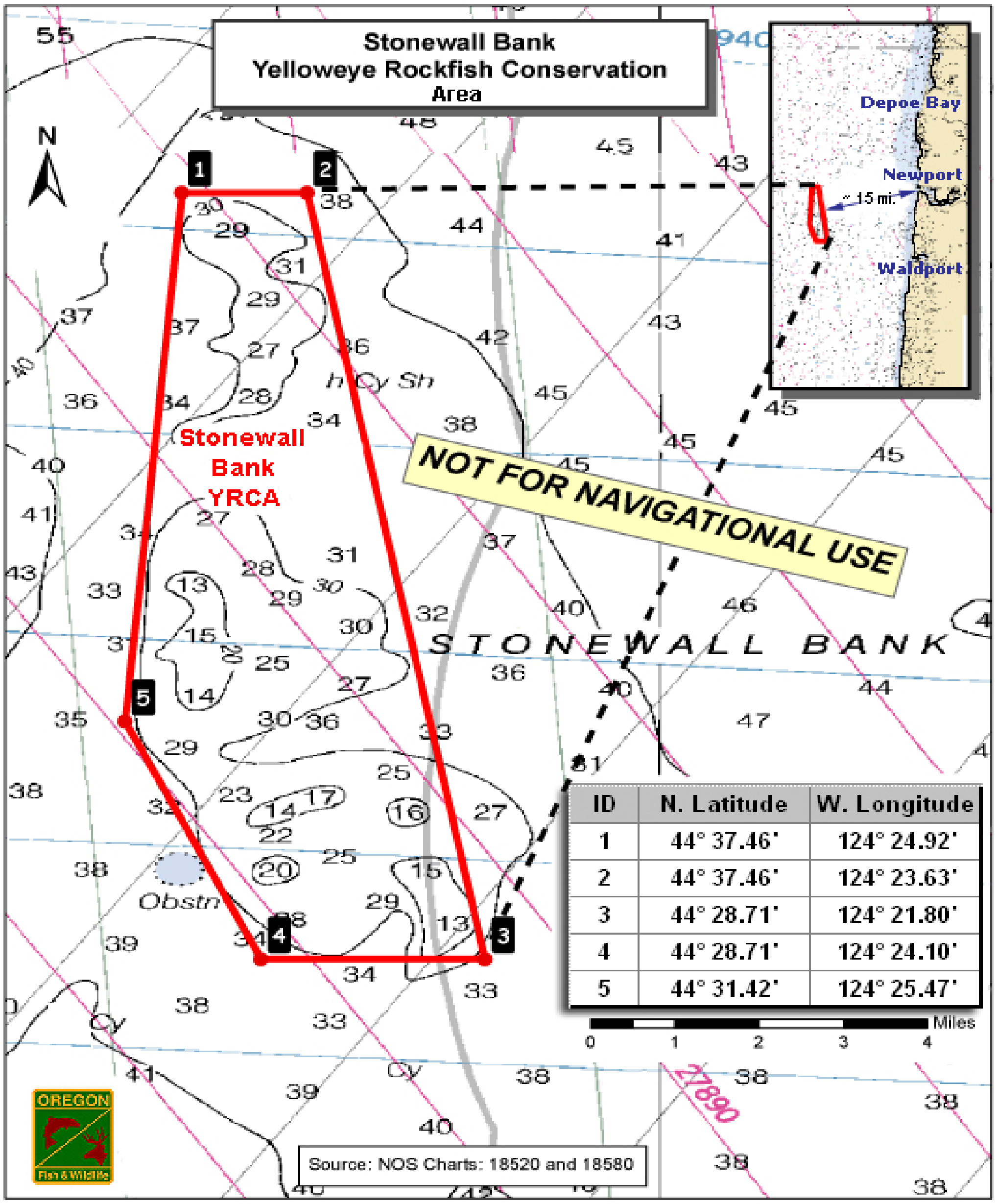
The following minimum size limits applied to 2009-2010 Oregon recreational fisheries and would be carried forward under the No Action Alternative:

- lingcod – 22 inches
- cabezon – 16 inches
- kelp greenling – 10 inches

Area Restrictions

A YRCA has been in place on Stonewall Bank since 2006 and would also remain in place under the No Action Alterative (Figure 2-10). No recreational fishing for groundfish and Pacific halibut can occur within this YRCA, which is bounded by the following waypoints:

44°37.458’ N lat	124°24.918’ W long;
44°37.458’ N lat	124°23.628’ W long;
44°28.71’ N lat	124°21.798’ W long;
44°28.71’ N lat	124°24.102’ W long;
44°31.422’ N lat	124°25.5’ W long.



ODFW, 05/22/06. Reprinted 12/12/06

Figure 2-10. The Stonewall Bank Yelloweye Rockfish Conservation Area where recreational fishing for groundfish and Pacific halibut is prohibited. Under the No Action Alternative, the area would remain closed.

<u>California Recreational – No Action</u>

Harvest Guidelines

The 2009-2010 California recreational groundfish fisheries were managed under harvest guidelines for canary and yelloweye rockfish. The harvest guideline for canary rockfish was 22.9 mt. The yelloweye harvest guideline was originally specified as 2.8 mt but it was revised downward on July 1, 2010 to 2.7 mt as a result of the court ruling (75FR38030). If the harvest guideline is projected to be attained inseason, CDFG would enact management actions, including closing recreational fisheries, restricting recreational fishery seasons, and/or restricting the depths where the fishery would be allowed to continue. A diagram of season and depth restrictions under the No Action Alternative is provided below (Figure 2-11).

Season Structure
California recreational fishery season structure is shown in Figure 2-11. All divers (boats permitted while diving for rockfish or other closed species during closed periods provided no hook-and-line gear on board or in possession while diving to catch rockfish) and shore-based anglers are exempt from the seasonal closures and depth restrictions for rockfish, greenlings, California scorpionfish, California sheephead, and ocean whitefish. In the South Region, California scorpionfish was open 12 months: 0-40 fm January-February, 0-60 fm in March-December.

<table>
<tr><th>Management Area</th><th>Jan</th><th>Feb</th><th>Mar</th><th>Apr</th><th>May</th><th>Jun</th><th>Jul</th><th>Aug</th><th>Sep</th><th>Oct</th><th>Nov</th><th>Dec</th><th>Months</th></tr>
<tr><td>Northern</td><td colspan="4">CLOSED</td><td colspan="5">May 15 - Sept 15 <20 fm</td><td colspan="3"></td><td>4</td></tr>
<tr><td>North-Central North of Point Arena</td><td colspan="4">CLOSED</td><td colspan="4">May 15 - Aug 15 <20 fm</td><td colspan="4"></td><td>3</td></tr>
<tr><td>North-Central South of Point Arena</td><td colspan="5">CLOSED</td><td colspan="5">June 13–Oct < 30 fm</td><td colspan="2"></td><td>4.5</td></tr>
<tr><td>South-Central Monterey</td><td colspan="4">CLOSED</td><td colspan="7">May – Nov 15 < 40 fm</td><td></td><td>6.5</td></tr>
<tr><td>South-Central Morro Bay</td><td colspan="4">CLOSED</td><td colspan="7">May – Nov 15 < 40 fm</td><td></td><td>6.5</td></tr>
<tr><td>Southern</td><td colspan="2">CLOSED</td><td colspan="10">Mar –Dec < 60 fm</td><td>10</td></tr>
</table>

Figure 2-11. Rockfish, cabezon and greenling season and depth restrictions in each management area under the No Action Alternative.

Bag Limits and Size Limits
Under the No Action Alternative, a statewide 10 fish rockfish, cabezon, and greenling bag limit with a sub-bag limit of 2 fish for bocaccio, cabezon and greenlings would be in place. Retention of cowcod, bronzespotted, canary, and yelloweye rockfish was prohibited in 2009-2010 and would also be prohibited under the No Action alternative. The following bag limits would also apply:

- Leopard Shark – 3 fish
- Scorpionfish – 5 fish
- Sheephead – 5 fish
- Soupfin Shark – 1 fish
- Pacific Halibut – 1 fish
- Sanddabs – None
- Petrale Sole – None
- Starry Flounder – None

A daily bag limit of 10 fish of any one species within the 20 finfish maximum bag limit would apply to the remaining species in the groundfish FMP.

The following minimum size limits applied to 2009-2010 California recreational fisheries and would be carried forward under the No Action alternative:

- Lingcod – 24 inches
- Cabezon – 15 inches
- Kelp Greenling – 12 inches
- Leopard Shark – 36 inches
- Scorpionfish – 10 inches
- Sheephead – 12 inches

Area Restriction Alternatives
CDFG evaluated and has available four potential YRCAs which include habitat in both state and Federal waters where high yelloweye encounter rates have been documented. The YRCAs could be implemented inseason, but are not in place at the start of the year. If implemented, YRCAs are anticipated to reduce yelloweye impacts during the open fishing seasons in both the Northern Groundfish Management Area and the North-Central North of Point Arena Groundfish Management Area, possibly allowing for a longer fishing season.

The four areas identified for possible use are in the general area of Point St. George, South Reef, Reading Rock, and Point Delgada. The boundaries for these areas and the latitude and longitude coordinates can be found in (50CFR660.70 (g) through (j)). To date, these YRCAs have not been implemented but would remain available management measures under the No Action Alternative.

2.4.2 The Council's Final Preferred Alternative

The Council's preferred integrated alternative for overfished species and management measures for the 2011 and 2012 fishing seasons were recommended at the June 2010 meeting in Foster City, California. All management measures available under current regulations are recommended for use in 2011-2012 groundfish fisheries, but are revised to keep total catch within the FPA ACLs or ACT if specified.

2.4.2.1 Harvest Specifications - The Council's Final Preferred Alternative

The OFL harvest specifications considered under the FPA for all groundfish species and species groups are the estimated or proxy MSY harvest levels, which are the harvest thresholds above which overfishing is occurring. The 2011 and 2012 OFLs under the FPA are described in Section 2.1.1 and shown in Table 2-2.

The ABC specifications considered under FPA for all groundfish species and species groups incorporate scientific uncertainty buffers for all groundfish stocks and stock complexes and are based on SSC recommendations. The ABC values proposed for the integrated alternatives (Alternatives 1, 2, 3 and the FPA) are the same for each of the alternatives, as they are based on the SSC recommendations for incorporating scientific uncertainty consistent with Amendment 23. The 2011 and 2012 ABCs for the FPA are described in Section 2.1.2 and shown in Table 2-8 and Table 2-9.

ACLs are specified for each stock and stock complex that is "in the fishery" as specified under the Amendment 23 framework. An ACL is a harvest specification set equal to the ABC or below the ABC to create a buffer that accommodates management uncertainty, socioeconomic considerations, rebuilding considerations, or to meet any other management objectives. Sector-specific ACLs may be specified in cases where a sector has a formal, long-term allocation of the harvestable surplus of a stock or stock complex. The ACL counts all sources of fishing-related mortality including landed catch, discard mortalities, research catches, and yield set-asides for EFPs. In this regard, the ACL is analogous to the total catch OY specified under the No Action Alternative. The ACLs proposed for non-overfished species with species-specific specifications are further described in Section 2.1.4 and shown in Table 2-10 and Table 2-11. ACLs for species that are included within stock complexes are further described in section 2.1.5 of this Chapter. Other than Pacific whiting and Dover sole, the ACLs for non-overfished species do not vary between the FPA and Alternatives 1, 2, and 3. The ACL for Pacific whiting under the FPA was considered as a range from 96,968 to 290,903 in 2011 and 2012.

The ACLs for each of the overfished species varies between the integrated alternatives. The development of ACLs for overfished species is fully described in detail Section 2.1.6 of this Chapter. The ACLs for the overfished species under the FPA are shown in Table 2-74, along with the median time to rebuild.

Table 2-74. FPA 2011-2012 overfished species harvest specifications, along with the time to rebuild and T_{TARGET} currently specified in the FMP (i.e., prior to enacting the proposed action).

Species	T_{TARGET} in FMP	Median time to rebuild given ACL [a/]	2011 (mt)	2012 (mt)
Bocaccio	2026	2022	263	274
Canary	2021	[2027]	102	107
Cowcod	2072	2071	4	4
Darkblotched	2028	2025	298	296
Petrale	N/A	2016	976	1,160
POP	2017	[2020]	180/157 [b/]	183/157 [b/]
Widow	2015	2010	600	600
Yelloweye	2084	2084	20/17 [b/]	20/17 [b/]

a/ Brackets indicate that the time to rebuild exceeds the T_{TARGET} in the FMP. Under the proposed action, the median time to rebuild would be specified as the new T_{TARGET}, except for widow rockfish where the current T_{TARGET} of 2015 remains.
b/ The first value is the ACL, the second the ACT.

2.4.2.2 Allocations - The Council's Final Preferred Alternative

Deductions to the ACL (or ACT if specified) are made to account for fishing-related mortality resulting from Pacific Coast treaty Indian tribal harvest, scientific research, non-groundfish fisheries, and, as necessary, EFPs. For 2011 and 2012, the overfished species deductions are as follows: bocaccio south of 40'10 north latitude is 13.4 mt, canary rockfish is 20 mt, cowcod south 40'10 north latitude is 0.3 mt, darkblotched rockfish is 18.7 mt, petrale sole is 65.4 mt, POP is 12.9 mt, widow rockfish is 60.9 mt, and yelloweye rockfish is 5.9 mt. Off-the-top deductions for overfished species for 2011 and 2012 are shown in detail in Table 2-41. Off-the-top deductions for non-overfished species for 2011 and 2012 are shown in detail in Table 2-42 and Table 2-43. The off-the-top deductions remain unchanged between the FPA and Alternatives 1, 2, and 3.

The value after the off-the-top deductions are made to the ACL or ACT is referred to as the fishery harvest guideline. The fishery harvest guideline is divided between the trawl fishery and non-trawl fisheries (recreational, limited entry fixed gear, and directed open access) based on the percentages adopted under Amendment 21 to the FMP. Sablefish and Pacific whiting are allocated under FMP provisions adopted prior to Amendment 21. Species that are not allocated by the FMP continue to be addressed through short-term allocations that are to be decided through the biennial harvest specifications and management measure process. Non-overfished species with formal allocations defined by the FMP (other than sablefish north of 36° north latitude) are shown in Table 2-46 and Table 2-47. Allocations for sablefish north of 36° north latitude are shown in Table 2-45.

Biennial harvest specifications may also be used to establish 2-year allocations for species without formal allocations or for those species where the formal allocation is suspended (overfished species) if they have the potential to constrain fishing opportunities for one or more sectors. The 2-year overfished species allocations vary between the integrated alternatives and drive the management measures proposed for the various fisheries. Harvest guidelines and allocations for overfished species under the FPA are shown in Table 2-75. Under trawl rationalization, overfished species allocations cannot be reallocated to or from the trawl sector inseason. Unused trawl IFQ quota pounds to permits will roll over (if 10 percent or less) for the second year of the biennium (2012) or remain stranded in the trawl sector in the final year of the biennial cycle. As such, the non-trawl sectors must have a sufficient allocation to reasonably accommodate fishing operations, or management measures must constrain the fishery such that the non-trawl allocations are not exceeded.

Table 2-75. Overfished Species Allocations and Harvest Guidelines Under the FPA Alternative.

<table>
<tr><th colspan="9">2011</th></tr>
<tr><th>Sector</th><th>Bocaccio</th><th>Canary</th><th>Cowcod</th><th>DKB</th><th>POP</th><th>Petrale</th><th>Widow</th><th>Yelloweye</th></tr>
<tr><td>Off the top ACL deductions [a/]</td><td>13.4</td><td>20</td><td>0.3</td><td>18.7</td><td>12.9</td><td>65.4</td><td>60.9</td><td>5.9</td></tr>
<tr><td>Fishery Harvest Guideline</td><td>249.6</td><td>82</td><td>3.7</td><td>279</td><td>144</td><td>911</td><td>539</td><td>11.1</td></tr>
<tr><td>Limited Entry Non-Whiting Trawl</td><td>60.0</td><td>20.0</td><td>1.8</td><td>240.0</td><td>107.0</td><td>871</td><td>235.0</td><td>0.6</td></tr>
<tr><td colspan="9">Non-nearshore [b/]</td></tr>
<tr><td>LE FG</td><td rowspan="2">57.9</td><td rowspan="2">2.3</td><td rowspan="6">0.9</td><td rowspan="6">14</td><td rowspan="6">7</td><td rowspan="6">35</td><td rowspan="6">49</td><td rowspan="3">2.4</td></tr>
<tr><td>OA DTL</td></tr>
<tr><td>Nearshore Fixed Gear [b/]</td><td>0.7</td><td>4.0</td></tr>
<tr><td>Washington Recreational [b/]</td><td>--</td><td>2.0</td><td>2.6</td></tr>
<tr><td>Oregon Recreational [b/]</td><td>--</td><td>7.0</td><td>2.4</td></tr>
<tr><td>California Recreational [b/]</td><td>131.0</td><td>14.5</td><td>3.1</td></tr>
<tr><td colspan="9">Limited Entry Whiting Trawl</td></tr>
<tr><td>Catcher Processor</td><td>--</td><td>4.8</td><td>--</td><td>9.0</td><td>10.0</td><td rowspan="2">5.0</td><td>87.0</td><td>--</td></tr>
<tr><td>Mothership</td><td>--</td><td>3.4</td><td>--</td><td>6.0</td><td>7.0</td><td>61.0</td><td>--</td></tr>
<tr><td>Shoreside</td><td>--</td><td>5.9</td><td>--</td><td>11.0</td><td>13.0 [c/]</td><td>[c/]</td><td>107.0</td><td>--</td></tr>
<tr><th colspan="9">2012</th></tr>
<tr><th>Sector</th><th>Bocaccio</th><th>Canary</th><th>Cowcod</th><th>DKB</th><th>POP</th><th>Petrale</th><th>Widow</th><th>Yelloweye</th></tr>
<tr><td>Off the top ACL deductions [a/]</td><td>13.4</td><td>20</td><td>0.3</td><td>18.7</td><td>12.9</td><td>65.4</td><td>60.9</td><td>5.9</td></tr>
<tr><td>Fishery Harvest Guideline</td><td>260.6</td><td>87</td><td>3.7</td><td>277</td><td>144</td><td>1,095</td><td>539</td><td>11.1</td></tr>
<tr><td>Limited Entry Non-Whiting Trawl</td><td>60.0</td><td>20.0</td><td>1.8</td><td>238.0</td><td>107.0</td><td>1,060</td><td>235.0</td><td>0.6</td></tr>
<tr><td colspan="9">Non-nearshore [b/]</td></tr>
<tr><td>LE FG</td><td rowspan="2">57.9</td><td rowspan="2">2.3</td><td>--</td><td rowspan="6">14</td><td rowspan="6">7</td><td rowspan="6">35</td><td rowspan="6">49</td><td rowspan="3">2.4</td></tr>
<tr><td>OA DTL</td><td>--</td></tr>
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<tr><td>Catcher Processor</td><td>--</td><td>5.0</td><td>--</td><td>9.0</td><td>10.0</td><td rowspan="2">5</td><td>87.0</td><td>--</td></tr>
<tr><td>Mothership</td><td>--</td><td>3.6</td><td>--</td><td>6.0</td><td>7.0</td><td>61.0</td><td>--</td></tr>
<tr><td>Shoreside</td><td>--</td><td>6.2</td><td>--</td><td>11.0</td><td>13.0</td><td>[c/]</td><td>107.0</td><td>--</td></tr>
</table>

a/ Assumes that the application of new Amendment 21 allocation structure specified at 50 CFR 660.55

b/ Values represent HGs which may be adjusted within the non-trawl allocation.

c/ Under trawl rationalization, the allocation is include as part of the bottom trawl allocation and not in addition to.

2.4.2.3 Management Measures - The Council's Final Preferred Alternative

Trawl Fishery – The Council's Final Preferred Alternative

Under the FPA, considerations were provided for the rationalized trawl fishery along with contingency management measures in the event that trawl rationalization was delayed beyond January 1, 2011. The Council recommended two-year trawl allocations for several species, which are further detailed in Section 2.2.2.1 of this chapter. In the event that Amendments 20 or 21 were not in place January 1, 2011, the allocations described in Section 2.2.2.1 could be implemented. The difference would be that under a rationalized fishery structure the allocations would be unchanged during the biennium, while under the cumulative trip limit structure the allocation could be modified through routine inseason action. Table 2-76 provides a summary of the trawl fishery management measures under the FPA.

Table 2-76. Summary of Trawl Fishery Management Measures Under the FPA Alternative

Fishery	**FPA**
Trawl Fishery [a]	
Catch limits (If trawl rationalization is <u>not</u> implemented)	• Cumulative trip limits for most species, specific to trawl type and geographic area. For specific limits see Table 2-62 and 2-63. • Cowcod and Bronzespotted prohibited south of 40°10 N. lat. • North of 40°10 N. lat. canary prohibited with all but selective flatfish trawl. • South of 40°10 N. lat. canary prohibited with large footrope trawl gear
	• MS sector - fleetwide whiting allocation with overfished species bycatch limits • C/P sector - fleetwide whiting allocation with overfished species bycatch limits • SB Sector - fleetwide whiting allocation with overfished species bycatch limits and the following cumulative limits North of 40°10 N. lat: Slope rockfish & darkblotched – 1000 lbs/mo. POP - 600 lbs/mo Sablefish -100 lbs/mo. Lingcod – 600 lbs/mo. Pacific cod- 600 lbs/mo
Rationalized Fishery (If trawl rationalization is implemented)	• Shoreside - IFQ for most species, cumulative trip limits for non-IFQ species • MS Coop - managed for fleetwide attainment of whiting within the sector allocations of overfished species • C/P Coop - managed for fleetwide attainment of whiting within the sector allocations of overfished species
Gear restrictions	• Same as No Action Alternative
Seasons	• Same as No Action Alternative
GCAs	• Same as No Action Alternative
Trawl RCAs (non-whiting) [a]	• Same as No Action Alternative
Trawl RCAs (whiting)	• Same as No Action Alternative
Monitoring [b]	• Same as No Action Alternative
Reporting Requirements	• Same as No Action Alternative

a/ Assumes additional monitoring and reporting associated with trawl rationalization are in place under a separate action.

Limited Entry Non-Whiting Trawl Fishery- The Council's Final Preferred Alternative

Implementation of Rationalized Fishery

Under the IFQ program for the shoreside sector, quota shares (QS) are initially distributed to fishery participants. Each year these shares are converted from a percent to a quantity by issuing quota pounds (QP) based on the OYs established for the year. The amount of groundfish caught by a LE trawl vessel, even if it is subsequently discarded, must be matched by an equivalent quantity of QP. The program includes an individual bycatch quota (IBQ) for Pacific halibut. The following species are IFQ species: lingcod, Pacific cod, sablefish north and south of 36° north latitude, POP, widow rockfish, canary rockfish, bocaccio, cowcod, yelloweye rockfish chilipepper rockfish, splitnose rockfish, yellowtail rockfish north of 40°10' north latitude, shortspine thornyhead north and south of 34°27' north latitude, longspine thornyhead north of 34°27' north latitude, darkblotched rockfish, minor slope rockfish north and south of 40°10' north latitude, Dover sole, English sole, petrale sole, arrowtooth flounder, starry flounder, and other flatfish. Species not managed under the IFQ program include shortbelly rockfish, longspine thornyhead S. of 34°27', black rockfish – coastwide, minor rockfish north nearshore complex, minor rockfish south nearshore complex, California scorpionfish, cabezon (off CA only), kelp greenling, and "other Fish". Once QS have been distributed, recipients are free to use them with any legal groundfish gear, which aside from trawl principally means bottom longline and fish pots.

Two-year management measures for a rationalized fishery include trawl allocations of species not covered under Amendment 21, trip limits for those species that are not managed under IFQs, and RCA configurations for vessels harvesting QP with trawl or fixed gear. The trawl RCAs under the FPA with a rationalized fishery would be the same as those in place on June 17, 2010 (Same as No Action Alternative). Notable features of this RCA include a modified 200 fm line in periods 1 and 6, which is designed to provide access to petrale sole. Under a rationalized trawl fishery, with individual accountability, the risk of exceeding the petrale sole trawl allocation or ACL is lower than under cumulative trip limit management. Because of the lowered risk under a rationalized fishery structure, the modified petrale areas can be accommodated. A modified 150 fm line is also in place during periods 1 and 6 south of 40°10' north latitude. Under the FPA, trawl RCA boundaries can be routinely adjusted inseason based upon fishery performance.

Under the FPA, the Council specified incidental trip limits for species not managed with IFQ for vessels using trawl or fixed gear to harvest IFQ species with a limited entry trawl permit (Table 2-77). The purpose of allowing trip limits for these species is to allow incidental catch to be landed and for the fishermen to be paid for those landings. These species are incidentally caught with or without having a trip limit specified for them. When there is no trip limit, the fish must be discarded (regulatory discard) or forfeited to the state at the time of landing. Under the FPA, incidental landing limit for vessels using trawl or fixed gear to harvest IFQ species with a limited entry trawl permit would remain unlimited for the remaining fish category (longnose skate, big skate, California skate, California scorpionfish, leopard shark, soupfin shark, finescale codling, Pacific rattail (grenadier), ratfish, kelp greenling, shortbelly, and cabezon in Washington). If increased landings do occur, however, the Council could implement the trip limits analyzed during this biennial cycle process and implement them through routine inseason action (see Appendix B).

All IFQ vessels will be required to carry at-sea observers at their own expense to monitor sorting and discarding of the catch and shoreside landings. An electronic system to report discarded catch and landings, will be integrated with the current state fish ticket system and available for more real-time fishery management.

Table 2-77. FPA: Incidental trip limits for vessels using trawl or fixed gear to harvest IFQ species with a limited entry permit.

Area	Species	Incidental Landing Limit
N. and S. of 40°10 N. lat.	Minor nearshore rockfish & black rockfish	300 pounds/month for periods 1-6
	Cabezon (OR and CA)	50 pounds/month for periods 1-6
	Spiny dogfish	60,000 pounds/month for periods 1-6
	Remaining fish [a/]	Unlimited
South of 34°27 N. lat.	Longspine thornyhead	24,000 pounds/2 months for periods 1-6

a/ Remaining fish includes: longnose skate, big skate, California skate, California scorpionfish, leopard shark, soupfin shark, finescale codling, Pacific rattail (grenadier), ratfish, kelp greenling, shortbelly, cabezon in WA.

Cumulative Trip Limit Management

For 2011, trip limits and RCA structures can be found in Table 2-78. For 2011, the FPA has markedly lower trip limits for sablefish in the northern areas, in comparison with the No Action Alternative (14,750 lbs/2 months versus an average of 21,389 lbs/2 months, respectively). This reflects the lower sablefish ACL and trawl allocation for the FPA compared with the No Action Alternative (2,538 mt versus 2,955 mt, respectively). The FPA also has much lower petrale sole trip limits coast-wide (4,800 lbs/2 months versus an average of 7,900 lbs/2 months) and somewhat lower trip limits for shortspine thornyheads, which is tied to the lower sablefish limits, since these fish co-occur. The Dover sole trip limits are 33 percent higher (150,000 lbs/2 months vs. 100,000 lbs/2 months in the No Action Alternative), to allow for increased harvest of this healthy stock given the much higher ACL and accompanying trawl allocation in the FPA (22,235 mt vs. 16,093 mt in the No Action Alternative). Because Dover sole also co-occurs with sablefish and thornyheads, Dover sole trip limits are not expected to be raised above this level. Dover Sole, Thornyhead, and trawl-caught Sablefish make up the DTS complex. Sablefish, and also shortspine thornyheads constrain the catch of the other species in the complex. Shortspine thornyhead are projected as exploited to 98 percent of the trawl allocation under this trip limit structure, in the FPA scenario.

Table 2-78. FPA: 2011 non-whiting LE trawl cumulative trip limits and RCA boundaries.

			2-month cumulative-poundage limits							
2-month period	RCA lines (fm) shallow	deep	sable-fish	long-spine	short-spine	Dover sole	petrale sole	arrow-tooth	other flatfish	slope rockfish
N. of 40°10' N lat.										
Large/small footrope limits										
1	*75*	200	**14,750**	20,000	17,200	150,000	**4,800**	150,000	110,000	6,000
2	*75*	200	**14,750**	20,000	17,200	150,000	**4,800**	150,000	110,000	6,000
3	*75*	150/200	**14,750**	20,000	17,200	150,000	**4,800**	150,000	110,000	6,000
4	*75*	150/200	**14,750**	20,000	17,200	150,000	**4,800**	150,000	110,000	6,000
5	*75*	200	**14,750**	20,000	17,200	150,000	**4,800**	150,000	110,000	6,000
6	*75*	200	**14,750**	20,000	17,200	150,000	**4,800**	150,000	110,000	6,000
Selective gear limits										
1	*75*	200	**8,000**	5,000	5,000	65,000	**4,800**	90,000	60,000	
2	*75*	200	**8,000**	5,000	5,000	65,000	**4,800**	90,000	60,000	
3	*75*	150/200	**8,000**	5,000	5,000	65,000	**4,800**	90,000	60,000	
4	*75*	150/200	**8,000**	5,000	5,000	65,000	**4,800**	90,000	60,000	
5	*75*	200	**8,000**	5,000	5,000	65,000	**4,800**	90,000	60,000	
6	*75*	200	**8,000**	5,000	5,000	65,000	**4,800**	90,000	60,000	
38° - 40°10' N lat.										
1	100	200	**14,750**	20,000	17,200	150,000	**4,800**	10,000	110,000	15,000
2	100	150	**14,750**	20,000	17,200	150,000	**4,800**	10,000	110,000	15,000
3	100	150	**14,750**	20,000	17,200	150,000	**4,800**	10,000	110,000	15,000
4	100	150	**14,750**	20,000	17,200	150,000	**4,800**	10,000	110,000	15,000
5	100	150	**14,750**	20,000	17,200	150,000	**4,800**	10,000	110,000	15,000
6	100	200	**14,750**	20,000	17,200	150,000	**4,800**	10,000	110,000	15,000
S. of 38° N lat.										
1	100	200	**14,750**	20,000	17,200	150,000	**4,800**	10,000	110,000	55,000
2	100	150	**14,750**	20,000	17,200	150,000	**4,800**	10,000	110,000	55,000
3	100	150	**14,750**	20,000	17,200	150,000	**4,800**	10,000	110,000	55,000
4	100	150	**14,750**	20,000	17,200	150,000	**4,800**	10,000	110,000	55,000
5	100	150	**14,750**	20,000	17,200	150,000	**4,800**	10,000	110,000	55,000
6	100	200	**14,750**	20,000	17,200	150,000	**4,800**	10,000	110,000	55,000

Slope rockfish limits for the FPA would be at the same levels as the beginning of 2010 (6,000 lbs/2 months), to keep POP and darkblotched rockfish impacts 15 percent to 20 percent below the trawl allocation, while allowing bycatch of other slope species within the trawl allocations. These trip limits could be lowered early in 2011 through routine inseason adjustment if future POP or darkblotched catch levels warrant, and in response to a GAP request for more temporally uniform slope rockfish trip limits structure, assuming that the fishery were managed under trip limits in 2011.

The FPA for 2011 is nearly the same as Alternative 3, except the trip limits reflect small comparative decreases to sablefish and Dover sole trawl allocations. These deductions represent removals for the at-sea whiting set-asides of 50 mt for sablefish and 5 mt for Dover sole. The at-sea whiting set asides were not included during the runs at the June Council meeting, but were addressed in the final model runs. Another notable difference between the FPA and Alternative 3 for 2011 is that the bocaccio trawl allocation is 60 mt in the FPA, while it is 29.6 mt in Alternative 3.

The FPA for 2012 has a higher petrale sole ACL and associated trawl allocation than for 2011 (1,055 mt vs. 871 mt, respectively). The 2012 FPA also shows a lower sablefish ACL and associated trawl allocation (2,459 mt) than in 2011 (2,538 mt). The Dover sole allocation remains the same at 22,235 mt for both years.

For 2012, trip limits and RCA structures can be found in Table 2-79. Sablefish trip limits are lowered further, compared with the No Action Alternative, due to a lower ACL, and decrease to the trawl allocation. Shortspine thornyhead trip limits are also lowered slightly in response to the constraining sablefish ACL. Petrale sole trip limits are markedly higher in 2012 versus 2011 (6,400 lbs/2 months versus 4,800 lbs/2 months). Slope rockfish trip limits are the same for 2012 as 2011. Dover sole trip limits remain the same as 2011. Projected impacts and trip limits for 2012 are largely for comparative purposes to explain impacts of ACLs and trawl allocations in this document, and would be likely to change, due to the latest WCGOP and updated landings data between June 2010 and January 1, 2012. The YRCAs in place under the No Action Alternative would remain in place under the FPA.

Table 2-79. FPA: 2012 non-whiting LE trawl cumulative trip limits and RCA boundaries.

			2-month cumulative-poundage limits							
2-month period	RCA lines (fm) shallow	deep	sable-fish	long-spine	short-spine	Dover sole	petrale sole	arrow-tooth	other flatfish	slope rockfish
N. of 40°10' N lat.										
Large/small footrope limits										
1	75	200	**14,000**	20,000	16,800	150,000	**6,400**	150,000	110,000	6,000
2	75	200	**14,000**	20,000	16,800	150,000	**6,400**	150,000	110,000	6,000
3	75	150/200	**14,000**	20,000	16,800	150,000	**6,400**	150,000	110,000	6,000
4	75	150/200	**14,000**	20,000	16,800	150,000	**6,400**	150,000	110,000	6,000
5	75	200	**14,000**	20,000	16,800	150,000	**6,400**	150,000	110,000	6,000
6	75	200	**14,000**	20,000	16,800	150,000	**6,400**	150,000	110,000	6,000
Selective gear limits										
1	75	200	**7,500**	5,000	5,000	65,000	**6,400**	90,000	60,000	
2	75	200	**7,500**	5,000	5,000	65,000	**6,400**	90,000	60,000	
3	75	150/200	**7,500**	5,000	5,000	65,000	**6,400**	90,000	60,000	
4	75	150/200	**7,500**	5,000	5,000	65,000	**6,400**	90,000	60,000	
5	75	200	**7,500**	5,000	5,000	65,000	**6,400**	90,000	60,000	
6	75	200	**7,500**	5,000	5,000	65,000	**6,400**	90,000	60,000	
38° - 40°10' N lat.										
1	100	200	**14,000**	20,000	16,800	150,000	**6,400**	10,000	110,000	15,000
2	100	150	**14,000**	20,000	16,800	150,000	**6,400**	10,000	110,000	15,000
3	100	150	**14,000**	20,000	16,800	150,000	**6,400**	10,000	110,000	15,000
4	100	150	**14,000**	20,000	16,800	150,000	**6,400**	10,000	110,000	15,000
5	100	150	**14,000**	20,000	16,800	150,000	**6,400**	10,000	110,000	15,000
6	100	200	**14,000**	20,000	16,800	150,000	**6,400**	10,000	110,000	15,000
S. of 38° N lat.										
1	100	200	**14,000**	20,000	16,800	150,000	**6,400**	10,000	110,000	55,000
2	100	150	**14,000**	20,000	16,800	150,000	**6,400**	10,000	110,000	55,000
3	100	150	**14,000**	20,000	16,800	150,000	**6,400**	10,000	110,000	55,000
4	100	150	**14,000**	20,000	16,800	150,000	**6,400**	10,000	110,000	55,000
5	100	150	**14,000**	20,000	16,800	150,000	**6,400**	10,000	110,000	55,000
6	100	200	**14,000**	20,000	16,800	150,000	**6,400**	10,000	110,000	55,000

Limited Entry Trawl Whiting - The Council's Final Preferred Alternative

Amendment 20 to the FMP implemented a rationalized trawl fishery structure for the limited entry whiting trawl sectors (catcher-processors, motherships, and shoreside) on January 1, 2011. Under the FPA for the whiting trawl fishery, considerations were provided for the rationalized trawl fishery along with contingency management measures (e.g., bycatch limit management) in the event that trawl rationalization was delayed beyond January 1, 2011. In the event that Amendments 20 or 21 were not in place January 1, 2011, the allocations described in Section 2.2.1.2 for a rationalized fishery could be implemented under the Bycatch Limit Management.

Under both a rationalized fishery structure and cumulative trip limit management, NMFS would continue (same as the No Action Alternative) to have the ability to implement depth-based closures for the whiting fishery on a sector-specific basis as an inseason measure to prevent exceeding an overfished species allocation (under a rationalized fishery) or bycatch limit (under cumulative trip limit management). Any of the specified management lines between the 75-fm and 150-fm lines may be used to restrict fishing depths for the non-tribal sectors. Management measures also maintain the authority for NMFS to implement the Ocean Salmon Conservation Zone (i.e., fishing restricted to depths seaward of the 100 fm line) if the Chinook HG is projected to be attained inseason.

<u>Implementation of Rationalized Fishery</u>

Under a rationalized fishery, at-sea mothership and catcher-processor sectors would be managed using cooperatives. The shoreside whiting sector would be managed by converting their allocation to IFQs, creating a single shoreside sector. The existing allocation of whiting between the shoreside whiting, mothership, and catcher-processor sectors will not change (42, 24, and 34 percent, respectively). No portion of one sector's whiting allocation could be transferred to another sector, except possibly through a rollover of bycatch whiting allocation from a sector that does not have the intent or ability to use it.

Although Pacific whiting comprises the dominant portion of the catch in this sector, some overfished rockfish do get caught. Sector bycatch allocations would be used under trawl rationalization, in a manner similar to bycatch limits in the non-rationalized fishery. NMFS could impose depth restrictions to avoid reaching an overfished species allocation or to close the sector if an allocation is reached. Total catch in the whiting sectors is fully monitored. Motherships and catcher-processors are already subject to full observer coverage, so few changes in the current monitoring program are needed to implement the rationalization program. Catcher vessels in the mothership sectors must carry an observer and are subject to maximized retention of catch for delivery to the processor. Catch is primarily monitored on the mothership.

A season start date is set by regulation, usually in mid-May, and the fishery proceeds until the quota is expended or fishing operations stop for economic reasons (vessels moving to other fisheries, whiting moving offshore). The regulated season start date is meant to prohibit fishing when salmon are passing through the fishing area

For 2011-2012, the Council adopted new allocations for widow, darkblotched, and POP as determined by Amendment 21 and a two year allocation for canary.

<u>Non-rationalized Fishery Management</u>

In the event that Amendments 20 or 21 were not in place January 1, 2011, the final preferred limited entry whiting trawl management measures would have been the same as the No Action Alternative for the catcher/processor and mothership sectors. Bycatch rates would be based on new allocations for widow, darkblotched, and POP as determined by Amendment 21 and a two-year allocation for canary (Table 2-64).

For the shoreside sector, if the fishery were not rationalized in 2011-2012, new management measures would have included the following trips limits for the shoreside non-treaty whiting fisheries operating north of 40º10' north latitude:

- Lingcod: 600 pounds per calendar month.
- Minor slope rockfish, including darkblotched rockfish: 1,000 pounds per calendar month.
- Pacific ocean perch: 600 pounds per calendar month.
- Pacific cod: 600 pounds per calendar month.
- Sablefish: 1,000 pounds per calendar month.

These limits would have been in addition to the No Action Alternative midwater trawl limits specified in Federal regulations (i.e., trip limit table 3) for widow rockfish and yellowtail rockfish north of 40º10' north latitude (Table 2-62). Midwater trawl limits south of 40º10' north latitude would have remained unaffected by this recommendation.

Fixed Gear - The Council's Final Preferred Alternative

Table 2-80 provides a summary of the limited entry fixed gear management measures under the FPA and Table 2-81 provides a summary of the open access fixed gear management measures under the FPA.

Table 2-80. Summary of Limited Entry Fixed Gear Fishery Management Measures Under the FPA

Cumulative limits	• Cumulative trip limits for most species, specific to geographic area. Average annual limits by target species are: Sablefish North of 36° N. lat 7,083 lbs/2 mo., South of 36° N. lat. 2000 lb/week California Scorpionfish 1,200 lb/2 mo. All other species are the same as No Action • Primary sablefish fishery managed with tier limits 2011 - Tier 1 at 41,379 lb, Tier 2 at 18,809 lb, and Tier 3 at 10,748 lb. 2012 - Tier 1 at 40,113 lb, Tier 2 at 18,233 lb, and Tier 3 at 10,419 lb. • Canary and yelloweye landings prohibited coastwide • Cowcod and bronzespotted rockfish landings prohibited South of 40°10 N. lat
Size limits	• Same as No Action Alternative
Gear restrictions	• Same as No Action Alternative
Seasons	• Same as No Action Alternative
GCAs	YRCAs - Same as No Action Alternative
	CCA Fishing is prohibited in CCAs with the following exceptions: • Fishing for "other flatfish" when using no more than 12 hooks, #2 or smaller same as No Action Alternative • Fishing for rockfish and lingcod shoreward of the 30 fm (possible 40 fm through inseason action)
	Farallon Island & Cordell Banks - Same as No Action Alternative
	• EFHCAs Same as No Action Alternative

Table 2-80. Summary of Limited Entry Fixed Gear Fishery Management Measures Under the FPA (continued).

Non-trawl RCAs	• North of 46°16 N. lat. Same as No Action • 46°16- 43° N. lat. 30 to 100 fm • 43°-42° N. lat. Same as No Action • 42°-40°10 N. lat. Same as No Action • 40°10-34°27 N. lat. Same as No Action • South of 34°27 N. lat. Same as No Action • Fishing is prohibited in non-trawl RCAs with the following exception: Fishing for "other flatfish" when using no more than 12 hooks, #2 or smaller
Monitoring	• Same as No Action Alternative
Reporting	• Same as No Action Alternative

Table 2-81. Summary of Open Access Fishery Management Measures Under the FPA

Cumulative limits	• Cumulative trip limits for most species, specific to trawl type and geographic area. Sablefish average annual limits: North of 36°N. lat. Same as No Action - 2,575 lbs/2 mo., South of 36º N. lat. 6,000 lb/2 mo. Salmon trollers Inside the non-trawl RCA, incidentally caught lingcod with a ratio limit of 1 lingcod per 15 Chinook, plus 1 lingcod up to a trip limit of 10 lingcod, up to 400 lbs/mo. All other species same as No Action Alternative • Canary and yelloweye landings prohibited coastwide • Cowcod and bronzespotted rockfish landings prohibited South of 40°10 N. lat
Gear restrictions	• Same as No Action Alternative
Seasons	• Same as No Action Alternative
GCAs	YRCAs - Same as No Action Alternative
	CCA Fishing is prohibited in CCAs with the following exceptions: • Fishing for "other flatfish" when using no more than 12 hooks, #2 or smaller same as No Action Alternative • Fishing for rockfish and lingcod shoreward of the 30 fm (possible 40 fm through inseason action)
	Farallon Island & Cordell Banks - Same as No Action Alternative
Open Access non-trawl RCAs	• North of 46°16 N. lat. Same as No Action Alternative • 46°16- 43° N. lat. 30 to 100 fm • 43°-42° N. lat. Same as No Action Alternative • 42°-40°10 N. lat. Same as No Action Alternative • 40°10-34°27 N. lat. Same as No Action Alternative • South of 34°27 N. lat. Same as No Action Alternative • Fishing is prohibited in non-trawl RCAs with the following exception: Fishing for "other flatfish" when using no more than 12 hooks, #2 or smaller
Non-groundfish trawl RCAs (CA Halibut, Sea Cucumber & Ridgeback Prawn)	• Same as No Action
Monitoring	• Same as No Action Alternative
Reporting	• Same as No Action Alternative

Allocations and Harvest Guidelines

Table 2-82 describes the FPA for the sablefish ACL north of 36° north latitude, compared to No Action, along with the sablefish allocations for limited entry and open access. The associated final preferred apportionment of overfished species for the non-nearshore fixed gear sector (open access and limited entry combined) can be found in Table 2-75. These final preferred apportionments are the basis by which sharing of overfished species occurs within the non-trawl sector. These are not harvest guidelines, but an amount available to the non-trawl sector for the start of the biennium. As part of routine inseason management, the Council could decrease or increase these apportionments based on updated projections.

Table 2-82. FPA: Sablefish ACL and allocations north of 36° north latitude, compared to No Action (2010).

Species	Fishery	2010 (mt)	2011 (mt)	2012 (mt)
Sablefish N. 36° N. lat.	**OY/ACL**	6,471	5,515	5,347
	LE Fixed Gear Allocation	2,140	1,874	1,816
	----LE Fixed Gear Primary	1,819	1,593	1,544
	----LE Fixed Gear Daily Trip Limit	321	281	272
	Open Access	529	463	449

Non-Nearshore Fixed Gear - The Council's Final Preferred Alternative

Area Restrictions

Under the FPA, the seaward non-trawl RCA is defined by management lines specified with waypoints at roughly 100 fm in waters off northern California (north of 40°10' north latitude) through Oregon and Washington (Figure 2-12). The non-trawl RCA south of 40°10' north latitude under the FPA is defined by management lines specified with waypoints at roughly 150 fm.

Seaward RCA Boundary	36°- 40° 10'	40°10'-Col/Eur 43°	Col/Eur 43°-Cascade Head 45.064°	Cascade Head 45.064°-Point Chehalis 46.888°	North of Point Chehalis 46.888°
Shoreward boundary to 100 fm					
100 fm					
125 fm					
150 fm					
>150 fm					

Figure 2-12. FPA. Non-trawl RCA seaward configuration. Grey shading indicates areas closed to fishing.

The Council recommended the 100 fm non-trawl RCA boundary as the FPA to provide greater access to fishing grounds while having no increase of impacts to overfished species relative to the No Action Alternative. Moving the seaward RCA from 43° north latitude to Cascade Head from 125 to 100 fm opens more fishing areas, may decrease conflicts among fixed gear fishermen, may reduce running time to some fishing grounds (which subsequently decreases expense and improves safety), and may increase sablefish catch rates in some instances. Fixed gear fishermen stressed that much of their productive fishing grounds are between 100 and 125 fm, and that moving the line to 125 fm created negative impacts for the fishery (Agenda Item B.3.b, ODFW Report, June 2010). The GAP reported that sablefish catch in waters shallower than 125 fm during the fall typically yield larger and more valuable sablefish, along with increased catches of lingcod (Agenda Item, B.3.b, Supplemental GAP Report, and June 2010). In addition, the GAP noted that fishing shallower would benefit smaller vessels (lack of space for increased gear that is required when fishing in deeper water) and enhances at-sea safety (Agenda Item, B.3.b, Supplemental GAP Report, June 2010). Finally, in some areas (particularly off Washington), the industry pointed out that RCA restrictions that push the fleet further off the coast results in more intense fishing pressure on increasingly less productive fishing grounds in smaller areas (decreased catch rates and increased gear conflicts over time) (Agenda Item B.7.b, Supplemental GAP Report, June 2010).

Under the FPA, the Council will have the ability to routinely adjust non-trawl RCA configurations inseason for four northern subareas bounded by Cape Mendocino at 40°10' north latitude, 43° north latitude, Cascade Head, Point Chehalis at 46.888° north latitude, and the U.S.-Canada border. These adjustments would be used to reduce overfished species impacts, if necessary.

The same seaward non-trawl RCA adjustment alternatives described above would also apply to the non-nearshore open access sector (Figure 2-12). Adjustments of the seaward non-trawl RCA boundary in the north largely affect sablefish targeting in the daily-trip-limit fishery, but also affect targeting opportunities on slope rockfish, spiny dogfish, shortspine thornyhead, and Pacific halibut. The Council recommended that the No Action Alternative trip limits north and south of 40 10 north latitude (Table 2-62 and Table 2-63) be carried forward for the 2011-2012 open access fixed gear fisheries, except for the sablefish limits south of 36° north latitude, described below.

The YRCAs in place under the No Action Alternative would remain in place under the FPA.

<u>Cumulative Limits - Non-Nearshore Limited Entry Fixed Gear</u>

The Council recommended that the No Action Alternative trip limits north and south of 40°10' north latitude (Table 2-62 and Table 2-63) be carried forward for the 2011-2012 limited entry fixed gear fisheries, except for the sablefish limits described below.

North of 36° north latitude under the FPA, the Council recommended higher sablefish cumulative limits, compared to the No Action Alternative, for the limited entry fixed gear daily trip limit fishery as follows:

Period 1 = 6,500 pounds per two months;
Period 2 = 7,500 pounds per two months;
Period 3 = 7,500 pounds per two months;
Period 4 = 7,500 pounds per two months;
Period 5 = 7,500 pounds per two months;
Period 6 = 6,000 pounds per two months.

No daily limit is recommended but a weekly limit of not less than 25 percent of the bimonthly limit was included as part of the Council's FPA. These limits are intended to allow the limited entry daily trip limit fishery attain their sablefish allocation.

The weekly landing limit of at least 25 percent of the bimonthly limit was recommended, even though the current model showed no significant relationship between weekly landing limits and actual bimonthly landings. It is possible that the weekly limit had some negative-effect to bimonthly landings, even though the effect was not detected. A more complex model will be applied to these data at a later date to better understand the relationship between weekly limits and actual bimonthly landings. In the meantime, dropping the daily limit and substantially increasing the bimonthly limit are major deviations from past management of this fishery. Hence, it is prudent to retain some weekly limit to ensure that landings do not increase unpredictably faster than anticipated.

Weekly landing limits have historically been set at approximately 25 percent of the bimonthly limit. A weekly limit set at 25 percent of the bimonthly limit would require at least four weeks of fishing for vessels to reach the bimonthly limit. Weekly limits should be no lower than 25 percent of the bimonthly limit, because it is likely that weather, breakdowns, and other unforeseen circumstances may prevent vessels from fishing.

The planned bimonthly landing limit is not constant. Hence, to simplify management, a constant weekly limit should be set at 1,900 lbs/week. This weekly limit represents 25 – 33 percent of the bimonthly landing limits set for 2011.

In order to attain the sablefish ACL south of 36° north latitude, the Council recommended sablefish trip limits in the Conception Area that are higher than the No Action limits. For limited entry, the Council recommended no daily limit, 2,000 pounds per week with no bi-monthly limit. A recent WCGOP report indicates that there are trace (i.e., less than 0.1 mt) overfished species interactions in the area south of 36° N. latitude. As such action, the FPA for the non-nearshore fisheries south of 36° north latitude is not anticipated to result in appreciable overfished species impacts.

Cumulative Limits -Non-Nearshore Open Access Fixed Gear

The Council recommended higher sablefish DTL limits, compared to the No Action Alternative, for Conception area open access fisheries in order to achieve the Conception Area sablefish ACL. For open access, the Council recommended 400 pounds per day or one weekly landing of up to 1,500 pounds not to exceed 6,000 pounds in 2 months. Analysis of this trip limit is provided in Appendix A.[16]

[16] At their September and November 2010 meetings, the Council considered the most recent fishery information, indicating that higher than anticipated catches were accruing in the Conception Area sablefish fishery and recommend and NMFS implemented inseason reductions to trip limits at the end of 2010. At their November 2010 meeting, the Council also recommended lower trip limits for open access sablefish in the Conception Area for 2011 to be implemented via routine inseason action to keep catches below the harvest specifications due to the higher than anticipated effort that was occurring in 2010. The Council recommended and NMFS will be implementing inseason adjustments to sablefish trip limits in the open access fishery in the Conception Area of 300 pounds per day, or one weekly landing of up to 1,200 pounds, not to exceed 2,400 pounds in 2 months. This restriction will likely be implemented at the start of Period 2, on March 1, 2011. These trip limits are lower and more restrictive than those trip limits that were in place during most of 2010.

Nearshore Fixed Gear – The Council's Final Preferred Alternative

Area Restrictions

Under the FPA, the No Action Alternative non-trawl RCA restrictions and trip limits remain in place for the nearshore fishery (Table 2-68, Table 2-69, Table 2-70, Table 2-71). The non-trawl RCA north of 40°10 north latitude is defined by management lines specified with waypoints at roughly 20 fm in waters off northern California (north of 40°10' north latitude) to 43° north latitude. Prior to 2009, the shoreward boundary was specified with waypoints at 30 fm. The movement of the line from 30 fm to 20 fm is projected to reduce yelloweye rockfish impacts by fixed gear fishermen targeting nearshore species. From 43° north latitude to 46° 16' north latitude the line returns to 30 fm; north of 46°16' north latitude the RCA is set at the shoreline (i.e., the shoreward area is closed to fishing).

The shoreward non-trawl RCA south of 40°10' north latitude to Point Conception (34°27' north latitude) under the FPA is defined by management lines specified with waypoints at roughly 30 fm. There is an additional closure between zero fm and 10 fm around the Farallon Islands to reduce impacts on shallow nearshore rockfish in that area. The shoreward non-trawl RCA south of Point Conception (34°27' north latitude) is defined by management lines specified with waypoints at roughly 60 fm. This more liberal RCA, compared to the north, can be accommodated by the minimal occurrence of canary and yelloweye rockfish in the Southern California Bight.

Under the FPA, the nearshore fishery is modeled using finer area stratifications and average landings for Oregon and California. As discussed in Appendix A, overfished species impact projections were stratified into three areas: 1) north of 42° north latitude; 2) between 42° and 40°10' north latitude; and 3) south of 40°10' north latitude. This stratification was preferred since management of the nearshore fishery is largely conducted by the states.

The Council also recommended a nearshore apportionment of the non-trawl allocation for canary and yelloweye rockfish. These final preferred apportionments are the basis by which sharing of overfished species occurs within the non-trawl sector. These are not harvest guidelines, but an amount available to the non-trawl sector for the start of the biennium. As part of routine inseason management, the Council could decrease or increase these apportionments based on updated projected impacts.

At the June 2010 Council meeting, the GAP statement and public testimony spoke to the hardship faced by the nearshore community under the restrictive yelloweye harvest amounts (Agenda Item B.7.b, Supplemental GAP Report and Agenda Item B.5.c, Public Comment). Although the FPA is less restrictive than other analyzed alternatives, access to nearshore stocks will continue to be restricted in Oregon and California due to the low yelloweye rockfish non-trawl nearshore apportionment (Table C-24). Since the nearshore fishery is not modeled on full attainment of nearshore species ACLs, this fishery will continue to be held to lower levels, resulting in lost economic opportunities.

Cumulative Limits - Nearshore Limited Entry Fixed Gear

The cumulative limits for the nearshore limited entry fixed gear in place under the No Action Alternative would remain in place under the FPA.

Cumulative Limits - Nearshore Open Access Fixed Gear

The Council recommended higher sablefish DTL limits, compared to the No Action Alternative, for Conception area open access fisheries in order to achieve the Conception Area sablefish ACL. For open access, the Council recommended 400 pounds per day or one weekly landing of up to 1,500 pounds not to exceed 6,000 pounds in 2 months. Analysis of this trip limit is provided in Appendix A.

Tribal Fisheries – The Council's Final Preferred Alternative

Trip limits for Washington coast tribal fisheries under the FPA are summarized in Table 2-83.

Table 2-83. Summary of the tribal fishery under the Final Preferred Alternative.

Cumulative limits	Shortspine thornyhead: All gears -17,000 lb per 2 months. Longspine thornyhead: All gears - 22,000 lb per 2 months. Canary rockfish Same as No Action Alternative. Yelloweye rockfish Same as No Action Alternative. Makah Tribe midwater trawl fisheries: Same as No Action Alternative. Other rockfish: Same as No Action Alternative. Rockfish taken during open competition tribal commercial fisheries for Pacific halibut Same as No Action Alternative. Flatfish and other fish (bottom trawl). • For Dover sole, English sole, other flatfish 110,000 lbs/2 mo. • Arrowtooth flounder 150,000 lbs/2 mo. • The limits will be combined across periods and the fleet to create a cumulative harvest target. The limits available to individual vessels will be adjusted inseason to stay within the overall harvest target as well as estimated impacts to overfished species. • Petrale sole -. Same as No Action Alternative Spiny dogfish – 200,000 lbs/2 mo.
Monitoring	• Same as No Action Alternative
Reporting	• Same as No Action Alternative

All Treaty Tribe Fisheries

In 2011-2012, the tribes will continue to have formal allocations for Sablefish and Pacific whiting that are deducted from the ACLs for those species (See Section 2.3). The tribal allocation for sablefish is 10 percent of the ACL north of 36° north latitude, less 1.5 percent for estimated discard mortality. For 2011 and 2012, the tribal sablefish allocations are 552 mt and 535 mt, respectively. The formula for the tribal allocation of Pacific whiting in 2010 was [17.5 percent * (U.S. OY)] + 16,000 mt and was described in a proposed rule on March 12, 2010 (75 FR 11829) and implemented in a final rule on May 4, 2010 (75 FR 23620). For 2011 the Makah and Quileute tribes and the Quinault Indian Nation are proposing to conduct whiting fisheries. The tribal whiting fisheries in 2010 received a set-aside of 49,939 mt, based on discussions with Makah and Quileute on their anticipated need and participation. The Quinault Indian Nation has not yet estimated effort or an amount of whiting needed for a future fishery. In 2009, the PFMC has requested that NMFS convene government-to-government discussions to establish appropriate set-asides or allocations for treaty tribal fisheries for 2010 and beyond. That process is moving forward but is not in place at this time.

The 2011 and 2012 tribal harvest guideline for black rockfish is the same as in 2009 and 2010: 13.61 mt (30,000 lbs) for the management area between the U.S./Canada border and Cape Alava (48°10.00' north latitude) and 4.5 mt (10,000 lbs) for the management area between Destruction Island and Leadbetter Point (46°38.17' north latitude). The tribes have not had formal allocations for Pacific cod or lingcod in recent years; however, the Council recommended adopting a tribal proposal for tribal harvest guidelines for these two species in 2011 and 2012. Based on this recommendation, harvest guidelines of 400 mt (881,840 lbs) for Pacific cod and 250 mt (551,150 lbs) for lingcod will apply to the tribes for 2011 and 2012.

Trawl Fisheries Management Measures for 2011 and 2012

Tribes implement management measures for tribal fisheries both separately and cooperatively with those management measures that are described in the Federal regulations. The tribes may adjust their tribal fishery management measures inseason to stay within the overall harvest targets described above, including their estimated impacts to overfished species. Trip limits are the primary management measure that the tribes specify in Federal regulations at 660.50, subpart C. The tribes propose trip limit management for the following species taken in tribal fisheries in 2011-2012: Spiny dogfish; several rockfish species and species groups, including thornyheads; and flatfish species and species groups. The tribes will continue to require full retention of all overfished rockfish species as well as all other marketable rockfish during treaty fisheries. The Makah Tribe has an observer program in place to monitor and enforce the limits proposed above (see Makah Trawl Observations in Appendix B).

For all tribal groundfish fisheries the following trip limits will apply in 2011 and 2012:

Thornyheads - Tribal fisheries will be restricted to 17,000 lbs/2 months for shortspine thornyheads and 22,000 lbs/2 months for longspine thornyheads. Those limits would be accumulated across vessels into a cumulative fleetwide harvest target for the year. The limits available to individual fishermen will then be adjusted inseason to stay within the overall harvest target as well as estimated impacts to overfished species.

Canary Rockfish - Tribal fisheries will be restricted to a 300 pound per trip limit.

Other Minor Nearshore, Shelf and Slope Rockfish - Tribal fisheries will be restricted to a 300 pound per trip limit for each species group, or the Limited Entry trip limits if they are less restrictive than the 300 pound per trip limit.

Yelloweye Rockfish - The tribes will continue developing depth, area, and time restrictions in their directed Pacific halibut fishery to minimize impacts on yelloweye rockfish. Tribal fisheries will be restricted to 100 pounds per trip.

Spiny Dogfish – Tribal fisheries for dogfish in 2011 and 2012 would be restricted to 200,000 lbs/2 months. Targeting of dogfish by treaty fishermen in 2011 and 2012 would be conducted while staying within current estimates of impacts on overfished species.

<u>Makah Trawl Fisheries for 2011 and 2012</u>

Makah Tribal Midwater Trawl Fishery - Treaty midwater trawl fishermen will be restricted to a cumulative limit of yellowtail rockfish, based on the number of vessels participating, not to exceed 180,000 lbs/2 month period for the entire fleet. Their landings of widow rockfish must not exceed 10 percent of the cumulative poundage of yellowtail rockfish landed by a given vessel for the year. The tribe may adjust the cumulative limit for any two-month period to minimize the incidental catch of canary and widow rockfish, provided the average cumulative limit does not exceed 180,000 pounds for the fleet.

Makah Tribal Bottom Trawl Fishery - Treaty fishermen using bottom trawl gear will be subject to trip limits similar to those applied to the limited entry fishery for shortspine and longspine thornyhead, Dover sole, English sole, rex sole, arrowtooth flounder, and other flatfish in 2009-2010. These are 110,000 lbs/2 months for Dover sole, English sole, and Other Flatfish; 150,000 lbs/2 months for arrowtooth flounder; 17,000 lbs/2 months for shortspine thornyhead; and 22,000 lbs/2 months for longspine thornyhead. For Dover sole, longspine thornyheads, and arrowtooth flounder, these bi-monthly limits in place at the beginning of the season will be combined across periods and the fleet to create a cumulative harvest target. The limits available to individual fishermen will then be adjusted inseason to stay within the overall harvest target as well as estimated impacts to overfished species. For petrale sole, fishermen would be restricted to 50,000 lbs/2 months for the entire year. Because of the relatively modest expected harvest, all other trip limits for the tribal fishery will be those in place at the beginning of the season in the limited entry fishery and will not be adjusted downward, nor will time restrictions or closures be imposed, unless in-season catch statistics demonstrate that the tribe has taken half of the harvest in the tribal area. Fishermen will be restricted to small footrope ($\leq$ 8 inches) trawl gear. Exploration of the use of selective flatfish trawl gear may be conducted prior to the 2011-2012 management cycle.

Recreational Fisheries - The Council's Final Preferred Alternative

<u>Washington Recreational - Final Preferred Alternative</u>

Harvest Guidelines
The final preferred overfished species harvest guidelines for the Washington recreational fisheries for 2011-2012 are found in Table 2-75.

Season Structure
Under the FPA, Washington would allow for a year-round groundfish season with lingcod seasons that are the same as the No Action Alternative. Table 2-84 summarizes the season structure. The aggregate bottomfish limit would be reduced from 15 to 12 and would include a cabezon sub limit of 2 per angler per day in addition to the sub limits for rockfish (10) and lingcod (2). Management measures in marine areas 3 and 4 would continue to restrict the groundfish fishery to waters shallower than 20 fm as is in place under the No Action Alternative but would be in place starting June 1 instead of May 21, through September 30. This is consistent with the original intent to have the depth restriction apply after the halibut season which used to begin on May 1 but has shifted to mid-May in recent years. In marine area 2, groundfish fishing would be allowed from March 15 to June 15 but would be prohibited in waters seaward of 30 fm. The No Action provisions that allow for Pacific cod and sablefish retention from May 1 through June and lingcod on days that the primary halibut season is open (7 days in 2010, and expected to be similar in 2011 and 2012) and the prohibition to fish for or retain lingcod south of 46° 58' north latitude on Fridays and Saturdays seaward of 30 fm which are in place under the No Action Alternative would continue to be in place under this alternative. Under the FPA rockfish retention would be allowed from May 15 through June 15 as encounters of overfished rockfish do not typically occur when anglers target rockfish in this area.

Under the FPA, the following lingcod seasons and size limits would apply in 2011 and 2012:

- Marine Areas 1-3 (from the Oregon/Washington border at 46º16' north latitude north to Cape Alava at 48º10' north latitude): open from March 12 through October 15 in 2011 and March 17 through October 13 in 2012.
- Marine Area 4 (Cape Alava to the US/Canadian border): open from April 16 to October 15 in 2011 and April 16 to October 13 in 2012.
- The lingcod minimum size limit during the open lingcod season would be 22 inches in Marine Areas 1-3 and 24 inches in Marine Area 4.

Table 2-84. FPA. Washington groundfish fishery season for 2011-2012.

<table>
<tr><th>Marine Area</th><th>Jan</th><th>Feb</th><th>Mar</th><th>Apr</th><th>May</th><th>June</th><th>July</th><th>Aug</th><th>Sep</th><th>Oct</th><th>Nov</th><th>Dec</th></tr>
<tr><td>3 & 4 (N. Coast)</td><td colspan="5">Open all depths</td><td colspan="4">Open <20 fm June 1-Sep 30 [a/]</td><td colspan="3">Open all depths</td></tr>
<tr><td>2 (S. Coast)</td><td colspan="2">Open all depths</td><td colspan="4">Open <30 fm Mar 15 - June 15 [b/], [c/], d</td><td colspan="2">Open all depths except lingcod prohibited on Fri. and Sat. >30 fm [e/]</td><td colspan="4">Open all depths</td></tr>
<tr><td>1 (Col. R.)</td><td colspan="3">Open all depths</td><td colspan="6">Open all depths [f/]</td><td colspan="3">Open all depths</td></tr>
</table>

a/ Groundfish retention allowed >20 fm on days when Pacific halibut is open.
b/ Retention of sablefish and Pacific cod allowed seaward of 30 fm from May 1- June 15.
c/ Retention of rockfish allowed seaward of 30 fm.
d/ Retention of lingcod allowed seaward of 30 fm on days that the primary halibut season is open.
e/ Retention of lingcod prohibited >30 fm, south of 46°58 on Fri. and Sat. from July 1 – August 31.
f/ Retention of groundfish, except sablefish and Pacific cod, prohibited with Pacific halibut on board.

Bag Limits and Size Limits

Under the FPA, the Washington recreational fishery would be open year-round except for lingcod. The aggregate groundfish bag limit would be reduced from 15 to 12 fish per angler per day. The aggregate groundfish bag limit would continue to include sub limits for rockfish (10 per angler per day) and lingcod (2 per angler per day) but a new sub limit of 2 cabezon per angler per day would be added for 2011 and 2012. The lingcod minimum size limit during the open lingcod season would be 22 inches in Marine Areas 1-3 and 24 inches in Marine Area 4.

Area Restrictions

The area restrictions that apply under the FPA for the Washington recreational groundfish and Pacific halibut fisheries are the same as those for the no action alternative.

<u>Oregon Recreational - Final Preferred Alternative</u>

Harvest Guidelines

Under the No Action Alternative, Oregon and Washington shared recreational fishery harvest guidelines for yelloweye rockfish and canary rockfish. The FPA for 2011-2012 removed the shared harvest guidelines for canary and yelloweye rockfish, each state now has a specified harvest guideline for its recreational fisheries. The season structures and depth restrictions adopted as the FPA for the Oregon recreational groundfish fishery in 2011 and 2012 are found in Figure 2-13.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Bottomfish Season	Open all depths			**Open < 40 fm**						Open all depths		
Marine Bag Limit [1]	Ten (10)			**1 Fish Cabezon Sub-Bag** [2]						Ten (10)		
Lingcod Bag Limit	Three (3)											
Flatfish Bag Limit [3]	Twenty Five (25)											

1 Marine bag limit includes all species other than lingcod, salmon, steelhead, Pacific halibut, flatfish, surfperch, sturgeon, striped bass, pelagic tuna and mackerel species, and bait fish such as herring, anchovy, sardine, and smelt

2 From April 1 through September 30, the marine bag limit is Ten (10) fish per day, of which no more than one (1) may be cabezon.

3 Flounders, soles, sanddabs, turbots and halibuts except Pacific halibut

Figure 2-13. Oregon recreational groundfish season in 2011-2012 under the FPA (17 mt yelloweye rockfish ACT).

Season structure

Under the FPA, the Oregon recreational groundfish fishery would be open offshore year-round, except from April 1 to September 30 when fishing is only allowed shoreward of 40 fm (Figure 2-13). Closing the fishery outside of 40 fm from April 1 to September 30, months where yelloweye rockfish harvest is highest, mitigate the impacts to depleted yelloweye rockfish. The shore-based fishery would be open year-round as depleted yelloweye rockfish are not impacted.

Bag and Size Limits

A marine fish daily bag limit of ten fish in aggregate was adopted under the FPA. The marine fish daily bag limit includes all species other than lingcod, salmon, steelhead, Pacific halibut, flatfish, surfperch, sturgeon, striped bass, pelagic tuna and mackerel species, and bait fish such as herring, anchovy, sardine and smelt. This daily bag limit provides the flexibility to make necessary adjustments through the yearly state process, reflecting the progression of the current year's fishery. The state process will likely reduce the marine fish daily bag limit from ten fish in aggregate to manage the harvest of "other nearshore" rockfish complex within the recreational fishery state ocean boat landing cap which is adopted in the yearly state process. Reducing the marine fish daily bag limit will also affect black rockfish harvest rates and may prevent the fishery from harvesting its total allocation. The status of black rockfish was assessed in 2007 as healthy. The final preferred ACL for 2011-2012 is 1,000 mt for the area off Oregon and California with an Oregon harvest guideline of 580 mt, which is the same as in 2009-2010. Assuming the recreational share continues to be 76 percent as determined through the state process, the harvest guideline for black rockfish would be 440.8 mt. Reductions in the marine fish daily bag limit is not expected to reduce yelloweye rockfish impacts, as data showed little difference in trip hours under 10, 8, 6, or 5 fish bag limits.

A cabezon seasonal sub-bag limit of one fish, concurrent with the seasonal depth restrictions was adopted under the FPA. This seasonal sub-bag limit will reduce cabezon impacts and keep impacts below the ACL, while still allowing for at least some retention year-round. The sub-bag limit occurring during the same months (April 1 through September 30) as the seasonal depth restrictions simplifies regulations.

A lingcod daily bag limit of three fish was adopted under the FPA. This daily bag-limit provides the flexibility to make necessary adjustments through the yearly state process, reflecting the progression of the current year's fishery. The state process will likely reduce the lingcod bag limit to two fish for the opening of the 2011 season. In the event the Pacific halibut catch allocation is reduced significantly from 2010 levels or the marine bag limit is further reduced inseason, the lingcod daily bag limit could be increased to three fish so long as the harvest guidelines for depleted yelloweye rockfish and canary rockfish are not exceeded.

A flatfish daily bag limit of 25 fish in aggregate was approved under the FPA and is consistent with the No Action management measures effective since 2007. The flatfish daily-bag limit consists of all soles and flounders except Pacific halibut. Adoption of the flatfish daily bag limit of 25 fish in aggregate promotes simplicity in regulations and provides the flexibility to create additional regulations specific to flatfish (i.e., allowed retention of flatfish in the Pacific halibut fishery, or allowed targeting of flatfish in the event of a closure due to rockfish harvest guideline attainment).

The FPA includes minimum length limits:

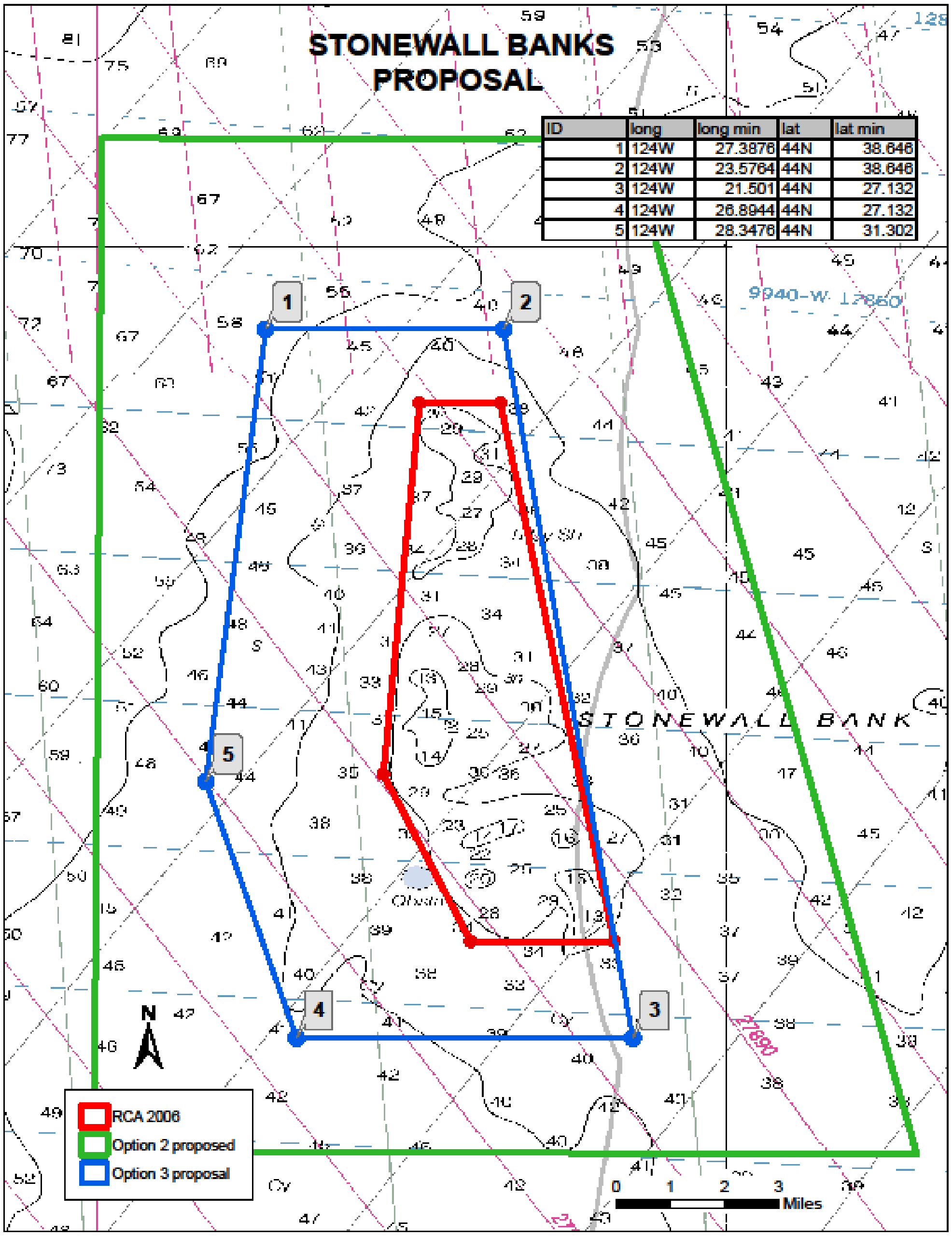
- lingcod – 22 in.
- cabezon – 16 in.
- kelp greenling – 10 in.

This management measure is consistent with the No Action management measures effective in 2007-2008 and 2009-2010. These length limits are effective tools in reducing harvest of these species, primarily in the shore and estuary fishery.

Area Restrictions

Under the FPA, targeting and retaining groundfish and Pacific halibut will be prohibited year-round in the Stonewall Bank Yelloweye Rockfish Conservation Area (YRCA), a high relief rocky habitat residing approximately 15 miles offshore from Newport, Oregon (Figure 2-10). Targeting and retaining Pacific halibut and groundfish within the Stonewall Bank was prohibited to reduce yelloweye rockfish impacts attributed to those fisheries.

Two other alternative Stonewall Bank YRCA closure areas (Figure 2-14) were not adopted under the FPA because the extent of yelloweye rockfish incidental catch in the expanded area(s) has not been determined. Public comment expressed concern over enlargement of the YRCA as the present size is already very disruptive to the groundfish and halibut fishery out of Newport. Concern was expressed that if the YRCA area is increased, the potential may be lost for future opportunity to target healthy species such as yellowtail rockfish in the event that gear is developed to allow a targeted fishery, while avoiding yelloweye rockfish encounters.



ODFW, 05/22/06

Figure 2-14. Alternative Proposals for the Stonewall Bank Yelloweye Rockfish Conservation Area.

Groundfish Retention in the All-Depth Pacific Halibut Fishery
Since 2009, only sablefish and Pacific cod may be retained in the Pacific halibut fishery at any depth in the area north of Humbug Mountain, Oregon. It is expected that groundfish retention in the all-depth Pacific halibut fishery will be similarly constrained in 2011 and 2012. Under the FPA, the Council recommended maintaining current regulations on groundfish retention during the all-depth Pacific halibut fishery.

Inseason Management Tools
Oregon has a responsive port-based monitoring program through their Ocean Recreational Boat Survey (ORBS) and regulatory processes in place to track harvest and take actions inseason if necessary. The following are suggested management measures that could be implemented inseason if the 2011 (or 2012) fishery does not proceed as expected.

Inseason management action may be implemented in 2011 or 2012 to reduce the impacts of the Oregon recreational groundfish fishery. Inseason management tools, designed to mitigate impacts, include bag limit adjustments (including non-retention), length limit adjustments, gear restrictions, and season, days per week, depth, and area closures.

Season, depth, days open per week, and area closures are the primary inseason tools for limiting yelloweye rockfish and canary rockfish impacts, since retention of these species is prohibited. If catch rates indicate that the harvest targets for yelloweye rockfish will be reached prematurely, offshore depth closures may be implemented inseason at 30, 25, or 20 fm as these two species are less abundant nearshore and release survival rates are higher in shallow waters. Additionally, days per week may also be closed to reduce impacts. ODFW will monitor inseason progress toward recreational harvest targets for canary rockfish and yelloweye rockfish. Regulations will depend upon the timing of the determination for their need.

Adjustments to the marine fish daily-bag limit to no more than ten fish may be implemented to achieve season duration goals in the event of accelerated or decelerated black rockfish or other nearshore rockfish harvest. The lingcod daily bag limits may be adjusted to no more than three fish in the event the marine bag limit changes or the Pacific halibut catch limit is reduced from 2010 levels. Season and/or area closures may also be considered if harvest targets are projected to be attained. Closing one or more days per week is an inseason tool that could be used to limit impacts for any managed species. Closing certain days each week would help lengthen the duration of a fishery approaching a harvest guideline.

Non-retention and length restrictions are the likely inseason tools to use for cabezon and greenling as release survival is very high. They may also be used to reduce impacts on nearshore species, such as black rockfish and other nearshore rockfish species.

Gear restrictions and/or release technique requirements may be implemented to reduce the impact of depleted rockfish species if successful techniques are developed, researched, reviewed, and accepted. Research in this area is currently being conducted and will continue into 2011-2012, testing the effectiveness and selectivity of various gears and the survivability of rockfish released at depth.

Directed flatfish fisheries would be legal year-round and open shoreward of 40 fm during any period the groundfish fishery has any depth restrictions (i.e., 40, 30, 25, and 20 fathom lines). The flatfish fishery would not have any depth restrictions when the groundfish fishery has no depth restrictions. Fisheries will be monitored to ensure that impacts to yelloweye and canary rockfish are within the harvest targets/guidelines.

In the event that the duration of total season is reduced from 12 months, the nearshore waters are closed to groundfish fishing due to management of nearshore species, or the Pacific halibut catch limit is reduced from 2010 levels, the fishery may be expanded to waters seaward of the RCA that is in effect at the time, promoting directed yellowtail rockfish and offshore lingcod opportunity. Fisheries will be monitored to ensure that impacts to yelloweye rockfish and canary rockfish are not in excess of the harvest targets/guidelines.

California Recreational - Final Preferred Alternative

Summary of California Recreational Fishery Management Measures

- Combine the Monterey South-Central and Morro Bay-South Central recreational management areas
- Add a management line at Cape Vizcaino (39º 44′ north latitude)
- Revise the naming convention for the California recreational management areas
- Eliminate the 10 fathom depth closure around the Farallon Islands and Noonday Rock
- Set California scorpionfish (sculpin) depth restriction in the Southern Management Area to 60 fm when scorpionfish is open
- Modify cabezon and kelp greenling gear restrictions to be consistent with rockfish regulations (one rod with no more than two hooks)
- Increase the cabezon bag limit to three fish statewide
- Align lingcod seasons in the California recreational fishery for all fishing modes, consistent with those for rockfish in each management area
- Decrease the lingcod size limit to 22 inches statewide; this includes a 14 inch fillet length requirement
- Increase the recreational depth restriction in the CCA from 20 fm to 30 fm according to RCA lines proposed for the CCA
- Modify the list of groundfish species allowed to be taken recreationally in the CCA to include shelf rockfish

Harvest Guidelines
Under the FPA, recreational fishery harvest guidelines would be specified for yelloweye rockfish and canary rockfish. The final preferred harvest guidelines for California recreational groundfish fisheries are found in Table 2-75.

Season Structure
Season structuring adopted as the FPA for the California recreational groundfish fishery in 2011 and 2012 is displayed in Figure 2-15. Under the final preferred yelloweye rockfish ACL, the California recreational harvest guideline is 3.1 mt. This will allow the North-Central North of Point Arena management area to maintain the No Action Alternative season structure, which is a 3-month fishing season at 20 fm from the first Saturday in May to August 15. The season structure has been reduced since 2000 in the North-Central North of Point Arena Management Area and since 2005 in the Northern Management areas. Under the FPA, the season opening date in the Northern and North-Central North of Point Arena area would be the second Saturday in May, which is May 14 in 2011 and May 12 in 2012.

Management Area	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Months
Northern [a/]	CLOSED				May 15 - Oct <20 fm								5.5
North-Central North of Point Arena [a/]	CLOSED				May 15 - Aug 15 <20 fm								3
North-Central South of Point Arena	CLOSED					June–Dec < 30 fm							7
South-Central Monterey	CLOSED				May – Dec < 40 fm								8
South-Central Morro Bay	CLOSED				May – Dec < 40 fm								8
Southern	CLOSED		Mar – Dec < 60 fm										10

a/ The season opening date in the Northern and North-Central North of Point Arena would be the second Saturday in May, which is May 14 in 2011 and May 12 in 2012.

Figure 2-15. FPA: California recreational rockfish, cabezon and greenling season structure by management area for 2011-2012

At its April 2010 meeting, the Council adopted a preliminary preferred harvest guideline for California recreational fisheries of 2.6 mt under the 17 mt ACL. Under this scenario, the season length in the North-Central North of Point Arena would have been reduced by 2 weeks relative to No Action, which is a 17 percent reduction. The time period lost in the 2 week reduction has the highest effort and profit potential as this is the prime camping and fishing season. As such, the Council recommended the higher, 3.1 mt yelloweye harvest guideline, in order to provide for the No Action season length in the North-Central North of Point Arena area. This is expected to result in increased opening weekend business, benefiting local communities.

The reduced catches of minor nearshore rockfish south and blue rockfish in the 2008 and 2009 seasons resulted in reduced projected impacts. In 2011-2012 there is a higher minor rockfish south ACL compared to No Action. These changes will allow a one-and-a-half month increase in the fishing season in the South-Central Management Area and a two-and-a-half month increase in the North-Central South of Point Arena Management Area, allowing fishing through December. This alternative also aligns lingcod seasons in the California recreational fishery for all fishing modes, consistent with those for rockfish in each management area.

Bag Limits and Size Limits
Under the FPA, a statewide 10 fish rockfish, cabezon, and greenling bag limit with a sub-bag limit of 2 fish for bocaccio and greenlings, and a sub-limit of 3 cabezon would apply. Retention of cowcod, bronzespotted, canary, and yelloweye rockfish would be prohibited. The following bag limits would also apply:

- Leopard Shark – 3 fish
- Scorpionfish – 5 fish
- Sheephead – 5 fish
- Soupfin Shark – 1 fish
- Pacific Halibut – 1 fish
- Sanddabs – None
- Petrale Sole – None
- Starry Flounder – None

A daily bag limit of 10 fish of any one species within the 20 finfish maximum bag limit would apply to the remaining species in the groundfish FMP.

The following minimum size limits applied to 2009-2010 California recreational fisheries and would be carried forward under the No Action alternative:

- Lingcod – 24 inches
- Cabezon – 15 inches
- Kelp Greenling – 12 inches
- Leopard Shark – 36 inches
- Scorpionfish – 10 inches
- Sheephead – 12 inches

The list of groundfish species allowed to be taken recreationally in the CCA would be changed to include shelf rockfish.

Area Restrictions
Modifying the depth restriction in the CCA from the No Action boundary of 20 fm to 30 fm and allowing retention of shelf rockfish within the open waters of the CCA is not expected to appreciably increase cowcod bycatch, since they are predominantly found in waters deeper than 60 fm (see Appendix B). At the June 2010 Council meeting 0.9 mt of cowcod out of the 4 mt ACL for 2011 was allocated to the non-trawl fishery including the recreational fishery. Since only *de minimis* take of cowcod has been observed in the non-trawl commercial fisheries, with less than a tenth of a mt estimated to have been taken in the last five years. A residual of nearly 0.7 mt is anticipated to be available to accommodate an unanticipated increase in impacts from the proposed action. The catch of cowcod is tracked inseason with a one week lag in the California recreational fishery, using the number of sampled cowcod to date in the current season and the relationship between the cumulative sampled catch and estimated catch from past seasons.

2.4.3 Alternative 1- Low Overfished Species ACLs

Alternative 1 combines the low overfished species ACLs with the Council's preliminary preferred non-overfished species ACLs except Pacific whiting, which rebuilds overfished species in the fastest time. For Pacific whiting the low ACL (96,968 mt) is considered in Alternative 1. Under this alternative canary rockfish, POP and bocaccio are rebuilt one year later than F=0, darkblotched rockfish two years later than F=0, cowcod four years later than F=0 and yelloweye rockfish 18 years greater than F=0. The canary rockfish ACL drives the management measures under this alternative. The apportionment of canary rockfish is so low that it severely reduces fishing opportunities coastwide. A rebuilding plan would be included for petrale sole in which petrale sole continues to be managed as a target species. The associated Pacific whiting ACL is the lowest ACL and is driven by the reduced availability of overfished species. Different sub-options that explore different management measures for the non-nearshore fishery Alternatives 1a and 1b are included in this alternative. Under Alternative 1, the canary rockfish ACL and associated apportionment to the non-nearshore fisheries is so low that the non-trawl RCAs would have to be restricted to depths that are deeper than implemented since the inception of RCAs (Option 1a) or sablefish allocations would have to be reduced by as much as 42 percent (Option 1b).

2.4.3.1 Harvest Specifications-Alternative 1

The OFL harvest specifications considered under Alternative 1 for all groundfish species and species groups are the estimated or proxy MSY harvest levels, which are the harvest thresholds above which overfishing is occurring. The 2011 and 2012 OFLs are the same as those shown for the FPA and are described in Section 2.1.1 and shown in Table 2-2.

The ABC specifications considered under Alternative 1 for all groundfish species and species groups incorporate scientific uncertainty buffers for all groundfish stocks and stock complexes and are based on SSC recommendations. The ABC values proposed for the integrated alternatives (Alternatives 1, 2, 3 and the FPA) are the same for each alternative, as they are based on the SSC recommendations for incorporating scientific uncertainty consistent with Amendment 23. The 2011 and 2012 ABCs are the same as those shown for the FPA and are described in Section 2.1.2 and shown in Table 2-8 and Table 2-9.

ACLs are specified for each stock and stock complex that is "in the fishery" as specified under the Amendment 23 framework. An ACL is a harvest specification set equal to the ABC or below the ABC to create a buffer that accommodates management uncertainty, socioeconomic considerations, rebuilding considerations, or to meet any other management objectives. Sector-specific ACLs may be specified in cases where a sector has a formal, long-term allocation of the harvestable surplus of a stock or stock complex. The ACL counts all sources of fishing-related mortality including landed catch, discard mortalities, research catches, and yield set-asides for EFPs. In this regard, the ACL is analogous to the total catch OY specified under the No Action Alternative. The ACLs for non-overfished species with species specific specifications are described in Section 2.1.4 and shown in Table 2-10 and Table 2-11. For non-overfished species managed within complexes, the ACLs are described in Section 2.1.5. Other than Pacific whiting and Dover sole, the ACLs for non-overfished species do not vary between the FPA and Alternatives 1, 2, and 3.

Pacific whiting harvest specifications are completed on an annual basis, thus the Council requested a range of potential whiting ACLs for more detailed analysis in order to understand the potential range of overfished species impacts and constraints (Table 2-13). Alternative 1 informs the bycatch impacts relative to the low whiting ACL (96,968 mt) and the low overfished species ACLs.

The ACLs for each of the overfished species vary between the integrated alternatives. The development of ACLs for overfished species is fully described in Section 2.1.6 of this Chapter. The ACLs for the overfished species under Alternative 1 are shown in Table 2-85, along with the median time to rebuild.

Table 2-85. Alternative 1: 2011 and 2012 overfished species harvest specifications along with the time to rebuild and T_{TARGET} currently specified in the FMP, prior to the proposed action.

Species	**T_{TARGET} in FMP**	**Median time to rebuild given ACL a/**	**ACL Alternative 2011 b/**	**ACL Alternative 2012 b/**
Bocaccio	2026	2019	53	56
Canary	2021	[2025]	49	51
Cowcod	2072	2064	2	2
Darkblotched	2028	2022	222	222
POP	2017	[2019]	80	80
Petrale	TBD	2014	459	624
Widow	2015	2010	200	200
Yelloweye	2084	2065	13	13

a/ Values from Table 2-35. Brackets indicate times to rebuild that are longer than the T_{TARGET} currently specified in the FMP prior to the proposed action.
b/ Values taken from the harvest specification alternatives in Table 2-39 (2011) and Table 2-40 (2012).

2.4.3.2 Harvest Specification Allocations - Alternative 1

The off-the-top deductions remain unchanged between the FPA and Alternatives 1, 2, and 3. Off-the-top deductions for overfished species for 2011 and 2012 are shown in detail in Table 2-41. Off-the-top deductions for non-overfished species for 2011 and 2012 are shown in detail in Table 2-42 and Table 2-43.

Non-overfished species with formal allocations defined by the FMP (other than sablefish north of 36° north latitude) are shown in Table 2-46 and Table 2-47. Allocations for sablefish north of 36° north latitude are shown in Table 2-45. For the non-overfished species, the allocation structure remains unchanged between the FPA and Alternatives 1, 2, and 3.

Biennial harvest specifications may also be used to establish 2-year allocations for species without formal allocations or for those species where the formal allocation is suspended (overfished species) if they have the potential to constrain fishing opportunities for one or more sectors. The 2-year overfished species allocations vary between the integrated alternatives and drive the management measures proposed for the various fisheries. Harvest guidelines and allocations for overfished species under Alternative 1 are shown in Table 2-86. Under trawl rationalization, overfished species allocations cannot be reallocated to or from the trawl sector inseason. Unused trawl IFQ quota pounds to permits will roll over (if 10 percent or less) for the second year of the biennium (2012) or remain stranded in the trawl sector in the final year of the biennial cycle. As such, the non-trawl sectors must have a sufficient allocation to reasonably accommodate fishing operations or management measure must constrain the fishery such that the non-trawl allocations are not exceeded.

Table 2-86. Overfished Species Allocations Under Alternative 1.

<table>
<tr><th colspan="9">2011</th></tr>
<tr><th>Sector</th><th>Bocaccio</th><th>Canary</th><th>Cowcod</th><th>DKB</th><th>POP</th><th>Petrale</th><th>Widow</th><th>Yelloweye</th></tr>
<tr><td>Off the top ACL deductions [a/]</td><td>13.4</td><td>20</td><td>0.3</td><td>18.7</td><td>12.9</td><td>65.4</td><td>60.9</td><td>5.9</td></tr>
<tr><td>Fishery Harvest Guideline</td><td>38.6</td><td>29</td><td>1.7</td><td>203</td><td>67</td><td>394</td><td>139</td><td>7.1</td></tr>
<tr><td>Limited Entry Non-Whiting Trawl</td><td>4.7</td><td>8.0</td><td>0.9</td><td>168</td><td>34</td><td>369</td><td>60</td><td>0.4</td></tr>
<tr><td colspan="9">Non-nearshore [b/]</td></tr>
<tr><td>LE FG</td><td rowspan="3">9.2</td><td rowspan="2">0.9</td><td rowspan="2">--</td><td rowspan="6">10</td><td rowspan="6">3</td><td rowspan="6">20</td><td rowspan="6">13</td><td rowspan="3">1.6</td></tr>
<tr><td>OA DTL</td></tr>
<tr><td>Nearshore Fixed Gear [b/]</td><td>1.4</td><td>--</td></tr>
<tr><td>Washington Recreational [b/]</td><td>--</td><td>1.8</td><td>--</td><td>1.6</td></tr>
<tr><td>Oregon Recreational [b/]</td><td>--</td><td>6.0</td><td>--</td><td>1.5</td></tr>
<tr><td>California Recreational [b/]</td><td>25.6</td><td>8.6</td><td>0.9</td><td>1.6</td></tr>
<tr><td colspan="9">Limited Entry Whiting Trawl</td></tr>
<tr><td>Catcher Processor</td><td>--</td><td>1.8</td><td>--</td><td>9.0</td><td>10.0</td><td>--</td><td>22.0</td><td>--</td></tr>
<tr><td>Mothership</td><td>--</td><td>1.3</td><td>--</td><td>6.0</td><td>7.0</td><td>--</td><td>16.0</td><td>--</td></tr>
<tr><td>Shoreside</td><td>--</td><td>2.2</td><td>--</td><td>11.0</td><td>13.0</td><td>--</td><td>28.0</td><td>--</td></tr>
<tr><th colspan="9">2012</th></tr>
<tr><th>Sector</th><th>Bocaccio</th><th>Canary</th><th>Cowcod</th><th>DKB</th><th>POP</th><th>Petrale</th><th>Widow</th><th>Yelloweye</th></tr>
<tr><td>Off the top ACL deductions [a/]</td><td>13.4</td><td>20</td><td>0.3</td><td>18.7</td><td>12.9</td><td>65.4</td><td>60.9</td><td>5.9</td></tr>
<tr><td>Fishery Harvest Guideline</td><td>42.6</td><td>31</td><td>1.7</td><td>203</td><td>67</td><td>559</td><td>139</td><td>7.1</td></tr>
<tr><td>Limited Entry Non-Whiting Trawl</td><td>5.0</td><td>8.5</td><td>0.9</td><td>168</td><td>34</td><td>526</td><td>60</td><td>0.4</td></tr>
<tr><td colspan="9">Non-nearshore [b/]</td></tr>
<tr><td>LE FG</td><td rowspan="3">9.9</td><td rowspan="2">1.0</td><td rowspan="2">--</td><td rowspan="6">10</td><td rowspan="6">28</td><td rowspan="6">28</td><td rowspan="6">13</td><td rowspan="3">1.6</td></tr>
<tr><td>OA DTL</td></tr>
<tr><td>Nearshore Fixed Gear [b/]</td><td>1.4</td><td>--</td></tr>
<tr><td>Washington Recreational [b/]</td><td>--</td><td>2.0</td><td>--</td><td>1.6</td></tr>
<tr><td>Oregon Recreational [b/]</td><td>--</td><td>6.4</td><td>--</td><td>1.5</td></tr>
<tr><td>California Recreational [b/]</td><td>27.6</td><td>9.1</td><td>0.9</td><td>1.6</td></tr>
<tr><td colspan="9">Limited Entry Whiting Trawl</td></tr>
<tr><td>Catcher Processor</td><td>--</td><td>1.9</td><td>--</td><td>9.0</td><td>10.0</td><td rowspan="3">5</td><td>22.0</td><td>--</td></tr>
<tr><td>Mothership</td><td>--</td><td>1.3</td><td>--</td><td>6.0</td><td>7.0</td><td>16.0</td><td>--</td></tr>
<tr><td>Shoreside</td><td>--</td><td>2.4</td><td>--</td><td>11.0</td><td>13.0</td><td>28.0</td><td>--</td></tr>
</table>

a/ Assumes that the application of new Amendment 21 allocation structure specified at 50 CFR 660.55
b/ Values represent HGs, which may be adjusted within the non-trawl allocation.

2.4.3.3 Management Measures – Alternative 1

Limited Entry Trawl – Alternative 1

Table 2-87 provides a summary of the trawl fishery management measures under Alternative 1.

Table 2-87 - Summary of trawl fishery management measures under Alternative 1,

Catch limits (If trawl rationalization is <u>not</u> implemented)	• Cumulative trip limits for most species, specific to trawl type and geographic area (See Table 2-62 and 2-63 for specific limits). • Cowcod and Bronzespotted prohibited south of 40°10 N. lat. • North of 40°10 N. lat. canary prohibited with all but selective flatfish trawl. • South of 40°10 N. lat. canary prohibited with large footrope trawl gear
	• MS sector managed for fleetwide attainment of whiting within the bycatch limits for overfished species • C/P sector managed as voluntary fleetwide co-op for attainment of whiting within the limits of overfished species bycatch limits
Rationalized Fishery (If trawl rationalization is implemented)	• Same as FPA
Gear restrictions	• Same as No Action Alternative
Seasons	• Same as No Action Alternative
GCAs	• Same as No Action Alternative
Trawl RCAs (non-whiting)	• RCA general restrictions - Same as No Action Alternative
	• <u>N. of 40º10' N. lat</u>. - Periods 1, 2,3, 5 & 6, 75 fm to 250 fm line; period 4, 100 fm to 250 fm line. • <u>South of 40º10' N. lat.</u> - 100 fm to 150 fm line year round.
Trawl RCAs (whiting)	• Same as No Action Alternative
Monitoring	• Same as No Action Alternative [a/]
Reporting Requirements	• Same as No Action Alternative [a/]

a/ Assumes additional monitoring and reporting associated with trawl rationalization are in place under a separate action.

Limited Entry Non-Whiting Trawl Fishery – Alternative 1

<u>Implementation of Rationalized Fishery</u>

Management of the trawl fishery under trawl rationalization would be the same as the FPA alternative. Under trawl rationalization, the burden to stay within the harvest specifications in the responsibility of the individual harvesters (IFQ) and harvester cooperatives (at-sea whiting).

<u>Cumulative Trip Limit Management</u>

Alternative 1 trip limits and RCA structures for 2011 and 2012 are presented in Table 2-88. Petrale sole is currently overfished. Under Alternative 1, petrale sole would be managed under a rebuilding plan. Until recently, this species has supported a sizeable target fishery, and as such, it is currently managed and modeled as a target species, and has management area-specific trip limits. Alternative 1 has the lowest petrale sole trawl non-whiting trawl allocation (342 mt) compared to Alternative 2 (643 mt) and Alternative 3 (865 mt). The Alternative 1 allocation results in an average bimonthly trip limit of 1,458 lbs/2 months, compared with the average petrale sole trip limits in 2010 of 7,900 lbs/2 months (No Action Alternative) and the FPA trip limits of 4,800 lbs/2 months for 2011 and 6,400 lbs/2 months for 2012. Deeper seaward RCAs would be in place to reduce darkblotched and petrale catch.

Table 2-88. Alternative 1 limited entry non-whiting trawl RCA boundaries and trip limits for 2011-2012.

			2-month cumulative-poundage limits							
2-month period	RCA lines (fm) shallow	deep	sable-fish	long-spine	short-spine	Dover sole	petrale sole	arrow-tooth	other flatfish	slope rockfish
N. of 40°10' N lat.										
Large/small footrope limits										
1	*75*	250	**14,000**	20,000	18,000	110,000	**2,000**	150,000	110,000	6,000
2	*75*	250	**14,000**	20,000	18,000	110,000	**1,500**	150,000	110,000	6,000
3	*75*	250	**12,000**	20,000	18,000	110,000	**1,000**	150,000	110,000	6,000
4	*100*	250	**12,000**	20,000	18,000	110,000	**1,000**	150,000	110,000	6,000
5	*75*	250	**12,000**	20,000	18,000	110,000	**1,000**	150,000	110,000	6,000
6	*75*	250	**14,000**	20,000	18,000	110,000	**2,000**	150,000	110,000	6,000
Selective gear limits										
1	75	*250*	**7,000**	5,000	5,000	30,000	**1,000**	30,000	30,000	
2	75	*250*	**7,000**	5,000	5,000	25,000	**1,500**	25,000	25,000	
3	75	*250*	**7,000**	5,000	5,000	25,000	**1,500**	25,000	25,000	
4	100	*250*	**7,000**	5,000	5,000	25,000	**2,000**	25,000	25,000	
5	75	*250*	**7,000**	5,000	5,000	25,000	**1,500**	25,000	25,000	
6	75	*250*	**7,000**	5,000	5,000	30,000	**1,000**	30,000	30,000	
38° - 40°10' N lat.										
1	100	150	**13,000**	20,000	18,000	110,000	**1,500**	10,000	110,000	15,000
2	100	150	**13,000**	20,000	18,000	110,000	**1,500**	10,000	110,000	15,000
3	100	150	**13,000**	20,000	18,000	110,000	**1,500**	10,000	110,000	15,000
4	100	150	**13,000**	20,000	18,000	110,000	**1,500**	10,000	110,000	15,000
5	100	150	**13,000**	20,000	18,000	110,000	**1,500**	10,000	110,000	15,000
6	100	150	**13,000**	20,000	18,000	110,000	**1,500**	10,000	110,000	15,000
S. of 38° N lat.										
1	100	150	**13,000**	20,000	18,000	110,000	**1,500**	10,000	110,000	55,000
2	100	150	**13,000**	20,000	18,000	110,000	**1,500**	10,000	110,000	55,000
3	100	150	**13,000**	20,000	18,000	110,000	**1,500**	10,000	110,000	55,000
4	100	150	**13,000**	20,000	18,000	110,000	**1,500**	10,000	110,000	55,000
5	100	150	**13,000**	20,000	18,000	110,000	**1,500**	10,000	110,000	55,000
6	100	150	**13,000**	20,000	18,000	110,000	**1,500**	10,000	110,000	55,000

Sablefish was a constraining target species in the Dover thornyhead sablefish (DTS) fishery. Under Alternative 1, the trawl allocation is 2,187 mt, this is 74 percent of the No Action Alternative, which is 2,955 mt, and 86 percent of the FPA, which is 2,538 mt. This is reflected in the trip limits for sablefish, which are an average of 11,500 lbs/2 months in Alternative 1, versus 21,389 lbs/2 months in the No Action Alternative, and 13,063 lbs/2 months in the FPA for 2011.

Trip limits and cumulative limits for non-target species are not modeled. Therefore, the limits do not change between Alternatives 1, 2, 3 and the FPA.

Limited Entry Whiting Trawl – Alternative 1

Implementation of Rationalized Fishery

Management measures for the whiting trawl fishery, if trawl rationalization is implemented, would be the same as the FPA alternative.

Non-rationalized Fishery Management

Management of the trawl fishery, in a non-rationalized fishery, would be the same as the FPA, but with lower bycatch rates based on the allocations in Table 2-86.

Fixed Gear – Alternative 1

Canary rockfish drives the management measures under Alternative 1. The apportionment of canary rockfish is so low that the shoreward boundary of the RCAs would have to be restricted to depths that are deeper and more restrictive than those implemented since inception of RCAs and access to sablefish would have to be severely restricted. Yelloweye rockfish would not constrain sablefish landings under this alternative because of the constraints imposed by canary rockfish. Table 2-89 provides a summary of the limited entry fixed gear management measures under Alternative 1 and Table 2-90 provides a summary of the open access fixed gear management measures.

Table 2-89. Summary of limited entry fixed gear fishery management measures under Alternative 1.

Cumulative limits	• Cumulative trip limits for most species, specific to trawl type and geographic area. Average annual limits by target species are: Sablefish North of 36°N. lat Option 1a- Same as FPA; Option 1b (42% reduction/ periods 1-4) – 5,250 lbs/2 mo Option 1c (33% reduction/ periods 1-4) – 5,750 lbs/2 mo South of 36º N. lat. - Same as FPA Nearshore Oregon – reductions to landed catch of black rockfish and greenling California – reductions to landed catch of species other than black rockfish and cabezon All other species same as FPA • Primary sablefish fishery managed with tier limits Allocation to the Primary fishery is the same as the FPA • Canary and yelloweye landings prohibited coastwide (same as No Action) • South of 40°10 N. latitude landings of cowcod and bronzespotted rockfish prohibited (same as No Action)
Size limits	• Same as No Action Alternative
Gear restrictions	• Same as No Action Alternative
Seasons	• Same as No Action Alternative
GCAs	• Same as No Action Alternative
	• CCA Fishing is prohibited in CCAs with the following exceptions: • Fishing for "other flatfish" when using no more than 12 hooks, #2 or smaller. • Fishing for rockfish and lingcod shoreward of the 20 fm
	• Farallon Islands & Cordell Banks Same as No Action Alternative
	• EFHCAs Same as No Action Alternative
Non-trawl RCAs	• North of 46°16 N. lat. 1a- Shoreline to 150 fm ; 1b- Shoreline to 125 fm • 46°16-45°03.83 N. lat. 1a- Same and No Action (30-100 fm); 30 to 125 fm (1b) • 45°03.83 - 43° N. lat. 1a- 30 to 100 fm 30; 1b- Same and No Action (30-125 fm) • 43°-42° N. lat. Same and No Action • 42°-40°10 N. lat. Same and No Action • 40°10-34°27 N. lat. –1a & 1b 20 to 150 fm • South of 34°27 N. lat. –1a & 1b 20 to 150 fm (applies around islands) Fishing is prohibited in non-trawl RCAs with the following exception: Fishing for "other flatfish" when using no more than 12 hooks, #2 or smaller
Monitoring	• Same as No Action
Reporting	• Same as No Action

Table 2-90. Summary of open access fishery management measures under Alternative 1.

Cumulative limits	• Cumulative trip limits for most species, specific to trawl type and geographic area. Sablefish average annual limits: North of 36°N. lat 1a- 2,488 lbs/2 mo (periods 1-4) 1b (42% reduction/ periods 1-4) –1,350 lbs/2 mo 1b (33% reduction/ periods 1-4) – 1,450 lbs/2 mo South of 36° N. lat. – Same as FPA Nearshore See my notes on the LEFG table for Nearshore spp. All other species - Same as FPA Salmon trollers - Same as No Action Alternative All other species -Same as No Action Alternative • Canary and yelloweye landings prohibited coastwide • Cowcod and bronzespotted rockfish landings prohibited South of 40°10 N. lat
Gear restrictions	• Same as No Action Alternative
Seasons	• Same as No Action Alternative
GCAs	YRCAs - Same as No Action Alternative
	• CCA Fishing is prohibited in CCAs with the following exceptions: • Fishing for "other flatfish" when using no more than 12 hooks, #2 or smaller. • Fishing for rockfish and lingcod shoreward of the 30 fm (40 fm)
	Farallon Island & Cordell Banks - Same as No Action Alternative
Open Access non-trawl RCAs	• North of 46°16 N. lat. 1a- Shoreline to 150 fm ; 1b- Shoreline to 125 fm • 46°16-45°03.83 N. lat. 1a- Same and No Action (30-100 fm); 30 to 125 fm (1b) • 45°03.83 - 43° N. lat. 1a- 30 to 100 fm 30; 1b- Same and No Action (30-125 fm) • 43°-42° N. lat. Same and No Action • 42°-40°10 N. lat. Same and No Action • 40°10-34°27 N. lat. –1a & 1b 20 to 150 fm • South of 34°27 N. lat. –1a & 1b 20 to 150 fm (applies around islands) Fishing is prohibited in non-trawl RCAs with the following exception: Fishing for "other flatfish" when using no more than 12 hooks, #2 or smaller
Non-groundfish trawl RCAs (CA Halibut, Sea Cucumber & Ridgeback Prawn)	• Same as No Action
Monitoring	• Same as No Action Alternative
Reporting	• Same as No Action Alternative

Non-Nearshore Fixed Gear – Alternative 1

Alternative 1 analyzes the Council's preliminary preferred sablefish ACL along with the low overfished species ACL alternatives and associated overfished species projected impacts for the non-nearshore fleet. This alternative demonstrates how the low overfished species ACLs restrict access to the sablefish ACL and associated allocations.

Allocations and Harvest Guidelines

Table 2-91 describes the FPA for the sablefish ACL north of 36° north latitude, compared to No Action, along with the sablefish allocations for limited entry and open access. Alternative 1 includes the Council's preliminary preferred sablefish ACL (updated with the technical corrections made in June along with the low overfished species ACL alternatives and the preliminary preferred apportionment of the non-trawl allocation to the non-nearshore fisheries.)

Table 2-91. Alternative 1: Sablefish ACL and allocations north of 36° N. latitude compared to No Action (2010).

Species	Fishery	2010 (mt)	2011 (mt)	2012 (mt)
Sablefish N. 36° N. lat.	**OY/ACL**	6,471	5,515	5,347
	LE Fixed Gear Allocation	2,140	1,874	1,816
	----LE Fixed Gear Primary	1,819	1,593	1,544
	----LE Fixed Gear Daily Trip Limit	321	281	272
	Open Access	529	463	449

Under Alternative 1, the apportionment of canary rockfish is so low that RCAs would have to be restricted to depths that are deeper than implemented since the inception of RCAs and sablefish allocations would have to be reduced by as much as 42% (Table 2-92). The result of these measures may be significantly reduced annual catches, fewer areas to fish, and longer-distance runs to reach fishing grounds. Some impacts to fishermen and communities will likely be decreased revenue, decreased catch rates, increased time spent on the water, increased gear conflicts, increased safety concerns. Yelloweye has no constraint on sablefish landings under this alternative because of the level of constraint imposed by the low canary rockfish apportionment.

Table 2-92. Alternative 1b. The 2011-2012 preliminary preferred alternative allocations (metric tons) for sablefish north of 36º N. latitude and minimum allocation reductions necessary to achieve the canary rockfish allocation.

	LE FG Share
2011 Full Allocation	1,874
w/ 42% reduction	1,095
2012 Full Allocation	1,816
w/ 33% reduction	1,225

Limited Entry Fixed Gear north of 36° north latitude

Under Alternative 1, yelloweye rockfish ceases to be the most constraining species and canary bycatch becomes the focus for management measures. Two options were considered (1a and 1b) that constrain the fishery to the low overfished species ACLs. Option 1a would seek to maintain full harvest of the fixed gear sablefish allocations and would require closing the area north of Point Chehalis completely to the non-nearshore sectors, or alternatively, pushing the RCA boundaries to 180 fm, 200 fm, or 250 fm. The latter would involve some uncertainty because appropriate bycatch rates to model the impact of these deeper RCA boundaries are not available.

<u>Area Restrictions</u>

The Council considered two options for establishing RCA boundaries to ensure achievement of the canary rockfish allocations (Figure 2-16, Figure 2-17).

Seaward RCA Boundary	**36°- 40° 10'**	**40°10'- Col/Eur 43°**	**Col/Eur 43°- Cascade Head 45.064°**	**Cascade Head 45.064°- Pt. Chehalis 46.888°**	**North of Pt. Chehalis 46.888°**
Shoreward boundary to 100 fm					
100 fm					
125 fm					
150 fm					
>150 fm					

Figure 2-16. Alternative 1a. Non-trawl RCA seaward configuration. The seaward area north of Point Chehalis would be closed completely. Grey shading indicates areas closed to fishing.

Seaward RCA Boundary	**36°- 40° 10'**	**40°10'- Col/Eur 43°**	**Col/Eur 43°- Cascade Head 45.064°**	**Cascade Head 45.064°- Pt. Chehalis 46.888°**	**North of Pt. Chehalis 46.888°**
Shoreward boundary to 100 fm					
100 fm					
125 fm					
150 fm					
>150 fm					

Figure 2-17. Alternative 1b: Seaward RCA boundary configurations required to achieve canary rockfish bycatch reductions**.**

The area north of Point Chehalis encompasses some of the most important sablefish fishing grounds on the coast and is the area where most of the catch has occurred. The non-nearshore fleets are estimated to have taken an average of 44 percent, and as much as 55 percent, of the overall annual fixed gear allocations for the northern sablefish stock in this area during the 2002-2008 period used to model bycatch. Under Alternative 1, Option 1a, where the area north of Point Chehalis would be closed to non-nearshore fixed gears and the areas between 40° 10' to 46.888° north latitude would be open to fixed gears seaward of 100 fm, the modeled overfished species impacts would provide room under the total apportionment of canary rockfish to provide a similar opportunity for the open access sectors (see the section "Open Access Sablefish Daily Trip Limit Fishery North of 36° north latitude" below).

The second option under Alternative 1b for lowering the expected canary bycatch requires a reduction to the available harvest of sablefish (i.e., under-harvest of the allocation shown in Table 2-92) and more constraining RCA lines in some areas. The Council has the option of differentially reducing the sablefish harvest between the limited entry and open access fleets north of 36° north latitude. However, for the purposes of this analysis, both sectors were reduced equally. Under Alternative 1, Option 1b, it would be necessary to reduce the sablefish allocation by 42 percent for the limited entry sablefish sector north of 36º north latitude for 2011. In addition, even though fishing would be allowed in all areas north of 36º north latitude, more restrictive RCA boundaries would be required (i.e., the RCA boundaries would be 125 fm north of 43° north latitude). These measures would reduce the model-projected canary bycatch to 0.8 mt in 2011, which is 0.1 mt lower than the apportionment of canary rockfish for 2011. A 33 percent reduction of the sablefish allocation would be required in 2012, along with the more restrictive RCA boundaries shown in, to reduce canary rockfish catch below the apportionment cap. The lower reduction of the sablefish allocation in 2012 relative to 2011 is due to reduced-sablefish ACL and increased-canary apportionment in 2012. Note that the catch of all other overfished species by the limited entry fishery are far below their respective apportionment caps because of the constraints imposed by canary rockfish. The management actions described herein provide space under the total canary rockfish apportionment cap to allow similar fishing opportunities for the open access sector.

Cumulative Limits

The Alternative 1 limited entry fixed gear trip limits are shown in Table 2-93, and open access trip limits are shown in Table 2-94.

Table 2-93. Alternative 1 Limited entry daily trip limit fishery limits for sablefish.

	Period	Daily	Weekly	Bimonthly
2011 - Alternative Ia	Jan-Feb	na	1,900	6,500
	Mar-Oct	na	1,900	7,500
	Nov-Dec	na	1,900	6,000
2011: Alternative Ib (42% Reduction)	Jan - Jun	na	1,500	5,000
	Jul - Aug	na	1,500	6,000
2012: Alternative Ib (33% Reduction)	Jan - Jun	na	1,500	5,500
	Jul - Aug	na	1,500	6,500

Table 2-94. Alternative 1 Open access daily trip limit fishery limits.

	Period	Daily	Weekly	Bimonthly
2011 - Alternative Ia	Jan -Jun	300	800	2,400
	Jul - Aug	300	950	2,750
2011: Alternative Ib (42% Reduction)	Jan - Jun	300	400	1,300
	Jul - Aug	300	500	1,500
2012: Alternative Ib (33% Reduction)	Jan - Jun	300	500	1,400
	Jul - Aug	300	600	1,600

Nearshore Fixed Gear – Alternative 1

Allocations and Harvest Guidelines

Alternative 1 includes the Council's preliminary preferred nearshore ACLs along with the low overfished species ACL alternatives and the preliminary preferred apportionment of the non-trawl allocation to the nearshore fisheries (Table 2-35). This alternative demonstrates how the low overfished species ACLs restrict access to the nearshore species.

Since black rockfish and greenling are important target strategies in Oregon, lower reductions in landed catch were taken for these species relative to others to stay within overfished species impacts. In California, black rockfish is an important target strategy in the area between 42° and 40°10' north latitude and cabezon is an important target strategy statewide; therefore, higher landings were maintained for these species relative to others while staying within overfished species impacts.

To better understand the impacts of overfished species catch sharing between Oregon and California, two catch sharing relationships for yelloweye rockfish - 50:50 (OR:CA) and 55:45 (OR:CA) were modeled, options 1 and 2, respectively. The rationale for these two options is described in Appendix A.

Area Restrictions

Primary management measures under this alternative are depth restrictions and reductions to target species catch (Figure 2-18).

Shoreward RCA Boundary	**South 34°27'**	**34°27'- 40° 10'**	**40°10' - 42°**	**42° - Col/Eur 43°**	**Col/Eur 43° - 46°16'**	**North of 46°16'**
Shore						
20 fm						
30 fm						
60 fm						

Figure 2-18. Alternative 1: Nearshore shoreward RCA configuration under option 1 and 2. Grey shading indicates areas closed to fishing.

Cumulative Limits - Nearshore Limited Entry Fixed Gear

There is no formal trip limit model for the nearshore. Therefore, in the essence of time/workload, the Council simply considered the change in landings under the options. If the Council chose Alternative 1 then the states would work to craft the limits and run them through the GMT.

Cumulative Limits - Nearshore Open Access Fixed Gear

There is no formal trip limit model for the nearshore. Therefore, in the essence of time/workload, the Council simply considered the change in landings under the options. If the Council chose Alternative 1 then the states would work to craft the limits and run them through the GMT.

Tribal Fisheries –Alternative 1

The tribal fisheries management measures under Alternative 1 would be the same as those described under the FPA.

Recreational Fishery Management Measures – Alternative 1

Washington Recreational – Alternative 1

The most restrictive option for the Washington recreational groundfish fishery would be in place under Alternative 1.

Harvest Guidelines
Alternative 1 includes the Council's preliminary preferred nearshore ACLs along with the low overfished species ACL alternatives, and the preliminary preferred apportionment of the Washington recreational harvest guidelines. See Table 2-86 for overfished species harvest guidelines under Alternative 1.

Season Structure
Under Alternative 1, the Washington recreational fishery would be open year-round except for lingcod. The following lingcod seasons would apply in 2011 and 2012:

- Marine Areas 1-3 (from the Oregon/Washington border at 46º16' north latitude north to Cape Alava at 48º10' north latitude): open from March 12 through October 15 in 2011 and March 17 through October 13 in 2012.

- Marine Area 4 (Cape Alava to the US/Canadian border): open from April 16 to October 15 in 2011 and April 16 to October 13 in 2012.

Bag and Size Limits
The aggregate groundfish bag limit would be reduced from 15 (No Action) to 12 fish per angler per day. The aggregate groundfish bag limit would continue to include the sub limits for rockfish (10 per angler per day) and lingcod (2 per angler per day) that are in place under the No Action Alternative, but would include a new sub limit of 2 cabezon per angler per day for 2011 and 2012. The lingcod minimum size limit during the open lingcod season would be 22 inches in Marine Areas 1-3 and 24 inches in Marine Area 4.

Area Restrictions
To maintain yelloweye harvest levels that do not exceed the Washington harvest share under this alternative, the time that the 20 fathom depth restriction is in place in marine areas 3 and 4 would have to increase from what is in place under the No Action Alternative (Table 2-95). Management measures for marine areas 1 and 2 would be the same as the No Action Alternative. The following area restrictions apply:

- North Coast (Marine Areas 3 and 4) - Prohibit the retention of bottomfish seaward of a line approximating 20 fm from May 15- September 30, except on days that halibut fishing is open.
- South Coast (Marine Area 2) - Groundfish retention would be prohibited seaward of a line approximating 30 fm from March 15-June 15. Sablefish and Pacific cod retention would be allowed in this area from May 1 through June 15. On days that the primary halibut season is open, lingcod may be retained throughout Marine Area 2. The retention of lingcod would be prohibited south of 46°58 north latitude and seaward of 30 fm on Fridays and Saturdays from July 1 through August 31.

- Columbia River (Marine Area 1) - Prohibit the retention of bottomfish, except sablefish and Pacific cod, with halibut onboard from May 1 through September 30.

Table 2-95. Alternative 1: Washington recreational groundfish season for 2011-2012.

Marine Area	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
3 & 4 (N. Coast)	Open all depths				Open <20 fm May 15-Sep 30 [a/]					Open all depths		
2 (S. Coast)	Open all depths		Open <30 fm Mar 15 - June 15 [b/ c/]				Open all depths except lingcod prohibited on Fri. and Sat. >30 fm [d/]		Open all depths			
1 (Col. R.)	Open all depths				Open all depths [e/]					Open all depths		

a/ Groundfish retention allowed >20 fm on days when Pacific halibut is open.
b/ Retention of sablefish and Pacific cod allowed seaward of 30 fm from May 1- June 15.
c/ Retention of lingcod allowed seaward of 30 fm on days that the primary halibut season is open.
d/ Retention of lingcod prohibited >30 fm, south of 46°58 on Fri. and Sat. from July 1 – August 31.
e/ Retention of groundfish, except sablefish and Pacific cod, prohibited with Pacific halibut on board.

Oregon Recreational – Alternative 1

This alternative demonstrates how the low overfished species ACLs restrict access to the nearshore species and impact the Oregon recreational fisheries. Depth management is the main tool used for controlling yelloweye rockfish catch in the Oregon recreational fishery. The options range from the least restrictive (Oregon Recreational Option 1, Figure 2-19), a year-round season with April through September open only shoreward of 20 fm to the most restrictive option (Oregon Recreational Option 5, Figure 2-19), a year-round season open only shoreward of 20 fm. All options are more restrictive than the 2009-2010 Oregon recreational groundfish seasons under the No Action Alternative.

Option	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	Open all depths			Open < 20 fm						Open all depths		
2	Open < 40 fm			Open < 20 fm						Open < 40 fm		
3	Open < 30 fm			Open < 20 fm						Open < 30 fm		
4	Open < 25 fm			Open < 20 fm						Open < 25 fm		
5	Open < 20 fm											

Figure 2-19. Options for Oregon recreational groundfish season in 2011-2012 under Alternative 1.

Harvest Guidelines
Alternative 1 includes the Council's preliminary preferred nearshore ACLs along with the low overfished species ACL alternatives, the preliminary preferred apportionment of the Oregon recreational harvest guidelines. See Table 2-86 for overfished species harvest guidelines.

Season Structure
Under Alternative 1, the Oregon recreational groundfish fishery would able to operate a year-round fishery with depth restrictions (25, 30, or 40 fm). Under this alternative, groundfish retention in the all-depth Pacific halibut fishery would not be allowed under any of the options in Figure 2-19.

Bag and Size Limits
Bag limits for marine fish, lingcod, and flatfish under the No Action Alternative would remain in place under Alternative 1, except for cabezon. A reduction in cabezon impacts would be necessary and can be accomplished with a seasonal sub-bag limit of one fish. The sub-bag limit coincides with the months that the groundfish fishery is restricted to inside of 20, 30, or 40 fm. Other than this option, all other bag and size limits are the same as specified in 2009-2010 and described under the No Action Alternative, including no retention of yelloweye or canary rockfish at any time or depth.

Area Restrictions
Under Alternative 1, the No Action Stonewall Bank YRCA could be extended inseason for 2011-2012 recreational fisheries if necessary to reduce yelloweye catch. The two possible extensions, increasingly more restrictive than the No action YRCA and that could be implemented inseason depending on the need to reduce catch are shown in Figure 2-14 (presented in the discussion of the FPA) and are defined by the following coordinates:

Stonewall Bank (largest area):

44°41.7594’ N. lat.	124°30.018’ W long.
44°41.7348’ N. lat.	124°21.603’ W long.
44°25.2456’ N. lat.	124°16.944’ W long.
44°25.2942’ N. lat.	124°30.1404’ W long.
44°41.7594’ N. lat.	124°30.018’ W long.

Stonewall Bank (medium area):

44°38.544’ N. lat.	124°27.4122’ W long.
44°38.544’ N. lat.	124°23.8554’ W long.
44°27.132’ N. lat.	124°21.501’ W long.
44°27.132’ N. lat.	124°26.8944’ W long.
44°31.302’ N. lat.	124°28.3476’ W long.

California Recreational – Alternative 1

Harvest guidelines
Alternative 1 includes the Council’s preliminary preferred nearshore ACLs along with the low overfished species ACL alternatives and the preliminary preferred California recreational harvest guidelines. See Table 2-86 for overfished species harvest guidelines.

Season Structure
Season structure under Alternative 1 is provided in Figure 2-20. The reduction in the yelloweye rockfish ACL to 14 mt would result in a 1.6 mt HG for the recreational fishery, which would not allow an increase in the 4-month fishing season in the Northern Management Area despite their reduced impacts on yelloweye rockfish since the 20 fm depth restriction was put in place in 2008. A reduction to the already highly constrained 3-month fishing season in the North-Central North of Point Arena Management Area would be needed to remain within the yelloweye rockfish HG; only a 1½-month season could be accommodated. In addition, the season length in the North-Central South of Point Arena Management Area would have to be decreased by a half-month. Rather than the one-month increase in season length in the South-Central Management Area proposed under Alternatives 2 and 3, the season would be reduced by one month to help maintain the 0.1 mt residual between the 1.6 mt HG and the 1.5 mt projected impacts for yelloweye rockfish and to remain below the bocaccio HG.

<table>
<tr><th>Management Area</th><th>Jan</th><th>Feb</th><th>Mar</th><th>Apr</th><th>May</th><th>Jun</th><th>Jul</th><th>Aug</th><th>Sep</th><th>Oct</th><th>Nov</th><th>Dec</th><th>Months</th></tr>
<tr><td>Northern</td><td colspan="4">CLOSED</td><td colspan="5">May 15 - Sep 15 <20 fm</td><td colspan="3"></td><td>4</td></tr>
<tr><td>North-Central North of Point Arena</td><td colspan="4">CLOSED</td><td colspan="2">May 15 - June <20 fm</td><td colspan="6"></td><td>1.5</td></tr>
<tr><td>North-Central South of Point Arena</td><td colspan="5">CLOSED</td><td colspan="4">June–Sep < 30 fm</td><td colspan="3"></td><td>4</td></tr>
<tr><td>South-Central Monterey</td><td colspan="4">CLOSED</td><td colspan="6">May – Oct < 40 fm</td><td colspan="2"></td><td>6</td></tr>
<tr><td>South-Central Morro Bay</td><td colspan="4">CLOSED</td><td colspan="6">May – Oct < 40 fm</td><td colspan="2"></td><td>6</td></tr>
<tr><td>Southern</td><td colspan="4">CLOSED</td><td colspan="5">May –Sep < 60 fm</td><td colspan="3"></td><td>5</td></tr>
</table>

Figure 2-20. Alternative 1: California season structure for rockfish, cabezon and greenling season structure for 2011-2012.

With the bocaccio HG of 27.6 mt, season lengths would have to be severely reduced by five months in the Southern Management Area resulting in only a five month fishing season during the least valuable months of the season. The resulting season would not encompass the critical months for rockfish fishing from March through April when coastal pelagic and highly migratory species are not available to the fishery. In addition, the season in the South-Central Management Area would be reduced by 1 month resulting in a 6-month fishing season to reduce bocaccio impacts to within the HG.

Bag and size Limits
Under Alternative 1 the bag and size limits would be the same as the FPA.

Area Restrictions
Depth restrictions under Alternative 1 are provided in Figure 2-20. Under Alternative 1, the cowcod HG would be 0.1 mt under the No Action catch sharing (Option 1); cowcod is less constraining than the bocaccio ACL which requires severe season length reductions or shallower depth restrictions in the Southern Management Area to remain within its 27.6 mt HG. The cowcod harvest limit of 0.9 mt under the 2008 Total Mortality Report Catch (Option 2) sharing would provide a 0.85 mt residual catch to accommodate any minimal increase in cowcod impacts due to the proposed increase in depth restriction in the CCA from 20 fm to 30 fm or 40 fm and retention of shelf and slope rockfish including bocaccio in the CCA. Potential increases in bocaccio impacts from these actions would be a concern given the 27.6 mt bocaccio ACL and the projected impacts of 26.6 mt in 2011, given the 1 mt residual between the projected impacts and the HG. Though there is concern as to whether the proposed changes to regulations in the CCA could be implemented, the alternative will accommodate all the other proposed changes to management measures. The reductions in season length in the Southern and South-Central Management Areas as well as forgone increases in fishing opportunity in the CCA would have extreme negative implications for fishing opportunity and the businesses in communities that rely on fishing for their economic well-being.

2.4.4 Alternative 2: Intermediate Overfished Species ACLs

Alternative 2 combines the intermediate overfished species ACLs with the Council's preliminary preferred non-overfished species ACLs except Pacific whiting. For Pacific whiting intermediate ACL (193,935 mt) is considered in Alternative 2. Under this alternative POP rebuilds one year later than F=0, bocaccio, canary rockfish, and petrale sole two years later than F=0, darkblotched rockfish 6 years later than F=0, cowcod eight years later than F=0 and yelloweye rockfish 30 years greater than F=0. A rebuilding plan would be included for petrale sole in which petrale sole continues to be managed as a target species. The associated Pacific whiting ACL is driven by the availability of overfished species. The Dover sole ACL is the same as Alternatives 1, 2, and 3.

2.4.4.1 Harvest Specifications – Alternative 2

The OFL harvest specifications considered under Alternative 2 for all groundfish species and species groups are the estimated or proxy MSY harvest levels, which are the harvest thresholds above which overfishing is occurring. The 2011 and 2012 OFLs are the same as those shown for the FPA and are described in Section 2.1.1 and shown in Table 2-2.

The ABC specifications considered under Alternative 2 for all groundfish species and species groups incorporate scientific uncertainty buffers for all groundfish stocks and stock complexes and are based on SSC recommendations. The ABC values proposed for the integrated alternatives (Alternatives 1, 2, 3 and the FPA) are the same for each alternative, as they are based on the SSC recommendations for incorporating scientific uncertainty consistent with Amendment 23. The 2011 and 2012 ABCs are the same as those shown for the FPA and are described in Section 2.1.2 and shown in Table 2-8 and Table 2-9.

ACLs are specified for each stock and stock complex that is "in the fishery" as specified under the Amendment 23 framework. An ACL is a harvest specification set equal to the ABC or below the ABC to create a buffer that accommodates management uncertainty, socioeconomic considerations, rebuilding considerations, or to meet any other management objectives. Sector-specific ACLs may be specified in cases where a sector has a formal, long-term allocation of the harvestable surplus of a stock or stock complex. The ACL counts all sources of fishing-related mortality including landed catch, discard mortalities, research catches, and yield set-asides for EFPs. In this regard, the ACL is analogous to the total catch OY specified under the No Action Alternative. The ACLs for non-overfished species with species-specific specifications are described in Section 2.1.4 and shown in Table 2-10 and Table 2-11. For non-overfished species managed within complexes, the ACLs are described in Section 2.1.5. Other than Pacific whiting and Dover sole, the ACLs for non-overfished species do not vary between the FPA and Alternatives 1, 2, and 3.

The ACLs for each of the overfished species vary between the integrated alternatives. The development of ACLs for overfished species is fully described in Section 2.1.6 of this Chapter. The ACLs for the overfished species under Alternative 2 are shown in Table 2-96, along with the median time to rebuild.

Table 2-96. Alternative 2: 2011, 2012 Overfished species harvest specifications along with the time to rebuild and T_{TARGET} currently specified in the FMP.

Species	T_{TARGET} in FMP	Median time to rebuild given ACL [a/]	ACL Alternative 2011 [b/]	ACL Alternative 2012 [b/]
Bocaccio	2026	2020	109	115
Canary	2021	[2026]	94	99
Cowcod	2072	2068	3	3
Darkblotched	2028	2025	298	296
POP	2017	[2019]	111	113
Petrale	TBD	2015	776	1,160
Widow	2015	2010	400	400
Yelloweye	2084	2074	17	17

a/ Values from Table 2-35. Brackets indicate times to rebuild that are longer than the T_{TARGET} currently specified in the FMP prior to the proposed action.
b/ Values taken from the harvest specification alternatives in Table 2-39 (2011) and Table 2-40 (2012).

2.4.4.2 Harvest Specification Allocations - Alternative 2

The off-the-top deductions remain unchanged between the FPA and Alternatives 1, 2, and 3. Off-the-top deductions for overfished species for 2011 and 2012 are shown in detail in Table 2-41. Off-the-top deductions for non-overfished species for 2011 and 2012 are shown in detail in Table 2-42 and Table 2-43.

Non-overfished species with formal allocations defined by the FMP (other than sablefish north of 36° north latitude) are shown in Table 2-46 and Table 2-47. Allocations for sablefish north of 36° north latitude are shown in Table 2-45. For the non-overfished species, the allocation structure remains unchanged between the FPA and Alternatives 1, 2, and 3.

Biennial harvest specifications may also be used to establish 2-year allocations for species without formal allocations or for those species where the formal allocation is suspended (overfished species) if they have the potential to constrain fishing opportunities for one or more sectors. The 2-year overfished species allocations vary between the integrated alternatives and drive the management measures proposed for the various fisheries. Harvest guidelines and allocations for overfished species under Alternative 2 are shown in Table 2-97. Under trawl rationalization, overfished species allocations cannot be reallocated to or from the trawl sector inseason. Unused trawl IFQ quota pounds to permits will roll over (if 10 percent or less) for the second year of the biennium (2012) or remain stranded in the trawl sector in the final year of the biennial cycle. As such, the non-trawl sectors must have a sufficient allocation to reasonably accommodate fishing operations or management measure must constrain the fishery such that the non-trawl allocations are not exceeded.

Pacific whiting harvest specifications are completed on an annual basis, thus the Council requested a range of potential whiting ACLs for more detailed analysis in order to understand the potential range of overfished species impacts and constraints (Table 2-13). Alternative 2 informs the bycatch impacts relative to the intermediate whiting ACL (193,935 mt) and the intermediate overfished species ACLs. Under Alternative 2, the analysis assumes that Amendment 21: Intersector Allocation is implemented on January 1, 2011, and as such formal allocations of darkblotched, POP, and widow rockfish are made to the whiting sectors. That is, the bycatch model for projecting overfished species impacts relative to the whiting ACL is no longer used for setting darkblotched, POP, and widow rockfish sector bycatch limits.

For canary rockfish, Alternative 2 was analyzed using the Council's preliminary preferred 2-year allocation of canary to the whiting sectors.

Table 2-97. Overfished species allocations and harvest guidelines under Alternative 2.

<table>
<tr><th colspan="9">2011</th></tr>
<tr><th>Sector</th><th>Bocaccio</th><th>Canary</th><th>Cowcod</th><th>DKB</th><th>POP</th><th>Petrale</th><th>Widow</th><th>Yelloweye</th></tr>
<tr><td>Off the top ACL deductions [a/]</td><td>13.4</td><td>2 0</td><td>0.3</td><td>18.7</td><td>12.9</td><td>65.4</td><td>60.9</td><td>5.9</td></tr>
<tr><td>Fishery Harvest Guideline</td><td>95.6</td><td>74</td><td>2.7</td><td>298</td><td>98</td><td>711</td><td>339</td><td>11.1</td></tr>
<tr><td>Limited Entry Non-Whiting Trawl</td><td>11.3</td><td>19.3</td><td>1.4</td><td>240</td><td>63</td><td>670</td><td>148</td><td>0.6</td></tr>
<tr><td colspan="9">Non-nearshore [b/]</td></tr>
<tr><td>LE FG</td><td rowspan="3">22.2</td><td rowspan="2">2.3</td><td>--</td><td rowspan="6">14</td><td rowspan="6">5</td><td rowspan="6">36</td><td rowspan="6">31</td><td rowspan="3">2.3</td></tr>
<tr><td>OA DTL</td><td>--</td></tr>
<tr><td>Nearshore Fixed Gear [b/]</td><td>3.3</td><td>--</td></tr>
<tr><td>Washington Recreational [b/]</td><td>--</td><td>4.4</td><td>--</td><td>2.6</td></tr>
<tr><td>Oregon Recreational [b/]</td><td>--</td><td>14.5</td><td>--</td><td>2.4</td></tr>
<tr><td>California Recreational [b/]</td><td>61.9</td><td>20.7</td><td>1.4</td><td>2.6</td></tr>
<tr><td colspan="9">Limited Entry Whiting Trawl</td></tr>
<tr><td>Catcher Processor</td><td>--</td><td>4.3</td><td>--</td><td>9.0</td><td>10.0</td><td>--</td><td>54.0</td><td>--</td></tr>
<tr><td>Mothership</td><td>--</td><td>3.0</td><td>--</td><td>6.0</td><td>7.0</td><td>--</td><td>38.0</td><td>--</td></tr>
<tr><td>Shoreside</td><td>--</td><td>5.3</td><td>--</td><td>11.0</td><td>13.0</td><td>--</td><td>67.0</td><td>--</td></tr>
<tr><th colspan="9">2012</th></tr>
<tr><th>Sector</th><th>Bocaccio</th><th>Canary</th><th>Cowcod</th><th>DKB</th><th>POP</th><th>Petrale</th><th>Widow</th><th>Yelloweye</th></tr>
<tr><td>Off the top ACL deductions [a/]</td><td>13.4</td><td>20</td><td>0.3</td><td>18.7</td><td>12.9</td><td>65.4</td><td>60.9</td><td>5.9</td></tr>
<tr><td>Fishery Harvest Guideline</td><td>101.6</td><td>79</td><td>2.7</td><td>277</td><td>100</td><td>1,095</td><td>339</td><td>11.1</td></tr>
<tr><td>Limited Entry Non-Whiting Trawl</td><td>12.0</td><td>20.5</td><td>2.5</td><td>238</td><td>65</td><td>1,035</td><td>148</td><td>0.6</td></tr>
<tr><td colspan="9">Non-nearshore [b/]</td></tr>
<tr><td>LE FG</td><td rowspan="3">23.7</td><td rowspan="2">2.4</td><td rowspan="6">0.2</td><td rowspan="6">14</td><td rowspan="6">5</td><td rowspan="6">55</td><td rowspan="6">31</td><td rowspan="3">2.3</td></tr>
<tr><td>OA DTL</td></tr>
<tr><td>Nearshore Fixed Gear [b/]</td><td>3.5</td></tr>
<tr><td>Washington Recreational [b/]</td><td>--</td><td>4.7</td><td>2.6</td></tr>
<tr><td>Oregon Recreational [b/]</td><td>--</td><td>15.4</td><td>2.4</td></tr>
<tr><td>California Recreational [b/]</td><td>65.8</td><td>22.0</td><td>2.6</td></tr>
<tr><td colspan="9">Limited Entry Whiting Trawl</td></tr>
<tr><td>Catcher Processor</td><td>--</td><td>4.6</td><td>--</td><td>9.0</td><td>10.0</td><td>--</td><td>54.0</td><td>--</td></tr>
<tr><td>Mothership</td><td>--</td><td>3.2</td><td>--</td><td>6.0</td><td>7.0</td><td>--</td><td>38.0</td><td>--</td></tr>
<tr><td>Shoreside</td><td>--</td><td>5.7</td><td>--</td><td>11.0</td><td>13.0</td><td>--</td><td>67.0</td><td>--</td></tr>
</table>

a/ Assumes that the application of new Amendment 21 allocation structure specified at 50 CFR 660.55
b/ Values represent HGs which may be adjusted within the non-trawl allocation.

2.4.4.3 Management Measures – Alternative 2

Trawl Fishery – Alternative 2

Table 2-98 provides a summary of the trawl fishery management measures under Alternative 2.

Table 2-98. Summary of trawl fishery management measures under the Alternative 2.

Fishery	**FPA**
Trawl Fishery [a/]	
Catch limits (If trawl rationalization is <u>not</u> implemented)	• Cumulative trip limits for most species, specific to trawl type and geographic area (See Table 2-62 and 2-63 for specific limits). • Cowcod and Bronzespotted prohibited south of 40°10 N. lat. • North of 40°10 N. lat. canary prohibited with all but selective flatfish trawl. • South of 40°10 N. lat. canary prohibited with large footrope trawl gear
	• Sector-specific bycatch limits same as FPA
Rationalized Fishery (If trawl rationalization is implemented)	• Same as FPA
Gear restrictions	• Same as No Action Alternative
Seasons	• Same as No Action Alternative
GCAs	• Same as No Action Alternative
Trawl RCAs (non-whiting)	• Same as No Action Alternative
Trawl RCAs (whiting)	• Same as No Action Alternative
Monitoring	• Same as No Action Alternative
Reporting Requirements	• Same as No Action Alternative

Limited Entry Non-Whiting Trawl Fishery – Alternative 2

<u>Implementation of Rationalized Fishery</u>

Management of the trawl fishery under trawl rationalization would be the same as the FPA. Under trawl rationalization, the burden to stay within the harvest specifications in the responsibility of the individual harvesters (IFQ) and harvester cooperatives (at-sea whiting).

<u>Cumulative Trip Limit Management</u>

Alternative 2 trip limits and RCA structures for 2011 and 2012 are presented in Table 2-99. Alternative 2 had intermediate trawl allocations for overfished and constraining target species compared with the other alternatives. Selective gear limits are lower than large and small footrope for petrale sole; the approach was to vary trip limits by season and gear types for trip limit reduction, but *average* trip limits were representative and comparable with Alternative 1 and 3.

Table 2-99. Alternative 2 limited entry non-whiting trawl trip limit tables for 2011-2012.

2-month period	RCA lines (fm) shallow	RCA lines (fm) deep	2-month cumulative-poundage limits: sable-fish	long-spine	short-spine	Dover sole	petrale sole	arrow-tooth	other flatfish	slope rockfish
N. of 40°10' N lat.										
Large/small footrope limits										
1	*75*	250	**14,000**	20,000	18,000	110,000	**6,000**	150,000	110,000	6,000
2	*75*	200	**14,000**	20,000	18,000	110,000	**6,000**	150,000	110,000	6,000
3	*75*	200	**13,000**	20,000	18,000	110,000	**5,000**	150,000	110,000	6,000
4	*100*	200	**13,000**	20,000	18,000	110,000	**5,000**	150,000	110,000	6,000
5	*75*	200	**13,000**	20,000	18,000	110,000	**5,000**	150,000	110,000	6,000
6	*75*	250	**14,000**	20,000	18,000	110,000	**6,000**	150,000	110,000	6,000
Selective gear limits										
1	75	*250*	**7,000**	5,000	5,000	50,000	**3,500**	50,000	40,000	
2	75	*200*	**7,000**	5,000	5,000	50,000	**3,500**	50,000	40,000	
3	75	*200*	**8,000**	5,000	5,000	50,000	**3,500**	50,000	40,000	
4	100	*200*	**8,000**	5,000	5,000	50,000	**3,500**	50,000	40,000	
5	75	*200*	**7,000**	5,000	5,000	50,000	**3,500**	50,000	40,000	
6	75	*250*	**7,000**	5,000	5,000	50,000	**3,500**	50,000	40,000	
38^{o} - 40°10' N lat.										
1	100	150	**12,000**	20,000	18,000	110,000	**5,000**	10,000	110,000	15,000
2	100	150	**12,000**	20,000	18,000	110,000	**5,000**	10,000	110,000	15,000
3	100	150	**12,000**	20,000	18,000	110,000	**5,000**	10,000	110,000	15,000
4	100	150	**12,000**	20,000	18,000	110,000	**5,000**	10,000	110,000	15,000
5	100	150	**12,000**	20,000	18,000	110,000	**5,000**	10,000	110,000	15,000
6	100	150	**12,000**	20,000	18,000	110,000	**5,000**	10,000	110,000	15,000
S. of 38° N lat.										
1	100	150	**12,000**	20,000	18,000	110,000	**5,000**	10,000	110,000	55,000
2	100	150	**12,000**	20,000	18,000	110,000	**5,000**	10,000	110,000	55,000
3	100	150	**12,000**	20,000	18,000	110,000	**5,000**	10,000	110,000	55,000
4	100	150	**12,000**	20,000	18,000	110,000	**5,000**	10,000	110,000	55,000
5	100	150	**12,000**	20,000	18,000	110,000	**5,000**	10,000	110,000	55,000
6	100	150	**12,000**	20,000	18,000	110,000	**5,000**	10,000	110,000	55,000

Alternative 2 has the intermediate petrale sole ACL (643 mt) compared to Alternative 1 (342 mt) and Alternative 3 (865 mt). The non-whiting trawl allocation under the No Action Alternative was 1,140 mt and the FPA was 871 mt in 2011. The Alternative 2 petrale model target resulted in an average bimonthly trip limit of 5,125 lbs/2 months, compared with 7,900 lbs/2 months for the No Action Alternative, 4,800 lbs/2 months for the FPA in 2011.

Sablefish was a constraining target species in the DTS fishery. Under Alternative 2, the trawl allocation was 2,325 mt, the No Action Alternative was 2,955 mt, and the FPA was 2,538 mt. This is reflected in the trip limits for sablefish, which were an average of 11,208 lbs/2 months in Alternative 2, versus 21,389 lbs/2 months in the No Action Alternative, and 13,063 lbs/2 months in the FPA in 2011.

Trip limits and cumulative limits for non-target species are not modeled. Therefore, the limits do not change between Alternatives 1, 2, 3 and the FPA.

Limited Entry Trawl Whiting – Alternative 2

Implementation of Rationalized Fishery

Management measures for the whiting trawl fishery, if trawl rationalization is implemented, would be the same as the FPA alternative.

Non-rationalized Fishery Management

Management of the trawl fishery, in a non-rationalized fishery, would be the same as the FPA, but with bycatch rates based on the allocations in Table 2-97.

Fixed Gear – Alternative 2

Table 2-100 provides a summary of the limited entry fixed gear management measures under Alternative 2 and Table 2-101 provides a summary of the open access fixed gear management measures.

Table 2-100. Summary of limited entry fixed gear fishery management measures under Alternative 2.

Cumulative limits	• Cumulative trip limits for most species, specific to trawl type and geographic area. Average annual limits by target species are: Sablefish North of 36°N. lat - Same as FPA South of 36º N. lat. -Same as FPA All other species same as FPA • Primary sablefish fishery managed with tier limits – Same as FPA • Canary and yelloweye landings prohibited coastwide • South of 40°10 N. latitude landings of cowcod and bronzespotted rockfish prohibited
Size limits	• Same as No Action Alternative
Gear restrictions	• Same as No Action Alternative
Seasons	• Same as No Action Alternative
GCAs	• Same as No Action Alternative
	• CCA Fishing is prohibited in CCAs with the following exceptions: • Fishing for "other flatfish" when using no more than 12 hooks, #2 or smaller. • Fishing for rockfish and lingcod shoreward of the 20 fm
	• Farallon Islands & Cordell Banks Same as No Action Alternative
	• EFHCAs Same as No Action Alternative
Non-trawl RCAs	• North of 46°16 N. lat. Same as No Action • 46°16-45°03.83 N. lat. Same as No Action • 45°03.83 - 43° N. lat. 30 to 100 fm; • 43°-42° N. lat. 30-100 fm • 42°-40°10 N. lat. Same as No Action • 40°10-34°27 N. lat. Same as No Action • South of 34°27 N. lat. Same as No Action Fishing is prohibited in non-trawl RCAs with the following exception: Fishing for "other flatfish" when using no more than 12 hooks, #2 or smaller
Monitoring	• Same as No Action
Reporting	• Same as No Action

Table 2-101. Summary of open access fishery management measures under Alternative 2.

Cumulative limits	• Cumulative trip limits for most species, specific to trawl type and geographic area. Sablefish average annual limits: Sablefish North of 36°N. lat - Same as FPA South of 36º N. lat. - Same as FPA All other species same as FPA Salmon trollers same as No Action Alternative All other species same as No Action Alternative • Canary and yelloweye landings prohibited coastwide • Cowcod and bronzespotted rockfish landings prohibited South of 40°10 N. lat
Gear restrictions	• Same as No Action Alternative
Seasons	• Same as No Action Alternative
GCAs	YRCAs - Same as No Action Alternative
	• CCA Fishing is prohibited in CCAs with the following exceptions: • Fishing for "other flatfish" when using no more than 12 hooks, #2 or smaller. • Fishing for rockfish and lingcod shoreward of the 20 fm
	Farallon Island & Cordell Banks - Same as No Action Alternative
Open Access non-trawl RCAs	• North of 46°16 N. lat. 2a & 2b Same as No Action • 46°16-45°03.83 N. lat. 2a & 2b Same as No Action • 45°03.83 - 43° N. lat. 2a- Same and No Action (30-125 fm); 2b- 30 to 100 fm; • 43°-42° N. lat. 2a Same and No Action (20-100 fm): 2b 30-100 fm • 42°-40°10 N. lat. Same and No Action • 40°10-34°27 N. lat. –2a (20 -150 fm); 2b Same as No Action (30-150 fm) • South of 34°27 N. lat. – 2a (20 -150 fm); 2b Same as No Action (60-150 fm) (applies around islands) Fishing is prohibited in non-trawl RCAs with the following exception: Fishing for "other flatfish" when using no more than 12 hooks, #2 or smaller
Non-groundfish trawl RCAs (CA Halibut, Sea Cucumber & Ridgeback Prawn)	• Same as No Action
Monitoring	• Same as No Action Alternative
Reporting	• Same as No Action Alternative

Non-Nearshore Fixed Gear –Alternative 2

Allocations and Harvest Guidelines

Alternative 2 analyzes the Council's preliminary preferred sablefish ACL (updated with the technical corrections made in June) along with the intermediate overfished species ACL alternatives and the associated preliminary preferred decision for apportionments of overfished species to the non-nearshore fleet. The sablefish ACL (and therefore the allocation for non-nearshore fixed gear fisheries) under the FPA or Alternative 1, 2, or 3 would be lower in 2011 and 2012 than observed in 2010 (Table 2-102). Because the model used to estimate impacts of this fishery on overfished species assumes full attainment of the allocation, the reduced ACL for 2011 and 2012 will automatically reduce the modeled impacts of overfished species relative to 2010 (i.e., bycatch projections for the limited entry fixed gear fishery under Alternative 2 are lower compared to No Action).

Table 2-102. Alternative 2: Preliminary preferred sablefish ACL and allocations north of 36° N. latitude compared to No Action (2010).

Species	Fishery	2010 (mt)	2011 (mt)	2012 (mt)
Sablefish N. 36° N. lat.	**OY/ACL**	6,471	5,515	5,347
	LE Fixed Gear Allocation	2,140	1,874	1,816
	----LE Fixed Gear Primary	1,819	1,593	1,544
	----LE Fixed Gear Daily Trip Limit	321	281	272
	Open Access	529	463	449

Area Restrictions

Projected impacts on overfished species are modeled for two options under Alternative 2. Option 1 shows impacts through implementation of the No Action seaward non-trawl RCA boundary configuration (Figure 2-21); Option 2 shows impacts to overfished species with the seaward RCA boundary configuration that was used prior to the 2009-2010 cycle (Figure 2-22). Yelloweye is the stock for which the Council put the current non-trawl RCA boundaries into place.

Seaward RCA Boundary	36°- 40° 10'	40°10'- Col/Eur 43°	Col/Eur 43°- Cascade Head 45.064°	Cascade Head 45.064°- Point Chehalis 46.888°	North of Point Chehalis 46.888°
Shoreward boundary to 100 fm					
100 fm					
125 fm					
150 fm					
>150 fm					

Figure 2-21. Alternative 2a: No Action non-trawl RCA seaward configuration. The shoreward configuration of the RCA is driven by the nearshore model. Grey shading indicates areas closed to fishing.

Seaward RCA Boundary	36°- 40° 10'	40°10'-Col/Eur 43°	Col/Eur 43°-Cascade Head 45.064°	Cascade Head 45.064°-Point Chehalis 46.888°	North of Point Chehalis 46.888°
Shoreward boundary to 100 fm					
100 fm					
125 fm					
150 fm					
>150 fm					

Figure 2-22. Alternative 2b: Non-trawl RCA seaward configuration, which was the structure prior to 2009-2010, i.e., 100 fm north of 40°10' north latitude. Grey shading indicates areas closed to fishing.

Cumulative Limits

The Alternative 2 limited entry fixed gear trip limits are shown in Table 2-103, and open access trip limits are shown in Table 2-104.

Table 2-103. Alternative 2 Limited entry daily trip limit fishery limits for sablefish.

	Period	Daily	Weekly	Bimonthly
2011 - Alternative 2	Jan-Feb	na	1,900	6,500
	Mar-Oct	na	1,900	7,500
	Nov-Dec	na	1,900	6,000

Table 2-104. Alternative 2 Open access daily trip limit fishery limits.

	Period	Daily	Weekly	Bimonthly
	Jan -Jun	300	800	2,400
2011 - Alternative 2	Jul - Aug	300	950	2,750

Nearshore Fixed Gear – Alternative 2

Under Alternative 2, Oregon is severely constrained by yelloweye rockfish and California is constrained by yelloweye and canary rockfish. Under this harvest level, neither state can maintain a No Action (2009-2010 season) fishery. As such, nearshore fishermen and communities will continue to be adversely impacted by the low available yelloweye. Since black rockfish and greenling are important target strategies in Oregon, smaller reductions in landed catch were taken for these species relative to others to stay within overfished species impacts. In California, black rockfish is an important target strategy in the area between 42° and 40°10' north latitude and cabezon is an important target strategy statewide; therefore, higher landings were maintained for these species relative to others while staying within overfished species impacts.

Allocations and Harvest Guidelines

Alternative 2 includes the Council's preliminary preferred nearshore ACLs along with the intermediate overfished species ACL alternatives and the preliminary preferred apportionment of the non-trawl allocation to the nearshore fisheries (Table 2-35, Table 2-105). This alternative demonstrates how the intermediate overfished species ACL restrict access to the nearshore species. Primary management measures under this alternative include depth restrictions and reductions to target species catch to stay within the nearshore apportionment of overfished species.

Table 2-105. Alternative 2: The Council's preliminary preferred nearshore apportionment of the non-trawl allocation to the nearshore fishery for canary and yelloweye rockfish.

Species	2011 Apportionment (mt)	2012 Apportionment (mt)
Canary	3.1	3.3
Yelloweye	0.7	0.7

To better understand the impacts of overfished species catch sharing between Oregon and California, two catch sharing relationships for yelloweye rockfish – 50:50 (OR:CA) and 55:45 (OR:CA) – were modeled (Appendix A).

Under this alternative, two sub-options (2a and 2b) were provided to show the tradeoffs between more restrictive depth restrictions and higher reductions in landed catch. In Oregon, overfished species impacts are modeled assuming a 20 fm depth restriction (option a) and a 30 fm depth restriction (option b). In California, overfished species impacts are modeled assuming a 20 fm depth restriction statewide (option a) and a 20 fm depth restriction between 42° and 40°10' north latitude only (option b). Although the 20 fm depth restriction provided little yelloweye savings in Oregon, it provided greater savings in California since a greater proportion of catch comes from the deeper depths. The economic analysis only incorporated option a, the higher landings more restrictive RCA structure. These sub-options are fully detailed in Appendix C. Sub-option 2a was carried forward into the integrated alternative for estimates of fishing mortality and economic models.

In Oregon, overfished species impacts are modeled assuming a 20 fm depth restriction (Figure 2-23) and a 30 fm depth restriction (Figure 2-24). In California, overfished species impacts are modeled assuming a 20 fm depth restriction statewide (Figure 2-23) and a 20 fm depth restriction between 42° and 40°10' north latitude only (Figure 2-24). Although the 20 fm depth restriction provided little yelloweye savings in Oregon, it provided greater savings in California since a greater proportion of catch comes from the deeper depths. The economic analysis only incorporated option a, with the higher landings more restrictive RCA structure.

Shoreward RCA Boundary	South 34°27'	34°27'- 40° 10'	40°10' - 42°	42° - Col/Eur 43°	Col/Eur 43° - 46°16'	North of 46°16'
Shore						
20 fm						
30 fm						
60 fm						

Figure 2-23. Alternative 2: Nearshore shoreward RCA configuration under option 1a and 2a, the higher landings more restrictive RCA option. Grey shading indicates areas closed to fishing.

Shoreward RCA Boundary	South 34°27'	34°27'- 40° 10'	40°10' - 42°	42° - Col/Eur 43°	Col/Eur 43° - 46°16'	North of 46°16'
Shore						
20 fm						
30 fm						
60 fm						

Figure 2-24. Alternative 2: Nearshore shoreward RCA configuration under option 1b and 2b, the lower landings less restrictive RCA option. Grey shading indicates areas closed to fishing.

Under Alternative 2 with the nearshore fishery is modeled assuming a 50:50 catch sharing of yelloweye rockfish between Oregon and California. Reductions to landed catch under this alternative are taken from average landings of 2007-2009 for Oregon and 2006-2008 for California.

<u>Area Restrictions</u>

Primary management measures under this alternative are depth restrictions and reductions to target species catch (Figure 2-23 and Figure 2-24).

<u>Cumulative Limits - Nearshore Limited Entry Fixed Gear</u>

There is no formal trip limit model for the nearshore. Therefore, in the essence of time/workload, the Council simply considered the change in landings under the options. If the Council chose Alternative 2 then the states would work to craft the limits and run them through the GMT.

<u>Cumulative Limits – Nearshore Open Access Fixed Gear</u>

There is no formal trip limit model for the nearshore. Therefore, in the essence of time/workload, the Council simply considered the change in landings under the options. If the Council chose Alternative 2 then the states would work to craft the limits and run them through the GMT.

Tribal Fisheries – Alternative 2

The tribal fisheries management measures under Alternative 2 would be the same as those described under the FPA

Recreational Fishery Management Measures – Alternative 2

<u>Washington Recreational Fisheries – Alternative 2</u>

This alternative demonstrates how the intermediate overfished species ACLs restrict access to the nearshore species and impact the Washington recreational fisheries.

Harvest Guidelines
Alternative 2 includes the Council's preliminary preferred nearshore ACLs along with the intermediate overfished species ACL alternatives, and the preliminary preferred apportionment of the Washington recreational harvest guidelines. See Table 2-97 for overfished species harvest guidelines.

Season Structure
The season structure under Alternative 2 is shown below in Table 2-106.

Table 2-106. Alternative 2: Washington recreational season structure under the intermediate overfished species ACLs.

Marine Area	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
3 & 4 (N. Coast)	Open all depths					Open <20 fm June 1-Sep 30 [a/]				Open all depths		
2 (S. Coast)	Open all depths		Open <30 fm Mar 15 - June 15 [b/], [c/], d				Open all depths except lingcod prohibited on Fri. and Sat. >30 fm [e/]		Open all depths			
1 (Col. R.)	Open all depths			Open all depths [f/]						Open all depths		

a/ Groundfish retention allowed >20 fm on days when Pacific halibut is open.
b/ Retention of sablefish and Pacific cod allowed seaward of 30 fm from May 1- June 15.
c/ Retention of rockfish allowed seaward of 30 fm.
d/ Retention of lingcod allowed seaward of 30 fm on days that the primary halibut season is open.
e/ Retention of lingcod prohibited >30 fm, south of 46°58 on Fri. and Sat. from July 1 – August 31.
f/ Retention of groundfish, except sablefish and Pacific cod, prohibited with Pacific halibut on board.

Bag and Size Limits
The bag and size limits would be the same as the FPA.

Area Restrictions
The area restrictions would be the same as the FPA.

<u>Oregon Recreational Fisheries – Alternative 2</u>

This alternative demonstrates how the intermediate overfished species ACL restrict access to the nearshore species and impact the Oregon recreational fisheries. Depth management is the main tool used for controlling yelloweye rockfish catch in the Oregon recreational fishery. Three sub-options were considered. The options range from the most restrictive (Oregon Recreational Option 1, Figure 2-25), a year-round season with April through September open only shoreward of 25 fm to the least restrictive option (Oregon Recreational Option 3, Figure 2-25), a year-round season with April through September open only shoreward of 40 fm. Oregon Recreational Option 3 reflects the No Action 2009-2010 Oregon recreational groundfish season.

Option	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	Open all depths			Open < 25 fm						Open all depths		
2	Open all depths			Open < 30 fm						Open all depths		
3	Open all depths			Open < 40 fm						Open all depths		

Figure 2-25. Alternative 2: Options for Oregon recreational groundfish season in 2011-2012 under the intermediate overfished species ACLs.

Allocations and Harvest Guidelines
Alternative 2 includes the Council's preliminary preferred nearshore ACLs along with the intermediate overfished species ACL alternatives and the preliminary preferred Oregon recreational harvest guidelines (Table 2-5 and 2-6). See Table 2-90 for overfished species harvest guidelines.

Season Structure
Under Alternative 2, the Oregon recreational groundfish fishery would able to operate a year-round fishery with April through September being under some depth restrictions (25, 30, or 40 fm). Groundfish retention in the all-depth Pacific halibut fishery would not be allowed under any of the sub-options.

Bag and Size Limits
Under Alternative 2, the No Action Alternative bag limits for marine fish, lingcod, and flatfish would remain in place, except for cabezon. These daily bag limits provide the flexibility to make necessary adjustments through the yearly state process, reflecting the progression of the current year's fishery. The state process will likely start off each season with reduced marine and lingcod daily bag limits and may increase or further reduce them inseason depending on the progression of the fishery relative to the impact on species with harvest targets/guidelines and state landing caps. A reduction in cabezon impacts would be necessary and can be accomplished with a seasonal sub-bag limit of one fish. The sub-bag limit coincides with the months that the groundfish fishery is restricted to inside of 40 fm. Other than this alternative, all other bag and size limits are the same as specified in 2009-2010 and described under the No Action Alternative, including no retention of yelloweye or canary rockfish at any time or depth.

The shore fishery would be managed for a year-round season as yelloweye rockfish are not impacted. Also, fishing for, take, retention and possession of sanddabs and "other flatfishes", excluding Pacific halibut would be legal year-round and open shoreward of 40 fm during any period the groundfish fishery has any depth restrictions. The flatfish fishery would not have any depth restrictions when the groundfish fishery has no depth restrictions (i.e., 40, 30, 25, and 20 fm lines).

Area Restrictions
No changes to the current boundary of the Stonewall Bank YRCA (Figure 2-10) would be necessary.

California Recreational – Alternative 2

Allocations and Harvest Guidelines
Alternative 2 recreational fishery management measures for California are intended to keep total catch within the Council's preliminary preferred nearshore ACLs (Table 2-10 and Table 2-11), the Council's preliminary preferred overfished species ACL alternatives (Table 2-35) and the preliminary preferred California recreational harvest guidelines (Table 2-97).

Season Structure
Season structure under Alternative 2 is shown in Figure 2-26. This alternative would not allow an increase in the season length in the Northern Management Area over No Action despite their reduced impacts on yelloweye rockfish since the 20 fm depth restriction was put in place in 2008. This alternative would also result in a half month reduction in the already highly constrained three month season length in the North-Central North of Point Arena Management Area with the loss of the first two weeks of August. In the North-Central South of Point Arena Management Area, October would be closed to fishing while the season start date was moved from June 13 to June 1, with the overall effect of reducing the season length by a half month relative to the No Action Alternative. In this management area, both yelloweye and blue rockfish constrain the season lengths. The season length in the Monterey and Morro Bay South-Central Management Areas could still be increased to include December, increasing the season length by one and a half months since yelloweye rockfish is not constraining in this area.

Management Area	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Months
Northern	CLOSED				May 15 - Sep 15 <20 fm								5.5
North-Central North of Point Arena	CLOSED				May 15 - Jul <20 fm								2.5
North-Central South of Point Arena	CLOSED					June–Sep < 30 fm							4
South-Central Monterey	CLOSED				May – Dec < 40 fm								8
South-Central Morro Bay	CLOSED				May – Dec < 40 fm								8
Southern	CLOSED		Mar –Dec < 60 fm										10

Figure 2-26. Alternative 2: California season structure for rockfish, cabezon and greenling season structure for 2011-2012.

Bag and Size Limits
The bag and size limits under Alternative 2 would be the same as under the FPA.

Area Restrictions
Depth restrictions under Alternative 2 are provided in Figure 2-26. The 20 fm depth restriction in the Northern Management Area was implemented in 2008, to reduce impacts on yelloweye rockfish.

2.4.5 Alternative 3 – The Council's April 2010 Preliminary Preferred Overfished Species ACL Alternatives and Non-Overfished Species ACLs

Alternative 3 represents the Council's Preliminary Preferred Alternative from April 2010, which was updated at the June 2010 Council meeting after a technical correction was made to the sablefish ACL. The Preliminary Preferred Alternative Dover sole ACL was increased for the FPA (increased from 17,000 mt to 25,000 mt).

The biological strategy underlying this alternative is to follow the process outlined in the FMP. The FMP contains the rebuilding plans, which specify the SPR rates used to rebuild the stock, which is in contrast to the No Action Alternative that carries the 2010 OY forward for 2011-2012 and results in a new SPR. For management stability, the SSC recommended continuing with a constant SPR harvest rate for most overfished species applied to the latest stock assessment, except for widow rockfish and yelloweye. Since widow rockfish appears to be rebuilt in 2010 under all 2011-2012 harvest removals (i.e., from 200 to 3,000 mt), the widow ACL is set at 600 mt to accommodate fisheries while still achieving rebuilding. The yelloweye ACL represents a departure from the harvest rate of 71.9 percent which is also the ramp-down goal harvest rate by increasing to 72.8. The reason for this departure is because maintaining the 71.9 percent harvest rate would not result in rebuilding by the T_{TARGET} of 2084. As such, the ACL for Alternative 3 is 20 mt for both 2011 and 2012 which is projected to result in rebuilding by T_{TARGET}.

The Council stated that the bocaccio ACL is not a preliminary preferred, but an ACL for more detailed analysis. For the purposes of analysis, the bocaccio ACL was included under Alternative 3 with the remaining preliminary preferred overfished species ACLs.

2.4.5.1 Harvest Specifications- Alternative 3

The OFL harvest specifications considered under Alternative 3 for all groundfish species and species groups are the estimated or proxy MSY harvest levels, which are the harvest thresholds above which overfishing is occurring. The 2011 and 2012 OFLs are the same as those shown for the FPA and are described in Section 2.1.1 and shown in Table 2-2.

The ABC specifications considered under Alternative 3 for all groundfish species and species groups incorporate scientific uncertainty buffers for all groundfish stocks and stock complexes and are based on SSC recommendations. The ABC values proposed for the integrated alternatives (Alternatives 1, 2, 3 and the FPA) are the same for each alternative, as they are based on the SSC recommendations for incorporating scientific uncertainty consistent with Amendment 23. The 2011 and 2012 ABCs are the same as those shown for the FPA and are described in Section 2.1.2 and shown in Table 2-8 and Table 2-9.

ACLs are specified for each stock and stock complex that is "in the fishery" as specified under the Amendment 23 framework. An ACL is a harvest specification set equal to the ABC or below the ABC to create a buffer that accommodates management uncertainty, socioeconomic considerations, rebuilding considerations, or to meet any other management objectives. Sector-specific ACLs may be specified in cases where a sector has a formal, long-term allocation of the harvestable surplus of a stock or stock complex. The ACL counts all sources of fishing-related mortality including landed catch, discard mortalities, research catches, and yield set-asides for EFPs. In this regard, the ACL is analogous to the total catch OY specified under the No Action Alternative. The ACLs for non-overfished species with species-specific specifications are described in Section 2.1.4 and shown in Table 2-10 and Table 2-11. For non-overfished species managed within complexes, the ACLs are described in Section 2.1.5. Other than Pacific whiting and Dover sole, the ACLs for non-overfished species do not vary between the FPA and Alternatives 1, 2, and 3.

The ACLs for each of the overfished species vary between the integrated alternatives. The development of ACLs for overfished species is fully described in Section 2.1.6 of this Chapter. The ACLs for the overfished species under Alternative 1 are shown in Table 2-96, along with the median time to rebuild.

The ACLs for each of the overfished species varies between the integrated alternatives. The ACLs for overfished species are fully described in Section 2.1.6 of this Chapter. The ACLs for the overfished under Alternative 3 are shown in Table 2-107, along with the median time to rebuild.

Table 2-107. Alternative 3: 2011, 2012 Overfished species harvest specifications along with the time to rebuild and T_{TARGET} currently specified in the FMP.

Species	T_{TARGET} in FMP	Median time to rebuild given ACL [a/]	ACL Alternative 2011 [b/]	ACL Alternative 2012 [b/]
Bocaccio	2026	2022	263 mt	274 mt
Canary	2021	[2027]	102 mt	107 mt
Cowcod	2072	2071	4 mt	4 mt
Darkblotched	2028	2027	332 mt	329 mt
Petrale	TBD	2016	976 mt	1,160 mt
POP	2017	[2020]	180 mt	183 mt
Widow	2015	2010	600 mt	600 mt
Yelloweye	2084	2084	20 mt	20 mt

a/ Values from Table 2-35. Brackets indicate times to rebuild that are longer than the T_{TARGET} currently specified in the FMP prior to the proposed action.
b/ Values taken from the harvest specification alternatives in Table 2-39 (2011) and Table 2-40 (2012).

2.4.5.2 Harvest Specification Allocations - Alternative 3

The off-the-top deductions remain unchanged between the FPA and Alternatives 1, 2, and 3. Off-the-top deductions for overfished species for 2011 and 2012 are shown in detail in Table 2-41. Off-the-top deductions for non-overfished species for 2011 and 2012 are shown in detail in Table 2-42 and Table 2-43.

Non-overfished species with formal allocations defined by the FMP (other than sablefish north of 36° north latitude) are shown in Table 2-46 and Table 2-47. Allocations for sablefish north of 36° north latitude are shown in Table 2-45. For the non-overfished species, the allocation structure remains unchanged between the FPA and Alternatives 1, 2, and 3.

Biennial harvest specifications may also be used to establish 2-year allocations for species without formal allocations or for those species where the formal allocation is suspended (overfished species) if they have the potential to constrain fishing opportunities for one or more sectors. The 2-year overfished species allocations vary between the integrated alternatives and drive the management measures proposed for the various fisheries. Harvest guidelines and allocations for overfished species under Alternative 3 are shown in Table 2-108. Under trawl rationalization, overfished species allocations cannot be reallocated to or from the trawl sector inseason. Unused trawl IFQ quota pounds to permits will roll over (if 10 percent or less) for the second year of the biennium (2012) or remain stranded in the trawl sector in the final year of the biennial cycle. As such, the non-trawl sectors must have a sufficient allocation to reasonably accommodate fishing operations or management measure must constrain the fishery such that the non-trawl allocations are not exceeded.

Biennial harvest specifications may also be used to establish 2-year allocations for species without formal allocations or for those species where the formal allocation is suspended (overfished species) if they have the potential to constrain fishing opportunities for one or more sectors. The 2-year overfished species allocations vary between the integrated alternatives and drive the management measures proposed for the various fisheries. Under trawl rationalization, overfished species allocations cannot be reallocated to or from the trawl sector inseason. Unused trawl IFQ quota pounds to permits will roll over (if 10 percent or less) for the second year of the biennium (2012) or remain stranded in the trawl sector in the final year of the biennial cycle. As such, the non-trawl sectors must have a sufficient allocation to reasonably accommodate fishing operations or management measure must constrain the fishery such that the non-trawl allocations are not exceeded.

Table 2-108. Overfished species allocations and harvest guidelines under Alternative 3.

<table>
<tr><th colspan="9">2011</th></tr>
<tr><th>Sector</th><th>Bocaccio</th><th>Canary</th><th>Cowcod</th><th>DKB</th><th>POP</th><th>Petrale</th><th>Widow</th><th>Yelloweye</th></tr>
<tr><td>Off the top ACL deductions [a/b/]</td><td>13.4</td><td>20</td><td>0.3</td><td>18.7</td><td>12.9</td><td>65.4</td><td>60.9</td><td>5.9</td></tr>
<tr><td>Fishery Harvest Guideline</td><td>249.6</td><td>82</td><td>3.7</td><td>310</td><td>167</td><td>911</td><td>539</td><td>14.1</td></tr>
<tr><td>Limited Entry Non-Whiting Trawl</td><td>29.6</td><td>21.3</td><td>1.9</td><td>313</td><td>129</td><td>860</td><td>235</td><td>0.7</td></tr>
<tr><td colspan="9">Non-nearshore [b/]</td></tr>
<tr><td>LE FG</td><td rowspan="3">58.2</td><td rowspan="2">2.5</td><td>--</td><td rowspan="6">16</td><td rowspan="6">8</td><td rowspan="6">46</td><td rowspan="6">49</td><td rowspan="3">3.0</td></tr>
<tr><td>OA DTL</td><td>--</td></tr>
<tr><td>Nearshore Fixed Gear [d/]</td><td>3.6</td><td>--</td></tr>
<tr><td>Washington Recreational [d/]</td><td>--</td><td>4.9</td><td>--</td><td>3.3</td></tr>
<tr><td>Oregon Recreational [d/]</td><td>--</td><td>16.0</td><td>--</td><td>3.0</td></tr>
<tr><td>California Recreational [d/]</td><td>161.8</td><td>22.9</td><td>1.9</td><td>3.4</td></tr>
<tr><td colspan="9">Limited Entry Whiting Trawl</td></tr>
<tr><td>Catcher Processor</td><td>--</td><td>4.8</td><td>--</td><td>9.0</td><td>10.0</td><td>--</td><td>87.0</td><td>--</td></tr>
<tr><td>Mothership</td><td>--</td><td>3.4</td><td>--</td><td>6.0</td><td>7.0</td><td>--</td><td>61.0</td><td>--</td></tr>
<tr><td>Shoreside</td><td>--</td><td>5.9</td><td>--</td><td>11.0</td><td>13.0</td><td>--</td><td>107.0</td><td>--</td></tr>
<tr><th colspan="9">2012</th></tr>
<tr><th>Sector</th><th>Bocaccio</th><th>Canary</th><th>Cowcod</th><th>DKB</th><th>POP</th><th>Petrale</th><th>Widow</th><th>Yelloweye</th></tr>
<tr><td>Off the top ACL deductions [a/]</td><td>13.4</td><td>20</td><td>0.3</td><td>18.7</td><td>12.9</td><td>65.4</td><td>60.9</td><td>5.9</td></tr>
<tr><td>Fishery Harvest Guideline</td><td>260.6</td><td>87</td><td>3.7</td><td>310</td><td>170</td><td>1,095</td><td>539</td><td>14.1</td></tr>
<tr><td>Limited Entry Non-Whiting Trawl</td><td>29.6</td><td>22.5</td><td>1.9</td><td>268</td><td>132</td><td>1,035</td><td>235</td><td>0.7</td></tr>
<tr><td colspan="9">Non-nearshore [b/]</td></tr>
<tr><td>LE FG</td><td rowspan="3">60.7</td><td rowspan="2">2.6</td><td>--</td><td rowspan="6">16</td><td rowspan="6">9</td><td rowspan="6">55</td><td rowspan="6">49</td><td rowspan="3">3.0</td></tr>
<tr><td>OA DTL</td><td>--</td></tr>
<tr><td>Nearshore Fixed Gear [b/]</td><td>3.8</td><td>--</td></tr>
<tr><td>Washington Recreational [b/]</td><td>--</td><td>5.2</td><td>--</td><td>3.3</td></tr>
<tr><td>Oregon Recreational [b/]</td><td>--</td><td>16.9</td><td>--</td><td>3.0</td></tr>
<tr><td>California Recreational [b/]</td><td>168.9</td><td>24.2</td><td>1.9</td><td>3.4</td></tr>
<tr><td colspan="9">Limited Entry Whiting Trawl</td></tr>
<tr><td>Catcher Processor</td><td>--</td><td>5.0</td><td>--</td><td>9.0</td><td>10.0</td><td>--</td><td>87.0</td><td>--</td></tr>
<tr><td>Mothership</td><td>--</td><td>3.6</td><td>--</td><td>6.0</td><td>7.0</td><td>--</td><td>61.0</td><td>--</td></tr>
<tr><td>Shoreside</td><td>--</td><td>6.2</td><td>--</td><td>11.0</td><td>13.0</td><td>--</td><td>107.0</td><td>--</td></tr>
</table>

a/ Assumes that the application of new Amendment 21 allocation structure specified at 50 CFR 660.55
b/ Values represent HGs which may be adjusted within the non-trawl allocation.

2.4.5.3 Management Measures – Alternative 3

Trawl Fishery – Alternative 3

Table 2-109 provides a summary of the trawl fishery management measures under Alternative 3.

Table 2-109. Summary of trawl fishery management measures under Alternative 3.

Fishery	Alternative 3
Trawl Fishery [a/]	
Catch limits (If trawl rationalization is <u>not</u> implemented)	• Cumulative trip limits for most species, specific to trawl type and geographic area. (See Table 2-62 and 2-63 for specific limits). • Cowcod and Bronzespotted prohibited south of 40°10 N. lat. • North of 40°10 N. lat. canary prohibited with all but selective flatfish trawl. • South of 40°10 N. lat. canary prohibited with large footrope trawl gear
	• Sector-specific limits same as FPA
Rationalized Fishery (If trawl rationalization is implemented)	• Same as FPA
Gear restrictions	• Same as No Action Alternative
Seasons	• Same as No Action Alternative
GCAs	• Same as No Action Alternative
Trawl RCAs (non-whiting) [a/]	• Same as No Action Alternative, except the shoreward boundary is shifted to 75 fm in Period 4 to restrict access to summer petrale sole. (See Table 2-110 for specific RCAs)
Trawl RCAs (whiting)	• Same as No Action Alternative
Monitoring	• Same as No Action Alternative
Reporting Requirements	• Same as No Action Alternative

a/ Assumes RCA associated with trawl rationalization, a cumulative limit fishery would eliminate the modified 200 fm line for the seaward boundary in periods 1 and 6, and move the shoreward boundary in period 4 to 75 fm.

Limited Entry Non-Whiting Trawl Fishery– Alternative 3

<u>Implementation of Rationalized Fishery</u>

Management of the trawl fishery under trawl rationalization will be the same as the FPA. Under trawl rationalization, the burden to stay within the harvest specifications in the responsibility of the individual harvesters (IFQ) and harvester cooperatives (at-sea whiting).

<u>Cumulative Trip Limit Management</u>

Alternative 2 trip limits and RCA structures for 2011 and 2012 are presented in Table 2-110. The allocations and trip limits under Alternative 3 are very similar to the FPA. In Alternative 3 and the FPA, the shoreward RCA boundary in period 4 was brought in to 75 fm in order to further restrict access to summer petrale sole, along with lower trip limits. Differences between the 2011 and 2012 model runs of Alternative 3 were relatively small and primarily limited to petrale sole, sablefish, and Dover sole. Sablefish allocations and trip limits were lower in 2012 than 2011, and petrale sole allocations and trip limits were higher in 2012 than 2011. Differences in allocations between years for other species, including rebuilding species were negligible. Trip limits and cumulative limits for non-target species are not modeled. Therefore, the limits do not change between Alternatives 1, 2, 3 and the FPA.

Table 2-110. Alternative 3, Limited entry non-whiting trawl trip limit tables for 2011-2012.

			2-month cumulative-poundage limits							
2-month period	RCA lines (fm) shallow	RCA lines (fm) deep	sable-fish	long-spine	short-spine	Dover sole	petrale sole	arrow-tooth	other flatfish	slope rockfish
N. of 40°10' N lat.										
Large/small footrope limits										
1	*75*	200	**15,500**	20,000	17,000	150,000	**4,900**	150,000	110,000	6,000
2	*75*	200	**15,500**	20,000	17,000	150,000	**4,900**	150,000	110,000	6,000
3	*75*	150/200	**15,500**	20,000	17,000	150,000	**4,900**	150,000	110,000	6,000
4	*75*	150/200	**15,500**	20,000	17,000	150,000	**4,900**	150,000	110,000	6,000
5	*75*	200	**15,500**	20,000	17,000	150,000	**4,900**	150,000	110,000	6,000
6	*75*	200	**15,500**	20,000	17,000	150,000	**4,900**	150,000	110,000	6,000
Selective gear limits										
1	*75*	200	**8,000**	5,000	5,000	65,000	**4,900**	90,000	60,000	
2	*75*	200	**8,000**	5,000	5,000	65,000	**4,900**	90,000	60,000	
3	*75*	150/200	**8,000**	5,000	5,000	65,000	**4,900**	90,000	60,000	
4	*75*	150/200	**8,000**	5,000	5,000	65,000	**4,900**	90,000	60,000	
5	*75*	200	**8,000**	5,000	5,000	65,000	**4,900**	90,000	60,000	
6	*75*	200	**8,000**	5,000	5,000	65,000	**4,900**	90,000	60,000	
38° - 40°10' N lat.										
1	100	200	**15,500**	20,000	17,000	150,000	**4,900**	10,000	110,000	15,000
2	100	150	**15,500**	20,000	17,000	150,000	**4,900**	10,000	110,000	15,000
3	100	150	**15,500**	20,000	17,000	150,000	**4,900**	10,000	110,000	15,000
4	100	150	**15,500**	20,000	17,000	150,000	**4,900**	10,000	110,000	15,000
5	100	150	**15,500**	20,000	17,000	150,000	**4,900**	10,000	110,000	15,000
6	100	200	**15,500**	20,000	17,000	150,000	**4,900**	10,000	110,000	15,000
S. of 38° N lat.										
1	100	200	**15,500**	20,000	17,000	150,000	**4,900**	10,000	110,000	55,000
2	100	150	**15,500**	20,000	17,000	150,000	**4,900**	10,000	110,000	55,000
3	100	150	**15,500**	20,000	17,000	150,000	**4,900**	10,000	110,000	55,000
4	100	150	**15,500**	20,000	17,000	150,000	**4,900**	10,000	110,000	55,000
5	100	150	**15,500**	20,000	17,000	150,000	**4,900**	10,000	110,000	55,000
6	100	200	**15,500**	20,000	17,000	150,000	**4,900**	10,000	110,000	55,000

Limited Entry Trawl Whiting– Alternative 3

Implementation of Rationalized Fishery

Management measures for the whiting trawl fishery, under trawl rationalization will be the same as the FPA alternative.

Non-rationalized Fishery Management

Management measures for the whiting trawl fishery, in a non-rationalized fishery, would be the same as the FPA alternative but with bycatch rates based on the allocations in Table 2-108.

Non-Nearshore Fixed Gear– Alternative 3

Table 2-111 provides a summary of the limited entry fixed gear management measures under Alternative 3 and Table 2-112 provides a summary of the open access fixed gear management measures.

Table 2-111. Summary of Limited Entry Fixed Gear Fishery Management Measures Under Alternative 3

Cumulative limits	• Cumulative trip limits for most species, specific to trawl type and geographic area. Average annual limits by target species are: Sablefish North of 36°N. lat - Same as FPA South of 36º N. lat. - Same as FPA All other species - Same as FPA • Primary sablefish fishery managed with tier limits Same as FPA • Canary and yelloweye landings prohibited coastwide • South of 40°10 N. latitude landings of cowcod and bronzespotted rockfish prohibited
Size limits	• Same as No Action Alternative
Gear restrictions	• Same as No Action Alternative
Seasons	• Same as No Action Alternative
GCAs	• Same as No Action Alternative
	• CCA Fishing is prohibited in CCAs with the following exceptions: • Fishing for "other flatfish" when using no more than 12 hooks, #2 or smaller. • Fishing for rockfish and lingcod shoreward of the 20 fm
	• Farallon Islands & Cordell Banks Same as No Action Alternative
	• EFHCAs Same as No Action Alternative
Non-trawl RCAs	• North of 46°16 N. lat. - Same as FPA • 46°16-45°03.83 N. lat. - Same as FPA • 45°03.83 - 43° N. lat. - Same as FPA • 43°-42° N. lat. - Same as FPA • 42°-40°10 N. lat. - Same as FPA • 40°10-34°27 N. lat. - Same as FPA • South of 34°27 N. lat. - Same as FPA Fishing is prohibited in non-trawl RCAs with the following exception: Fishing for "other flatfish" when using no more than 12 hooks, #2 or smaller
Monitoring	• Same as No Action
Reporting	• Same as No Action

Table 2-112. Summary of Open Access Fishery Management Measures Under Alternative 3

Cumulative limits	• Cumulative trip limits for most species, specific to trawl type and geographic area. Sablefish average annual limits: North of 36°N. lat - Same as FPA South of 36º N. lat. Same as FPA All other species - Same as FPA Salmon trollers same as No Action Alternative All other species same as No Action Alternative • Canary and yelloweye landings prohibited coastwide • Cowcod and bronzespotted rockfish landings prohibited South of 40°10 N. lat
Gear restrictions	• Same as No Action Alternative
Seasons	• Same as No Action Alternative
GCAs	YRCAs - Same as No Action Alternative
	• CCA Same as No Action Alternative
	Farallon Island & Cordell Banks - Same as No Action Alternative
Open Access non-trawl RCAs	• North of 46°16 N. lat. - Same as FPA • 46°16-45°03.83 N. lat. - Same as FPA • 45°03.83 - 43° N. lat. - Same as FPA • 43°-42° N. lat. - Same as FPA • 42°-40°10 N. lat. - Same as FPA • 40°10-34°27 N. lat. - Same as FPA • South of 34°27 N. lat. - Same as FPA • Fishing is prohibited in non-trawl RCAs with the following exception: Fishing for "other flatfish" when using no more than 12 hooks, #2 or smaller
Non-groundfish trawl RCAs (CA Halibut, Sea Cucumber & Ridgeback Prawn)	• Same as No Action
Monitoring	• Same as No Action Alternative
Reporting	• Same as No Action Alternative

Allocations and Harvest Guidelines

Alternative 3 includes the Council's preliminary preferred sablefish ACL (updated with the technical corrections made in June; Table 2-113) along with the preliminary preferred overfished species ACL alternatives (Table 2-107) and the associated preliminary preferred decision for apportionments of overfished species to the non-nearshore fleet (Table 2-107). As shown previously, the sablefish ACL (and therefore the allocation for non-nearshore fixed gear fisheries) will be lower in 2011 and 2012 than observed in 2010 (Table 2-113).

Table 2-113. Alternative 3: Preliminary preferred sablefish ACL and allocations north of 36° N. latitude compared to No Action (2010).

Species	Fishery	2010 (mt)	2011 (mt)	2012 (mt)
Sablefish N. 36° N. lat.	**OY/ACL**	6,471	5,515	5,347
	LE Fixed Gear Allocation	2,140	1,874	1,816
	----LE Fixed Gear Primary	1,819	1,593	1,544
	----LE Fixed Gear Daily Trip Limit	321	281	272
	Open Access	529	463	449

Table 2-114. Alternative 3: Apportionment of the non-trawl allocation of overfished species to the non-nearshore fixed gear sector under the Council's preliminary preferred overfished species ACLs.

Species	2011 Apportionment (mt)	2012 Apportionment (mt)	Comments
Canary rockfish	3.6	3.8	
Yelloweye rockfish	2.1	2.1	Includes 0.4 mt for OA DTL and 1.7 mt for LE FG

<u>Area Restrictions</u>

Projected impacts on overfished species are modeled for two options under Alternative 3. Option 1 shows impacts through implementation of the No Action seaward non-trawl RCA boundary configuration (Figure 2-27); Option 2 shows impacts to overfished species with the seaward RCA boundary configuration that was used prior to the 2009-2010 cycle (Figure 2-28). Yelloweye is the stock for which the Council put the current non-trawl RCA boundaries into place.

Seaward RCA Boundary	36°- 40° 10'	40°10'- Col/Eur 43°	Col/Eur 43°- Cascade Head 45.064°	Cascade Head 45.064°- Point Chehalis 46.888°	North of Point Chehalis 46.888°
Shoreward boundary to 100 fm					
100 fm					
125 fm					
150 fm					
>150 fm					

Figure 2-27. Alternative 3, Option 1: Non-trawl RCA seaward configuration. The shoreward configuration of the RCA is driven by the nearshore model. Grey shading indicates areas closed to fishing.

Seaward RCA Boundary	36°- 40° 10'	40°10'- Col/Eur 43°	Col/Eur 43°- Cascade Head 45.064°	Cascade Head 45.064°- Point Chehalis 46.888°	North of Point Chehalis 46.888°
Shoreward boundary to 100 fm					
100 fm					
125 fm					
150 fm					
>150 fm					

Figure 2-28. Alternative 3, Option 2: Non-trawl RCA seaward configuration, which was the structure prior to 2009-2010, i.e., 100 fm north of 40°10' north latitude. Grey shading indicates areas closed to fishing.

Cumulative Limits

The Alternative 3 limited entry fixed gear trip limits are shown in Table 2-115, and open access trip limits are shown in Table 2-116.

Table 2-115. Alternative 3 Limited entry daily trip limit fishery limits for sablefish.

	Period	Daily	Weekly	Bimonthly
2011 - FPA (same for Alternative Ia, option 2, Alternative 2, and Alternative 3)	Jan-Feb	na	1,900	6,500
	Mar-Oct	na	1,900	7,500
	Nov-Dec	na	1,900	6,000

Table 2-116. Alternative 3 Open access daily trip limit fishery limits.

	Period	Daily	Weekly	Bimonthly
2011 - FPA (same for Alternative Ia, option 2, Alternative 2, and Alternative 3)	Jan -Jun	300	800	2,400
	Jul - Aug	300	950	2,750

Nearshore Fixed Gear– Alternative 3

Allocations and Harvest Guidelines

Alternative 3 includes the Council's preliminary preferred nearshore ACLs along with the preliminary overfished species ACL alternatives and the preliminary preferred apportionment of the non-trawl allocation to the nearshore fisheries (Table 2-35, Table 2-117). This alternative demonstrates how the intermediate overfished species ACL restrict access to the nearshore species.

Table 2-117. Alternative 3: The Council's preliminary preferred nearshore apportionment of the non-trawl allocation to the nearshore fishery for canary and yelloweye rockfish.

Species	2011 Apportionment (mt)	2012 Apportionment (mt)
Canary	3.5	3.7
Yelloweye	0.9	0.9

Under Alternative 3, Oregon is severely constrained by yelloweye rockfish and California is constrained by yelloweye and canary rockfish. Under this harvest level, neither state can maintain the No Action (2009-2010) fishery. As such, nearshore fishermen and communities will continue to be adversely impacted by the low available yelloweye. Since black rockfish and greenling are important target strategies in Oregon, lower reductions in landed catch were taken for these species relative to others to stay within overfished species impacts. In California, black rockfish is an important target strategy in the area between 42° and 40°10' north latitude and cabezon is an important target strategy statewide; therefore higher landings were maintained for these species relative to others while staying within overfished species impacts.

To better understand the impacts of overfished species catch sharing between Oregon and California, two catch sharing relationships for yelloweye rockfish - 50:50 (OR:CA) and 55:45 (OR:CA) were modeled. The rationale for these two options is described in Appendix A, Description of Catch Projection Models.

Under this alternative, two sub-options (a and b) are provided to show the tradeoffs between more restrictive depth restrictions and higher reductions in landed catch. In Oregon, overfished species impacts are modeled assuming a 20 fm depth restriction (Figure 2-29) and a 30 fm depth restriction (Figure 2-30). In California, overfished species impacts are modeled assuming a 20 fm depth restriction statewide (Figure 2-29) and a 20 fm depth restriction between 42° and 40°10' north latitude only (Figure 2-30). Although the 20 fm depth restriction provided little yelloweye savings in Oregon, it provided greater savings in California since a greater proportion of catch comes from the deeper depths. The economic analysis only incorporated option a, the higher landings more restrictive RCA structure.

Shoreward RCA Boundary	South 34°27'	34°27'- 40° 10'	40°10' - 42°	42° - Col/Eur 43°	Col/Eur 43° - 46°16'	North of 46°16'
Shore						
20 fm						
30 fm						
60 fm to seaward RCA						

Figure 2-29. Alternative 3: Nearshore shoreward RCA configuration under option 1a and 2a, the higher landings more restrictive RCA option. Grey shading indicates areas closed to fishing.

Shoreward RCA Boundary	South 34°27’	34°27’- 40° 10'	40°10' - 42°	42° - Col/Eur 43°	Col/Eur 43° - 46°16’	North of 46°16’
Shore						
20 fm						
30 fm						
60 fm to seaward RCA						

Figure 2-30. Alternative 3: Nearshore shoreward RCA configuration under option 1b and 2b, the lower landings less restrictive RCA option. Grey shading indicates areas closed to fishing.

<u>Cumulative Limits - Nearshore Limited Entry Fixed Gear</u>

There is no formal trip limit model for the nearshore. Therefore, in the essence of time/workload, the Council simply considered the change in landings under the options. If the Council chose Alternative 3 then the states would work to craft the limits and run them through the GMT.

<u>Cumulative Limits - Nearshore Open Access Fixed Gear</u>

There is no formal trip limit model for the nearshore. Therefore, in the essence of time/workload, the Council simply considered the change in landings under the options. If the Council chose Alternative 3 then the states would work to craft the limits and run them through the GMT.

Tribal Fisheries- Alternative 3

The tribal fisheries management measures for under Alternative 3 would be the same as those described under the FPA.

Recreational Fisheries – Alternative 3

<u>Washington Recreational – Alternative 3</u>

This alternative demonstrates how the preliminary preferred overfished species ACLs restrict access to the nearshore species and impact the Washington recreational fisheries.

Allocations and Harvest Guidelines
Alternative 3 includes the Council’s preliminary preferred nearshore ACLs along with the Council’s preliminary preferred overfished species ACL alternatives (Table 2-108) and the preliminary preferred Washington recreational harvest guidelines.

Season Structure
The season structure would be the same as the FPA.

Bag and Size Limits
The bag and size limits would be the same as the FPA.

Area Restrictions
The area restrictions would be the same as the FPA.

<u>Oregon Recreational –Alternative 3</u>

Harvest Guidelines
Alternative 2 includes the Council's preliminary preferred nearshore ACLs along with the intermediate overfished species ACL alternatives and the preliminary preferred Oregon recreational harvest guidelines (Table 2-5 and 2-6). See Table 2-90 for overfished species harvest guidelines.

Alternative 3 includes the Council's preliminary preferred nearshore ACLs along with the Council's preliminary preferred overfished species ACL alternatives (Table 2-35) and the preliminary preferred Oregon recreational harvest guidelines. This alternative demonstrates how the preliminary preferred overfished species ACL and harvest guidelines restrict access to the nearshore species and impact the Oregon recreational fisheries.

Season Structure
Depth management is the main tool used for controlling yelloweye rockfish catch in the Oregon recreational fishery. The options range from the most restrictive (Oregon Recreational Option 1, Figure 2-31), a year-round season with April through September open only shoreward of 40 fm to the least restrictive option (Oregon Recreational Option 4, Figure 2-31), a year-round season with May through August open only shoreward of 40 fm. Oregon Recreational Option 1 reflects the No Action Alternative and the 2009-2010 Oregon recreational groundfish season. Oregon Recreational Options 2-4 reflects the possibility that the Pacific halibut catch limit may be reduced from the 2010 limit. These alternatives are based on the 2010 halibut catch limit (15 percent lower than the 2009 catch limit) and may allow for the retention of groundfish during the all-depth halibut days on the central Oregon coast.

<table>
<tr><th>Option</th><th>Jan</th><th>Feb</th><th>Mar</th><th>Apr</th><th>May</th><th>Jun</th><th>Jul</th><th>Aug</th><th>Sep</th><th>Oct</th><th>Nov</th><th>Dec</th></tr>
<tr><td>1</td><td colspan="3">Open all depths</td><td colspan="6">Open < 40 fm</td><td colspan="3">Open all depths</td></tr>
<tr><td>2</td><td colspan="4">Open all depths</td><td colspan="5">Open < 40 fm</td><td colspan="3">Open all depths</td></tr>
<tr><td>3</td><td colspan="3">Open all depths</td><td colspan="5">Open < 40 fm</td><td colspan="4">Open all depths</td></tr>
<tr><td>4</td><td colspan="4">Open all depths</td><td colspan="4">Open < 40 fm</td><td colspan="4">Open all depths</td></tr>
</table>

Figure 2-31. Alternative 3: Oregon recreational groundfish fishery season options under Alternative 3. Option 1 reflects the season structure under the No Action and FPA, which is also available under Alternative 3.

Under Alternative 3, the Oregon recreational groundfish fishery would be able to operate a year-round fishery with liberalized seasonal depth restrictions (Options 2-4) relative to the No Action Alternative (Option 1). Options 2 and 3 would also be possible if groundfish retention during the all-depth Pacific halibut fishery was allowed.

Bag and Size Limits
No Action bag limits for marine fish, lingcod, and flatfish would remain in place under Alternative 3, except for cabezon. These daily bag limits provide the flexibility to make necessary adjustments through the yearly state process, reflecting the progression of the current year's fishery. The state process will likely start off each season with reduced marine and lingcod daily bag limits and may increase or further reduce inseason depending on the progression of the fishery relative to the impact on species with harvest targets/guidelines and state landing caps. A reduction in cabezon impacts would be

necessary and can be accomplished with a seasonal sub-bag limit of one fish. The sub-bag limit coincides with the months that the groundfish fishery is restricted to inside of 40 fm. Other than this, all other bag and size limits are the same as specified in 2009-2010 and described under the No Action Alternative, including no retention of yelloweye or canary rockfish at any time or depth.

The shore-based fishery would be managed for a year-round season as yelloweye rockfish are not impacted. Also, fishing for, take, retention and possession of sanddabs and "other flatfishes", excluding Pacific halibut would be legal year-round and open shoreward of 40 fm during any period the groundfish fishery has any depth restrictions. The flatfish fishery would not have any depth restrictions when the groundfish fishery has no depth restrictions (i.e., 40, 30, 25 and 20 fm lines).

Area Restrictions
No changes to the current boundary of the Stonewall Bank YRCA (Figure 2-10) would be necessary.

California Recreational – Alternative 3

Harvest Guidelines
Alternative 3 recreational fishery management measures for California are intended to keep total catch within the Council's preliminary preferred nearshore ACLs (Table 2-10 and Table 2-11), the Council's preliminary preferred overfished species ACL alternatives (Table 2-35), and the preliminary preferred California recreational harvest guidelines (Table 2-108).

Season Structure
Season structure under Alternative is shown in Figure 2-32. Projected yelloweye rockfish impacts are extremely constraining to the fishery North of Point Arena and reductions in the ACLs from the preliminary preferred alternative of 20 mt would result in additional season length reductions in the North-Central North of Point Arena Management Area. The 20 mt yelloweye rockfish ACL under Alternative 3 and the corresponding 3.4 mt HG allow the limited season in the North-Central North of Point Arena Management Area to be sustained as well as allowing a one and a half month increase to the season in the Northern Management Area. This alternative also provides one and a half months of additional fishing opportunities in the North-Central South of Point Arena Management Area and the Monterey and Morro Bay South-Central Management Areas while providing a 0.3 mt buffer between the projected impacts of 3.1 mt and the harvest guideline of 3.4 mt. The reduced catches of Minor Nearshore Rockfish South and blue rockfish in the 2008 and 2009 seasons resulted in reduced projected impacts for these species in 2011 and 2012, which will accommodate the one and a half month increases in the fishing season in these three management areas. Alternative 3 would allow for an additional 5.5 months of fishing season statewide over the No Action Alternative.

Management Area	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Months
Northern	CLOSED				May 15 - Oct <20 fm								5.5
North-Central North of Point Arena	CLOSED				May 15 - Aug 15 <20 fm								3
North-Central South of Point Arena	CLOSED					June–Nov < 30 fm							6
South-Central Monterey	CLOSED				May – Dec < 40 fm								8
South-Central Morro Bay	CLOSED				May – Dec < 40 fm								8
Southern	CLOSED		Mar –Dec < 60 fm										10

Figure 2-32. Alternative 3: California season structure for rockfish, cabezon and greenling season structure for 2011-2012.

Bag and size Limits
The Bag and size limits under Alternative 2 would be the same as the FPA

Area Restrictions
Depth restrictions under Alternative 3 are provided in Figure 2-32. The CCA depth restrictions that allow commercial fixed gear and recreational fishing in the shoreward areas would be increased from 20 fm under the No Action Alternative to 30 fm under Alternative 3. Modifying the depth restriction in the CCA from 20 to 30 fm is not projected to result in increased catch of cowcod over the No Action Alternative. The 168.3 mt bocaccio ACL would accommodate any potential increase in bocaccio impacts in the recreational fishery from allowing retention of shelf and slope rockfish and a 30 fm depth restriction in the CCA.

2.4.6 Alternative 4 - The NMFS-preferred Alternative

The NMFS has identified a NMFS final preferred alternative (Alternative 4) that differs from the Council's final preferred alternative. With the exception of yelloweye rockfish and cowcod the harvest specifications in Alternative 4 would be the same as the FPA. Under Alternative 4, the median time to rebuild for two overfished species, yelloweye rockfish and cowcod would be shorter than under the FPA and result in lower ACLs. For yelloweye rockfish, the ACL would be 17 mt. For cowcod, the ACL would be 3 mt. NMFS preliminarily concluded that this alternative is more consistent with direction provided in the recent court decision in NRDC v. NMFS, and is more consistent with the MSA obligations to rebuild overfished species in the shortest timeframe possible, taking into account the obligation to rebuild, the needs of fishing communities, and the marine environment.

2.4.6.1 Harvest Specifications – Alternative 4

The OFL harvest specifications considered under Alternative 4 for all groundfish species and species groups are the estimated or proxy MSY harvest levels, which are the harvest thresholds above which overfishing is occurring. The 2011 and 2012 OFLs are the same as those shown for the FPA and are described in Section 2.1.1 and shown in Table 2-2.

The ABC specifications considered under Alternative 4 are the same as the FPA. The ABC specification for all groundfish species and species groups incorporate scientific uncertainty buffers for all groundfish stocks and stock complexes and are based on SSC recommendations. The ABC values proposed for the integrated alternatives (Alternatives 1, 2, 3, 4 and the FPA) are the same for each of the alternatives, as they are based on the SSC recommendations for incorporating scientific uncertainty consistent with Amendment 23. The 2011 and 2012 ABCs are the same as those shown for the FPA and are described in Section 2.1.2 and shown in Table 2-8 and Table 2-9.

ACLs are specified for each stock and stock complex that is "in the fishery" as specified under the Amendment 23 framework. An ACL is a harvest specification set equal to the ABC or below the ABC to create a buffer that accommodates management uncertainty, socioeconomic considerations, rebuilding considerations, or to meet any other management objectives. Sector-specific ACLs may be specified in cases where a sector has a formal, long-term allocation of the harvestable surplus of a stock or stock complex. The ACL counts all sources of fishing-related mortality including landed catch, discard mortalities, research catches, and yield set-asides for EFPs. In this regard, the ACL is analogous to the total catch OY specified under the No Action Alternative. The ACLs for non-overfished species with species-specific specifications are described in Section 2.1.4 and shown in Table 2-10 and Table 2-11. For non-overfished species managed within complexes, the ACLs are described in Section 2.1.5.

The ACLs for each of the overfished species vary between the integrated alternatives. The ACLs for the overfished species under Alternative 4 are shown in Table 2-118 with the median time to rebuild. The median year to rebuild yelloweye rockfish under this alternative is 2074 which is 27 greater than F=0. The median time to rebuild under this alternative is ten years earlier than the FPA which has a 20 mt ACL and an associated 17 mt ACT. It should be noted that the yelloweye ACL under the Council's final preferred alternative represents a departure from the harvest rate of 71.9 percent, which is also the ramp-down goal harvest rate, by increasing it (more conservative) to 72.8 percent. If the harvest rate associated with the Council's recommended ACT were continued over the long term, the median time to rebuild would be 2074, consistent with Alternative 4. For cowcod the median year to rebuild under this alternative is 2068 which is eight years greater than F=0. When compared to the FPA the rebuilding is projected to occur three years sooner under Alternative 4. Alternative 4 is slightly more conservative than the FPA in that it provides an incremental measure of precaution that increases the likelihood of achieving the projected median time to rebuild of 2074.

Under Alternative 4, widow rockfish is projected to rebuild by 2010 under all of the alternatives. An ACL of 600 mt accommodates fisheries while still achieving rebuilding. Relative to $F_{=0}$, the change in rebuilding time are as follows for the remaining overfished species: for POP and petrale the median time to rebuild is two years longer than $_{F=0}$; for canary rockfish the median time to rebuild is three years longer than $_{F=0}$, for bocaccio the median time to rebuild is four years longer than $_{F=0}$; for darkblotched rockfish the median time to rebuild is eleven years longer than $_{F=0}$; and the yelloweye rockfish median time to rebuild is 37 years longer than $_{F=0.}$ A petrale sole rebuilding plan would be implemented that would continue to be managed as a target species. The ACLs for non-overfished species are the same in Alternatives, 1, 2, 3, and the FPA, with the exception of Pacific whiting and Dover sole. The Dover sole ACL is 25,000 mt and the Pacific whiting ACL is the same as No Action 193,935 mt.

Table 2-118. Alternative 4 (NMFS preferred Alternative): 2011-2012 overfished species harvest specifications.

Species	T_{TARGET} in FMP	Median time to rebuild given ACL [a/]	2011 (mt)	2012 (mt)
Bocaccio	2026	2022	263	274
Canary	2021	[2027]	102	107
Cowcod	2072	2068	3	3
Darkblotched	2028	2025	298	296
Petrale	N/A	2016	976	1,160
POP	2017	[2020]	180/157 [b/]	183/157 [b/]
Widow	2015	2010	600	600
Yelloweye	2084	2074	17	17

a/ Brackets indicate that the time to rebuild exceeds the T_{TARGET} in the FMP. Under the proposed action, the median time to rebuild would be specified as the new T_{TARGET}, except for widow rockfish where the current T_{TARGET} of 2015 remains.
b/ The first value is the ACL, the second the ACT.

2.4.6.2 Allocations – Alternative 4

Deductions to the ACL or ACT if specified are made to account for fishing-related mortality resulting from Pacific Coast treaty Indian tribal harvest; scientific research, non-groundfish fisheries, and, as necessary, EFPs. For 2011 and 2012, the overfished species deductions are: bocaccio south of 40'10 north latitude is 13.4 mt, canary rockfish is 20 mt, cowcod south 40'10 north latitude is 0.3 mt, darkblotched rockfish is 18.7 mt, petrale sole is 65.4 mt, POP is 12.9 mt, widow rockfish is 60.9 mt, and yelloweye rockfish is 5.9 mt. The off-the-top deductions remain unchanged between the FPA and Alternatives 1, 2, 3, and 4. Off-the-top deductions for overfished species for 2011 and 2012 are shown in detail in Table 2-41. Off-the-top deductions for non-overfished species for 2011 and 2012 are shown in detail in Table 2-42 and Table 2-43.

The value after the off-the-top deductions are made to the ACL or ACT is referred to as the fishery harvest guideline. The fishery harvest guideline is divided between the trawl fishery and non-trawl fisheries (recreational, limited entry fixed gear, and directed open access) based on the percentages adopted under Amendment 21 to the FMP. Sablefish and Pacific whiting are allocated under FMP provisions adopted prior to Amendment 21. Species that are not allocated by the FMP continue to be addressed through short-term allocations that are to be decided through the biennial harvest specifications and management measure process. Non-overfished species with formal allocations defined by the FMP (other than sablefish north of 36° north latitude) are shown in Table 2-46 and Table 2-47. Allocations for sablefish north of 36° north latitude are shown in Table 2-45.

Biennial harvest specifications may also be used to establish 2-year allocations for species without formal allocations or for those species where the formal allocation is suspended (overfished species) if they have the potential to constrain fishing opportunities for one or more sectors. The 2-year overfished species allocations vary between the integrated alternatives and drive the management measures proposed for the various fisheries. Harvest guidelines and allocations for overfished species under Alternative 3 are shown in Table 2-119. Under trawl rationalization, overfished species allocations cannot be reallocated to or from the trawl sector inseason. Unused trawl IFQ quota pounds to permits will roll over (if 10 percent or less) for the second year of the biennium (2012) or remain stranded in the trawl sector in the final year of the biennial cycle. As such, the non-trawl sectors must have a sufficient allocation to reasonably accommodate fishing operations or management measure must constrain the fishery such that the non-trawl allocations are not exceeded.

Table 2-119. Overfished species allocations and harvest guidelines under Alternative 4.

2011								
Sector	**Bocaccio**	**Canary**	**Cowcod**	**DKB**	**POP**	**Petrale**	**Widow**	**Yelloweye**
Off the top ACL deductions [a/]	13.4	20	0.3	18.7	12.9	65.4	60.9	5.9
Fishery Harvest Guideline	*249.6*	*82*	*2.7*	*279*	*144*	*911*	539	*11.1*
Limited Entry Non-Whiting Trawl	60.0	20.0	1.8	240.0	107.0	871	235.0	0.6
Non-nearshore [b/]								
LE FG	57.9	2.3	0.9	14	7	35	49	2.4
OA DTL								
Nearshore Fixed Gear [b/]	0.7	4.0						
Washington Recreational [b/]	--	2.0						2.6
Oregon Recreational [b/]	--	7.0						2.4
California Recreational [b/]	131.0	14.5						3.1
Limited Entry Whiting Trawl								
Catcher Processor	--	4.8	--	9.0	10.0	5.0	87.0	--
Mothership	--	3.4	--	6.0	7.0		61.0	--
Shoreside	--	5.9	--	11.0	13.0 [c/]	[c/]	107.0	--
2012								
Sector	**Bocaccio**	**Canary**	**Cowcod**	**DKB**	**POP**	**Petrale**	**Widow**	**Yelloweye**
Off the top ACL deductions [a/]	13.4	20	0.3	18.7	12.9	65.4	60.9	5.9
Fishery Harvest Guideline	*260.6*	*87*	*2.7*	*277*	*144*	*1,095*	*539*	*11.1*
Limited Entry Non-Whiting Trawl	60.0	20.0	1.8	238.0	107.0	1,060	235.0	0.6
Non-nearshore [b/]								
LE FG	57.9	2.3	--	14	7	35	49	2.4
OA DTL			--					
Nearshore Fixed Gear [b/]	0.7	4.0	--					
Washington Recreational [b/]	--	2.0	--					2.6
Oregon Recreational [b/]	--	7.0	--					2.4
California Recreational [b/]	131.0	14.5	0.9					3.1
Limited Entry Whiting Trawl								
Catcher Processor	--	5.0	--	9.0	10.0	5	87.0	--
Mothership	--	3.6	--	6.0	7.0		61.0	--
Shoreside [c/]	--	6.2	--	11.0	13.0	--	107.0	--

a/ Assumes that the application of new Amendment 21 allocation structure specified at 50 CFR 660.55

b/ Values represent HGs which may be adjusted within the non-trawl allocation.

c/ Under trawl rationalization, the allocation is include as part of the bottom trawl allocation and not in addition to.

2.4.6.3 Management Measures- Alternative 4

Trawl Fishery – Alternative 4

Table 2-120 provides a summary of the trawl fishery management measures under Alternative 4. Only a rationalized trawl fishery was considered under this alternative. Under trawl rationalization, the burden to stay within the harvest specifications is the responsibility of the individual harvesters (IFQ) and harvester cooperatives (at-sea whiting). The trawl RCA for the rationalized fishery would be the same as the FPA, the boundaries as they exist on June 17, 2010.

Table 2-120. Summary of trawl fishery management measures under Alternative 4.

Fishery	**FPA**
Trawl Fishery [a/]	
Rationalized Fishery (If trawl rationalization is implemented)	• Shoreside -Same as FPA • MS Co-op - Same as FPA • C/P Co-op - Same as FPA
Gear restrictions	• Same as No Action Alternative
Seasons	• Same as No Action Alternative
GCAs	• Same as No Action Alternative
Trawl RCAs (non-whiting) [a/]	• Same as No Action Alternative
Trawl RCAs (whiting)	• Same as No Action Alternative
Monitoring [b/]	• Same as No Action Alternative
Reporting Requirements	• Same as No Action Alternative

a/ Assumes additional monitoring and reporting associated with trawl rationalization are in place under a separate action.

Under the IFQ program for the shoreside sector, quota shares (QS) are initially distributed to fishery participants. Each year these shares are converted from a percent to a quantity by issuing quota pounds (QP) based on the OYs established for the year. The amount of groundfish caught by a LE trawl vessel, even if it is subsequently discarded, must be matched by an equivalent quantity of QP. The program includes an individual bycatch quota (IBQ) for Pacific halibut. The following species are IFQ species: lingcod, Pacific cod, sablefish north and south of 36° north latitude, POP, widow rockfish, canary rockfish, bocaccio, cowcod, yelloweye rockfish, chilipepper rockfish, splitnose rockfish, yellowtail rockfish north of 40°10’ north latitude, shortspine thornyhead north and south of 34°27’ north latitude, longspine thornyhead north of 34°27’ north latitude, darkblotched rockfish, minor slope rockfish north and south of 40°10’ north latitude, Dover sole, English sole, petrale sole, arrowtooth flounder, starry flounder, and other flatfish. Species not managed under the IFQ program include shortbelly rockfish, longspine thornyhead S. of 34°27', black rockfish – coastwide, minor rockfish north nearshore complex, minor rockfish south nearshore complex, California scorpionfish, cabezon (off CA only), kelp greenling, and “other Fish”. Once QS have been distributed, recipients are free to use them with any legal groundfish gear, which aside from trawl principally means bottom longline and fish pots.

Two-year management measures for a rationalized fishery include trawl allocations of species not covered under Amendment 21, trip limits for those species that are not managed under IFQs, and RCA configurations for vessels harvesting QP with trawl or fixed gear. The trawl RCAs would be the same as those in place on June 17, 2010 (Same as No Action Alternative). Notable features of this RCA include a modified 200 fm line in periods 1 and 6, which is designed to provide access to petrale sole. Under a rationalized trawl fishery, with individual accountability, the risk of exceeding the petrale sole trawl allocation or ACL is lower than under cumulative trip limit management. Because of the lowered risk under a rationalized fishery structure, the modified petrale areas can be accommodated. A modified 150 fm line is also in place during periods 1 and 6 south of 40°10’ north latitude. Trawl RCA boundaries can be routinely adjusted inseason based upon fishery performance.

Under this Alternative, the Council specified incidental trip limits for species not managed with IFQ would be implemented (Table 2-121). The purpose of allowing trip limits for these species is to allow incidental catch to be landed and for the fishermen to be paid for those landings. These species are incidentally caught with or without having a trip limit specified for them. When there is no trip limit, the fish must be discarded (regulatory discard) or forfeited to the state at the time of landing. Incidental landing limit for vessels using trawl or fixed gear to harvest IFQ species with a limited entry trawl permit remain unlimited for the remaining fish category (longnose skate, big skate, California skate, California scorpionfish, leopard shark, soupfin shark, finescale codling, Pacific rattail (grenadier), ratfish, kelp greenling, shortbelly, and cabezon in Washington), but should increased landings occur, the Council could implement the trip limits analyzed during this biennial cycle process and implement them through routine inseason action (see Appendix B relative to the FPA).

All IFQ vessels will be required to carry at-sea observers at their own expense to monitor sorting and discarding of the catch and shoreside landings. An electronic system to report discarded catch and landings, will be integrated with the current state fish ticket system and available for more real-time fishery management.

Table 2-121. Alternative 4 (Same as FPA): Incidental trip limits for vessels using trawl or fixed gear to harvest IFQ species with a limited entry permit.

Area	Species	Incidental Landing Limit
N. and S. of 40°10 N. lat.	Minor nearshore rockfish & black rockfish	300 pounds/month for periods 1-6
	Cabezon (OR and CA)	50 pounds/month for periods 1-6
	Spiny dogfish	60,000 pounds/month for periods 1-6
	Remaining fish [a/]	Unlimited
South of 34°27 N. lat.	Longspine thornyhead	24,000 pounds/2 months for periods 1-6

a/ Remaining fish includes: longnose skate, big skate, California skate, California scorpionfish, leopard shark, soupfin shark, finescale codling, Pacific rattail (grenadier), ratfish, kelp greenling, shortbelly, cabezon in WA.

Pacific Whiting Trawl Fishery – Alternative 4

Under a rationalized fishery, at-sea mothership and catcher-processor sectors would be managed using cooperatives. The shoreside whiting sector would be managed by converting their allocation to IFQs, creating a single shoreside sector. The existing allocation of whiting between the shoreside whiting, mothership, and catcher-processor sectors will not change (42, 24, and 34 percent, respectively). No portion of one sector's whiting allocation could be transferred to another sector, except possibly through a rollover of bycatch whiting allocation from a sector that does not have the intent or ability to use it.

Although Pacific whiting comprises the dominant portion of the catch in this sector, some overfished rockfish do get caught. Sector bycatch allocations would be used under trawl rationalization, in a manner similar to bycatch limits in the non rationalized fishery. NMFS could impose depth restrictions to avoid reaching an overfished species allocation or to close the sector if an allocation is reached. Total catch in the whiting sectors is fully monitored. Motherships and catcher-processors are already subject to full observer coverage, so few changes in the current monitoring program are needed to implement the rationalization program. Catcher vessels in the mothership sectors must carry an observer and are subject to maximized retention of catch for delivery to the processor. Catch is primarily monitored on the mothership.

A season start date is set by regulation, usually in mid-May, and the fishery proceeds until the quota is expended or fishing operations stop for economic reasons (vessels moving to other fisheries, whiting moving offshore). The regulated season start date is meant to prohibit fishing when salmon are passing through the fishing area

For 2011-2012, the Council adopted new allocations for widow, darkblotched, and POP as determined by Amendment 21 and a two year allocation for canary.

Fixed Gear – Alternative 4

The fixed gear management measures (limited entry and open access non-nearshore and nearshore fisheries) under Alternative 4 would be the same as those described under the FPA. Table 2-122 and Table 2 123 summarize the changes in management measures from No Action and the FPA.

Table 2-122. Summary of limited entry fishery management measures under Alternative 4.

Cumulative limits	• Cumulative trip limits for most species, specific to trawl type and geographic area. Average annual limits by target species are: Sablefish North of 36°N. lat - Same as FPA South of 36º N. lat. -Same as FPA All other species same as FPA • Primary sablefish fishery managed with tier limits – Same as FPA • Canary and yelloweye landings prohibited coastwide • South of 40°10 N. latitude landings of cowcod and bronzespotted rockfish prohibited
Size limits	• Same as No Action Alternative
Gear restrictions	• Same as No Action Alternative
Seasons	• Same as No Action Alternative
GCAs	YRCAs - Same as No Action Alternative
	CCA - Same as No Action Alternative
	Farallon Island & Cordell Banks - Same as No Action Alternative
	• EFHCAs Same as No Action Alternative
Non-trawl RCAs	North of 46°16 N. lat. Same as No Action • 46°16- 43° N. lat. Same as No Action • 43°-42° N. lat. Same as No Action • 42°-40°10 N. lat. Same as No Action • 40°10-34°27 N. lat. Same as No Action South of 34°27 N. lat. Same as No Action • Fishing is prohibited in non-trawl RCAs with the following exception: Fishing for "other flatfish" when using no more than 12 hooks, #2 or smaller
Monitoring	• Same as No Action
Reporting	• Same as No Action

Table 2-123. Summary of open access fishery management measures under Alternative 4

Cumulative limits	• Cumulative trip limits for most species, specific to trawl type and geographic area. Sablefish average annual limits: Sablefish North of 36°N. lat - Same as FPA South of 36º N. lat. - Same as FPA All other species same as FPA Salmon trollers same as FPA All other species same as No Action Alternative • Canary and yelloweye landings prohibited coastwide • Cowcod and bronzespotted rockfish landings prohibited South of 40°10 N. lat
Gear restrictions	• Same as No Action Alternative
Seasons	• Same as No Action Alternative
GCAs	YRCAs - Same as No Action Alternative
	CCA Same as No Action
	Farallon Island & Cordell Banks - Same as No Action Alternative
Open Access non-trawl RCAs	North of 46°16 N. lat. Same as No Action Alternative • 46°16- 43° N. lat. Same as FPA • 43°-42° N. lat. Same as No Action Alternative • 42°-40°10 N. lat. Same as No Action Alternative • 40°10-34°27 N. lat. Same as No Action Alternative • South of 34°27 N. lat. Same as No Action Alternative • Fishing is prohibited in non-trawl RCAs with the following exception: Fishing for "other flatfish" when using no more than 12 hooks, #2 or smaller
Non-groundfish trawl RCAs (CA Halibut, Sea Cucumber & Ridgeback Prawn)	• Same as No Action
Monitoring	• Same as No Action Alternative
Reporting	• Same as No Action Alternative

Tribal Fisheries – Alternative 4

The tribal fisheries management measures under Alternative 4 would be the same as those described under the FPA

Recreational Fisheries – Alternative 4

Washington Recreational – Alternative 4

The Washington recreational fisheries management measures under Alternative 4 would be the same as those described under the FPA.

Oregon Recreational– Alternative 4

The Oregon recreational fisheries management measures under Alternative 4 would be the same as those described under the FPA.

California Recreational – Alternative 4

Summary of California Recreational Fishery Management Measures

- Combine the Monterey South-Central and Morro Bay-South Central recreational management areas
- Add a management line at Cape Vizcaino (39º 44´ north latitude)
- Revise the naming convention for the California recreational management areas
- Eliminate the 10 fathom depth closure around the Farallon Islands and Noonday Rock
- Set California scorpionfish (sculpin) depth restriction in the Southern Management Area to 60 fm when scorpionfish is open
- Modify cabezon and kelp greenling gear restrictions to be consistent with rockfish regulations (one rod with no more than two hooks)
- Increase the cabezon bag limit to three fish statewide
- Align lingcod seasons in the California recreational fishery for all fishing modes, consistent with those for rockfish in each management area
- Decrease the lingcod size limit to 22 inches statewide; this includes a 14 inch fillet length requirement

Harvest Guidelines

Under the No Action Alternative, recreational fishery harvest guidelines would be specified for yelloweye rockfish and canary rockfish. The final preferred harvest guidelines for California recreational are found in Table 2-119.

Season structure

Season structuring under Alternative 4 is the same as the FPA for the California recreational groundfish fishery in 2011 and 2012 and is found in Figure 2-33.

Management Area	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Months
Northern [a/]	CLOSED				May 15 - Oct <20 fm								5.5
North-Central North of Point Arena [a/]	CLOSED				May 15 - Aug 15 <20 fm								3
North-Central South of Point Arena	CLOSED					June–Dec < 30 fm							7
South-Central Monterey	CLOSED				May – Dec < 40 fm								8
South-Central Morro Bay	CLOSED				May – Dec < 40 fm								8
Southern	CLOSED		Mar – Dec < 60 fm										10

a/ The season opening date in the Northern and North-Central North of Point Arena would be the second Saturday in May, which is May 14 in 2011 and May 12 in 2012.

Figure 2-33. Alternative 4 (Same as FPA): California recreational rockfish, cabezon and greenling season structure by management area for 2011-2012

Bag Limits and Size Limits

Under Alternative 4 the bag and size limits would be the same as the FPA, a statewide 10 fish rockfish, cabezon, and greenling bag limit with a sub-bag limit of 2 fish for bocaccio and greenlings, and a sub-limit of 3 cabezon would apply. Retention of cowcod, bronzespotted, canary, and yelloweye rockfish would be prohibited. The following bag limits would also apply:

- Leopard Shark – 3 fish
- Scorpionfish – 5 fish
- Sheephead – 5 fish
- Soupfin Shark – 1 fish
- Pacific Halibut – 1 fish
- Sanddabs – None
- Petrale Sole – None
- Starry Flounder – None

A daily bag limit of 10 fish of any one species within the 20 finfish maximum bag limit would apply to the remaining species in the groundfish FMP.

The following minimum size limits applied to 2009-2010 California recreational fisheries and would be carried forward under the No Action alternative:

- Lingcod – 24 inches
- Cabezon – 15 inches
- Kelp Greenling – 12 inches
- Leopard Shark – 36 inches
- Scorpionfish – 10 inches
- Sheephead – 12 inches

Unlike the FPA, the list of groundfish species allowed to be taken recreationally in the CCA would **NOT** be changed to include shelf rockfish.

Area Restrictions

The CCAs would remain unchanged from No Action. Depth restrictions are shown in figure 2-33.

2.5 Alternatives Considered but Eliminated from More Detailed Analysis

During the scoping process for 2011 and 2012 groundfish harvest specifications and management measures, a wider range of alternatives were considered but rejected from detailed analysis in this EIS. The following section details those 2011 and 2012 harvest specifications and management measures initially considered but rejected.

2.5.1 Rejected Harvest Specifications

One complication of the process to decide 2011 and 2012 harvest specifications was a new harvest specification framework was contemplated in a parallel amendment process. OYs were routinely set equal to ABCs (the MSY harvest levels under the old framework) for healthy stocks under the old framework used to decide No Action harvest specifications. However, under the new Amendment 23 framework, that would not be allowed since a scientific uncertainty buffer below the OFL (the MSY harvest level under the new framework) is required to set an ABC. The SSC was still developing methods for quantifying scientific uncertainty in consideration of the new ABC in November 2009 when the initial range of 2011 and 2012 ACLs was recommended for analysis. Some of the ACL alternatives were equal to projected OFLs. These ACL alternatives were ultimately rejected from more detailed analysis.

A wider range of overfished species ACLs were initially considered at the November 2009 Council meeting that ranged from a zero-harvest alternative to ACLs that had a median time to rebuild equal to T_{MAX}. The Council rejected the zero-harvest ACLs for overfished species as unrealistic since eliminating fishing mortality on these species would cause too much harm to fishing communities. The Council also rejected the higher overfished species' ACL alternatives because they extended rebuilding too far to meet the Council's conservation objective to rebuild the stocks in the shortest time possible while taking into account the status and biology of the overfished stock, the needs of fishing communities, and the interaction of the overfished stock within the marine ecosystem. Table 2-124 compares the initial range of overfished species ACL alternatives considered for analysis in November 2009 with the range of ACLs adopted for more detailed analysis in April 2010.

Table 2-124. The range of 2011 and 2012 ACLs initially considered for analysis in November 2009 compared to the range of ACLs adopted for more detailed analysis in April 2010.

Stock	Year	Adopted for Analysis		Rejected From Analysis	
		Low ACL	High ACL	Low ACL	High ACL
BOCACCIO S. of 40°10' N. lat.	2011	53	263	0	605
	2012	56	274	0	609
CANARY	2011	49	102	0	415
	2012	51	107	0	426
COWCOD S. of 40°10' N. lat.	2011	2	4	0	9
	2012	2	4	0	9
DARKBLOTCHED	2011	222	332	0	461
	2012	222	329	0	453
PACIFIC OCEAN PERCH	2011	80	180	0	605
	2012	80	183	0	829
WIDOW	2011	200	600	0	3,000
	2012	200	600	0	3,000
YELLOWEYE	2011	13	20	0	21
	2012	13	20	0	22
PETRALE SOLE	2011	459	976	0	1,170
	2012	624	1,160	0	1,369

Minor Rockfish Complexes

In the development of integrated alternatives, consideration was given to dismantling of the minor rockfish complexes (both north and south) and grouping them by stock vulnerability based on the PSA analysis prepared by the GMT. Due to workload and the complexity of the necessary analysis, the GMT could not complete the work in time for the 2011-2012 biennial management cycle. The Council expressed interest in such an analysis for the 2013-2014 biennial process and encouraged that a broad range of methods be considered through the Council's STAR-light process (less vigorous review than the full STAR panel process). The lack of species specific historical landing data for stocks within complexes makes an analysis difficult. The trawl IFQ program will require full observer coverage for catch accounting, and it is expected to provide catch by species data that could be used in such an analysis.

2.5.2 Rejected Management Measures

At its November 2009 meeting, the Council considered a preliminary list of management measures for preliminary analysis (Agenda Item G.9.a, Attachment 1, November 2009). Upon hearing the advice of the advisory bodies and public, the Council refined that list for analysis over winter (Agenda Item 1.4.a, Attachment 2, April 2010). Table 2-125 lists the management measures that were considered but rejected for more detailed analysis and inclusion in the FPA. Preliminary analysis and further explanation behind the recommendation to remove these management measures from the FPA are outlined in Appendix B.

Table 2-125. List of final management measures that were rejected for more detailed analysis and/or implementation in 2011-2012.

Category	Management Measure	Reason for Rejection
Overarching	Hot-spot cold spot analysis for yelloweye and canary	Preliminary analysis completed and informed management measures; detailed analysis postponed due to workload
RCA Adjustment	Modify RCA at Catalina Island from 60 to 100 fm for both commercial and recreational	Increased regulatory complexity with limited increase in opportunity. Potential increased impacts to cowcod
CA Commercial Fixed Gear	Remove gear restriction for "Other flatfish"	Potential increased impacts to petrale
Commercial	Modify commercial CCA	Potential increased impacts to cowcod
Commercial	Modify lingcod size limits	Lack of public support
Commercial Fixed Gear	Remove shelf closure south of 34°27 N. lat. in March and April	Potential increased impacts to bocaccio
Commercial Fixed Gear	Mandatory seabird avoidance devices	If significant impacts to seabirds exist then mitigation would occur through consultation process
Commercial Fixed Gear	Allow drifting by vessels in the RCA	Enforcement concerns
Commercial Fixed Gear	Redefine ownership and control for LE FG sablefish tiers	Workload
Commercial Fixed Gear	Remove or modify the lingcod spawning closure	Potential increased impacts to yelloweye and potential to reduce lingcod trip limits
Commercial Trawl	In the event trawl rationalization is delayed, analyze non-treaty trawl trip limits for the California early whiting season	Concerns about limiting participation indirectly via trip limits as well as workload
Commercial Trawl	Analyze management lines for the trawl fishery south of 40°10 N. lat.	Workload, waiting for enhanced data from trawl rationalization program
Commercial Trawl	Regulatory flexibility for trawl gears	Workload
Commercial Trawl	Revisit Amendment 20 Pacific halibut IBQ issues	Wait for first year of rationalization and then reassess
Recreational	Analyze retention of canary	Potential increased impacts to canary
WA and OR Recreational	Analyze recreational charter logbooks for WA and OR	Lack of funding for implementation
WA and OR Recreational	Additional management lines for OR and WA	Increased regulatory complexity with limited benefit
WA and OR Recreational	Modify lingcod size limits in OR and WA	Potential increased impacts to yelloweye and canary

Table 2-125. List of final management measures that were rejected for more detailed analysis and/or implementation in 2011-2012 (continued).

Category	Management Measure	Reason for Rejection
OR Recreational	Yellowtail fishery deeper than 150 fm in OR	Waiting for sufficient data from a similar EFP, which would inform a regulated fishery
OR Recreational	Groundfish retention in P. Halibut fisheries	Fully analyzed but rejected for use in 11-12 because of the potential increase in yelloweye rockfish impacts
CA Recreational	Chilipepper fishery deeper than 150 fm in CA	Waiting for sufficient data from a similar EFP, which would inform a regulated fishery
CA Recreational	Exempt flatfish from depth and season closures	Potential increased impacts to petrale
CA Recreational	Modify fillet regulations in order to reduce unidentified rockfish	Negative economic impacts with little improvement to unidentified rockfish
CA Recreational	Increase lingcod bag limit	Potential increased impacts to yelloweye and canary
CA Recreational	Increase depth restriction to 50 fm in Monterey and Morro Bay	Potential increased impacts to yelloweye rockfish
CA Recreational	100 fm depth restriction around Catalina Island	Potential increased impacts to cowcod rockfish

2.5.3 Management measures considered in Appendix B, but rejected from final management measures

2.5.3.1 Improvements to Catch Accounting

NMFS currently relies on the individual states' catch accounting systems in order to document groundfish landings from off the coasts of Washington, Oregon, and California, except for the shoreside, mothership and catcher-processor sectors of the Pacific whiting fishery. Because state reporting requirements only apply when a landing occurs, the individual states are unable to gather landing data from vessels that land catch in Mexico or Canada. At the April 2010 Council meeting, the Enforcement Consultants, an advisory body to the Council, expressed its concern regarding the transport of groundfish into Canada and Mexico without adequate catch accounting (Agenda Item I.4.b., Supplemental EC Report, April 2010). The primary catch accounting concern expressed by the EC was the risk of vessels circumventing the catch accounting requirements and impairing the Council's ability to track landings of groundfish relative to the ACLs, particularly overfished species landings. The Enforcement Consultants considered several alternatives including a No Action Alternative, implementing a new Federal reporting requirement through a Vessel Activity Report, implementing adjustments for catch accounting uncertainty, and implementing additional state fish ticket reporting. The Enforcement Consultants recommendations and an analysis of the catch accounting alternatives are detailed in Appendix B.

2.5.3.2 Gear Stowage for Non-trawl Vessels Transiting the RCA

Current Federal groundfish regulations at 50CFR660.12 relative to fishing in Groundfish Conservation Areas, prohibit the operation of a vessel with longline and/or trap gear onboard in these areas (50CFR660.230), except for purposes of continuous transiting, with all groundfish longline and/or trap gear stowed. In addition regulations at 50CFR660.230 and 660.330 prohibit vessels using non-trawl gears from transiting through the non-trawl RCAs unless "all groundfish non-trawl gear is stowed either: below deck; or if the gear cannot readily be moved, in a secured and covered manner, detached from all lines, so that it is rendered unusable for fishing." Stowage requirements for non-trawl (limited entry fixed gear and open access) vessel were implemented in 2008 through a rulemaking and require the use of vessel monitoring system (VMS) transmissions of vessel locations relative to groundfish conservation area restrictions (Final Rule 72 FR 69162, December 7, 2007). Groundfish Conservation Areas are defined at 50CFR660.70.

In 2009, the Council's Ad Hoc Vessel Monitoring Committee met to discuss potential changes to VMS regulations. Their report (Agenda Item G.9.b, VMSC Report, November 2009) identified several VMS issues for Council consideration under the 2011-2012 harvest specifications and management measures process. Several of the issues were considered but rejected by the Council for more detailed analysis (see Section 3.2.1, Overview of the Regulatory Regime for Groundfish Fisheries). The Council did recommend that the Enforcement Consultants further consider a list of specific vessel activities that could be allowed while transiting a closed area (i.e., non-trawl RCA). Specifically, the Council was interested in allowing the baiting and unbaiting of gear as well as cleaning and untangling gear while transiting the non-trawl RCA. In June 2010, the Enforcement Consultants analyzed several alternatives including allowing only those vessels carrying VMS to have more liberal gear stowage requirements while transiting the non-trawl RCA and allowing more liberal gear stowage only when a WCGOP observer was onboard the vessel. The Enforcement Consultants recommendations and an analysis of the alternatives gear stowage for non-trawl vessels transiting the RCA are detailed in Appendix B.

2.5.3.3 Define Sablefish Dressed Weight in the Groundfish Regulations

Federal groundfish regulations at 50 CFR 660, Subpart C, generally require all catch to be accounted for in "round weights" (as defined in 50 CFR 600.10 as "the weight of the whole fish before processing or removal of any part"), unless otherwise specified. Therefore, most Federal groundfish regulations (trip limits, tier limits, allocations, etc.) are given in round weights and are enforced as such. However, Federal and State regulations do not necessarily require that all groundfish be landed in a condition that is considered "round weight." For most fisheries and species, the Federal regulations defer to State requirements on what condition the fish must be in for landing and then a weight conversion is applied to calculate round weight equivalents. It is a common misconception that Federal groundfish regulations prohibit heading and gutting (not considered processing) and processing of groundfish prior to landing. Based on a review of Federal regulations, heading and gutting is not prohibited for any species, and processing (as defined at 50CFR660.11) is prohibited only in the limited entry primary sablefish fishery and in the Pacific whiting fishery (see 660.112). The definition of processing also explicitly says that "heading and gutting" is not considered processing unless additional preparations are done.

Section 50CFR660.60 describes how weight limits and conversions are generally established by the state where the fish is or will be landed and how the weight conversions provided in Federal regulations are those conversions currently in Washington, Oregon, and California and may be subject to change by those states. Federal groundfish regulations allow for heading and gutting at sea even if processing is prohibited, as these activities do not meet the definition of "processing" in 50CFR660.11. Therefore, heading and gutting is allowed in the sablefish tier fishery prior to landing, as long as a conversion rate is applied to those "dressed" fish prior to applying the round weight tier limit. Current regulations at 660.360(h)(5)(iii) describe the weight conversion factor for commercially caught sablefish as "…[for] headed and gutted (eviscerated) sablefish the weight conversion factor is 1.6 (multiply the headed and gutted weight by 1.6 to determine the round weight)."

Under the current regulations described above, the methods used for heading and gutting sablefish may not be consistent among all landings, though they may meet the legal definition. While this allows for some flexibility to fishermen and fish buyers, it is problematic because there is ambiguity in regulations, and there have been differing interpretations on whether or not "headed and gutted" allows for the collar to be removed before it constitutes "processing" as defined in 660.11. Since Federal regulations prohibit processing at-sea in the limited entry sablefish tier fishery, there is a need to clarify the regulations regarding exactly what "headed and gutted" means. The Enforcement Consultants considered two alternatives for defining dressed weight which are further discussed and analyzed in Appendix B.

2.5.3.4 Review Federal Definition Regarding Ice and Slime

Federal groundfish regulations at 50 CFR660.11 specify that round weight does not include the contributing weight of any ice, water, or slime. Since all groundfish trip limits are specified in round weight, ice, water, and slime should not count towards a trip limit. Therefore, deductions for these types of substances must be made to groundfish landings so that the catch is accurately counted toward the trip limit. The International Pacific Halibut Commission (IPHC) regulations establish standard deductions for ice and slime for recording landed halibut weights. However, ice and slime deductions are not standardized for federally managed groundfish species. Therefore, buyers have made different payments because of the way ice and slime deductions were treated.

Under FMP Amendment 20, the catch monitoring program for the rationalized trawl fishery is intended to accurately account for ice, water, and slime deductions in a consistent manner between fish buyers, see Appendix B.

CHAPTER 3 AFFECTED ENVIRONMENT

3.1 Biological Resources

This section describes the current condition of biological resources that may be affected by implementation of the alternatives. The effects of implementation of the alternatives on these biological resources are presented in Chapter 4.

3.1.1 Groundfish

More than 90 fish species are managed under the FMP. These groundfish include: 60-plus rockfish, including all genera and species from the family *Scorpaenidae* (*Sebastes*, *Scorpaena*, *Sebastolobus*, and *Scorpaenodes*) occurring in waters off Washington, Oregon, and California; 12 flatfish species, 6 roundfish species; and 6 miscellaneous fish species that include sharks, skates, grenadiers, rattails, and morids. Rockfish make up the majority of species managed under the FMP. Rockfish vary greatly in their morphological and behavioral traits, with some species being semi-pelagic and found in mid-water schools, and others leading solitary, sedentary, bottom-dwelling lives (Love, *et al.* 2002). Rockfish inhabit a wide range of depths, from nearshore kelp forests and rock outcrops to varied deepwater (greater than 150 fm) habitats on the continental slope. Despite the range of behaviors and habitats, most rockfish share general life history characteristics, which include slow growth rates, bearing live young, and large but infrequent recruitment events. These life history characteristics contribute to relatively low average productivity that may reduce their ability to withstand heavy exploitation (Parker, *et al.* 2000), especially during periods of unfavorable environmental conditions.

Roundfish managed under the FMP include lingcod, cabezon, kelp greenling Pacific cod, sablefish and Pacific whiting. Adult lingcod are a relatively sedentary species found coastwide along the rocky shelf and in nearshore habitats. Lingcod grow rapidly; reaching 12 inches in the first year and having a maximum life span of 20 years. Cabezon is a coastwide species that is primarily found nearshore, in intertidal areas and among jetty rocks, out to 100 m (Love 1996; Miller and Lea 1972). Cabezon may reach an age of more than 20 years (Wilson-Vandenberg 1992). Kelp greenling are relatively common along the west coast, with the adults found in rocky reefs of shallow nearshore areas. Kelp greenling's estimated maximum age is 16 years (Howard 1992). Pacific cod are widely distributed along the Pacific Coast from Alaska to Santa Monica, California (Hart 1988); (Love 1996). Although Pacific cod prefer shallow, soft bottom habitats in marine and estuarine environments (Garrison and Miller 1982), adults have been found associated with coarse sand and gravel substrates (Garrison and Miller 1982), (Palsson 1990). Compared to the other roundfish species, adult sablefish are a longer living species that is found in deeper waters, being most abundant between 200 and 1,000 m, and found as deep as 3,000 m (Beamish and McFarlane 1988; Kendall, Jr. and Matarese 1987; Love 1996; Mason, *et al.* 1983). Adult sablefish commonly occur over sand and mud (McFarlane and Beamish 1983; NOAA 1990) in deep marine waters, but have also been found over hard-packed mud and clay bottoms in the vicinity of submarine canyons (MBC 1987). The coastal stock of Pacific whiting is semi-pelagic and is the most abundant single-species groundfish population in the California Current system (Stewart and Hamel 2010). The stock is characterized by highly variable recruitment patterns and a relatively short lifespan. In general, the species referred to as roundfish share similar morphology, are faster growing with shorter life spans then many of the rockfish, and have external fertilization with some species having large and highly variable recruitment events.

Flatfish species from the order *Pleuronectiformes* have asymmetrical skulls with both eyes on the same side of the head. The 12 flatfish species in the FMP include species that have been assessed, such as arrowtooth flounder, Dover sole, English sole, petrale sole, and starry flounder, as well as those species that have not been assessed and are managed within the Other Flatfish complex (i.e., butter sole, curlfin sole, flathead sole, Pacific sanddab, rex sole, rock sole, and sand sole). Most of the flatfish species are distributed coastwide in waters of the continental shelf with the exception of arrowtooth flounder, butter sole, and flathead sole, which are found on the shelf in waters north of central California. Flatfish species vary in deep distribution. The flatfish species primarily found in more nearshore areas include starry flounder, Pacific sanddab, butter sole, curlfin sole, sand sole and rock sole. Flatfish species found in deeper waters include Dover sole, flathead sole, and petrale sole. The remaining species show more variation in depth distribution. Many of the flatfish species migrate seasonally from shallow water summer feeding grounds on the continental shelf to deep water spawning grounds over the continental slope (NOAA 1990). Though there are variations between species, most of the flatfishes are found on soft bottom such as sand or sandy gravel substrates and mud; however, some are found in eelgrass habitats (Pearson and Owen 1992) and, in the case of arrowtooth flounder, occasionally over low-relief rock-sponge bottoms (NOAA 1990).

The species managed under the FMP are distributed throughout the EEZ and occupy diverse habitats at all stages in their life history. In addition, many of the stocks have geographic ranges that extend beyond the U.S. EEZ into Canadian or Mexican waters. The life history traits of the groundfish species have important implications on stock assessment and how the stocks are managed. This is because fishing changes population abundance of the target species, as well as affects life-history traits and population dynamics and may also affect the yield. For each groundfish species, detailed information on habitat utilization patterns, fisheries that harvest the species, geographic range, migrations and movements, reproduction, growth and development, and trophic interactions are fully described in Appendix B2 to the final EIS titled "The Pacific Coast Groundfish Fishery Management Plan, EFH Designation and Minimization of Adverse Impacts (NMFS 2005). Historical catch and management information for each groundfish stock can be found in Volume 1 of the 2008 Status of the Pacific Coast Groundfish Fishery stock assessment and fishery evaluation (SAFE document) (PFMC 2008b).

3.1.1.1 Overview

Amendment 23 Specifications

On January 16, 2009, NMFS published a final rule for new NS1 guidelines (74FR3178). Amendment 23 to the FMP incorporates the provisions of the revised NS1 guidelines codified at Subpart D of 50CFR600. New fishery specifications proposed to be implemented under Amendment 23 include: overfishing limits (OFLs), an acceptable biological catch (ABC) that incorporates a scientific uncertainty buffer in specifications, annual catch limits (ACLs), annual catch targets (ACTs), and accountability measures (AMs). These revised specifications are designed to better account for scientific and management uncertainty and to prevent overfishing. The OFLs and ABC which characterize the biological condition of the stocks are further described later in this section.
Table 3 1 compares the specifications under Amendment 23 to specifications in the existing FMP.

Table 3-1. Revised harvest specifications under Amendment 23 to the FMP.

2009-2010 Harvest Specifications	Purpose of the Harvest Specification	Amendment 23 Harvest Specifications
ABC	Overfishing Limit	OFL
OY	Accommodates scientific uncertainty	ABC
	Accommodates management uncertainty, socioeconomic concerns, rebuilding concerns, etc.	ACL
HG	Accommodates ad hoc sector allocations and other management objectives	ACT

Stock Assessment Process
A stock assessment is the scientific and statistical process where the status of a fish population or subpopulation (stock) is assessed in terms of population size, reproductive status, fishing mortality, and sustainability. In the terms of the FMP, stock assessments provide: 1) an estimate of the current biomass and reproductive potential; 2) an estimate of F_{MSY} or proxy thereof translated into exploitation rate; 3) the estimated MSY biomass (B_{MSY}), or proxy thereof; 4) estimated unfished biomass; and, 5) a precision estimate (e.g., confidence interval) for the current biomass estimate. Stock assessments also serve as useful predictive tools to evaluate alternative management scenarios and the consequences of alternative actions before they are implemented. With the exception of Pacific whiting, which is assessed annually as specified in the U.S.- Canada Pacific Whiting Treaty, groundfish stock assessments are conducted on a two year cycle. Given the large number of groundfish species and limited state and Federal resources, a subset of all groundfish stocks are assessed in each stock assessment cycle. Overfished species stock assessments are typically conducted every two years. Stock assessments are used for the purpose of setting specifications, including: MSY, OFL, the maximum fishing mortality threshold (MFMT), the minimum stock size threshold (MSST), ABC, OY, ACL and rebuilding standards. The process for setting groundfish specifications involves the adoption of new and updated stock assessments on the status of groundfish stocks. During the biennial specification process, the SSC reviews new full and updated stock assessments and relevant analyses, including rebuilding analyses for overfished species, used in setting groundfish harvest specifications and makes recommendations to the Council relative to the standards of the best available science and the soundness of the scientific information relative to making management decisions. The Council then approves all or a portion of the stock assessments and makes recommendations for further analysis.

The perception of stock status and productivity for many stocks, particularly those for overfished species, often changes substantially between stock assessments. Such changes can be a result of a range of technical factors, including how a given assessment model is structured, the assumptions used to fix or estimate key parameters (i.e., whether parameters such as natural mortality and steepness are fixed, estimated freely, or estimated with an informative prior), and the evolution of methods for developing time series and estimates of uncertainty from different sources of raw data. The population dynamics of target species themselves are responsive to a mix of complex (and typically poorly understood) biological, oceanographic and interspecies interactions. New sources of information (e.g., new data sets, extensions of existing data sets, incorporation of environmental factors into assessments) can result in changes in parameter estimates and model outputs. Consequently, estimates of depletion and stock status can vary substantially between assessment cycles. In such cases, the most plausible result from the assessment could be viewed as highly uncertain.

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NMFS maintains a peer review groundfish stock assessment process, consistent with the requirements of the MSA (§302(g)(1)(E)). The process includes analyses and reports, beginning with data collection and continuing through to scientific recommendations and information presented to the Council and its advisors. The terms of reference for the groundfish stock assessment process for 2009-2010 defines the expectations and responsibilities for various participants in the groundfish stock assessment review (STAR) process, and outlines the guidelines and procedures for a peer review process for the Council. The STAR process is a key element in an overall process designed to review the technical merits of stock assessments and other scientific information used by the SSC. This process allows the Council to make timely use of new fishery and survey data, to analyze and understand these data as completely as possible, to provide opportunity for public comment, and to assure that the results are as accurate and error-free as possible.

Following a 2004 U.S. Government Accountability Office (GAO 2004) review of five Pacific coast groundfish stock assessments, NMFS has taken numerous steps to improve groundfish stock assessments. Much effort has been concentrated on improving data quality and quantity by creating a working group for bottom trawl survey improvements, increasing the frequency of groundfish stock assessments, extending the geographic ranges of the shelf and slope surveys to cover over 300 more miles along the southern California coast, researching new techniques to identify and characterize untrawlable areas, evaluating line-gear methods for surveying groundfish in rocky habitats, conducting annual juvenile groundfish surveys, conducting research on sounds made by fish to aid in locating them and in studying their behaviors, and developing and testing a new hook design for non-lethal collection of DNA samples. Because the 2004 GAO review found that the assessments lacked estimates of uncertainty, such as the margin of error associated with species biomass estimates, efforts have been made to identify the uncertainty affecting the reliability of the population estimates. The SSC developed a terms of reference for the groundfish stock assessment and review process and defined expectations for uncertainty characterization and provided guidance on how to depict the uncertainties of the stock assessments. Stock assessments have consequently provided more informative calculations of the uncertainties of stock assessment results.

Many indices, particularly fishery-dependent indices, such as commercial or recreational catch per unit of effort (CPUE) trends, tend to be associated with higher levels of uncertainty. Fishery-dependent data can be less reliable than fishery-independent data for a variety of reasons. For example, catch rates may be stable in the face of stock declines as a result of increasing fishing power or changing spatial patterns in effort (Hilborn and Walters 1992; Walters 2003). Furthermore, management measures can substantially alter the integrity of fishery-dependent data, particularly as fishery participants develop responses to actions by managers to reduce or control effort. Consequently, assessments for data-poor species, such as cowcod and yelloweye rockfish, which are based on highly uncertain catch reconstructions and recreational CPUE time series to inform biomass trends, are associated with much greater levels of uncertainty relative to other groundfish species' assessments.

Stock Assessment Uncertainty

Stock assessments are intrinsically uncertain (NRC 1998). Sources of uncertainty include: the inherent variability in populations, errors in sampling due to variability associated with the process of observing and measuring populations, and errors in model specifications (NRC 1998). The stock assessment process relies on a foundation of sound scientific data used in appropriate models to accurately characterize the status of stocks. The dynamics of fish stock growth, together with fluctuations in environmental conditions, result in stochastic variation in fish abundance (NRC 1998). Gathering information on the stocks is important and generally leads to greater certainty and confidence. However, increasing the amount of data collected does not necessarily solve the problem of uncertainty in assessments. In general, stock assessments of species where there is abundant and reliable data tend to be more robust with respect to estimating stock trends and abundance.

Stock assessments rely on various sources of information. The principle data used in the Pacific coast groundfish stock assessments are fishery-dependent data from the commercial and recreational fisheries and fishery-independent data from resource surveys and other scientific studies. Fishery-dependent data sources for assessment are typically the amount of fish caught, the size of the fish in the catch, the biological characteristics of fish in the catch (e.g., age, maturity, sex), and the ratio of fish caught to the time spent fishing (catch per unit of effort). Fishery-dependent indices, such as commercial or recreational CPUE trends, tend to be associated with higher levels of uncertainty.

Fishery-dependent data are often less reliable than fishery-independent data for a variety of reasons (Hilborn and Walters 1992; Walters 2003). NMFS conducts fishery-independent resource surveys. The major objective of fishery-independent surveys is to monitor temporal and spatial changes in the relative or absolute abundance of a target fish population in a manner that is not subject to the biases inherent in commercial or recreational fishery data. While commercial fishing operations typically concentrate fishing on the largest aggregations or the most valuable catch, resource surveys fish in a standardized manner over a wide range of locations. Survey results are used in conjunction with commercial and recreational catch data to assess the status of groundfish stocks. Most of the survey work on the west coast has been conducted using bottom trawl gear randomly stratified over latitudinal and depth strata along the continental shelf and slope (Lauth 2000; Weinberg, *et al.* 2002). However, the use of trawl gear has been limited to trawlable habitat. The results from the resource surveys are typically the key inputs to the stock assessments for west coast groundfish stock assessments as well as a source of the biological data for estimating life history parameters. For species that are not well sampled by traditional survey data, such as cowcod and yelloweye rockfish, other temporal indices of abundance are used to tune assessments.

Model uncertainty is also a key factor in considering how the results of stock assessments are used. The perception of stock status and productivity for many stocks, particularly those for rebuilding species, often changes substantially between stock assessments. Such changes can be a result of a range of technical factors, including how a given assessment model is structured, the assumptions used to fix or estimate key parameters (i.e., whether parameters such as natural mortality and steepness are fixed, estimated freely, or estimated with an informative prior), and the evolution of methods for developing time series and estimates of uncertainty from different sources of raw data. As the population dynamics of target species are responsive to a mix of complex (and typically poorly understood) biological, oceanographic and interspecific interactions, new sources of information (e.g., new data sets, extensions of existing data sets, incorporation of environmental factors into assessments) can also result in changes in parameter estimates and model outputs. Consequently, estimates of depletion and stock status can vary substantially between assessment cycles. A precautionary approach that requires recognition of gaps in knowledge and the explicit identification of the range of interpretations that is reasonable given the present information would provide more comprehensive treatment given such scientific uncertainty in stock assessments. With groundfish stock assessments, each base case assessment model captures some uncertainty. The uncertainty associated with assumed model specifications is also captured through alternate states of nature (i.e., alternative model assumptions) bracketing the base case assessments and explicitly included in decision tables.

Under the revised NS1 guidelines, the ABC is a value set below OFL that accommodates the uncertainty in estimating OFL (i.e., the MSY harvest level; see Section 2.1.2, Acceptable Biological Catches). As required by the MSA, the SSC considered stock assessment uncertainty and provided recommendations to the Council for quantifying scientific uncertainty in west coast stock assessments. The SSC concentrated efforts on the quantification of statistical measurement of error and model specification error. A conceptual framework that factors in scientific uncertainty for stocks with quantitative assessments is proposed in this biennial specifications process (see Section 2.2). Under the framework, scientific uncertainty associated with estimating an OFL (σ) is quantified by the SSC and the percentage reduction that defines the scientific uncertainty buffer and the ABC can be determined by translating the estimated σ to a range of overfishing probability (P*) values. Each P* value is then mapped to its corresponding buffer fraction (Section 2.1.2). The Council then determines the preferred level of risk aversion by selecting an appropriate P* value, accordingly. In cases where the P* approach is used, the upper limit of P* values considered is 0.45 based on the Council's preferred Amendment 23 alternative.

Additionally, the terms of reference for groundfish stock assessments requires development of decision tables for use in characterizing stock assessment uncertainty. The guidance states:

> "Once a base model has been bracketed on either side by alternative model scenarios, which capture the overall degree of uncertainty within the assessment, a 2-way decision table analysis (states-of-nature versus management action) is the preferred way to present the repercussions of uncertainty to management. An attempt should be made to develop alternative model scenarios such that the base model is considered twice as likely as the alternative models, i.e., the ratio of probabilities should be 25:50:25 for the low stock size alternative, the base model, and the high stock size alternative."

Neither approach is mutually exclusive, nor do they preclude the SSC from further recommendations for stock-specific approaches to quantifying scientific uncertainty for quantitatively assessed species. Groundfish stocks that have not been assessed and those with little data to inform managers about harvest specifications are provided larger scientific uncertainty buffers.

Stock Status

When setting the OFL, groundfish species are divided into three categories (Section 2.1.1):

- Category 1 species are those for which a quantitative stock assessment has been prepared using catch-at-age, catch-at-length or other data. OFLs and overfished/rebuilding thresholds can be calculated for these species. ABCs can also be calculated for these species based on the uncertainty of the biomass estimated within an assessment or the variance in biomass estimates between assessments.
- Category 2 species are those species for which some biological indicators are available, including a relatively data-poor quantitative assessment; an aggregate population model using historical catches and/or survey trend information; or an approach where estimated natural mortality (M) is multiplied by a survey biomass estimate. For this category, there may be adequate prior knowledge about the population to estimate overfished and overfishing thresholds, but there is greater uncertainty of the data and analyses used to inform stock status.
- Category 3 species are unassessed species caught in the fishery, for which only catch information is used to inform harvest specifications. For category 3 species, it is impossible to

quantitatively determine stock status or an overfished threshold. Average historic catches are used to determine the OFL for category 3 species.

Amendment 23 to the FMP added an additional category of species, identified as ecosystem component (EC) species. EC species are not targeted in any fishery and are not generally retained for sale or personal use. EC species are not determined to be subject to overfishing, approaching an overfished condition, or overfished, nor are they likely to become subject to overfishing or overfished in the absence of conservation and management measures.

Abundance-based Reference Points

Abundance-based reference points are defined in the FMP. For each species with a stock assessment a level of depletion is estimated, which is current biomass relative to its unfished stock biomass (B_0 or $B_{unfished}$). The OFL is calculated by applying an estimated or proxy F_{MSY} harvest rate to the estimated abundance of the exploitable stock. The biomass level that produces MSY (i.e., B_{MSY}) is generally unknown and assumed to be variable over time due to long-term fluctuations in ocean conditions, so that no single value is appropriate. The proxy MSY abundance for most west coast groundfish species is 40 percent of B_0 (denoted $B_{40\%}$). The proxy threshold for declaring most groundfish stocks overfished is 25 percent of B_0 or $B_{25\%}$.[17] The MSA and National Standard guidelines refer to this threshold as the Minimum Stock Size Threshold or MSST. Stocks estimated to be above the depletion threshold, yet below an abundance level that supports MSY, are considered to be in the "precautionary zone" (between $B_{25\%}$ and $B_{40\%}$). For stocks in the "precautionary zone," the FMP specifies precautionary reductions in harvest rate to better ensure future increases in the stock's abundance to B_{MSY}. For the 2011 and 2012 harvest specifications, full stock assessments were prepared for the following stocks: bocaccio, widow rockfish, lingcod, cabezon, yelloweye rockfish, petrale sole, splitnose rockfish and greenstriped rockfish. Assessment updates were prepared for: canary rockfish, cowcod, darkblotched rockfish, and POP. According to the terms of reference for conducting and reviewing stock assessments, updates are appropriate in situations where a "model" has already been critically examined by a full STAR panel and the SSC and recommended with no fundamental structural changes the next time the stock is assessed. The objective of an update assessment is to incorporate the most recent data informing the assessment.

[17] The proposed proxy B_{MSY} level and MSST for assessed flatfish species are $B_{25\%}$ and $B_{12.5\%}$, respectively.

3.1.1.2 Overfished stocks

Depleted groundfish species are those with spawning biomasses that have dropped below the Council's depletion or minimum stock size threshold of 25 percent of initial spawning biomass ($B_{25\%}$) for rockfish and, in the case of petrale sole, below the flatfish MSST of $B_{12.5\%}$. The FMP mandates these stocks be rebuilt through harvest restrictions and other conservation measures to the B_{MSY} target. Furthermore, the MSA mandates the rebuilding periods need to be the shortest time possible while taking into account the status and biology of the depleted stock, the needs of fishing communities, and the interaction of the depleted stock within the marine ecosystem. A rebuilding analysis that considers alternate harvest levels and rebuilding times is prepared for each overfished species. All overfished species received either full assessments or assessment updates in 2009, which are discussed in section 3.1.1.2.

Table 3-2. Overfished stocks managed under the FMP.

Common name	Scientific name
Bocaccio [a/]	*Sebastes paucispinis*
Canary rockfish	*Sebastes pinniger*
Cowcod	*Sebastes levis*
Darkblotched rockfish	*Sebastes crameri*
Pacific ocean perch	*Sebastes alutus*
Petrale sole	*Eopsetta jordani*
Widow rockfish	*Sebastes entomelas*
Yelloweye rockfish	*Sebastes ruberrimus*

Table 3-3. Overfished stocks - biomass reference points in most recent stock assessment.

Species	Last Assessed	Estimated Depletion in year of last Assessment	Spawning biomass when last assessed	~95% Interval
Bocaccio	2009 update	28%	2,209,950 larvae	
Canary rockfish	2009 update	24%	6,170 mt	4,385-7,955 mt
Cowcod	2009 update	5%	98 mt	
Darkblotched rockfish	2009 update	28%	7,940 mt	8,977-6,903 mt
Pacific ocean perch	2009	29%	10,794 mt	12,438-9150 mt
Petrale sole	2009	12%	2,938 mt	3,770-2106 mt
Widow rockfish	2009	39%	15,625 mt	5,984 – 25,266 mt
Yelloweye rockfish	2009	20.3%	201.5 M eggs	128-353 M eggs

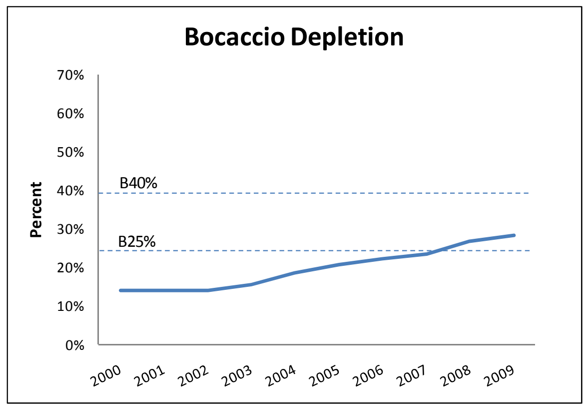
Table 3-4. Latitudinal and depth distributions of overfished groundfish species (adults) managed under the FMP. [a/]

Common name	Latitudinal Distribution		Depth Distribution (fm)	
	Overall	**Highest Density**	**Overall**	**Highest Density**
Bocaccio [a/]	Coastwide	S. 40º N. lat., N. 48º N. lat.	15-180	54-82
Canary rockfish	Coastwide	Coastwide	27-460	50-100
Cowcod	S. 40º N. lat.	S. 34º27' N. lat.	22-270	100-130
Darkblotched rockfish	N. 33º N. lat.	N. 38º N. lat.	16-300	96-220
Pacific ocean perch	Coastwide	N. 42º N. lat.	30-350	110-220
Petrale sole	Coastwide	Coastwide	10-250	160-250
Widow rockfish	Coastwide	N. 37º N. lat.	13-200	55-160
Yelloweye rockfish	Coastwide	N. 36º N. lat.	25-300	27-220

a/ Only the southern stock of bocaccio south of 40°10' N. lat. is listed as depleted.

Bocaccio

Field, *et al.* (2009) prepared a new stock assessment for the bocaccio stock between the U.S.-Mexico border and Cape Blanco, Oregon using the Stock Synthesis 3.03a model. Changes the in model include, a northern expansion of the modeled area from Cape Mendocino, California to Cape Blanco, Oregon and the extension of the catch history from 1950 to 1892. Although bocaccio range further north, data indicates that there are two separate stocks. The following section summarizes the 2009 stock assessment results.



From the 1850s until around 1950, the bocaccio population trajectory moderately declined, but is estimated to have steeply declined from the early 1950s through the early 1960s, as catches rose. The biomass increased sharply thereafter, as a result of one or several very strong recruitment events in the early 1960s. The stock is estimated to have exceeded the mean unfished biomass level through the early 1970s, when catches again began to climb rapidly to their peak levels. By the mid-1980s depletion was at approximately 20 percent of the unfished level, and by the early 1990s depletion was at about 15 percent. Fishing mortality remained high throughout this period, even as catches declined rapidly, and recruitment during the 1990s was at very low levels. Since the early 2000s, spawning output has been increasing steadily. Spawning output in 2009 is estimated at 2,209,900 mt (~95% confidence: 1,546,440 – 2,873,360). Depletion is 2009 was estimated to be 28.1 percent (0.18 - 0.37 percent). There are clear signs that the stock is rebuilding at a relatively rapid rate. Recovery may be taking place more rapidly in the south, and recovery in the central/northern California region may be dependent on an influx of fish from the southern area.

Model uncertainty regarding natural mortality rates and estimates of selectivity for the NMFS triennial trawl survey continue to be problematic. In addition, management actions since 2001 that include large scale area closures affecting the spatial distribution of fishing mortality have truncated several abundance indices (recreational CPUE indices), which confounds the interpretation of survey indices as well as fishery dependent and independent length frequency data. Data from relatively recent, short term surveys do not yet appear to be informative with respect to trends in abundance, although they are informative with respect to cohort strength. Further and more detailed information can be found in the stock assessment document.

Canary rockfish

Stewart (2009b) prepared a stock assessment update for the coastwide canary rockfish stock using the Stock Synthesis 3.03a model. The information presented in this section was summarized from the 2009 stock assessment update.

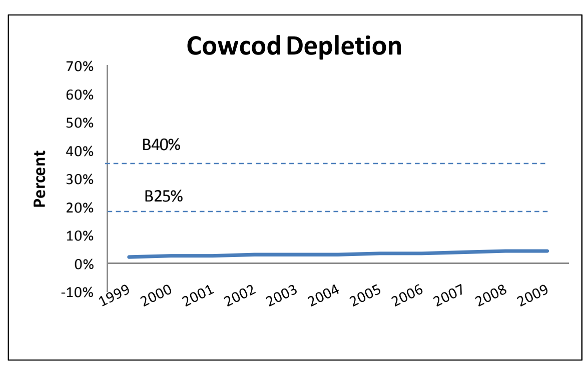
The new assessment used the same data sources as the previous assessment and were updated through 2008. Historical (< 1981) catch estimates were substantially revised by NMFS and CDFG scientists. The historical catch revisions resulted in a 24 percent reduction in the total estimated canary catch from 1916-2006, with most of this reduction occurring prior to 1968. The new data resulted in a slightly more pessimistic view of the stock's rebuilding trajectory. The new assessment estimates the 2007 depletion level to have been 21.7 percent (below the estimate of 32.4 percent from the 2007 assessment (Stewart 2008)) and 23.7 percent in 2009 (~95 percent asymptotic interval: 16-28 percent) the change is largely due to a revised historical catch time-series for California.

The new assessments estimates the unfished spawning stock biomass to be 25,993 mt (down from the 2007 estimate of 32,561 mt). After a period of above average recruitments, recent year-class strengths (1997-2008) have generally been low, with only 4 of the 12 years (1999, 2001, 2006, and 2007) estimated to have produced larger recruitments. Because of the limited number of years they have been observed, the strengths of the 2006-2007 year classes are subject to greater uncertainty. As the larger recruitments from the late 1980s and early 1990s move through the population, the rate of recovery in future projections is estimated to slow. In the absence of any future fishing mortality (beginning in 2011 and assuming a 2010 OY of 105 mt) the canary rockfish stock is projected to have a 50 percent probability of recovery to the $B_{40\%}$ by 2024.

The base case assessment model explicitly captures parameter uncertainty in the asymptotic confidence intervals for key parameters and management quantities. Uncertainty around the base model results is considered through integration or rebuilding trajectories over two alternate states of nature corresponding to lower and higher stock-recruitment steepness, the parameter largely governing productivity and recent rebuilding trajectory. Further and more detailed information can be found in the stock assessment document.

Cowcod

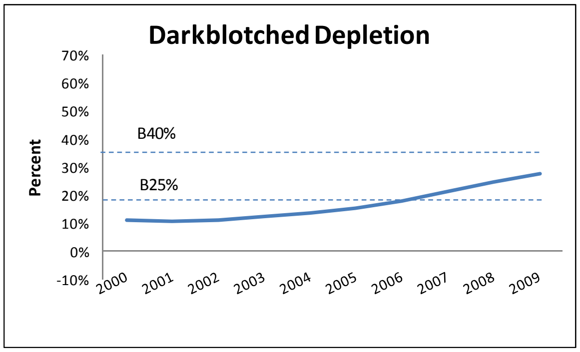
Dick, *et al.* (2009) prepared a stock assessment update for cowcod, in the Southern California Bight (U.S. waters south of Point Conception) using an age-structured production model that followed the Stock Synthesis 2 model. The assumption of an isolated stock is untested, and no information is available regarding stock structure or dispersal across the assumed stock boundaries.



Cowcod is a long lived species with a mean generation time estimated at 38 years. Estimates of relative depletion in 2009 range from 3.8 percent to 21 percent. The cowcod stock shows a slow but increasing trend in stock biomass. Management actions since 2001 that include large scale area closures specifically to reduce fishery interactions with cowcod has truncated data used in the assessment. Due to uncertainty in total mortality since no-retention regulations took effect, recreational and commercial mortalities have been fixed at 0.25 metric tons per year, per fishery. A major source of uncertainty in the assessment was the assumed value of the steepness parameter in the spawner-recruit relationship. In addition, the percentage of cowcod in total rockfish landings in years prior to the 1980s is not well understood. Further and more detailed information on the stock status can be found in the stock assessment document.

Darkblotched Rockfish

Hamel and Wallace (2008a) prepared a single stock assessment update for darkblotched rockfish in the U.S. Vancouver, Columbia, Eureka and Monterey areas using the Stock Synthesis 3.03a model. The information presented in this section was summarized from the 2009 stock assessment update.

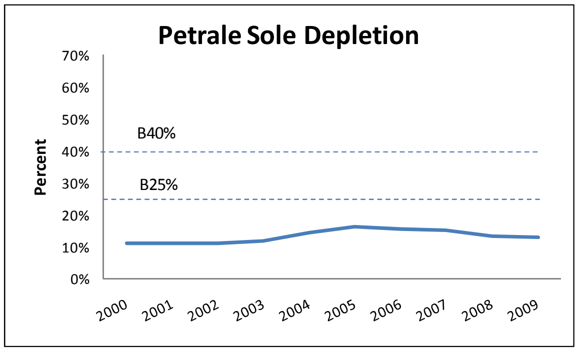


In 2009, the biomass (1+ age fish) is estimated at 12,836 mt, as compared to 5,862 mt in 2000. The recruitment pattern for darkblotched rockfish is highly variable between years. Recruitment levels between 1980s and 1990s were generally poor when compared with average historical recruitment levels. The exception being 1999 and 2000 year-classes which appear to be two of the four largest years since 1975. The point estimate for the depletion of the spawning output at the start of 2009 is 27.5 percent.

A number of sources of uncertainty were explicitly included in the assessment. Allowance was made for uncertainty in natural mortality and the parameters of the stock recruitment relationship. Sources of uncertainty not included in the current model, included the degree of connection between the stocks of darkblotched rockfish off British Columbia and those in Council waters; the effect of climatic variables on recruitment, growth and survival of darkblotched rockfish; and gender based differences in survival. Further and more detailed information on the stock status can be found in the stock assessment update.

Petrale Sole

Haltuch and Hicks (2009b) prepared a new coastwide stock assessment for petrale sole using the Stock Synthesis 3.03a model. There is currently no genetic evidence suggesting distinct biological stocks of petrale sole off the U.S. coast. The information presented in this section was summarized from new stock assessment document.

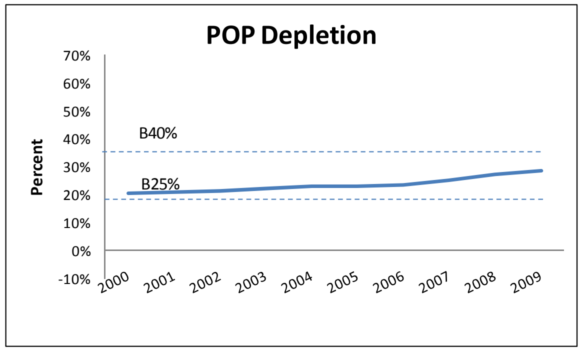


Petrale sole were lightly exploited during the early 1900s. By the 1950s, the petrale sole fishery was well developed and showing clear signs of depletion and declines in catches and biomass. The base model indicates that the spawning biomass has been below $B_{25\%}$ continuously since 1953. The petrale sole spawning stock biomass is estimated to have increased slightly from the late 1990s, peaking in 2005, in response to above average recruitment. However, this increasing trend has reversed since the 2005 assessment and the stock has been declining, most likely due to strong year classes having passed through the fishery. The estimated relative depletion level in 2009 is 11.6 percent (~95% asymptotic interval: ±4.8%, ~ 75% interval based on the range of states of nature: 9.4-13.8%), corresponding to 2937.6 mt (~95% asymptotic interval: ±832.7 mt, states of nature interval: 2407.8-3468.1 mt) of female spawning biomass in the base model. Unfished spawning stock biomass was estimated to be 25,334 mt.

The base case assessment model includes parameter uncertainty from a variety of sources, but likely underestimates the uncertainty in recent trend and current stock status. For this reason, in addition to asymptotic confidence intervals, results from models that reflect alternate states of nature regarding the estimate of 2009 spawning biomass are presented as a decision table within the stock assessment document. Further and more detailed information on the stock status can be found in the stock assessment document.

Pacific Ocean Perch

Hamel (2009b) prepared a stock assessment update for POP in the combined US Vancouver and Columbia areas using the same forward projection age-structured model used in the previous stock assessment. The following information is summarized from the stock assessment update.

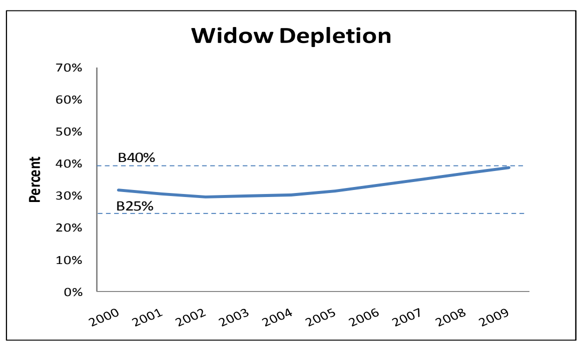


Poor recruitment has been seen in recent years, compared with the 1950s and 1960s, although the 1999 year class (the 2002 recruitment year) appears to be larger than any other since the 1960s. The 2000 year class also appears to be relatively large; however, this may be due to some small amount of overall bias in ageing. The estimate of depletion of the spawning biomass at the start of 2009 is estimated to be 28.6 percent. The POP biomass shows an increasing trend.

A number of sources of uncertainty are explicitly included in this assessment such as uncertainty in natural mortality, the parameters of the stock-recruitment relationship, and the survey catch ability coefficients. There are also other sources of uncertainty that are not included in the current model. These include the degree of connection between the U.S. and Canadian stocks; the effect of climatic variables on recruitment, growth and survival; gender differences in growth and survival; the relationship between individual spawner biomass and effective spawning output and age and maturity. Further and more detailed information on the stock status can be found in the stock assessment update document.

Widow Rockfish

He, *et al.* (2009a) prepared a new coastwide stock assessment for widow rockfish using the Stock Synthesis 3 model. The information in the following section was summarized from the new assessment.

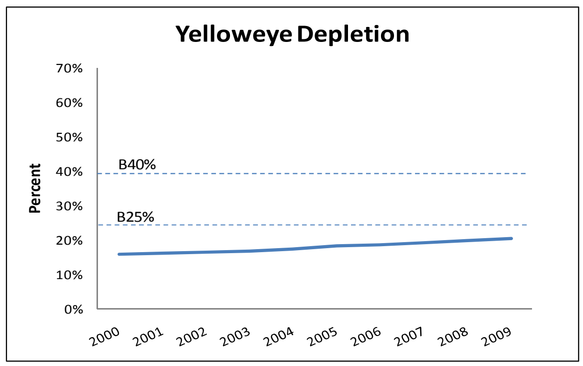


Stock spawning output steadily declined between 1980 and 2003, after major commercial fisheries for widow rockfish began. Since 2003, stock spawning output has shown an increasing trend. Spawning output in 2009 is estimated at 15,625 mt (~95% confidence: 5984-25266). Depletion is 2009 is estimated at 38.5 percent (14.2-62.9). Because the biomass is still below $B_{40\%}$, it is still considered overfished.

The highest known widow rockfish recruitment occurred in 1970. Recruitments remained generally low in the early 1990s as well as since 2001 when compared to the long-term average. The previous assessment (2007) update indicated that the 2000 recruitment was strong, but this assessment does not confirm this is the case. As in the last assessment, uncertainty in estimation of recruitment remains high.

As with the previous stock assessment, a major source of uncertainty within the current stock assessment is the lack of a reliable abundance index (information obtained from samples or observations and used as a measure of the weight or number of fish which make up a stock) for widow rockfish. The primary source of information on trends in abundance of widow rockfish was fishery-dependent information derived from Oregon bottom trawl logbook data. Because the catch rates have been very low due to catch restrictions, no Oregon bottom trawl logbook data after 1999 can be used in the assessment. Based on the recommendation of the STAR Panel, fishery independent data derived from the National Marine Fisheries Service triennial bottom trawl survey were used to develop an additional abundance index. Additional areas of uncertainty include: estimates of stock recruitment relationships and the relationship of the Canadian stock to the U.S. stock. Further and more detailed information can be found in the stock assessment document.

Yelloweye Rockfish



Stewart et al. (2009) prepared a new coastwide stock assessment for yelloweye rockfish in 2009 using the Stock Synthesis 3.03b model. The following information is summarized from the new assessment.

Yelloweye rockfish are estimated to have been lightly exploited until the mid-1970s, when catches increased, resulting in a rapid decline in biomass and spawning output began. Fishing mortality rates are estimated to have been in excess of the current F-target for rockfish (SPR = F50%) from 1976 through 1999. Large reductions in harvest have been made since 2000 (SPR > F50%). The estimated relative depletion level in 2007 is 19.2% (slightly above the estimate of 16.4 percent from the 2007 assessment) and 20.3 percent in 2009 (states of nature: 17.3-23.5%). The coastwide abundance of yelloweye rockfish was estimated to have dropped below the $B_{40\%}$ management target in 1989 and the overfished threshold in 1994. In hindsight, the spawning output appears to have passed through the target and threshold levels, with annual catch averaging almost five times the current estimate of the MSY. The coastwide stock remains below the overfished threshold, although the spawning output is estimated to have been increasing since 2000, in response to reductions in harvest.

Data for yelloweye rockfish are sparse and relatively uninformative, especially regarding current trends. Yelloweye rockfish catches are very uncertain due to the relatively small contribution of yelloweye to rockfish market categories and the relatively large scale of recreational removals. In addition, since 2001, management restrictions have required nearly all yelloweye rockfish caught by recreational and commercial fishermen to be discarded at sea. Parameters that generally contribute significant model uncertainty to stock assessments, including those defining steepness, natural mortality and growth are estimated, but may be poorly determined due to the short time-series of available data. Currently available fishery-independent indices of abundance are imprecise and not highly informative. It is unclear whether increased rates of recovery (or lack thereof) will be detectable without more precise survey methods applied over broad portions of the coast. Fishery data are also unlikely to produce conclusive information about the stock for the foreseeable future, due to retention prohibitions and active avoidance of yelloweye among all fleets. Further and more detailed information can be found in the stock assessment document.

3.1.1.3 Healthy Stocks

Healthy groundfish species are those with estimated spawning biomass levels at or greater than $B_{40\%}$ (the B_{MSY} Proxy). Table 3-53-5 lists those species considered to be "healthy" following the 2009 stock assessment cycle. Healthy species with new stock assessments in 2009 include cabezon (including substocks off California and Oregon), lingcod, greenstriped rockfish, and splitnose rockfish. The biological status of the newly assessed stocks are summarized in section 3.1.1.3. Reference points from the most recent stock assessment are summarized in Table 3-6. The latitudinal and depth distributions of healthy stocks are summarized in Table 3-. The detailed information on life history, historical catch, and management information for each healthy groundfish stock can be found in the 2008 Status of the Pacific Coast Groundfish Fishery (SAFE document) (PFMC 2008b).

Table 3-5. Healthy groundfish stocks managed under the FMP.

Common name	Scientific name
Arrowtooth flounder	*Atheresthes stomias*
Dover sole	*Microstomus pacificus*
English sole	*Parophrys vetulus*
Starry flounder	*Platichthys stellatus*
Black rockfish	*Sebastes melanops*
Blackgill rockfish	*Sebastes melanostomus*
Cabezon	*Scorpaenichthys marmoratus*
California scorpionfish	*Scorpaena gutatta*
Chilipepper rockfish	*Sebastes goodie*
Gopher rockfish	*Sebastes carnatus*
Greenstriped rockfish	*Sebastes elongatus*
Longspine thornyhead	*Sebastolobus altivelis*
Shortbelly rockfish	*Sebastes jordani*
Shortspine thornyhead	*Sebastolobus alascanus*
Splitnose rockfish	*Sebastes diploproa*
Yellowtail rockfish	*Sebastes flavidus*
Kelp greenling	*Hexagrammos decagrammus*
Lingcod	*Ophiodon elongatus*
Longnose skate	*Raja rhina*

Table 3-6. Healthy stocks - reference points from most recent stock assessment.

Species	Last Assessed	Estimated Depletion in year of last Assessment	Spawning biomass when last assessed	~95% Interval	Projected Depletion in 2011	Projected Depletion in 2012
Flatfish Species						
Arrowtooth flounder	2007	79%	63,302 mt	41,027-85,577 mt	66% [a/]	60% [a/]
Dover sole	2004	60%	178,800 mt		68% [b/]	66% [b/]
English sole	2007	116%	41,907 mt	31,046-52,766	54%	45%
Starry flounder	2005	North 44% South 62%	North 2,121 mt South 1,445 mt		North 33% South 34%[c/]	North 34% South 35% [c/]
Rockfish Species						
Black rockfish South	2007	71%	3,227 M larvae	2,031-4,433 M larvae	62%	57%
Black rockfish North	2007	53%			52%	49%
Blackgill rockfish	2005	52%	4,977 mt	4,796 - 6,788	48%	47%
California scorpionfish	2005	58%-80%	563-816 mt		48-53%	47-52%
Chilipepper rockfish	2007	70%	23,224 mt	16,773-29,797 mt	63%[d/]	64% [d/]
Greenstriped rockfish	2009	81%	5,736 M eggs		86%	88%
Gopher rockfish	2005	97%	1,931 mt		55%	53%
Longspine thornyhead	2005	71%	50,274 mt		62% [e/]	61% [e/]
Shortbelly rockfish	2007	73%[f/]				
Shortspine thornyhead	2005	63%	82,151 mt	--	60%	59%
Splitnose rockfish	2009	66%	8,426 M eggs	4,357-12,494 M eggs	77%	84%
Yellowtail rockfish	2004	55%	12,407 mt		75%	77%
Roundfish Species						
Cabezon (off CA)	2009	48%			51%	48%
Cabezon (off OR)	2009	52%			51%	47%
Kelp greenling	2005	49%	157		33%	35%
Lingcod	2009	North 62% South 74%	20,484 mt 18,656 mt	14,449-26,520 mt 13,581-23,731 mt	62% 71%	62% 71%
Miscellaneous Species						
Longnose skate	2007	66%	4,634 mt	4,196-5,073 mt	60%	57%

a/ Catch for 2009-2018 was fixed at the maximum potential catch removable under the 40:10 harvest control rule, with MSY based on the Council's SPR proxy (F_{SPR}).
b/ F40% rate of fishing mortality and the following assumptions: total catches during 2005 and 2006 would be at the OY levels specified by the Council (total catch each year of 7440 mt)
c/ Northern and southern population assessments were projected forward under the 40/10 harvest policy.
d/ Assumes average removals from past 10 years.
e/ Estimated catches used in the projections were above the current (2004) OY, and twice the current estimated catches.
f/ Non-qualitive assessment that estimates the 2005 biomass at 65% of B_0

Table 3-7. Distribution of healthy groundfish stocks (adults).[a/]

Common name	Latitudinal Distribution		Depth Distribution (fm)	
	Overall	Highest Density	Overall	Highest Density
Flatfish Species				
Arrowtooth flounder	N. 34º N. lat.	N. 40º N. lat.	10-400	27-270
Dover sole	Coastwide	Coastwide	10-500	110-270
English sole	Coastwide	Coastwide	0-300	40-200
Starry flounder	Coastwide	N. 34º20' N. lat..	0-150	0-82
Rockfish Species [b/]				
Black rockfish	N. 34º N. lat.	N. 34º N. lat.	0-200	0-30
Blackgill rockfish	Coastwide	S. 40º N. lat.	48-420	125-300
California scorpionfish	S. 37º N. lat.	S. 34º27' N. lat..	0-100	0-100
Chilipepper rockfish	Coastwide	34º-40º N. lat.	27-190	27-190
Longspine thornyhead	Coastwide	Coastwide	167->833	320-550
Shortbelly rockfish	Coastwide	S. 46º N. lat.	50-175	50-155
Shortspine thornyhead	Coastwide	Coastwide	14->833	55-550
Splitnose rockfish	Coastwide	Coastwide	50-317	55-250
Yellowtail rockfish	Coastwide	N. 37º N. lat.	27-300	27-160
Roundfish Species				
Cabezon	Coastwide	Coastwide	0-42	0-27
Kelp greenling	Coastwide	N. 40º N. lat.	0-25	0-10
Lingcod	Coastwide	Coastwide	0-233	0-40
Shark and Skate Species				
Longnose skate	Coastwide	N. 46º N. lat.	30-410	30-340

a/ Data from (Casillas, *et al.* 1998), (Eschmeyer, *et al.* 1983), (Hart 1988), (Miller and Lea 1972), (Love, *et al.* 2002), and NMFS survey data. Depth distributions refer to offshore distributions, not vertical distributions in the water column.

Healthy Stocks With New Assessments

Cabezon

Cope and Key (2009) prepared a new stock assessment for cabezon using the Stock Synthesis model, version 3.03a. Two California sub-stocks and cabezon in the waters off Oregon were assessed. This is the first time the Oregon sub-stock was assessed. Overall, spawning biomass has increased in California in recent years but not in Oregon. The information in the following section was summarized from the new stock assessment.

In California, cabezon were lightly exploited until the 1940s, particularly in northern California. Catches began to increase in southern California in the 1960s. The increased catch caused a large decline in spawning biomass. In Oregon, the take of cabezon didn't begin until the 1970s, and in turn caused a decline in spawning biomass.

The SSC recommended combining the results of the area models for the two California substocks of cabezon for use in deciding statewide harvest specifications. The coastwide cabezon unfished spawning biomass in California, as a sum of the two California sub-stocks, is estimated at 1,298 mt. The estimated 2009 spawning biomass coastwide as a sum of the two California substocks, is estimated at 627 mt. The new assessment estimates a healthy spawning biomass of cabezon off California at the start of 2009 of 48.3 percent of unfished biomass. Projected spawning biomass depletion rates for cabezon off California in 2011 and 2012 are 50.9 and 47.5 percent of unfished biomass, respectively.

The assessment results for the Oregon cabezon substock were recommended to be used to decide statewide Oregon harvest specifications. The Oregon estimated spawning output is 409 mt. The new assessment estimates a healthy spawning biomass of cabezon off Oregon at the start of 2009 of 52.4

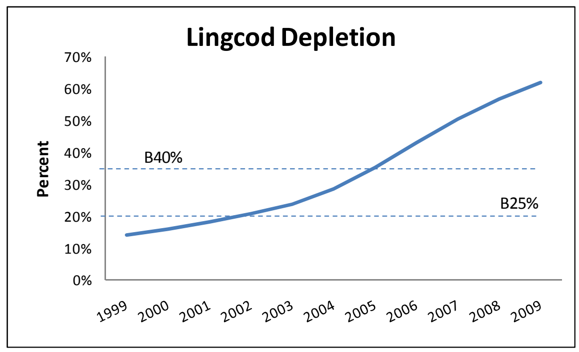
percent of unfished biomass. Projected spawning biomass depletion rates for cabezon off California in 2011 and 2012 are 51 and 47 percent of unfished biomass, respectively.

Historically, vessel-based recreational catch (private and charter) has been the primary reported source of biomass removals of cabezon. Commercial catch has become a major source of removals in the last 15 years because the species has been taken in the developing live-fish fishery in both California and southern Oregon. Because cabezon are caught primarily in the nearshore fishery and are believed to not suffer from barotrauma, discard mortality is assumed to be low. Though much of the declines in cabezon populations correspond to removals by the recreational fishery sectors, the added impact of the live-fish fishery is also seen in declines through the mid- to late-1990s in all sub-stocks.

Several sources of uncertainty were recognized and explored using sensitivity analyses. There were major uncertainties related to the values assumed for natural mortality for each sex, the assumption of male growth patterns, the choice of the stock-recruit relationship, and values assumed for recruitment compensation. Most uncertainty was seen in the absolute biomass measures. Further and more detailed information can be found in the stock assessment document.

<u>Lingcod</u>

Hamel et al. (2009) prepared two separate lingcod stock assessments using the Stock Synthesis model, version 3.03a. One assessment was for the Washington and Oregon area (northern portion), and the other assessment was for California area (southern portion). Genetics analysis and tagging studies suggest that lingcod are one coastwide stock. The information is this section was summarized from the 2009 stock assessment.



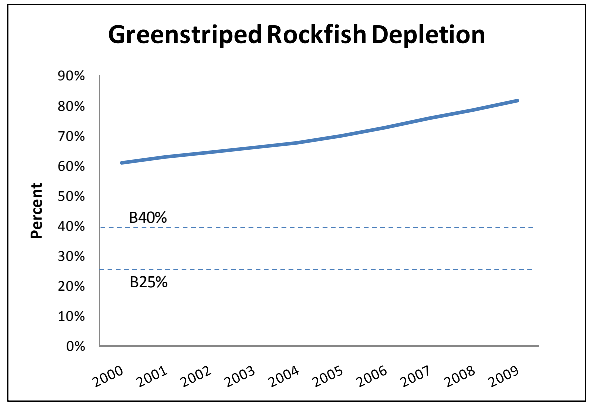
The base model for the northern area indicates that the lingcod female spawning biomass declined rapidly in the 1980s and early 1990s, hitting a low of 3,217 mt in 1995, and has subsequently recovered to 21,264 mt, which is over 60 percent of its unfished biomass level. For the north, the unfished spawning biomass is estimated to have been 33,075 mt (~95 percent confidence interval: 28,661-37,489 mt) with an expected mean recruitment of 3.162 million age-0 recruits (~95 percent confidence interval: 2.728-3.595). The spawning potential ratio for lingcod in the north has been above the proxy target of 45 percent since 1998, and in recent years has been far above that level. The southern area base model indicates that the lingcod female spawning biomass declined rapidly in the 1970s and early 1980s, reaching a low point of 2,320 mt in 1998. Subsequently, the spawning biomass has recovered to 13,466 mt, which is over 70 percent of the unfished level. The unfished spawning biomass in the south is estimated to have been 25,311 mt (~95 percent confidence interval: 22,485-28,136 mt) with an expected mean recruitment of 3.518 million age-0 recruits (~95 percent confidence interval: 3.100-3.935). The relative spawning potential ratio for lingcod in the south has been below the proxy target of 45 percent since 2001, and in recent years has been far below that level. Coastwide, the estimated depletion of the spawning biomass at the start of 2009 was 67.0 percent with 61.9 percent for the north (~95 percent confidence interval: 48-76 percent), and 73.7 percent for the south.

A number of sources of stock assessment uncertainty were explicitly included in the assessments. Unresolved sources of uncertainty included including the degree of connection between the two lingcod stocks and also between the northern stock and the stock off British Columbia; the estimation of growth;

and the fit of the Northwest Fishery Science Center's survey data. More detailed information can be found in the stock assessment document.

<u>Greenstriped Rockfish</u>

Greenstriped rockfish are a minor shelf rockfish species and have never been managed with species-specific specifications. Hicks, *et al.* (2009) prepared the first greenstriped rockfish stock assessment using the Stock Synthesis model, version 3.03a. The information in this section was summarized from the new stock assessment.



The stock is distributed coastwide and was treated as a single stock. Population parameters were estimated using fishery landings and length data from five fleets, abundance indices and length data from the NMFS triennial survey, and abundance indices, length data, and age data from the NMFS survey. The estimated spawning output started to significantly decline in the 1960s, when the landings increased, and continued to decline until the late 1990s. The spawning output increased quickly in the last decade from a low near 59 percent in 1999 to approximately 81 percent of unfished spawning output in 2009. With little targeted fishing, greenstriped rockfish exploitation rates have rarely exceeded the MSY proxy levels. Recruitment is highly variable with high recruitment values occurring in 1971, 1984, 1993, and 1998, and low values occurring in the 1990s, early 1970s, and 2006. The estimated depletion has remained above the 40 percent of unfished spawning output target and it is unlikely that the stock has ever fallen below this threshold.

A number of sources of stock assessment uncertainty were identified including the historical discarding practices prior to the collection of WCGOP data; the value of natural mortality; the estimated length-based selectivity for some fleets; and the accuracy of the reconstructed landings time Series. More detailed information can be found in the stock assessment document.

<u>Splitnose Rockfish</u>

Gertseva, *et al.* (2009) prepared a new coastwide stock assessment for splitnose rockfish using the Stock Synthesis version 3.02E model. The information in this section is summarized from the stock assessment.

Splitnose rockfish were lightly exploited until the 1940s, when the trawl fishery for rockfish first became important. With the development of the POP fishery (a species with which splitnose rockfish co-occur), spawning output of splitnose rockfish began to decline. A sharp drop in the 1960s was associated with large harvests of POP by foreign trawl fleets operating in the U.S. EEZ. Another drop occurred in 1998 when the increased availability of splitnose rockfish led to high removals off California. Since 1999, the splitnose spawning output was estimated to have been increasing in response to below-average removals and above-average recruitment during the last decade. At the beginning of 2009 the estimated depletion was 66 percent of its unfished biomass level with the spawning stock output is estimated to be 8,426 million eggs.

Uncertainty in the model was explored though asymptotic variance estimates and sensitivity analyses. Asymptotic confidence intervals were estimated within the model and reported throughout the assessment for key model parameters and management quantities. Uncertainty in recent recruitment was used to define alternative states of nature and develop the decision table. Further more detailed information can be found in the stock assessment document.

3.1.1.4 Precautionary Zone Stocks

Precautionary zone groundfish species are those with estimated spawning biomass levels less than the B_{MSY} proxy and greater than the MSST (the overfished threshold), that have not been declared overfished. Pacific whiting is the only precautionary zone stock with a new stock assessment (in 2010). Table 3-8 lists species considered to be "precautionary zone" stocks following the 2009-2010 stock assessment cycle. The biological status of whiting was summarized at the March Council meeting and the 2008 SAFE document, because whiting specifications are not set through this action. Biological characteristics of precautionary zone stocks that are relevant to biological resources that may be affected by implementation of the alternatives are summarized in Table 3-93-9 and Table 3-3-10. Detailed information regarding life history, historical catch, and management information for each precautionary zone groundfish stock can be found in the 2008 Status of the Pacific Coast Groundfish Fishery (SAFE document) (PFMC 2008b).

Table 3-8. Precautionary zone stocks managed under the FMP.

Common name	Scientific name
Blue rockfish	*Sebastes mystinus*
Pacific whiting	*Merluccius productus*
Sablefish	*Anoplopoma fimbria*

Table 3-9. Precautionary zone stocks - reference points from most recent stock assessment.

Species	Last Assessed	Estimated Depletion in year of last Assessment	Spawning biomass when last assessed	~95% Interval	Projected Depletion in 2011	Projected Depletion in 2012
Blue rockfish	2007	29.7%	618	528-708	30%	30%
Pacific whiting	2010	NMFS - 31% TINSS- 38%	0.41 mil mt 1.75 mil mt	0.22 to 0.59 mil mt 0.65 to 4.4 mil mt	25%	26%
Sablefish	2005	35%	75,070 mt	39,119-138,539 mt	34%	34%

Table 3-10. Distribution of precautionary zone groundfish stocks (adults) managed under the FMP. [a/]

Common name	Latitudinal Distribution		Depth Distribution (fm)	
	Overall	Highest Density	Overall	Highest Density
Rockfish Species				
Blue rockfish	Coastwide	Coastwide	0-300	13-21
Roundfish Species				
Pacific whiting	Coastwide	Coastwide	20-500	
Sablefish	Coastwide	Coastwide	27->1,000	

a/. Depth distributions refer to offshore distributions, not vertical distributions in the water column.

3.1.1.5 Unassessed Groundfish Stocks

Unassessed groundfish stocks are category 3 species, which includes species managed in complexes such as minor rockfish, other flatfish and other fish (Table 3-11). These species are caught in the fishery, but at best there is only information on landed biomass. For category 3 species, it is impossible to quantitatively determine stock status or an overfished threshold. Average historic catches are used to determine the OFL for category 3 species.

Table 3-11. Latitudinal and depth distributions of groundfish species (adults) managed under the FMP.

Common name	Latitudinal Distribution		Depth Distribution (fm)	
	Overall	Highest Density	Overall	Highest Density
Butter sole	N. 34º N. lat.	N. 34º N. lat.	0-200	0-100
Curlfin sole	Coastwide	Coastwide	4-291	4-50
Flathead sole	N. 38º N. lat.	N. 40º N. lat.	3-300	100-200
Pacific sanddab	Coastwide	Coastwide	0-300	0-82
Rex sole	Coastwide	Coastwide	10-350	27-250
Rock sole	Coastwide	N. 32º30' N. lat..	0-200	summer 10-44 winter 70-150
Sand sole	Coastwide	N. 33º50' N. lat..	0-100	0-44
Aurora rockfish	Coastwide	Coastwide	100-420	82-270
Bank rockfish	S. 39º30' N. lat..	S. 39º30' N. lat..	17-135	115-140
Black rockfish	N. 34º N. lat.	N. 34º N. lat.	0-200	0-30
Black-and-yellow rockfish	S. 40º N. lat.	S. 40º N. lat.	0-20	0-10
Blackgill rockfish	Coastwide	S. 40º N. lat.	48-420	125-300
Bronzespotted rockfish	S. 37º N. lat.	S. 37º N. lat.	41-205	110-160
Brown rockfish	Coastwide	S. 40º N. lat.	0-70	0-50
Calico rockfish	S. 38º N. lat.	S. 33º N. lat.	10-140	33-50
Chameleon rockfish	37º-33º N. lat.	37º-33º N. lat.	95-150	95-150
Chilipepper rockfish	Coastwide	34º-40º N. lat.	27-190	27-190
China rockfish	N. 34º N. lat.	N. 35º N. lat.	0-70	2-50
Copper rockfish	Coastwide	S. 40º N. lat.	0-100	0-100
Dusky rockfish [d/]	N. 55º N. lat.	N. 55º N. lat.	0-150	0-150
Dwarf-Red rockfish	33º N. lat.	33º N. lat.	>100	>100
Flag rockfish	S. 38º N. lat.	S. 37º N. lat.	17-100	shallow
Freckled rockfish	S. 33º N. lat.	S. 33º N. lat.	22-92	22-92
Gopher rockfish	S. 40º N. lat.	S. 40º N. lat.	0-30	0-16
Grass rockfish	S. 44º40' N. lat..	S. 40º N. lat.	0-25	0-8
Greenblotched rockfish	S. 38º N. lat.	S. 38º N. lat.	33-217	115-130
Greenspotted rockfish	S. 47º N. lat.	S. 40º N. lat.	27-110	50-100
Greenstriped rockfish	Coastwide	Coastwide	33-220	27-136
Halfbanded rockfish	S. 36º40' N. lat..	S. 36º40' N. lat..	32-220	32-220
Harlequin rockfish [e/]	N. 40 º N. lat.	N. 51º N. lat.	38-167	38-167
Honeycomb rockfish	S. 36º40' N. lat..	S. 34º27' N. lat..	16-65	16-38
Kelp rockfish	S. 39º N. lat.	S. 37º N. lat.	0-25	3-4
Longspine thornyhead	Coastwide	Coastwide	167->833	320-550
Mexican rockfish	S. 36º20' N. lat..	S. 36º20' N. lat..	50-140	50-140
Olive rockfish	S. 41º20' N. lat..	S. 40º N. lat.	0-80	0-16
Pink rockfish	S. 37º N. lat.	S. 35º N. lat.	40-200	40-200
Pinkrose rockfish	S. 34º N. lat.	S. 34º N. lat.	54-160	108
Puget Sound rockfish	N. 40º N. lat.	N. 40º N. lat.	6-200	6-200
Pygmy rockfish	N. 32º30' N. lat..	N. 32º30' N. lat..	17-150	17-150
Quillback rockfish	N. 36º20' N. lat..	N. 40º N. lat.	0-150	22-33
Redbanded rockfish	Coastwide	N. 37º N. lat.	50-260	82-245
Redstripe rockfish	N. 37º N. lat.	N. 37º N. lat.	7-190	55-190
Rosethorn rockfish	Coastwide	N. 38º N. lat.	65-300	55-190
Rosy rockfish	S. 42º N. lat.	S. 40º N. lat.	8-70	30-58
Rougheye rockfish	Coastwide	N. 40º N. lat.	27-400	27-250
Semaphore rockfish	S. 34º27' N. lat..	S. 34º27' N. lat..	75-100	75-100
Sharpchin rockfish	Coastwide	Coastwide	50-175	50-175

Table 3-2. Latitudinal and depth distributions of groundfish species (adults) managed under the FMP (continued).

Common name	Latitudinal Distribution		Depth Distribution (fm)	
	Overall	Highest Density	Overall	Highest Density
Shortraker rockfish	N. 39º30' N. lat..	N. 44º N. lat.	110-220	110-220
Silvergray rockfish	Coastwide	N. 40º N. lat.	17-200	55-160
Speckled rockfish	S. 38º N. lat.	S. 37º N. lat.	17-200	41-83
Squarespot rockfish	S. 38º N. lat.	S. 36º N. lat.	10-100	10-100
Starry rockfish	S. 38º N. lat.	S. 37º N. lat.	13-150	13-150
Stripetail rockfish	Coastwide	Coastwide	5-230	5-190
Swordspine rockfish	S. 38º N. lat.	S. 38º N. lat.	38-237	38-237
Tiger rockfish	N. 35º N. lat.	N. 35º N. lat.	30-170	35-170
Treefish	S. 38º N. lat.	S. 34º27' N. lat.	0-25	3-16
Vermilion rockfish	Coastwide	Coastwide	0-150	4-130
Yellowmouth rockfish	N. 40º N. lat.	N. 40º N. lat.	77-200	150-200
Big skate	Coastwide	S. 46º N. lat.	2-110	27-110
California skate	Coastwide	S. 39º N. lat.	0-367	0-10
Leopard shark	S. 46º N. lat.	S. 46º N. lat.	0-50	0-2
Soupfin shark	Coastwide	Coastwide	0-225	0-225
Spiny dogfish	Coastwide	Coastwide	0->640	0-190
Finescale codling	Coastwide	N. 38º N. lat.	190-1,588	190-470
Pacific rattail	Coastwide	N. 38º N. lat.	85-1,350	500-1,350
Ratfish	Coastwide	Coastwide	0-499	55-82

3.1.1.6 Non-groundfish Species

The 2009-2010 Groundfish Harvest Specifications FEIS (PFMC 2008a) provides a detailed description of other fish species caught in groundfish fisheries. There have not been substantial changes in the status of those species in the intervening period. Therefore, the information in that FEIS is incorporated by reference. Non-groundfish species incidentally caught in groundfish fisheries include:

- Salmon; ESA-listed salmon are discussed in Section 4.3
- Pacific halibut; a prohibited species in groundfish fisheries
- Coastal pelagic species, principally squid incidentally caught in whiting fisheries
- Highly migratory species, such as tuna and billfish, which because they are mainly pelagic are infrequently caught in groundfish fisheries
- Dungeness crab; associated fisheries are managed by the states
- Greenlings, ocean whitefish, and California sheephead, which are managed by CDFG

Non-groundfish fisheries also incidentally catch groundfish. These fisheries are discussed below in Section 3.2.2.5.

3.2 Socioeconomic Environment

The socioeconomic context for west coast groundfish fisheries may be viewed in two dimensions: the various fisheries that target or otherwise catch the species managed under the groundfish FMP, and the fishing communities where groundfish are landed, and where related infrastructure (including processing facilities) and economic activity occurs. Past groundfish harvest specifications EISs include detailed information about fishery sectors and fishing communities. Information from various sources is incorporated by reference to support the description of baseline socioeconomic conditions:

- Groundfish harvest specifications and management measures EISs for the past two management cycles, 2007-2008 and 2009-2010 (PFMC 2006; PFMC 2008a)
- The EIS evaluating Amendment 20 (PFMC 2010c)
- The 2008 Groundfish SAFE document (PFMC 2008b)

In addition, Appendix F to this EIS includes historical landings and revenue data derived from the PacFIN database and is used as a source document for the summaries in this section.

For the purposes of this EIS the baseline period for the socioeconomic environment is 2005-2009.

3.2.1 Overview of the Regulatory Regime for Groundfish Fisheries

Chapter 4 in the 2008 Groundfish SAFE document describes the regulatory regime, encompassing the management measures applied to groundfish fisheries and other important aspects of management such as catch monitoring and accounting. Since many management measures are established or adjusted through the harvest specification process the description of the alternatives (Chapter 2) in this and other Groundfish harvest specifications EISs also provide an overview of the range of management measures in use. The description of the No Action Alternative in the Amendment 20 EIS summarizes the principal management measures for groundfish trawl fisheries. Section 3.3 in the Amendment 20 FEIS catalogs past actions, such as amendments to the FMP, many of which resulted in the implementation of new management measures. A summary catalog of key management measures is provided here.

- Limited access permit system (see Section 3.3.3 of the Amendment 20 FEIS for additional detail): Limited access, or limited entry, permits regulate participation in various groundfish sectors. These sectors are described in greater detail in the next section. FMP Amendment 6 created the limited entry system, including gear endorsements for trawl and fixed gear. (Use of certain gear types is allowed without an endorsement; these vessels fish in the so-called open access sector, which has had a separate allocation of target species.) Amendment 15 created additional limits on participation in the commercial sectors targeting Pacific whiting; these measures are superseded by similar measures implemented under Amendment 20.
- Groundfish closed areas, principally Rockfish Conservation Areas (RCAs): RCAs are coastwide, depth-based closures intended to limit bycatch of overfished species. Seaward and shoreward boundaries vary by sector or gear type, by latitude, and by season. More limited closures have been implemented to reduce bycatch of yelloweye rockfish and cowcod. Other groundfish-related closures have been implemented to mitigate impacts to essential fish habitat and to ESA-listed salmon. Detailed information on the configuration of these closed areas may be found on the National Marine Fisheries Service (NMFS), Northwest Region (NWR) website: http://www.nwr.noaa.gov/Groundfish-Halibut/Groundfish-Fishery-Management/Groundfish-

Closed-Areas/Index.cfmhttp://www.nwr.noaa.gov/Groundfish-Halibut/Groundfish-Fishery-Management/Groundfish-Closed-Areas/Index.cfm.

- Vessel monitoring system (VMS): VMS requirements for vessels catching groundfish were first implemented in 2004 for vessels fishing under a limited entry permit. The requirement was expanded to "open access" vessels in 2008. The current requirement covers vessels "on trips in which groundfish are taken and retained, possessed or landed in Federal waters." The VMS requirement was implemented to monitor compliance with the groundfish closed areas described above. Additional information about this requirement may be found on the NMFS NWR website: http://www.nwr.noaa.gov/Groundfish-Halibut/Groundfish-Fishery-Management/Vessel-Monitoring-System/Index.cfm
- Catch control tools: Cumulative trip limits have been a key measure to regulate groundfish landings for non-whiting fisheries. The limits specify the total amount of a particular management unit (stock, stock complex, or geographic subdivision thereof) that may be landed during a 2-month period. Whiting fishery catch has been controlled through seasons and quotas. The trawl rationalization program under Amendment 20 replaces trip limits with individual fishing quotas (IFQs) for the shoreside whiting and non-whiting sectors. The whiting at-sea sectors would be managed under a co-op structure for each of the two at-sea sectors. (See the next section for an explanation of these sectors and more discussion of Amendment 20 measures.) Since the late 1990s, when several groundfish stocks were declared overfished, landings based catch control tools have become less effective due to regulatory discards.
- At-sea observers: To improve bycatch accounting in the non-whiting trawl fishery, NMFS implemented the west coast Groundfish Observer Program (WGOP) in 2002 for vessels that harvest catch and land the catch on shore. Currently less than 25 percent of non-whiting trawl fishing trips are monitored by the WCGOP. The primary purpose of the observer coverage is to provide data that can be used to derive catch ratios (bycatch rates) of non-target species. Whiting fisheries have more complete monitoring through maximized retention requirements for the shore-based sector, and observers aboard motherships and catcher-processors. The trawl rationalization program under Amendment 20 will require 100 percent observer coverage in the combined shore-based (whiting and non-whiting) trawl fishery. Non-trawl groundfish fisheries are subject to partial observer coverage.

3.2.2 Commercial Fishery Sectors

Managers identify groundfish fishery sectors, around which regulations are structured. Commercial fisheries are identified based on the regulatory status, gear used, and target strategy of the vessels comprising each sector. From a regulatory standpoint, groundfish fisheries are identified based on whether vessels possess a Federal groundfish limited access ("limited entry") permit, and the particular endorsements on that permit. In addition, Washington coast Indian Tribes prosecute groundfish fisheries based on treaty rights. Given their sovereign status these fisheries are considered separately from other commercial fishery sectors. Based on these considerations the following non-Tribal commercial fishery sectors are identified for the purposes of management:

1. Catcher-processor vessels targeting Pacific whiting using midwater trawl gear and processing their catch at sea.
2. Catcher vessels targeting Pacific whiting with midwater trawl gear and delivering to at-sea mothership processors (referred to as the mothership sector).
3. Catcher vessels targeting Pacific whiting with midwater trawl gear and delivering to processing plants on land (referred to as the shoreside whiting sector).

4. Vessels using bottom trawl gear to target groundfish species other than Pacific whiting, with their catch landed onshore (referred to as the non-whiting trawl sector).
5. Vessels using longline or pots (referred to as fixed gear) to target groundfish and possessing a Federal limited entry permit with this gear endorsement (referred to as the limited entry fixed gear sector).
6. Vessels using legal groundfish gear other than trawl (principally longline and pot gear) to target groundfish but not possessing a limited entry permit (referred to as the "directed open access sector").
7. Vessels using a variety of gear types that catch groundfish incidentally, usually defined by catch composition rather than regulatory status (referred to as the "incidental open access sector").

Recreational groundfish fisheries are also important to west coast coastal communities' economies. Recreational fisheries are primarily managed by the states, so catch and effort data are often grouped by state and substate region. A distinction is also made between charter vessels (commercial passenger fishing vessels, or CPFVs) and private recreational vessels, that is, individuals fishing from their own or rented boats.

These sectors are characterized in the sections that follow.

An important reason for identifying fishery sectors relates to the allocation of catch opportunity. Overall catch limits by management unit (a stock, stock complex, or geographic subdivision of either) determined by the ACL may be divided among sectors for the purpose of management. These allocations may be "formal" or "informal." Formal allocations identified in the regulations and management measures are generally crafted in order to ensure that a sector has the opportunity to catch the portion of the ACL determined by an allocation. Informal or implicit allocations are a function of the particular management measures established as part of the biennial process for stocks that do not have a formal allocation. The way in which these management measures constrain catch opportunities create functional allocations of the stocks available for harvest. In addition to allocations, managers also consider set asides and "catch sharing." These divisions of harvest opportunity play more of a bookkeeping function so that managers can estimate the total catch that is likely to occur during the management period. Set asides are a straightforward accounting device, applying primarily to research catches and fisheries prosecuted under an exempted fishing permit. Treaty fisheries are also accorded a set aside, because the sovereign status of these groups means that their fisheries are independently managed in coordination with the Council. Catch sharing plans are like short-term allocations, but are distinguished from these because managers have more flexibility to adjust management measures in a way that changes harvest opportunity associated with these plans. In this sense they lie somewhere between the formal and informal allocations described above. The Amendment 21 FEIS (PFMC 2010a) describes historical allocations and newly adopted allocations; this information is incorporated by reference. Chapter 2 provides more detailed discussion of different allocations considered under the alternatives.

Table 3-12 provides an overview of the change in ex-vessel revenue by fishery sector since 1998.

Table 3-3. Ex-vessel revenue, inflation adjusted $1,000s, by groundfish fishery sector, 1998-2009 and 2004-2009.

Fishing Sectors	Change 1998-2009		Change 2004-2009	
	$1,000s	Percent	$1,000s	Percent
Non Treaty Sectors				
Whiting catcher processor	-1,165	-22.7%	-7,034	-64.0%
Whiting mothership	-1,600	-36.3%	-208	-6.9%
Shoreside whiting	-1,299	-19.2%	-2,681	-32.9%
Shoreside non-whiting trawl	-12,241	-28.7%	6,601	27.6%
Limited entry fixed gear	7,340	89.5%	5,338	52.3%
Open access fixed gear	1,231	18.0%	2,961	58.1%
Incidental open access[a/]	-1,750	-85.3%	-343	-53.2%
Treaty Sectors				
Mothership whiting	-$633	-33.8%	-831	-40.1%
Shoreside whiting[b/]			520	97.4%
Shoreside non-whiting groundfish	$3,205	189.9%	834	20.6%

a/ Includes exempted trawl.
b/ Began in 2003.

3.2.2.1 Limited Entry Non-whiting Trawl Sector

Section 5.2.3 of the 2008 SAFE and Section 3.6 of the Amendment 20 FEIS describe the characteristics of this sector, as does Section 7.1.2.2 in the 2009-2010 Groundfish Harvest Specifications FEIS.

Management and Regulation

Under the FMP in order to target groundfish with trawl gear a vessel must possess an appropriately endorsed groundfish limited entry permit. A 2003 capacity reduction program (referred to as the "trawl buyback program") had a substantial effect on the number of vessels participating in this sector. The program retired 91 vessels and associated groundfish limited entry permits in order to stabilize what had been declining per-vessel revenues and to reduce bycatch by the remaining vessels. Amendment 20 would change the principal catch control tool for this sector from 2-month cumulative trip limits to individual fishing quota (IFQ) management. Under IFQ management each permit receives quota share representing a fraction of the sector's catch opportunity for certain species management units. Quota shares are converted into quota pounds based on the sector's annual allocation, which is determined in part by formal allocations established under Amendment 21 and decisions taken as part of this biennial management process. Quota shares and quota pounds are tradable, although restrictions have been put in place. Under Amendment 20 the two shoreside trawl sectors (whiting and non-whiting) will be combined into a single sector managed with IFQs, which will be fully tradable among vessels in the resulting sector. The Amendment 20 FEIS comprehensively evaluates the effects of IFQ management on catcher vessels, processors, and fishing communities, among other environmental components. The reader is referred to that document for more information on the features and effects of IFQ management.

Closed areas, most prominently RCAs, have been an important management tool since 2002, intended to reduce bycatch of overfished species. The configuration of RCAs have been adjusted over time, and can vary during the year, to account for fishing strategies and what is known about the seasonal changes in the distribution of overfished species. Although bycatch reduction is one of the objectives of IFQ management, RCAs will remain in place as a means of controlling overall fleet performance with respect to bycatch of these species.[18]

Landings and Revenue

Since the late 1990s the need to constrain catch of overfished species has had a major impact on target species landings, and thus revenue for the sector. As shown in Figure 5-1 in the 2008 SAFE, landings for the sector declined from a high of 51,000 mt in 1996 to under 20,000 mt in 2005. Since then landings and revenue have increased modestly.

As shown in Figure 3-1, while ex-vessel revenue for the sector as a whole in 2009 was about 70 percent of the 1998 value (inflation adjusted), on a per-vessel basis average ex-revenue revenue has increased by almost 40 percent. This increase occurred after 2003 and is likely attributable to the buyback program mentioned above as indicated by the sharp drop in number of vessels in 2004.

Non-whiting trawl vessels engage in a variety of target strategies, which can be discerned in part by the mix of species in landings and at what depth they fish. Generally, vessels fishing on the continental shelf target various flatfish species, principally Dover sole, petrale sole, and arrowtooth flounder. Vessels fishing farther offshore, on the continental slope, engage in a "DTS" strategy, short for Dover sole, thornyheads, and sablefish. Figure 3-2 shows the distribution of revenue by various species over the 2005-2009 period. Sablefish accounts for a third of revenue, followed by Dover sole, petrale sole, and thornyheads (members of the genus *Sabestolobus*).

Table 44 in Appendix F reports the annual average number of vessels landing groundfish by length category and sector, 2005-2009; this information is presented in percentage terms in Table 3-. Most of the non-whiting trawl vessels are distributed fairly evenly across three length categories ranging from 50 to 150 feet.

Table 3-13. Distribution of vessels by sector and length category (based on 44 in Appendix F).

Sector	Vessel Length Categories						
	< 40	40 - 50	50 - 60	60 - 70	70 - 150	> 150	Unspec.
Whiting CPs	0%	0%	0%	3%	0%	92%	5%
Mothership whiting CVs	0%	0%	0%	2%	94%	0%	4%
Shoreside whiting	0%	0%	3%	14%	83%	0%	0%
Shoreside non-whiting trawl	1%	12%	27%	23%	36%	0%	0%
Limited Entry fixed gear	46%	29%	14%	7%	4%	0%	0%
Open Access fixed gear	77%	18%	3%	1%	0%	0%	0%
Other Open Access	61%	29%	6%	2%	2%	0%	0%
Non-groundfish	0%	0%	0%	0%	0%	0%	0%

[18] Under IFQ management current landing restrictions, intended to discourage targeting of overfished species, will be replaced by the individual accountability imposed through the requirement to possess sufficient quota to cover catches. This could result in increased retention of marketable species that were previously discarded. Therefore, bycatch could be reduced in two ways, through avoiding catch in the first place and increased retention of those fish that are caught.

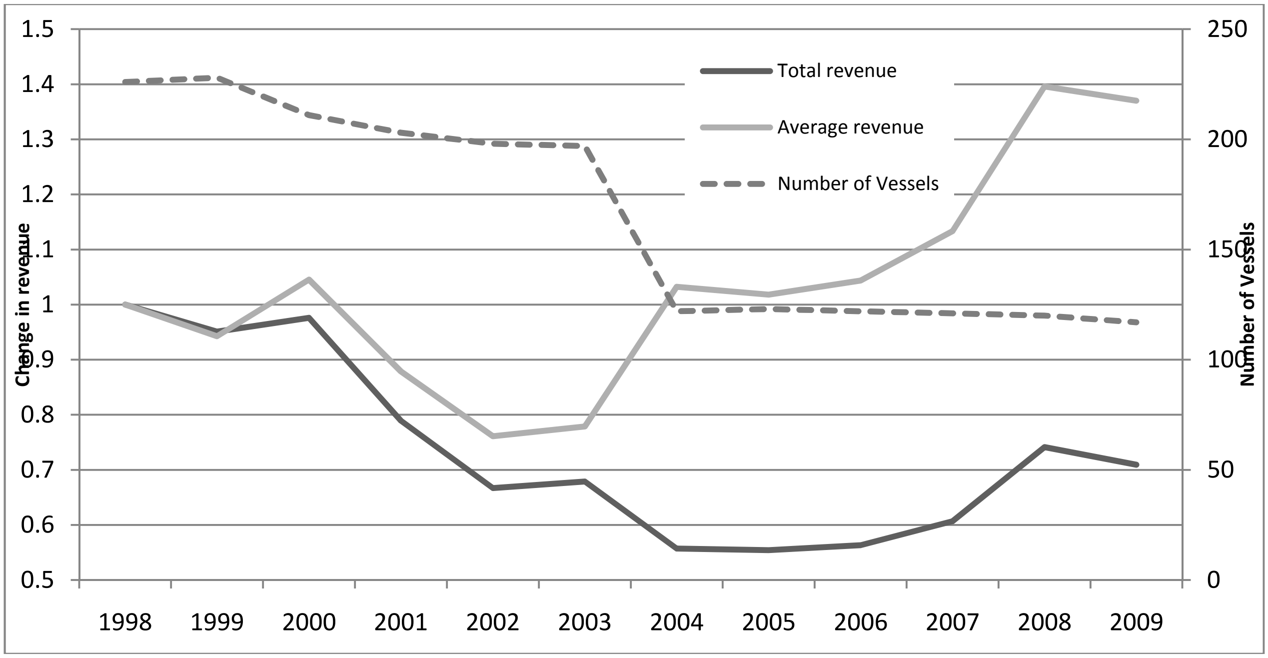


Figure 3-1. Change in total and average (per vessel) ex-vessel revenue and number of vessels for the non-whiting trawl sector, 1998-2009, adjusted for inflation (1998=100).

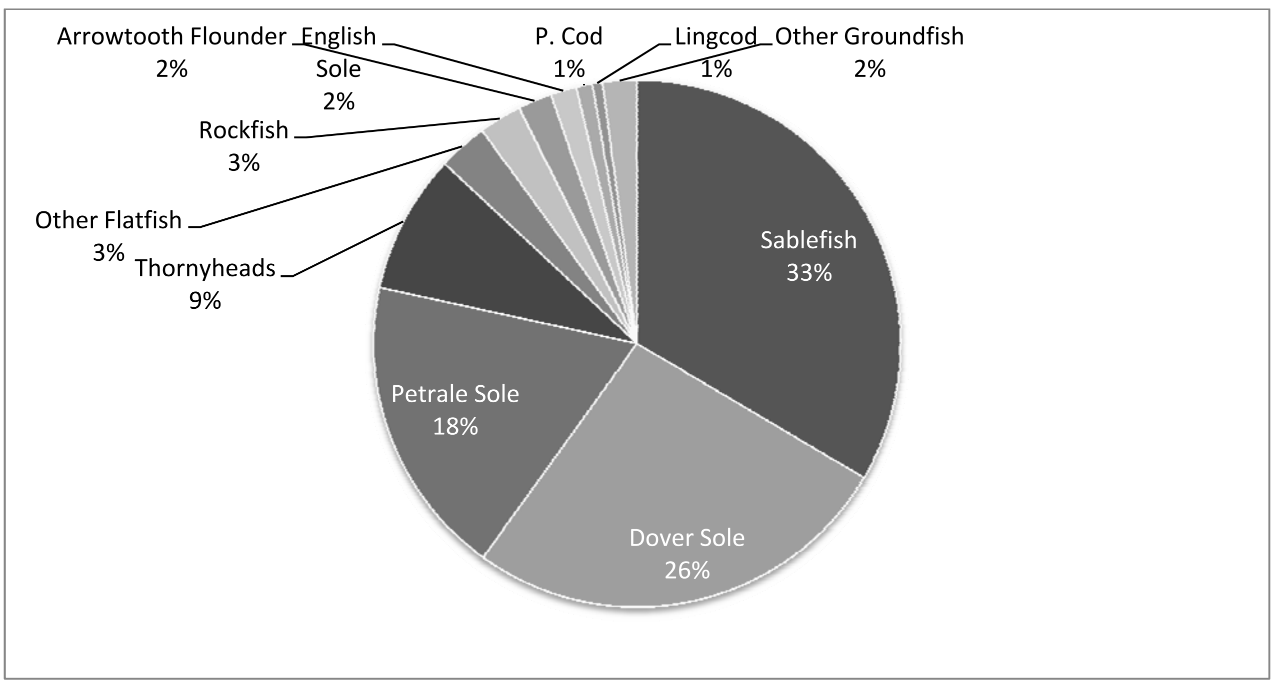


Figure 3-2. Composition of limited entry non-whiting trawl ex-vessel revenue, average 2005-2009.

3.2.2.2 Pacific Whiting Sectors

Section 5.2.4 of the 2008 SAFE describes the catcher-processor and mothership sectors (collectively, the at-sea sectors). Section 3.6 in the Amendment 20 FEIS describes groundfish trawl catcher vessels in the whiting sectors; Sections 3.10 and 3.11 describe mothership processors and catcher-processors respectively. Section 7.1.2.3 in the 2009-2010 Groundfish Harvest Specifications FEIS describes the whiting mothership and catcher-processor sectors.

Management and Regulation

A 2007 emergency rule, subsequently followed up by Amendment 15 to the FMP, created permit endorsements to limit participation in the three whiting sectors. Pacific whiting form dense semi-pelagic schools so that vessels targeting the species generally encounter only small amounts of bycatch. However, overfished rockfish can be caught incidentally, either because they co-occur with Pacific whiting or because vessels mistakenly set the gear on the wrong species. The whiting sectors are managed through a season and quota structure. The season opens around May 1 each year (and occasionally a few weeks earlier off of central California). The Pacific whiting OY (or ACL under Amendment 23 to the FMP) is allocated among the three whiting sectors after a portion is set aside for expected catch in Tribal fisheries. The season for each sector then runs until its allocation is used up. As with other groundfish fisheries, catch limits on overfished rockfish have created a bigger constraint on whiting fisheries, resulting in a “race for bycatch”—competition among the whiting sectors to catch their target species quota before limits on overfished species were reached. As a result, beginning with the 2009-2010 management period, sector-specific bycatch limits have been put in place for canary rockfish, darkblotched, and widow rockfish.

As noted above, under Amendment 20 the shoreside whiting sector will be combined with the non-whiting trawl sector and managed with IFQs beginning in 2011. Amendment 20 also implemented new measures for the at-sea sectors beginning in 2011. The mothership sector will be managed through a co-op structure with catcher vessels within a co-op delivering to a specified mothership. The catcher-processor sector already operates as voluntary co-op; Amendment 20 implements additional measures intended to support the continued functioning of this co-op.

Landings and Revenue

Figure 3-3 compares the annual change in ex-vessel revenue for the whiting sectors, and the non-whiting sector. Revenue increased in all whiting sectors from 1998, although with a degree of variability. In 2008 revenues spiked well above the 1998 baseline but dropped precipitously in 2009 to levels below what they were in 1998.

On average the catcher-processor sector has accounted for the largest share of ex-vessel revenue[19] between 2005-2009, at $11.6 million, or 39 percent of revenues from the three sectors; mothership catcher vessels averaged $7.5 million, or 25 percent; and the shoreside whiting sector averaged $10.7 million or 36 percent.

Figure 3-4 shows the change in median per-vessel ex-vessel revenue since 1998. Revenues have trended upward substantially with some variability and a big drop in 2009. In 2008 revenues were

[19] “Ex-vessel value” refers to the amount paid for raw fish delivered to a buyer or processor. In the case of catcher-processors where no catcher-to-processor transaction actually takes place, ex-vessel value of the raw fish is imputed from average values taken from the mothership sector.

almost double the 1998 value for the shoreside catcher vessels, three times greater for mothership catcher vessels and almost four times greater for catcher-processors.

As might be expected, whiting catcher vessels are generally larger than non-whiting trawl vessels, as indicated in Table 3-; 83 percent of shoreside whiting vessels and 94 percent of mothership catcher vessels are in the 70-150 feet category compared to 36 percent of non-whiting trawl vessels. Many whiting catcher vessels also participate in fisheries in Alaska where operational characteristics of the fisheries require larger vessels sizes.

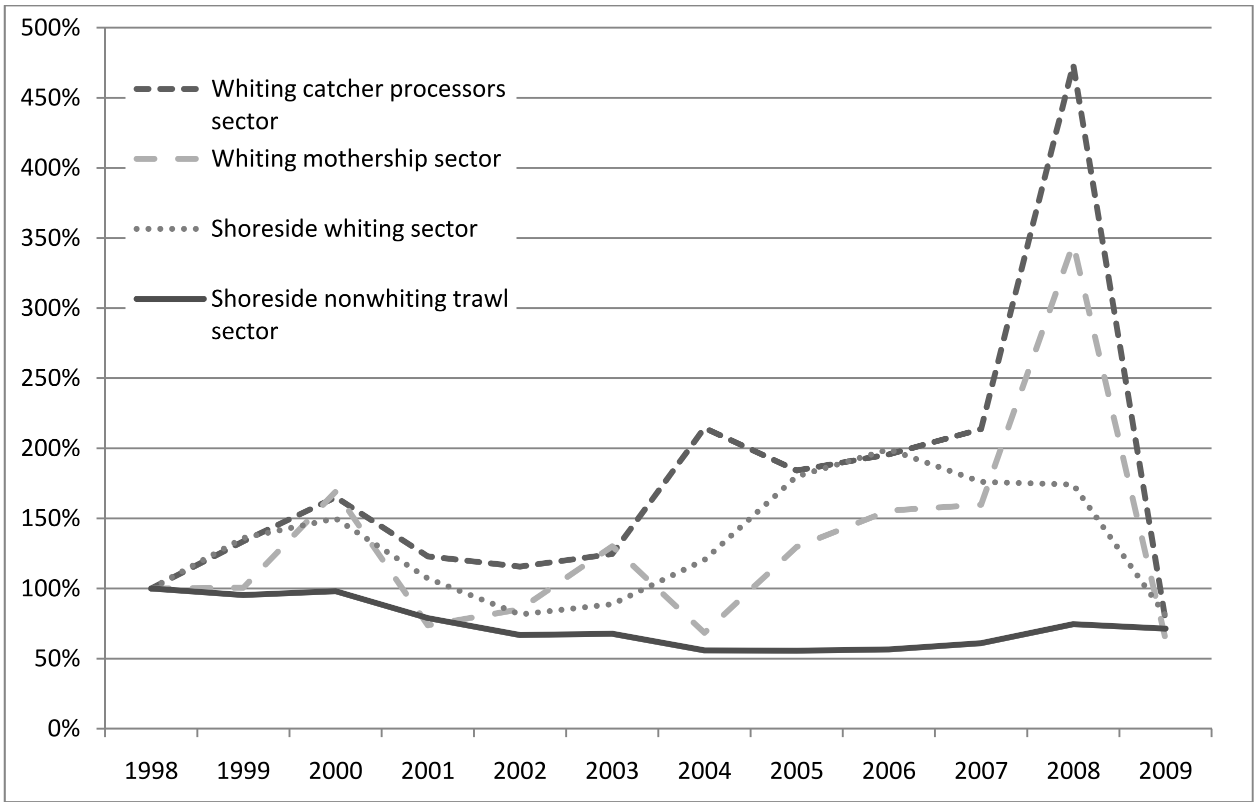


Figure 3-3. Change in total ex-vessel revenue by whiting and non-whiting trawl sectors 1998-2009 (1998=100%), adjusted for inflation.

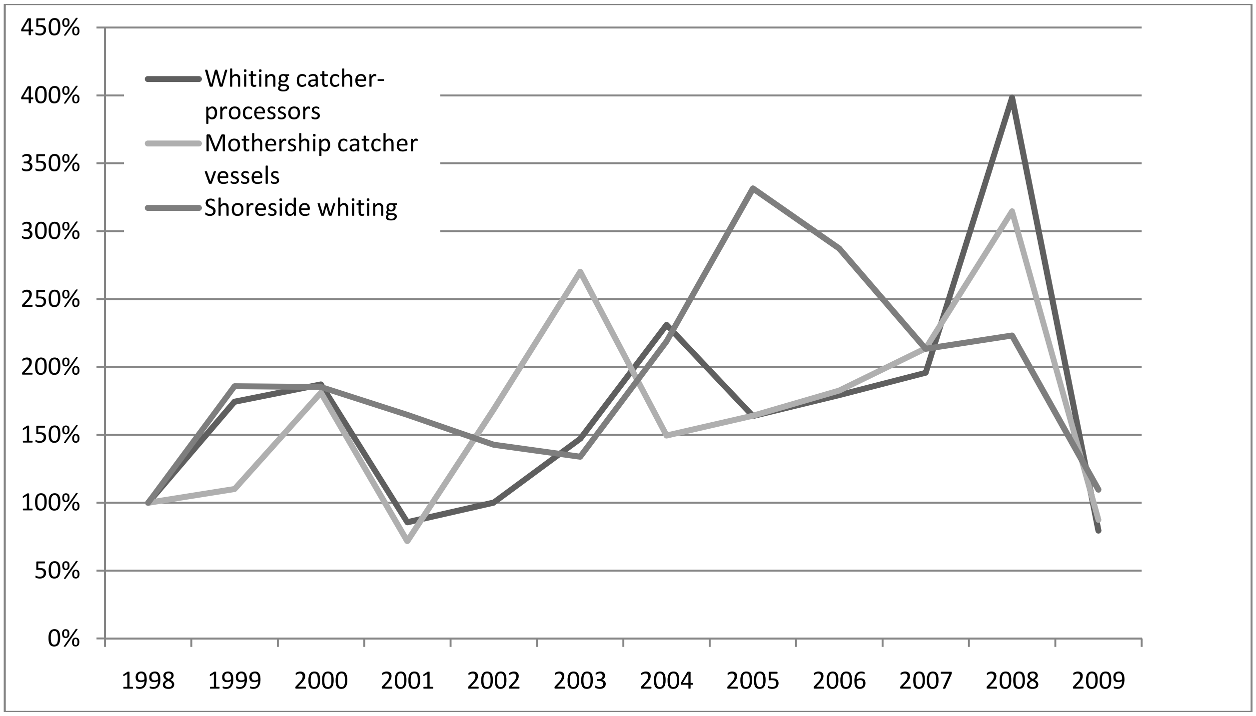


Figure 3-4. Change in median per-vessel ex-vessel revenue, whiting sectors, 1998-2009 (1998=100%), adjusted for inflation.

Figure 11 in Appendix F shows average monthly landings by the whiting sectors, 2005-2009. While the figure shows some variation among the sectors, during this period 60 percent of the catch occurred during May through July, with peak landings in June. However, catches can occur through December, although it is principally the catcher-processor sector making catches in the latter months.

3.2.2.3 Limited Entry Fixed Gear Sector

Section 5.2.5 of the 2008 SAFE and Section 3.8.1 of the Amendment 20 FEIS describe the characteristics of the limited entry fixed gear sector. Section 7.1.2.4 in the 2009-2010 Groundfish Harvest Specifications FEIS also describes this sector.

Management and Regulation

In 2001 Amendment 14 to the Groundfish FMP implemented a permit stacking program for limited entry fixed gear sector, which is a form of catch privilege. Section 3.3.3.2 in the Amendment 20 FEIS describes the features of this program. A sablefish-endorsed limited entry permit holder may acquire up to two additional permits.[20] Permits have an associated catch privilege according to the "tier" of the permit, allowing a vessel to harvest a specified amount of sablefish during the April to October primary season. Cumulative trip limits are used to manage landings of species other than sablefish during the primary season; outside of the primary season all species landings, including sablefish, are managed with cumulative trip limits. Sablefish trip limits outside the primary season are set according to the allocation of this species to the limited entry fixed gear sector.

[20] The sablefish permit endorsement was implemented under Amendment 9 to the Groundfish FMP in 1997 and is required to fish for sablefish during the primary season (April 1 to October 31).

Landings and Revenue

Figure 3-5 shows the change in average per-vessel revenue since 1998 for all vessels and the 35 top ranked vessels in terms of revenue. (A total of 344 vessels participated in the sector during this period so 35 is about 10 percent). The top earning vessels more than doubled their per-vessel ex-vessel revenue while the fleet as a whole saw a more modest increase in revenue. The per-vessel increases are at least in part due to the decline in participation, from 194 to 139 vessels during the period. In contrast to the open access fleet (see below), the relatively greater increase in top-ranked vessel revenue compared to the fleet as a whole suggests that the fleet as a whole is relatively efficient. Therefore, the decline in participation did not merely weed out under-performers, which would have shown a greater effect on per-vessel revenue for the fleet as a whole. Also, the top-ranked earners may have benefitted more from permit stacking, which was introduced in 2001, and is probably reflected in the decline in number of vessels shown in the figure as permits were stacked onto fewer vessels.

Figure 3-6 shows the species composition of limited entry fixed gear ex-vessel revenue based on information from 2005-2009. Sablefish is the most important species, comprising 84 percent of ex-vessel revenue, followed by thornyheads (most of which is shortspine thornyhead). Figure 3-7 breaks down the rockfish, excluding thornyheads, into finer species or species group categories. Almost half of rockfish revenue comes from slope rockfish. Black rockfish and other nearshore rockfish comprise another 36 percent. The vessels in the fleet likely pursue two strategies. One component, those with sablefish tier limits, fish on the continental slope, catching slope rockfish species as well. Other vessels, especially those without sablefish tier limits, fish inshore, specializing in rockfish. As shown in Table 3-, a greater proportion of these vessels are in the greater than 40 foot length categories compared to vessels in the open access fixed gear sector.

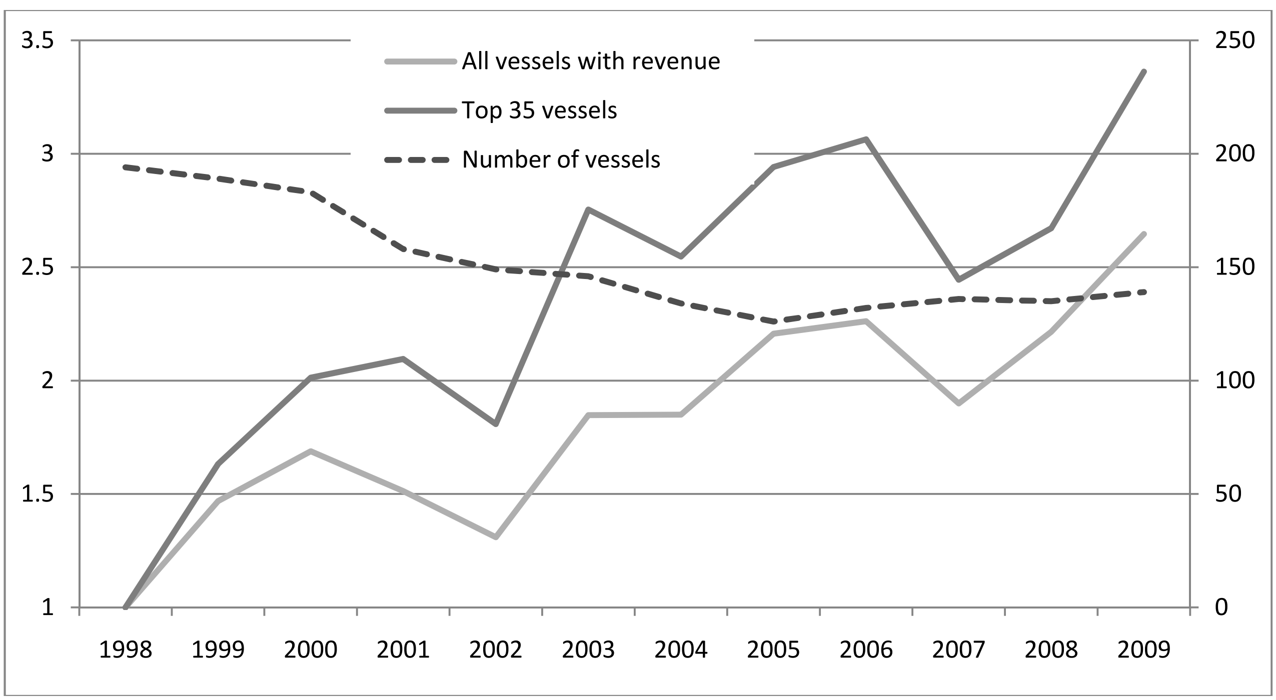


Figure 3-5. Change in average per-vessel ex-vessel revenue for all vessels and the top 35 earning vessels (1998=100, left axis), and participation (number of vessels, right axis) in the limited entry fixed gear sector, 1998-2009, adjusted for inflation.

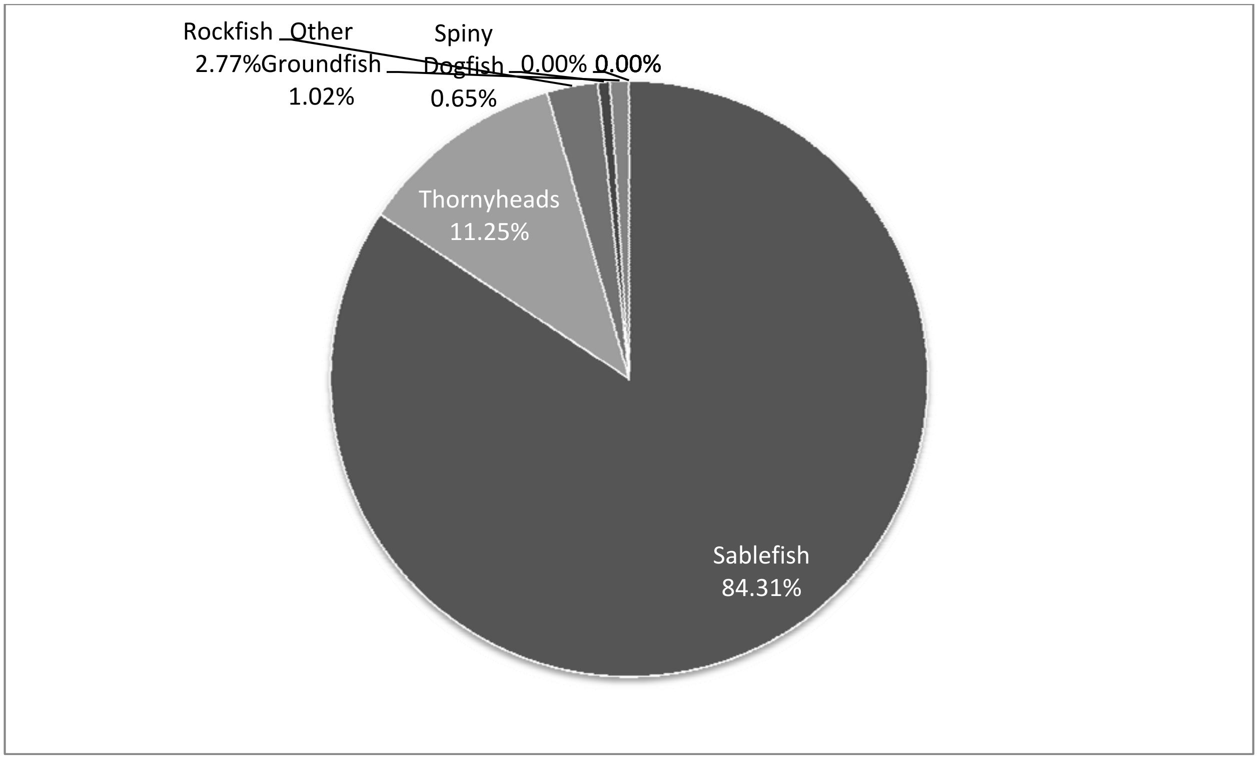


Figure 3-6. Composition of limited entry fixed gear ex-vessel revenue, average 2005-2009.

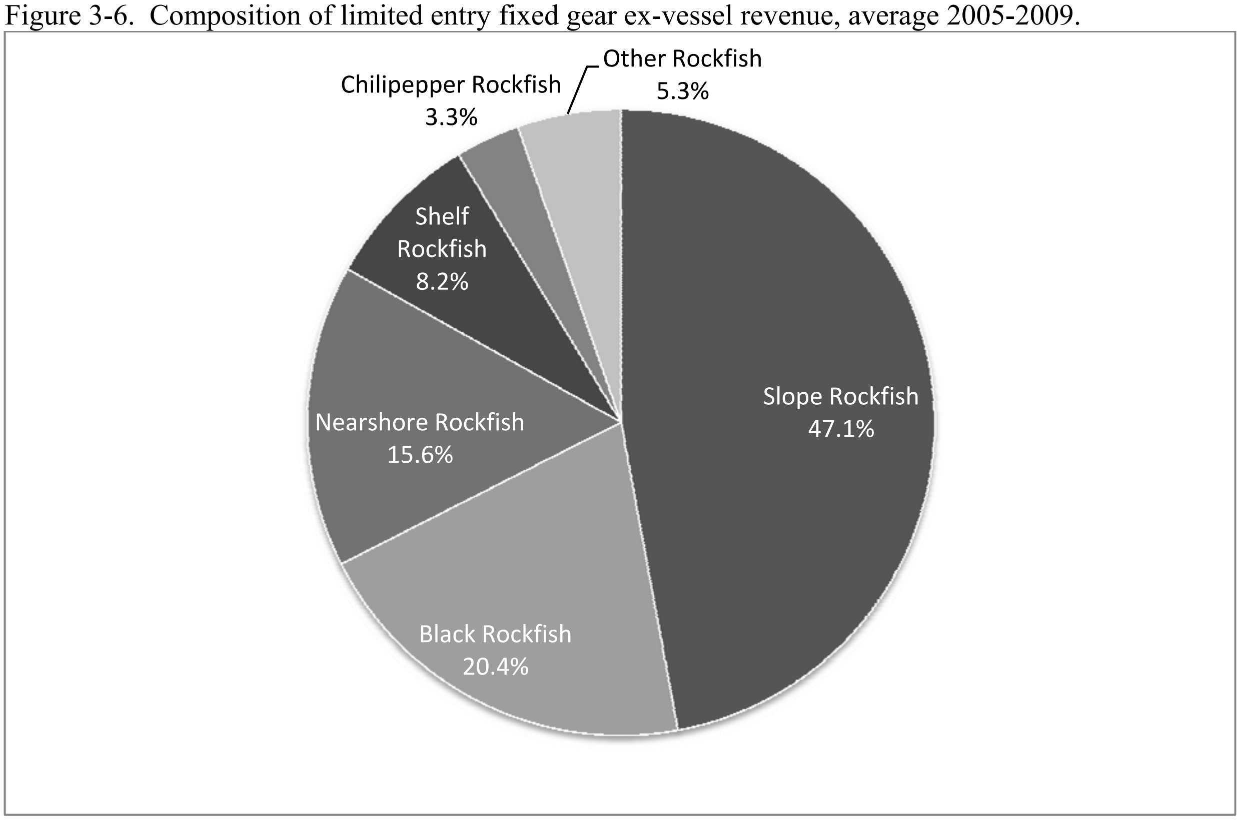


Figure 3-7. Composition of rockfish (excluding thornyheads) ex-vessel revenues by limited entry fixed gear sector, 2005-2009.

3.2.2.4 Open Access Fixed Gear

Section 5.2.6 in the 2008 SAFE describes the "open access" sector, which includes vessels primarily targeting sablefish with fixed gear, but not possessing a Federal groundfish limited access permit, and a range of other fisheries in which groundfish are caught incidentally. Because there is no permit-based distinction between target and incidental fisheries their classification is imputed from the composition of catch at the trip level. This also means there is an overlap in participation between the two sectors, which is reflected in the data used to compile the information in Appendix F. Looking at data since 2005 suggests about a 30 percent overlap in participation by vessels making at least one groundfish landing during the period. Section 7.1.2.5 of the 2009-2010 Groundfish Harvest Specifications FEIS describes the directed and incidental open access sectors.

Management and Regulation

As noted above, the label open access refers to the fact that these vessels do not possess a Federal permit with an endorsement for the gear being used, although they may possess other Federal or state limited access permits or endorsements. Vessels in this sector are subject to management measures implemented through the biennial process. Landings are regulated through trip limits. These vessels are also subject to the same RCAs as the limited entry fixed gear sector.

Landings and Revenue

Figure 3-8 show per-vessel ex-vessel revenue trends and participation for this sector. Like the limited entry fixed gear sector participation has declined, resulting in an increase in per-vessel average ex-vessel revenue for the fleet as a whole. Counter-intuitively, the top-ranked earners (in this case the top 100, approximately 10 percent of the total number of participating vessels) show little change in average revenue. When all vessels, including those with no revenue in a given year, are included in the average revenue calculation the trend line follows that of the top 100 earners rather closely. This suggests that the decline in participation represents attrition mainly of under-performers, which boosted average per-vessel revenue of remaining participants. The top earners are probably already relatively efficient compared to the fleet as a whole so this phenomenon would have relatively little effect on them. Overall, this indicates that the open access fixed gear fleet has been historically more heterogeneous in terms of performance compared to the limited entry fixed gear sector.

As with the limited entry fixed gear sector, sablefish is the most important component of revenue, although it accounts for a smaller proportion, just under half (Figure 3-9). Figure 3-10 breaks out the rockfish revenue, the next largest source after sablefish, into finer species categories. Nearshore rockfish is the largest component followed by black rockfish, reflecting the fact that these vessels infrequently fish out on the continental slope in comparison to the limited entry fixed gear sector. Vessels in this sector are generally smaller compared to the limited entry fixed gear sector. Table 3- shows that 77 percent of the vessels in this sector are in the under-40 feet category compared to 46 percent in the limited entry fixed gear sector.

Figure 3-11 shows the proportion of revenue in fixed gear fisheries (both limited entry and open access) derived from rockfish and sablefish since 1998. The proportion attributed to rockfish has declined substantially since 1998 while sablefish has become a larger proportion. Except for 2004 and 2007, since 2002 sablefish has represented a larger proportion of revenue compared to rockfish.

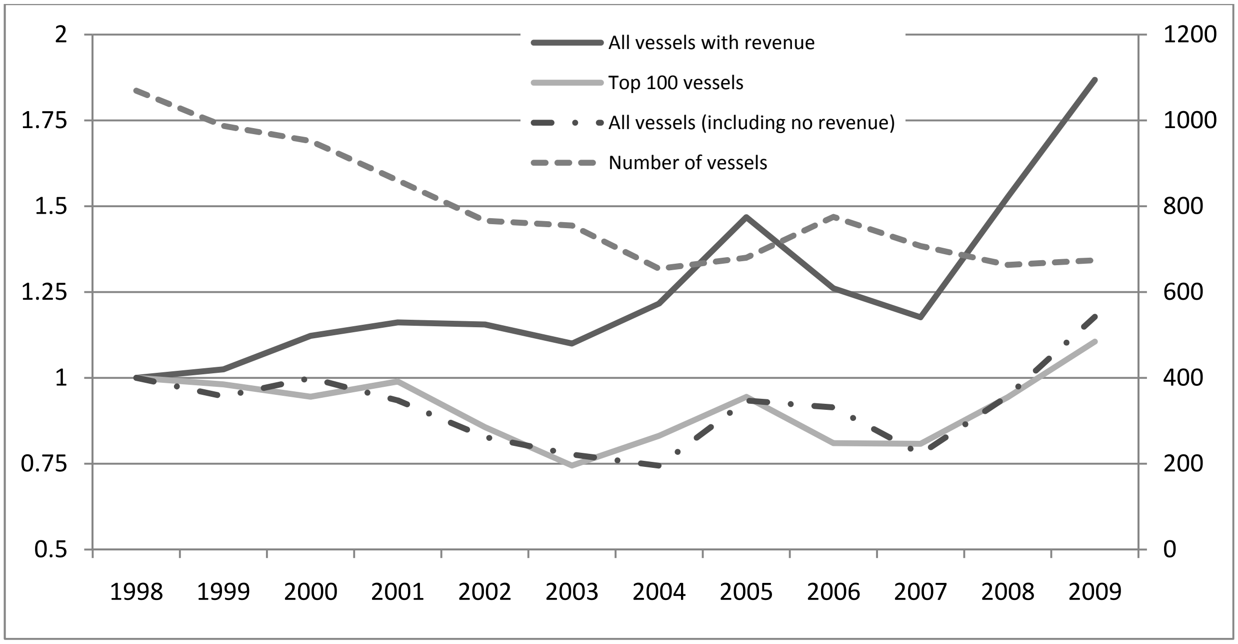


Figure 3-8. Ex-vessel revenue (1998=100, left axis) and participation (number of vessels, right axis), 1998-2009, in the open access fixed gear sector.

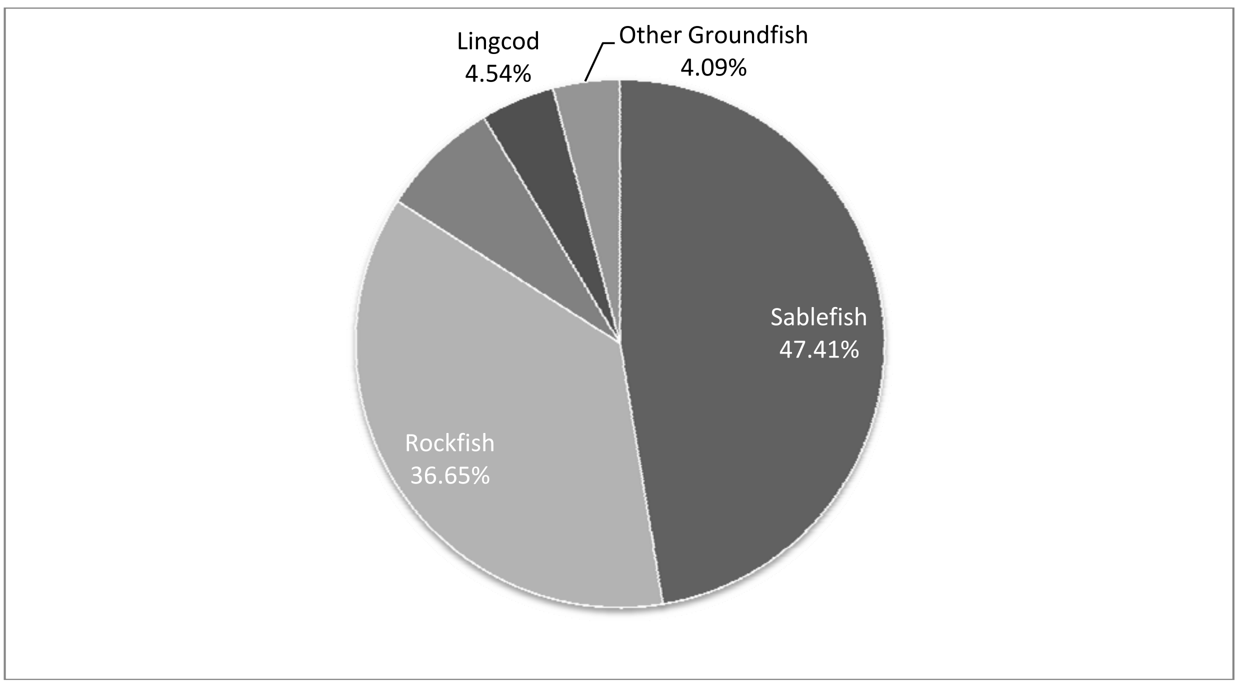


Figure 3-9. Composition of open access fixed gear ex-vessel revenue, 2005-2009.

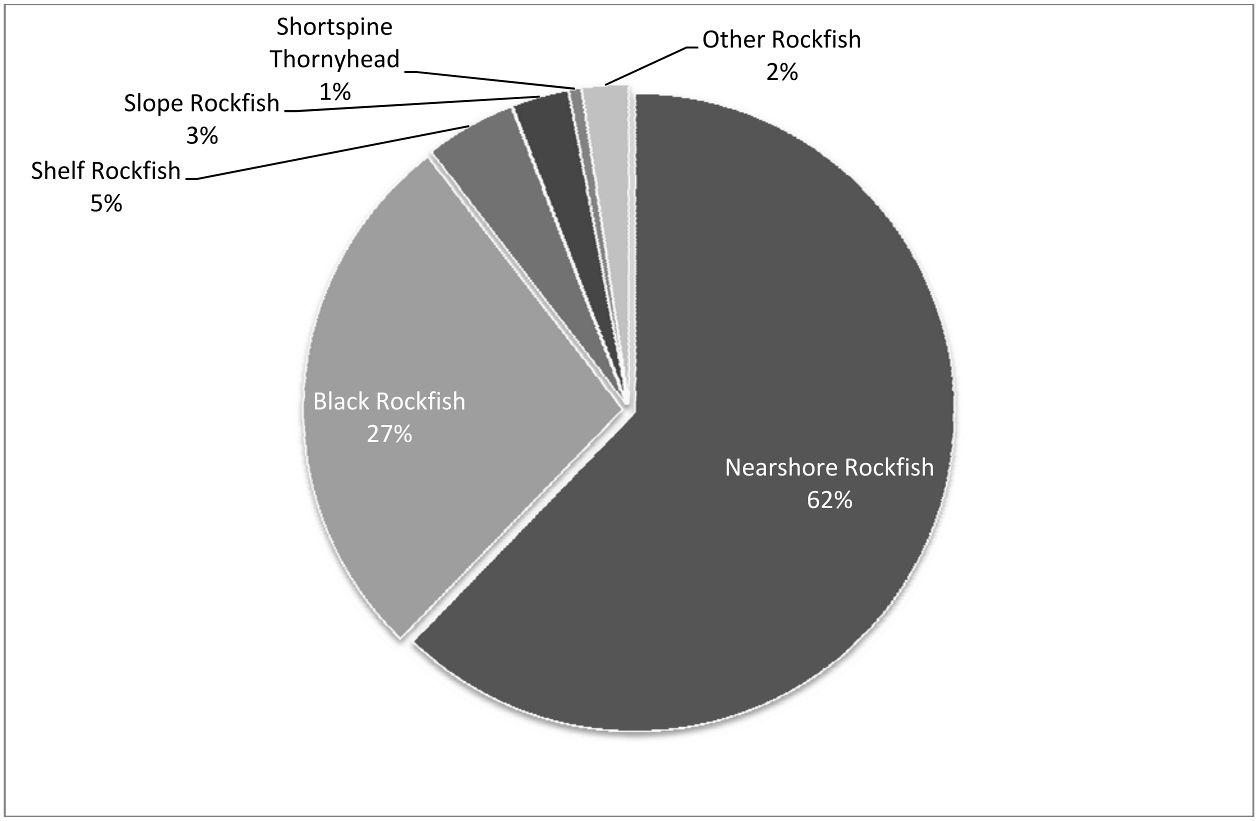


Figure 3-10. Composition of open access fixed gear rockfish ex-vessel revenue, 2005-2009.

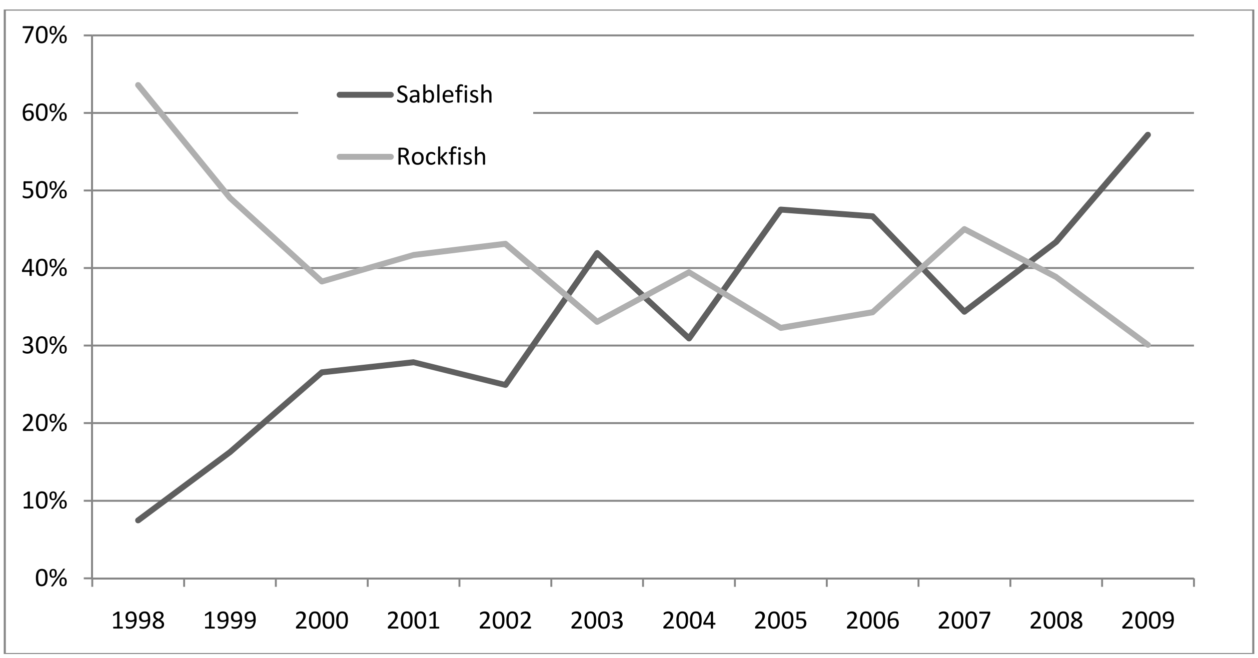


Figure 3-11. Percent of fixed gear (LE & OA) groundfish revenue coming from sablefish and rockfish, \$1,000s inflation adjusted (2009), 1998-2009.

3.2.2.5 Vessels Catching Groundfish Incidentally

Section 5.2.6 in the 2008 SAFE describes the open access groundfish sector, including fisheries that catch groundfish incidentally. As noted above, Section 7.1.2.5 of the 2009-2010 Groundfish Harvest Specifications FEIS describes both directed and incidental open access groundfish fisheries. A variety of fisheries may incidentally catch groundfish including so-called exempted trawl fisheries—pink shrimp, spot prawn, ridgeback prawn, and California halibut. As shown in Figure 3-12 hook-and-line is the most common gear type measured by revenue, followed by exempted trawl (California halibut, prawn and shrimp trawl) and non-trawl net gear.

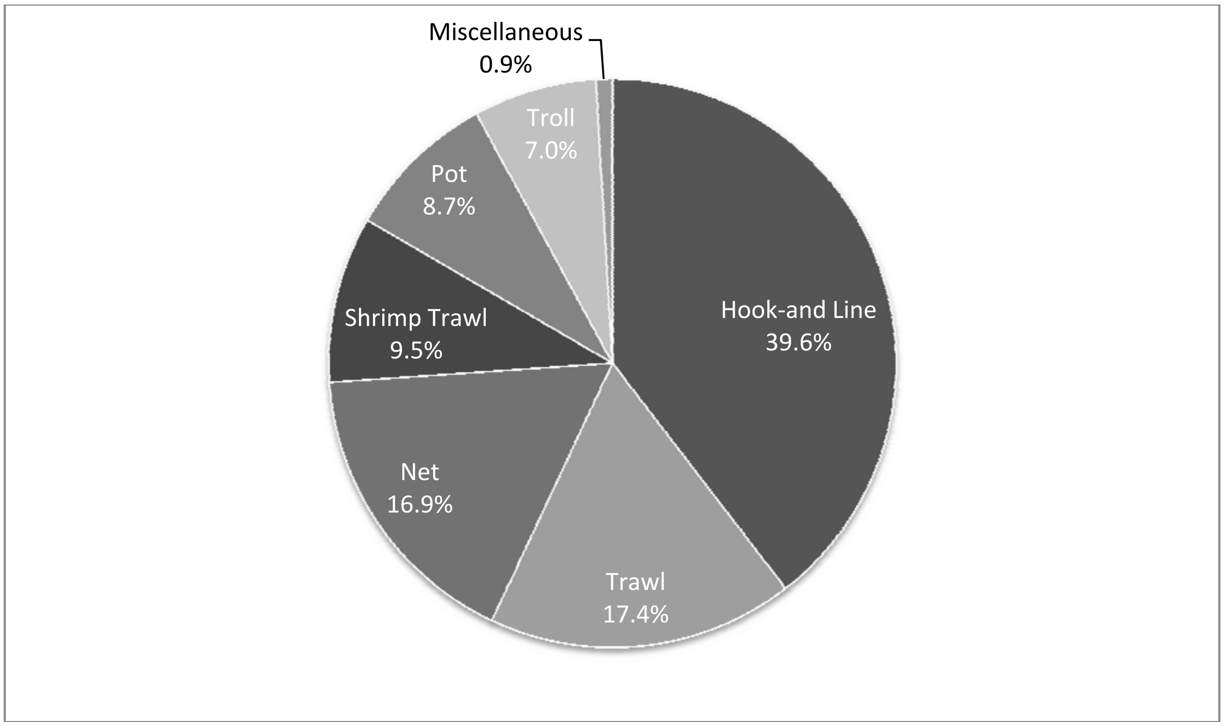


Figure 3-12. Distribution of gear type used by incidental open access vessels by revenue from groundfish, 2005-2009.

Management and Regulation

Vessels in this sector (often referred to as the "incidental open access sector,") are subject to the same trip limits and RCAs imposed on the directed open access sector. Special measures may apply to particular fisheries, such as pink shrimp and California halibut trawl.

Landings and Revenue

Since this sector is defined by the composition of landings rather than particular regulatory characteristics it includes non-specialist vessels that may target groundfish on particular trips (or during certain seasons) while also pursuing other fisheries. The net effect is that groundfish represent a less important part of their overall landings. Nonetheless, Figure 3-13 shows that the makeup of groundfish revenue sources by groundfish species resembles that of the other non-whiting groundfish sectors. The hook-and-line gear group (Figure 3-12) likely represents, at least in part, vessels targeting Pacific halibut that also occasionally target groundfish.

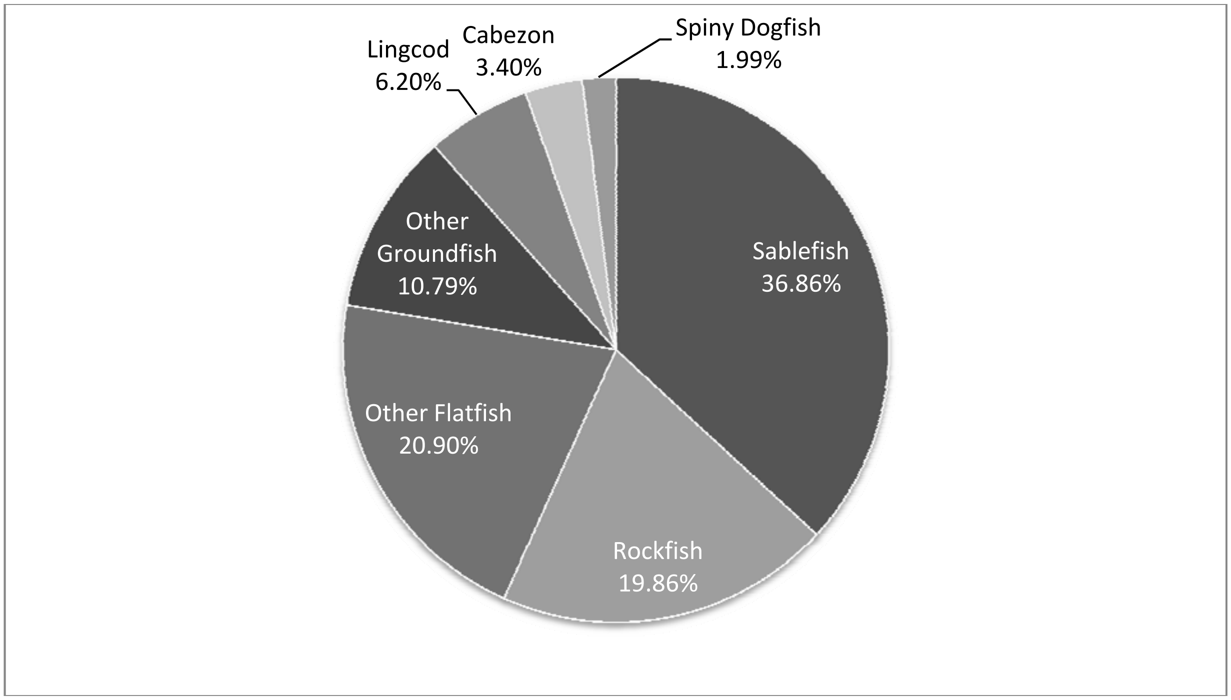


Figure 3-13. Composition of incidentally caught groundfish ex-vessel revenue, average 2005-2009.

3.2.2.6 Tribal Groundfish Fisheries

Section 5.2.7 of the 2008 SAFE document, Sections 2.2.1.1 and 7.2.6 of the 2009-2010 Groundfish Harvest Specifications FEIS, and Section 3.15 of the Amendment 20 FEIS describe tribal fisheries. Section 6.2.5 in the Groundfish FMP describes the special status of these fisheries. Several Pacific Northwest Indian tribes have treaty rights to fish for groundfish in their usual and accustomed fishing grounds. The Federal government has accommodated these fisheries through a regulatory process described at 50 CFR 660.324. Participants in the tribal commercial fisheries use similar gear to non-tribal fishers. Groundfish caught in the tribal commercial fishery pass through the same markets as non-tribal commercial groundfish catch.

Thirteen western Washington tribes possess and exercise treaty fishing rights to halibut, including the four tribes that possess treaty fishing rights to groundfish. Tribal halibut allocations are divided into a tribal commercial component and the year-round ceremonial and subsistence component.

In addition to hook-and-line fisheries, the Makah tribe annually harvests a whiting allocation using midwater trawl gear. Since 1996, a portion of the U.S. whiting OY has been allocated to the Pacific Coast treaty tribes (50 CFR 660.385(e)). The tribal allocation is subtracted from the whiting OY before allocation to the non-tribal sectors. Since 1999, the tribal allocation has been based on a sliding scale related to the U.S. whiting OY. To date, only the Makah tribe has conducted a whiting fishery. In 2009 both the Makah and Quileute Tribes anticipated participating in the fishery, but only Makah prosecuted a fishery. Changes to the allocation structure beginning in 2009 are discussed in more detail below.

In 2003, the landed catch OY of 148,000 mt resulted in a tribal allocation of 25,000 mt. In 2004, the landed catch OY was 250,000 mt with a tribal allocation of 32,500 mt. In 2005 and again in 2006, the

U.S. landed catch OY of 269,069 had a corresponding tribal allocation of 35,000 mt. In 2007, the U.S. OY of 242,591 mt resulted in a tribal allocation of 32,500 mt. In 2008 the U.S OY was 269,545 mt resulting in a tribal allocation of 35,000 mt.

Makah non-whiting vessels fit with mid-water trawl gear have also been targeting yellowtail rockfish in recent years. Tribal regulations specify the monthly limit of yellowtail, based on the number of vessels participating, as well as limits for canary rockfish (300 pounds per trip), and minor nearshore, shelf, and slope rockfish (300 pounds per trip combined) and interactions with widow rockfish (not to exceed 10 percent of yellowtail landings). This fishery is managed by both time and area to stay within projected impacts on overfished rockfish, primarily widow and canary, taken incidentally with yellowtail. Short test tows are taken in areas previously identified as having low bycatch rates before that area is open to fishing. If vessels in the fishery approach the limits established by tribal regulation, the area is closed to further fishing until it can be shown to have reduced bycatch rates. An observer program is in place to verify bycatch levels in the fishery, and assigned vessels must carry an observer to participate (see Appendix B).

Over the last several years, Makah fishermen have expressed interest in a targeted fishery for spiny dogfish using longline gear in addition to continued landings with bottom trawl. This fishery would be restricted by time and area to minimize interactions with overfished rockfish, particularly yelloweye, such that projected impacts would not increase. The Makah Tribe is also proposing an increase in the targeting of arrowtooth flounder (and possibly other flatfish species) with bottom trawl for 2011 and 2012 pending the results of a test fishery that may be conducted as early as 2010. The test fishery will examine bycatch rates of standard small-footrope gear compared to selective flatfish trawls both with and without Pacific halibut excluders. Halibut excluders will be designed to take advantage of dimensional size differences, behavior, or both in minimizing their bycatch.

Management and Regulation

Under treaty arrangements, tribes manage fisheries prosecuted by their members. Their management is coordinated through the Council process so catches can be accounted for when developing management measures. West coast treaty tribes in Washington State have formal allocations for sablefish, black rockfish, and Pacific whiting. For other species without formal allocations the tribes propose trip limits to the Council, which the Council tries to accommodate while ensuring that catch limits are not exceeded. Whether formally allocated or not, tribal catches are accounted through set asides, which are amounts taken “off the top” of the overall catch limit.

In instances of overfished species, where the harvestable surplus is estimated to be small or non-existent, there are usually no directed fisheries for that species. Conservation measures may be considered in other fisheries that impact the overfished species, while protecting the treaty rights to other groundfish in accordance with U.S. v. Washington. For Endangered Species Act listed stocks, the standards of Principle 3(C) (i.e., the ‘‘Conservation Necessity Principle’’) of the June 1997 Secretarial Order Number 3206 should be met before other restrictions apply. Species under rebuilding fall somewhere in between: they do not require the same level of restriction as endangered species act (ESA) listed species, but are also not allocated in the same manner as healthy target species. In these instances the tribes and the state of Washington acting as co-managers will enter more informal negotiations to determine acceptable levels of harvest by both tribal and non-tribal fisheries while rebuilding the species.

Ad hoc tribal/non-tribal allocations[21] under the No Action management regime have been worked out in the Council process. However, some of the lower ACL alternatives for overfished species, such as canary and yelloweye rockfish, may prompt formal government-to-government negotiations to resolve concerns regarding the need to protect the treaty right to other groundfish. Any unresolved issues over proper tribal and non-tribal allocations and the need to preserve treaty access to other species may then need to be resolved within the framework of the ongoing U.S. v. Washington case. This is an added step in the process of deciding revised rebuilding plans under the 2011-2012 harvest specifications and management measures. It is unclear how any delay in this allocation decision, if it occurs in the more formal *U.S. v. Washington* process, will affect final decisions on the actions contemplated in this EIS. Under the alternatives presented herein it is assumed that this formal negotiation will not occur prior to implementation, so there is only one action alternative based on the consensus proposal put forward by the coastal treaty tribes.

Approximately one-third of the tribal sablefish allocation is taken during an open competition fishery, in which vessels from the sablefish tribes all have access to this portion of the overall tribal sablefish allocation. The open competition portion of the allocation tends to be taken during the same period as the major tribal commercial halibut fisheries in March and April. The remaining two-thirds of the tribal sablefish allocation is split among the tribes according to a mutually agreed-upon allocation scheme. Specific sablefish allocations are managed by the individual tribes, beginning in March and lasting into the autumn, depending on vessel participation and management measures used. Participants in the halibut and sablefish fisheries tend to use hook-and-line gear, as required by the IPHC. By agreement the tribes also use snap gear for equity reasons in the fully competitive sablefish fishery (i.e., someone participating in a fully competitive sablefish fishery who landed no halibut would not have to meet any IPHC requirements, but would still have to use snap line gear by tribal regulation).

Landings and Revenue

Because Tribes have sovereign rights to manage their fisheries, the Tribal sectors do not have an equivalent regulatory dimension like the commercial sectors discussed above. These sectors have been identified more for data presentation purposes, although they do relate to target strategy.

The Makah Tribe participates in whiting fisheries with both a mothership and shore-based component. Figure 3-14 compares commercial and treaty whiting landings. On average the treaty fisheries have accounted for 14 percent of total whiting landings since 2005, generating about $4.3 million per year.

Table 3- 3-14 shows the distribution of revenue by gear type for the tribal non-whiting sector. This sector is defined by groundfish landings other than whiting and thus includes a variety of gear types. Hook-and-line gear represents by far the largest portion of average annual revenue for the 2005-2009 period at 65 percent, followed by bottom trawl at 17 percent. In terms of species composition characterized in terms of revenue from groundfish, sablefish accounts for almost 75 percent during the 2005-2009 period followed by rockfish at 13 percent. This is similar to the commercial non-whiting sectors (especially fixed gear) where sablefish is the most important component of revenues followed by rockfish.

Fleet size by tribe is depicted in Table 3-3-15. While all four Coastal Tribes have longline fleets, only Makah currently has a trawl fleet. Table 3-16 shows recorded landings of groundfish species by treaty tribes from 2004 to 2009, and Table 3-17 shows associated groundfish revenues for those same years.

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[21] Ad hoc tribal/non-tribal allocations exist for the overfished species and many target groundfish species. However, such allocations do not include those for sablefish and Pacific whiting, which are long-term allocations frameworked in the FMP and specified in Federal regulations.

Note that, beginning in 2008, the tribes have been using their own Treaty Online Catch Accounting System Treaty Online Catch Accounting System (TOCAS) database to record fish ticket landings. Since 1999, Pacific whiting have comprised the vast bulk of tribal landings. It is also worth noting that overall groundfish landings and revenue have reduced in recent years due to increasing restrictions designed to rebuild overfished rockfish. The Makah Tribe's trawl fleet has reduced from 10 vessels to 5 active (8 eligible) vessels due in part to reduced markets. Buyers in Neah Bay have reduced the number of trucks taking fish to processors since the Limited Entry trawl closure of the area shoreward of the RCA north of Cape Alava went into place.

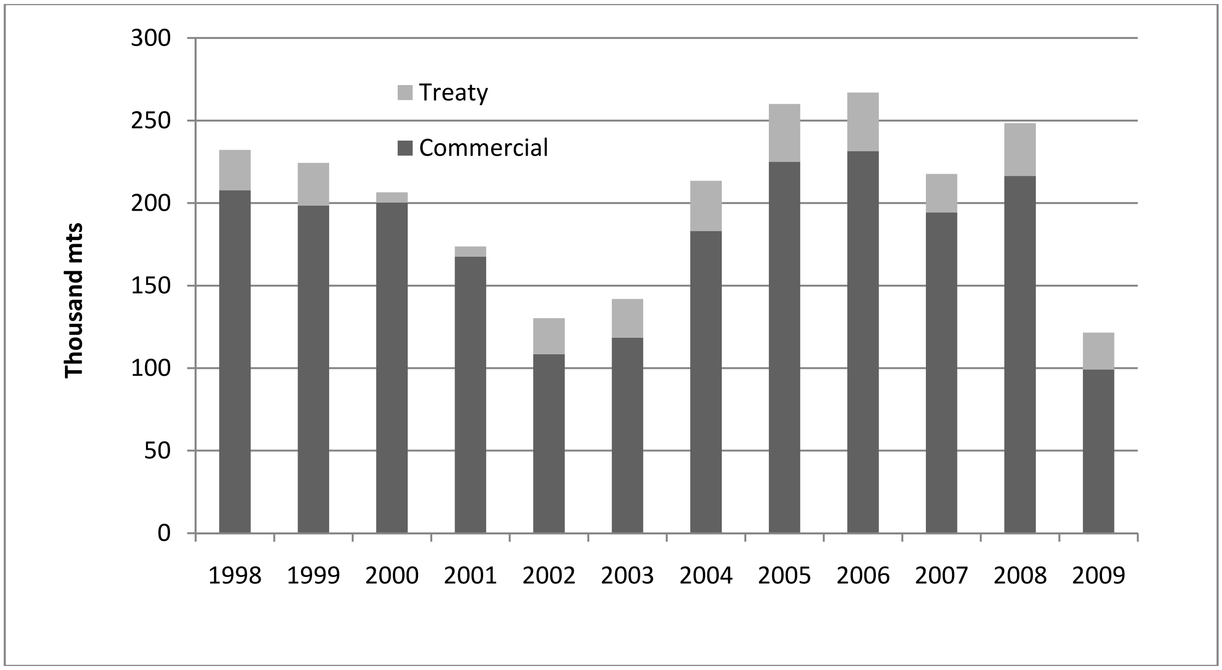

Figure 3-14. Commercial and Tribal whiting landings, thousand mt, 1998-2009.

Table 3-14. Groundfish revenue by gear type for the Tribal non-whiting shoreside sector, inflation adjusted (2009) $1,000s, 2005-2009.

Year	Hook-and-line	Net	Pot	Shrimp Trawl	Groundfish Trawl	Total
2005	$3,680	$0	$34	$1,096	$1,366	$6,176
2006	$3,606	$0	$581	$983	$874	$6,044
2007	$3,657	$0	$454	$660	$944	$5,716
2008	$4,289	$0	$559	$486	$864	$6,199
2009	$4,381	$0	$290	$156	$1,187	$6,015
Average	*$3,922.71*	*$0.10*	*$383.84*	*$676.25*	*$1,047.03*	*$6,029.94*

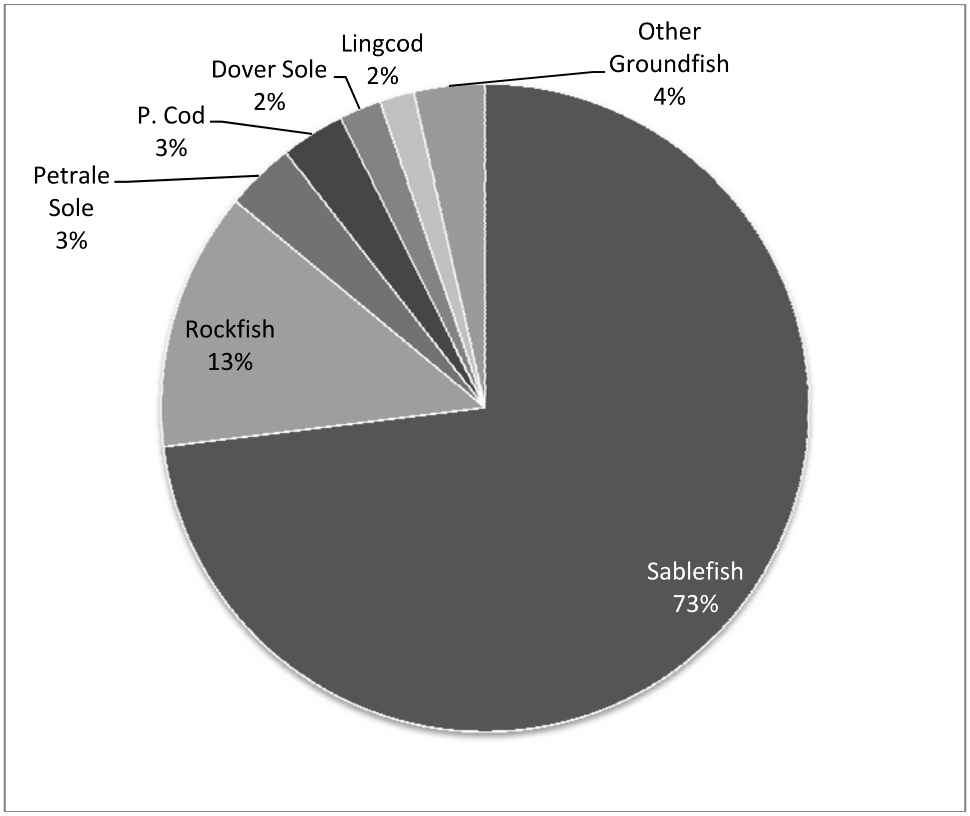

Figure 3-15. Distribution of groundfish ex-vessel revenue by species for the Tribal non-whiting sector, 2005-2009.

Table 3-15. Distribution of vessels engaged in Tribal groundfish fisheries.

Treaty Tribe	Number of Vessels in Groundfish Fishery				Port
	Longline (length in ft)	**Whiting (length in ft)**	**Trawl (length in ft)**	**Total**	
Makah	31 (33'-62')	5 (95'-124')	5 (49'-62')	45	Neah Bay
Hoh	0	-	-	0	N/A
Quileute	8 (45’-68’)	-	-	8	La Push
Quinault	15(38'-62')	-	-	15	West Port

Table 3-16. Recorded landings of groundfish in treaty fisheries taken from the PacFIN and TOCAS databases from 2004-2009.

Group	Species	2004	2005	2006	2007	2008	2009
Flatfish	ARROWTOOTH FLOUNDER	180,500	349,100	438,300	495,700	43,986	18,335
	DOVER SOLE	184,200	319,600	492,500	668,800	509,936	280,967
	ENGLISH SOLE	178,700	145,200	92,700	146,500	78,437	201,368
	PETRALE SOLE	185,400	65,400	58,200	99,100	96,797	153,131
	REX SOLE	15,100	30,200	45,400	49,200	80,913	63,423
	ROCK SOLE	5,400	5,100	2,500	7,100	6,134	1,457
	UNSP. FLATFISH	14,800	64,300	66,200	19,300	5,928	5,422
	UNSPECIFIED SANDDAB	800	2,600	17,500	30,600	420	26,007
	SAND SOLE	2,000	1,000	40	400		368
	STARRY FLOUNDER	5,000	2,800	100	1,100		11
	BUTTER SOLE			24			
Flatfish Total		771,900	985,300	1,213,464	1,517,800	822,551	750,489
Rockfish	BOCACCIO						
	NOM. BLACK ROCKFISH			100		35	
	NOM. CANARY ROCKFISH	6,800	9,500	6,400	3,200	7,711	16,983
	CANARY ROCKFISH						
	NOM. DARKBLOTCHED ROCKFISH	300	200	300	200		
	DARKBLOTCHED ROCKFISH						
	GREENSTRIPED ROCKFISH						
	PACIFIC OCEAN PERCH						
	REDBANDED ROCKFISH						
	REDSTRIPE ROCKFISH						
	ROUGHEYE ROCKFISH						
	ROSETHORN ROCKFISH						
	SHARPCHIN ROCKFISH						
	SILVERGREY ROCKFISH						
	UNSP. POP GROUP	8,500	7,500	6,300	4,500	1,288	382
	UNSP. ROCKFISH					10	1,854
	WIDOW ROCKFISH						
	NOM. WIDOW ROCKFISH	47,300	63,000	21,800	2,600	28,965	74,763
	NOM. YELLOWEYE ROCKFISH	1,700	1,800	1,100	1,000	535	574
	YELLOWEYE ROCKFISH						
	NOM. YELLOWTAIL ROCKFISH	775,300	1,195,200	378,800	163,100	408,200	976,526
	YELLOWTAIL ROCKFISH						
	Unsp. Shelf Rockfish	9,900	20,600	15,000	5,500	3,572	3,451
	Unsp. Near-Shore Rockfish	200	500	600	300	360	104
	Unsp. Slope Rockfish	50,300	63,300	63,100	70,200	43,048	80,074
	BLACKGILL ROCKFISH						
	SHORTRAKER ROCKFISH						
Rockfish Total		900,300	1,361,600	493,500	250,600	493,724	1,154,711
Other Groun	SPINY DOGFISH	88,300	13,100	169,300	249,300	200,276	65,019
	LINGCOD	52,500	65,900	99,000	104,900	137,735	83,424
	PACIFIC COD	678,300	272,800	78,500	100,000	58,416	324,331
	SABLEFISH	1,563,500	1,542,900	1,475,900	1,137,900	723,894	887,107
	UNSPECIFIED SKATE	19,400	51,600	85,700	123,700	103,497	88,248
	NOMINAL SHORTSPINE THORNYHEAD	14,200	23,800	47,400	84,800	79,773	67,623
	SHORTSPINE THORNYHEAD						
	NOMINAL LONGSPINE THORNYHEAD		400				
	WALLEYE POLLOCK	101,200	43,200	1,900	2,500	36	
Other Groundfish Total		2,517,400	2,013,700	1,957,700	1,803,100	1,303,627	1,515,751
	PACIFIC WHITING	63,157,381	75,743,442	78,133,229	66,528,214	70,342,172	49,341,153
TOTAL	All Groundfish Species	67,346,981	80,104,042	81,797,893	70,099,714	72,962,074	52,762,103

Table 3-17. Ex-vessel revenue from treaty fisheries taken from the PacFIN and TOCAS databases from 2004-2009.

Group	Species	2004	2005	2006	2007	2008	2009
Flatfish	ARROWTOOTH FLOUNDER	17,738	36,375	40,111	48,564	4,399	17,968
	DOVER SOLE	60,293	112,660	180,174	244,343	188,676	91,033
	ENGLISH SOLE	59,394	46,979	30,693	48,531	25,649	66,854
	PETRALE SOLE	191,978	66,263	61,407	105,891	97,184	140,268
	REX SOLE	5,250	12,641	15,898	17,216	27,591	20,993
	ROCK SOLE	1,823	1,744	768	2,486	2,208	516
	UNSP. FLATFISH	4,927	21,296	20,100	5,801	2,134	1,887
	UNSPECIFIED SANDDAB	263	667	6,152	10,990	110	8,374
	SAND SOLE	1,489	630	22	244	0	272
	STARRY FLOUNDER	1,591	854	34	370	0	4
	BUTTER SOLE			8		0	0
Flatfish Total		344,746	300,109	355,367	484,436	347,952	348,170
Rockfish	BOCACCIO					0	0
	NOM. BLACK ROCKFISH					0	0
	NOM. CANARY ROCKFISH	3,238	4,239	2,912	1,598	4,364	10,292
	CANARY ROCKFISH					0	0
	NOM. DARKBLOTCHED ROCKFISH	142	62	105	90	0	0
	DARKBLOTCHED ROCKFISH					0	0
	GREENSTRIPED ROCKFISH					0	0
	PACIFIC OCEAN PERCH					0	0
	REDBANDED ROCKFISH					0	0
	REDSTRIPE ROCKFISH					0	0
	ROUGHEYE ROCKFISH					0	0
	ROSETHORN ROCKFISH					0	0
	SHARPCHIN ROCKFISH					0	0
	SILVERGREY ROCKFISH					0	0
	UNSP. POP GROUP	3,852	3,445	3,945	1,927	741	177
	UNSP. ROCKFISH					4	1,205
	WIDOW ROCKFISH					0	0
	NOM. WIDOW ROCKFISH	22,618	29,949	10,757	1,146	13,005	27,064
	NOM. YELLOWEYE ROCKFISH	1,790	1,876	1,042	1,094	395	389
	YELLOWEYE ROCKFISH					0	0
	NOM. YELLOWTAIL ROCKFISH	368,860	569,781	179,024	77,415	180,833	397,446
	YELLOWTAIL ROCKFISH					0	0
	Unsp. Shelf Rockfish	3,907	8,323	6,500	2,537	1,779	1,746
	Unsp. Near-Shore Rockfish	103	248	297	151	198	58
	Unsp. Slope Rockfish	22,479	27,835	28,872	35,257	23,806	37,635
	BLACKGILL ROCKFISH					0	0
	SHORTRAKER ROCKFISH					0	0
Rockfish Total		426,989	645,758	233,454	121,215	225,125	476,011
Other Groundfish	SPINY DOGFISH	14,994	2,120	29,723	37,872	39,054	10,338
	LINGCOD	34,335	44,537	75,339	84,129	108,260	65,988
	PACIFIC COD	307,518	123,505	42,225	54,775	38,730	155,030
	SABLEFISH	2,476,945	2,440,889	2,638,997	2,435,147	1,683,777	2,223,090
	UNSPECIFIED SKATE	2,014	6,896	12,256	20,090	22,562	15,708
	NOMINAL SHORTSPINE THORNYHEAD	11,408	15,647	31,976	64,631	60,787	34,826
	SHORTSPINE THORNYHEAD					0	0
	NOMINAL LONGSPINE THORNYHEAD		258			0	0
	WALLEYE POLLOCK	14,021	6,277	441	380	5	0
Other Groundfish Total		2,861,235	2,640,129	2,830,957	2,697,024	1,953,176	2,504,980
	PACIFIC WHITING	1,894,721	3,787,172	4,687,994	4,656,975	7,526,612	2,763,105
TOTAL	All Groundfish Species	5,527,691	7,373,168	8,107,772	7,959,650	10,052,864	6,092,265
	Non-whiting groundfish	3,632,970	3,585,996	3,419,778	3,302,675	2,526,252	3,329,161

3.2.3 Recreational Fisheries

Section 7.1.3 of the 2009-2010 Groundfish Harvest Specifications FEIS describes west coast recreational fisheries. Recreational fisheries are an important part of fishery-related economic activity. Table 3-18 shows recreational angler trips (combing both charter and private) by region and the percent of those trips that were for bottomfish, a proxy for groundfish. Figure 3-16 displays angler trips by state and year, 2005-2009; participation has declined modestly over the time period. Table 3-18 provides counts of charter vessels. The totals are substantially lower than what was reported for 2005 (PFMC 2008a, Table 7-37), when the coastwide total was 524. However, this discrepancy represents a difference in the method of enumeration, as the numbers in Table 3-19 reflect only those charter vessels participating in groundfish trips. Information provided in previous groundfish harvest specifications EISs demonstrates the seasonality of recreational fishing. As would be expected, participation is higher during warmer months. Figure 3-17 uses information presented in previous EISs to highlight this seasonality. The number of marine angler trips peaks in the July-August period, but the seasonal concentration is more pronounced in northern areas. For example, Washington State saw no trips recorded in November-December and 36 percent of trips were in July-August, while in Southern California the proportions for the same periods were 12 percent and 30 percent, respectively.

Table 3-18. Recreational angler trips, charter and private combined, and percent of trips for groundfish (bottomfish), 2007-2009. (Source: GMT state reps.)

Region	2007	2008	2009
Washington - Total Trips	130,659	95,352	163,728
Washington - %Groundfish	16.6%	21.8%	10.8%
La Push-Neah Bay - Total Trips	20,820	15,400	21,298
La Push-Neah Bay - %Groundfish	23.6%	27.7%	19.5%
Westport - Total Trips	45,944	37,547	55,299
Westport - %Groundfish	33.6%	39.0%	22.6%
Ilwaco-Chinook - Total Trips	63,895	41,496	87,131
Ilwaco-Chinook - %Groundfish	2.0%	3.4%	1.1%
Other Location - Total Trips		909	
Other Location - %Groundfish		53.7%	
Oregon - Total Trips	190,230	133,624	186,553
Oregon - %Groundfish	35.0%	54.1%	38.5%
Astoria - Total Trips	14,115	5,545	12,972
Astoria - %Groundfish	1.5%	5.3%	1.7%
Tillamook - Total Trips	34,336	24,089	34,621
Tillamook - %Groundfish	24.6%	42.3%	22.4%
Newport - Total Trips	67,659	51,595	70,581
Newport - %Groundfish	39.5%	55.5%	38.4%
Coos Bay - Total Trips	40,518	24,986	34,598
Coos Bay - %Groundfish	27.8%	47.0%	34.6%
Brookings - Total Trips	33,602	27,409	33,781
Brookings - %Groundfish	59.6%	78.0%	73.4%
California - Total Trips	1,012,702	815,553	865,765
California - %Groundfish	50.8%	59.8%	65.5%
North Coast: Humboldt and Del Norte - Total Trips	45,380	24,133	45,766
North Coast: Humboldt and Del Norte - %Groundfish	42.7%	79.3%	72.0%
North-Central Coast: Sonoma and Mendocino - Total Trips	27,419	10,321	16,080
North-Central Coast: Sonoma and Mendocino - %Groundfish	42.5%	93.2%	94.2%
North-Central Coast: San Mateo through Marin - Total Trips	118,418	91,333	99,419
North-Central Coast: San Mateo through Marin - %Groundfish	39.9%	44.4%	48.9%
South-Central Coast: San Luis Obispo through Santa Cruz - Total Trips	123,418	75,722	87,128
South-Central Coast: San Luis Obispo through Santa Cruz - %Groundfish	55.7%	83.9%	78.4%
South Coast: Ventura and Santa Barbara - Total Trips	79,782	77,495	55,558
South Coast: Ventura and Santa Barbara - %Groundfish	67.5%	71.9%	75.5%
South Coast: San Diego through Los Angeles - Total Trips	618,284	536,550	561,813
South Coast: San Diego through Los Angeles - %Groundfish	50.7%	55.7%	64.0%
Grand Total - Total Trips	1,333,591	1,044,530	1,216,046
Grand Total - %Groundfish	45.2%	55.6%	54.0%

Table 3-19. Average number of charter vessels involved in groundfish trips by region, 2008-2009.

Region	2008	2009
Washington Total	**78**	**78**
La Push-Neah Bay	15	15
Westport	35	35
Ilwaco-Chinook	28	28
Oregon Total	**82**	**82**
Astoria	13	13
Tillamook	13	13
Newport	30	30
Coos Bay	16	16
Brookings	10	10
California Total	**108**	**113**
North Coast: Humboldt and Del Norte	5	8
North-Central Coast: Sonoma and Mendocino	12	11
North-Central Coast: San Mateo through Marin	26	31
South-Central Coast: San Luis Obispo through Santa Cruz	17	15
South Coast: Ventura and Santa Barbara	17	17
South Coast: San Diego through Los Angeles	31	31
Washington-Oregon-California Totals	**268**	**273**

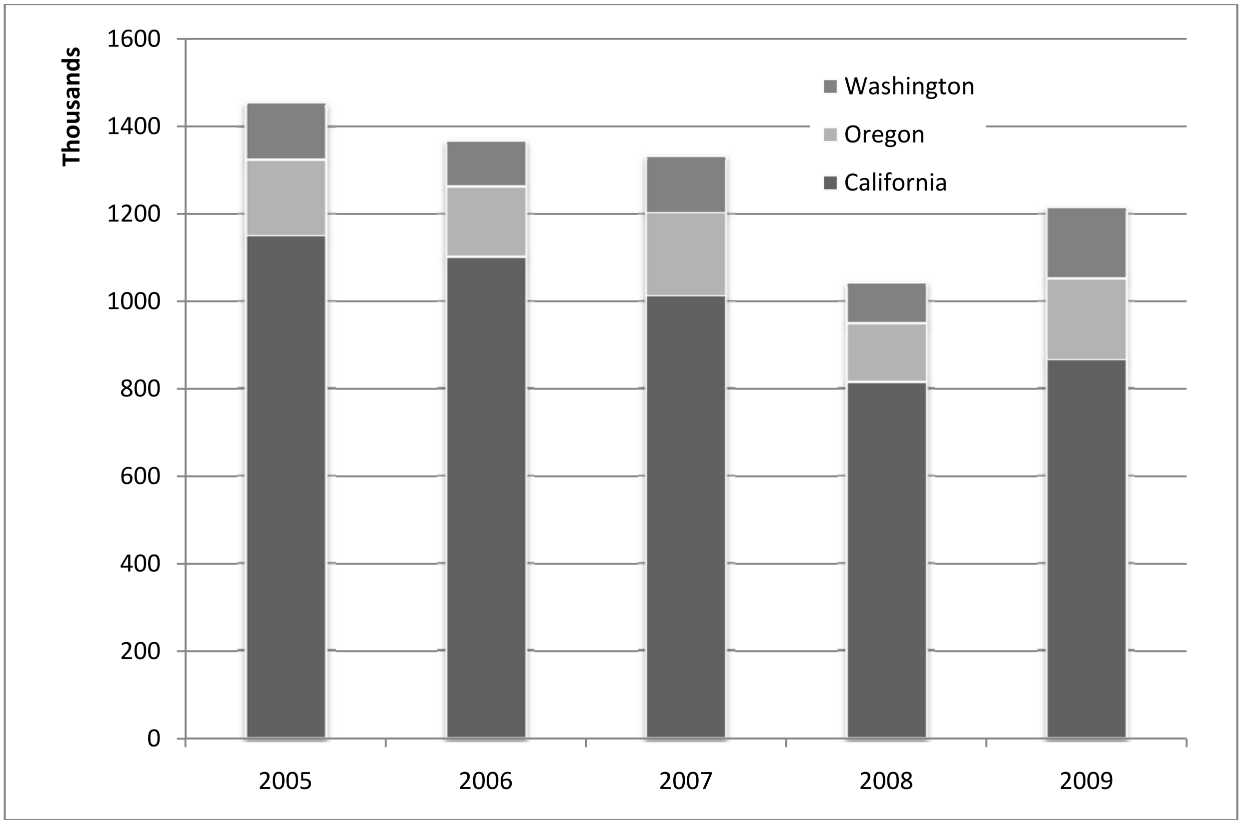

Figure 3-16. Total angler trips by state, 2005-2009.

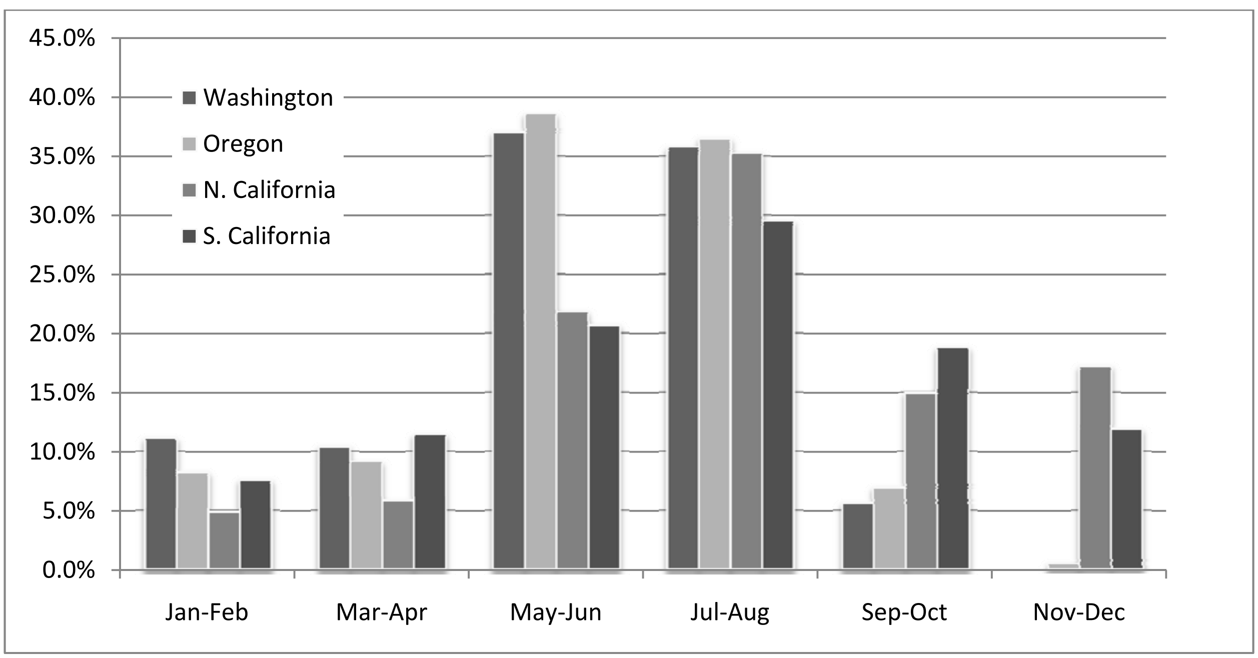

Figure 3-17. Seasonal distribution of marine angler trips in 2003. (Source: PFMC 2004b)

3.2.4 Communities

The effects of fishery management action on coastal communities is an important consideration for several reasons. First, MSA National Standard 8 states that conservation and management measures shall take into account the importance of fishery resources to fishing communities in order to provide for sustained participation and to the extent practicable minimize adverse economic impacts to affected communities. Rebuilding overfished groundfish stocks has also been a central concern and the MSA highlights the tradeoff between stock rebuilding and socioeconomic impacts in Section 304(e)(4)(A). This section states that a rebuilding plan shall specify a time for rebuilding to "be as short as possible" taking into account (among other factors) "the needs of fishing communities."

Documents prepared by the Council and NMFS related to groundfish fishery management actions have included detailed information characterizing west coast fishing communities. The following sources are incorporated by reference:

- Section 8.0 in Appendix A to the 2005-2006 Groundfish Harvest Specifications FEIS (PFMC 2004b, Appendix A) includes a detailed analysis of 2000 Census data to characterize west coast fishing communities. It includes summary descriptions of port infrastructure and community demographics at a regional level. Updated demographic information, based on 2006 data from the U.S. Census Bureau's Population Estimates Program is included in the 2008 Groundfish SAFE.
- Section A.4 in Appendix A to the 2007-2008 Groundfish Harvest Specification FEIS (PFMC 2006, Appendix A) includes an analysis to identify west coast fishing communities that may be more vulnerable to adverse socioeconomic impacts. This analysis rated communities according to their engagement in fishing, dependence on groundfish fisheries, and socioeconomic resiliency. An update of this analysis was prepared in conjunction with the current 2010-2011 Groundfish Harvest Specifications EIS. This update is documented in Appendix E.
- Section 3.14 of the Amendment 20 FEIS includes a description of west coast communities, including the results of an analysis of various characteristics related to potential effects of the proposed action, implementation of IFQs and co-ops for trawl fishery sectors.
- A 2007 National Oceanic & Atmospheric Administration (NOAA) Technical Memorandum profiles social characteristics of west coast fishing communities (Norman, *et al.* 2007).

3.2.4.1 Processors and Other Fishery-related Infrastructure

Section 3.9 of the Amendment 20 FEIS describes shoreside processors of trawl groundfish. A more general description of processors is included in Section 5.3 in the 2008 Groundfish SAFE.

Although PacFIN data includes a processor identification code, in practice these are "first receivers," which in addition to processing facilities at the landing site may include buyers that transport fish to other processing facilities located in other ports or away from the coast, restaurant buyers, and others who may do little or no actual processing of the fish before selling into retail markets. At the extreme in this regard is the live fish market, discussed below.

Information in the 2008 SAFE document demonstrates consolidation and concentration in the west coast seafood processing sector. Based on 2004-2005 landings data, the three largest processing companies accounted for 78 percent of all groundfish purchases, while the next three largest accounted for an additional 12 percent.

Section 3.9.3 in the Amendment 20 FEIS contains an analysis of product flows among processing centers. As appropriate, information from this analysis is referenced in the description of fishing communities below.

The live fish fishery principally involves small vessels fishing in nearshore waters. Live groundfish landings averaged 565 mt annually, 2005-2009, or about a half a percent of coastwide groundfish landings (excluding at-sea whiting). Figure 3-18 shows the distribution of these landings by port and species. The fishery is confined to southern Oregon and California with Brookings, Oregon accounting for the largest share among ports. Rockfish and thornyheads comprise the largest share of landings by species.

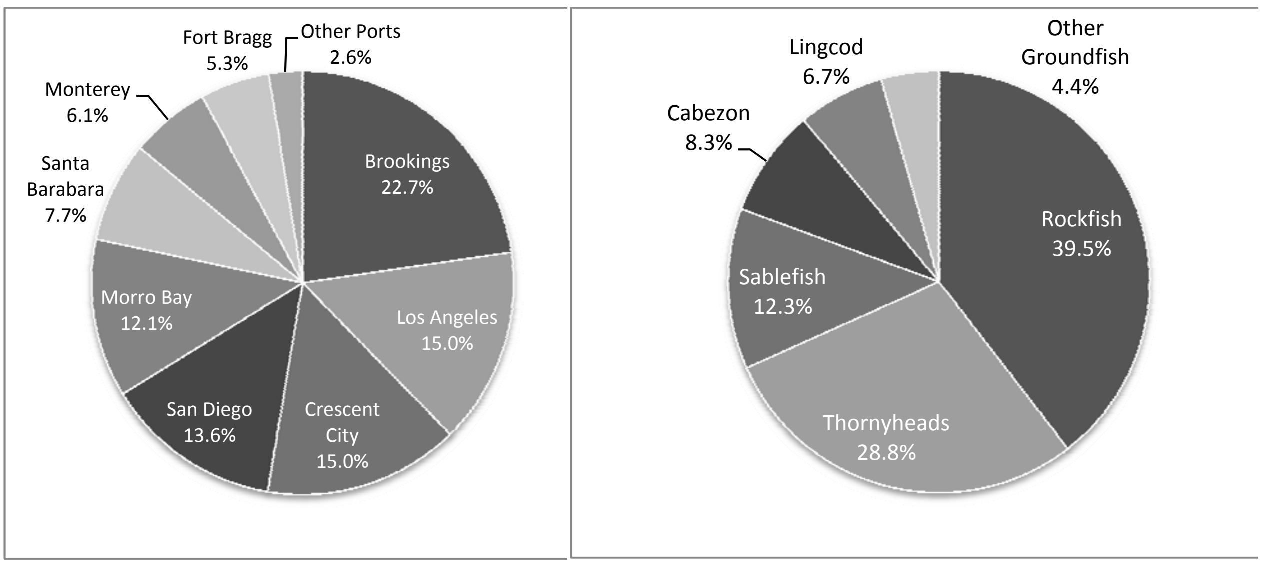

Figure 3-18. Distribution of live groundfish landings, 2005-2009, by port (left) and species (right).

3.2.4.2 Port Group Areas

The unit of analysis for the evaluation of community level impacts is the port group area. Port group areas are regional entities encompassing one or more counties and the ports within them as they are coded in the PacFIN database. The IO-Pac model used to estimate changes in personal income resulting from management actions ("income impacts") uses these port group areas. (See Appendix D for documentation of this model.) By the same token, landings estimates from various fishery-based projection models are mapped to port group areas based on recent landings patterns. For analyzing community impacts of the 2001-2012 groundfish specifications landings patterns for 2009 were used for this purpose. These landings and ex-vessel revenue projections estimated by species, port group area and gear sector constitute the input to the IO Pac model. Community demographic estimates produced by the U.S. Census Bureau between decennial censuses are generally available only at the county level.

Table 3-288 and Figure 3-21 show the constituent ports and counties comprising each port group area.

Tables listed below provide information from various sources to characterize port group areas:

- Table 3-22 shows the "primary sector" for the port group area, using PacFIN revenue data to identify which sector accounted for the largest portion of ex-vessel groundfish revenue, 2005-2009 (the actual value is shown in parenthesis). It summarizes the vulnerability analysis by showing the number of counties rated vulnerable or most vulnerable within the region. It pulls ratings from the Amendment 20 EIS port comparative advantage model on factors related to trawl rationalization, but which are also relevant to the effects of 2011-2012 management measures. It also shows relative standing of ports with respect to "potential QP revenue."[22]
- Table 3-2323 shows the importance of various sectors within port group areas from a coastwide and within port perspective. Coastwide importance is based on the rank of the port group area relative to all other port groups in terms of ex-vessel revenue from the sector. In-port importance is based on the rank of the port in terms of the percentage of landings from groundfish sectors in that port due to the sector. Values in parenthesis show the actual percent of groundfish landings from that sector relative to either coastwide or within port revenues.
- Table 3-2424 shows the percentage of the population for various minorities and the rank of the port group area relative to these statistics. This information is relevant to environmental justice considerations as required by executive order (EO) 12898. Table 3-26 shows the poverty rate in port group areas based on U.S. Census Bureau American Community Survey 3-year (2006-2008) Table B17001.
- Table 3-5 provides supplemental information on the distribution of ex-vessel revenue by sector and port group area.

In addition, the updated vulnerability analysis described in Appendix E contains additional data related to community engagement in fisheries and dependence on groundfish fisheries.

Based on the information on these tables and from sources incorporated by reference as described above, the port group areas are briefly characterized below.

Overview: Change in Ex-vessel Revenue in Port Groups

Table 3-20 shows the change in ex-vessel groundfish revenue by port group area and state for two time periods, the longer term (1998-2009) and the recent past (2004-2009). (Note: revenue from the at-sea whiting fisheries are not included but tribal fishery revenue is included.) Figure 3-19 shows the annual trends graphically. Ex-vessel revenue fell substantially from 2000 to 2002; however, since 2004 coastwide revenue grew by 25 percent. Over the longer period coastwide groundfish revenue fell by 3.6 percent. However, this masks considerable variability at the state and port group level. Over the longer period gains in Washington and Oregon did not quite balance out the substantial drop in revenue in California. Newport showed the biggest gain in revenue among port groups over the longer period at $1.9 million, while Monterey showed the biggest decline at $2.7 million. However, during the more

[22] Potential QP revenue was calculated based on an assessment of the principal port of vessels associated with trawl limited access permits and the expected initial allocation of quota shares to these permits. Based on the trawl sector allocations under the preliminary preferred alternative and recent average prices by species category, potential revenue from the quota pounds that could be assigned to vessels associated with the ports was calculated. That this is potential revenue cannot be over-emphasized, because there are many factors that could cause quota pounds to be landed in other ports and regions. In addition, because of both potential bycatch and market constraints, actual landings may not take the full allocation for a given species.

recent 2004-2009 period, California and Oregon saw big gains in revenue in percentage terms while Washington experienced a modest decline. While most other port groups showed gains, revenue in Monterey continued to decline. Newport and Astoria showed the largest gains in revenue during the 2004-2009 period. According to the data in Table 3-3 these recent changes are likely driven by growth in non-whiting tribal fisheries and commercial fixed gear fisheries, likely driven by price increases for fixed gear caught sablefish.

Table 3-21. shows information on the change in ex-vessel revenue from landings of all species for the same period, 1998-2009. At this broader scale, ex-vessel revenue has grown by 41 percent coastwide. All Washington and Oregon port groups saw gains. In California several ports had declines in revenue even though the state as a whole had a 25 percent gain. Bodega Bay, San Francisco, Monterey, and Morro Bay experienced declines in both groundfish revenue and overall revenue. Other California ports with declines in groundfish revenue had increases in overall revenue for the 1998-2009 period.

Table 3-20. Change in inflation adjusted ex-vessel revenue from groundfish, $1,000s, by port group area, 1998-2009 and 2004-2009.

	Change 1998-2009		Change 2004-2009	
Port Group Area	**$1,000s**	**Percent**	**$1,000s**	**Percent**
Puget Sound	-333	-11.3%	-1,788	-40.6%
North Washington Coast	1,677	57.8%	181	4.1%
South and Central WA Coast	1,415	36.3%	556	11.7%
Unidentified WA	775	115.5%	879	155.1%
Washington Subtotal	**3,534**	**33.9%**	**-171**	**-1.2%**
Astoria	-348	-3.1%	2,268	26.0%
Tillamook	44	30.5%	-38	-16.8%
Newport	1,949	24.0%	2,233	28.5%
Coos Bay	-556	-8.4%	1,948	47.0%
Brookings	1,506	49.5%	2,522	124.4%
Oregon Subtotal	**2,595**	**8.9%**	**8,932**	**38.9%**
Crescent City	-1,489	-38.4%	1,172	96.4%
Eureka	-826	-16.2%	1,163	37.4%
Fort Bragg	126	3.2%	1,389	50.9%
Bodega Bay	-1,549	-85.7%	115	81.2%
San Francisco	-1,533	-51.3%	-491	-25.2%
Monterey	-2,684	-67.5%	-698	-35.0%
Morro Bay	-352	-8.6%	1,458	64.2%
Santa Barbara	-452	-37.6%	243	47.9%
Los Angeles	-71	-6.8%	-301	-23.7%
San Diego	238	51.1%	420	148.5%
California Subtotal	**-8,592**	**-30.1%**	**4,470**	**28.9%**
Coastwide Total	**-2,462**	**-3.6%**	**13,231**	**25.2%**

Table 3-21. Change in inflation adjusted ex-vessel revenue from all species, $1,000s, 1998-2009.

Port Group Area	$1,000	Percent
Puget Sound	$640	12.7%
North Washington Coast	$2,202	41.1%
South and Central WA Coast	$16,662	54.4%
Unidentified WA	$6,605	409.6%
Washington Subtotal	**$26,108**	**61.3%**
Astoria	$6,449	28.4%
Tillamook	$1,353	94.6%
Newport	$12,665	69.0%
Coos Bay	$11,743	96.7%
Brookings	$3,911	49.3%
Oregon Subtotal	**$36,120**	**57.7%**
Crescent City	$3,487	24.7%
Eureka	$1,812	13.8%
Fort Bragg	-$447	-5.7%
Bodega Bay	-$5,865	-76.9%
San Francisco	-$5,049	-36.1%
Monterey	-$2,180	-24.1%
Morro Bay	-$3,308	-40.2%
Santa Barbara	$31,368	172.7%
Los Angeles	$9,853	45.5%
San Diego	$551	10.0%
Unidentified CA	-$129	-63.3%
California Subtotal	**$30,093**	**25.2%**
Coastwide Total	**$92,321**	**41.1%**

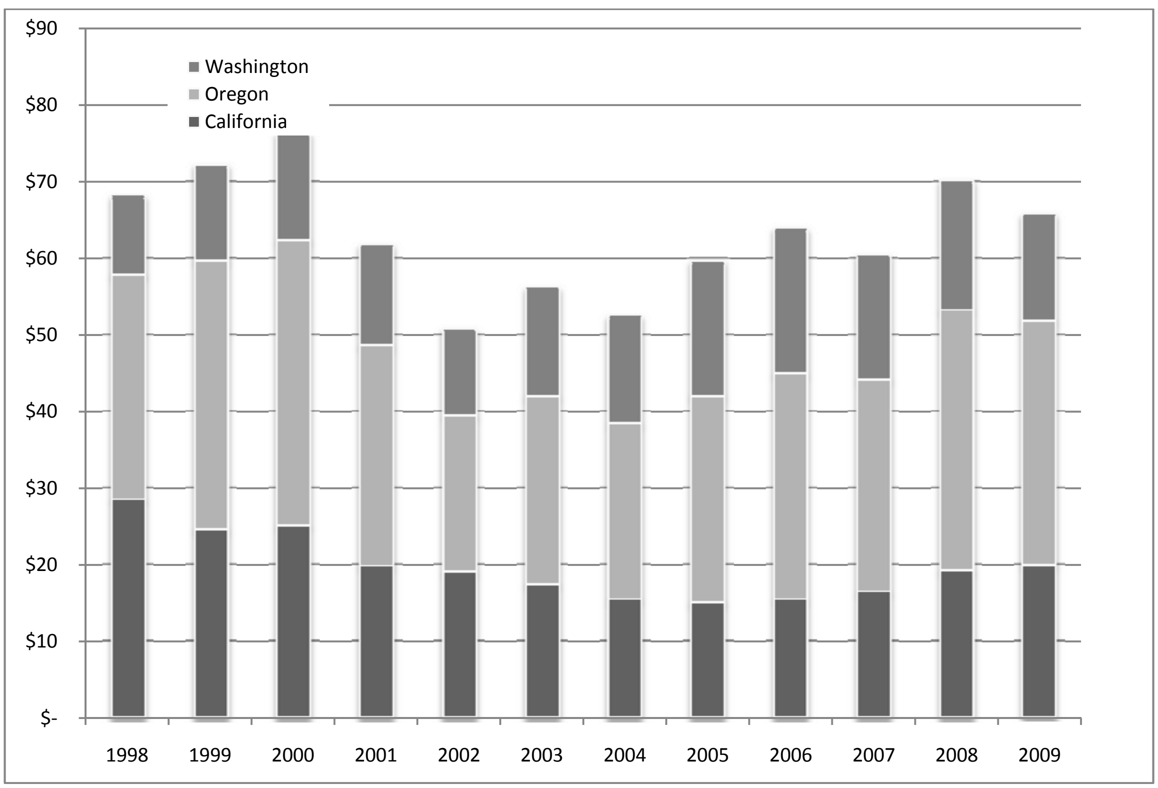

Figure 3-19. Change in groundfish ex-vessel revenue, inflation adjusted $millions, by state, 1998-2009.

Puget Sound

The main groundfish ports in Puget Sound are Bellingham, Anacortes, and Seattle. Bellingham is an important processing center for groundfish. According to the product flow analysis in the Amendment 20 FEIS a large proportion of fish landed in the port is processed locally and fish is also imported from other ports for processing. Anacortes and Seattle are mainly important for whiting sectors. Seattle is a major entrepôt for both Alaska and west coast fisheries. Information in Table 3-23 suggests that Puget Sound is an important center across groundfish fishery sectors, although non-whiting groundfish trawl may be considered the primary sector based on share of revenue. The region is relatively urbanized and thus benefits from a strong infrastructure base to support fisheries. However, non-whiting groundfish trawl fisheries based in the region fish in relatively high bycatch areas, a disadvantage, which under trawl rationalization could cause some activity to shift to other areas through the transfer of quota pounds and ultimately quota share. This area ranks as medium in terms of potential QP revenue compared to other port group areas.

In 2009 Puget Sound had $2.6 million in ex-vessel revenue from groundfish, 4.4 percent of the coastwide total, ranking ninth among port group areas.

The updated community vulnerability analysis did not rate any of the counties in the region as vulnerable. However, the 2006 vulnerability analysis, which made assessments at the port level (using 2000 census data) rated Bellingham as a vulnerable port. It has a relatively large Hispanic or nonwhite population in relation to the other port group areas. The 2006-2008 poverty rate was 10 percent, ranking it sixteenth among the port group areas.

North Washington Coast

Neah Bay is an important groundfish port in this region. It is also the main settlement of the Makah Indian Reservation. For that reason the primary sector is tribal non-whiting. The region is relatively unimportant for nontribal commercial groundfish sectors, except for fixed gear. The region is largely rural and thus is at a disadvantage in terms of infrastructure. There is little or no local processing of groundfish and landings are transported to other processing centers, such as Westport, Washington and Astoria, Oregon. Like Puget Sound, adjacent fishing grounds are rated relatively high in terms of potential bycatch of overfished species. It is also ranked relatively disadvantaged in terms of fleet efficiency, a factor in groundfish trawl fleet consolidation resulting from the transition to IFQ management.[23] Comparatively less potential QP revenue may be realized in this region both because of initial allocation of quota shares and its relative disadvantages.

The La Push-Neah Bay region accounted for 1.6 percent of west coast recreational angler trips during the 2007-2009 period (Table 3-18). Slightly less than a quarter of the trips were groundfish directed.

In 2009 the North Washington Coast had $1.1 million in ex-vessel revenue from groundfish, 1.9 percent of the coastwide total, ranking thirteenth among port group areas.

Although not rated vulnerable in the updated vulnerability analysis both Neah Bay and Clallam County were rated as vulnerable in the 2006 analysis. (The updated analysis ranked the region medium for engagement, dependence, and resiliency.) The region ranks relatively high in terms of Native American population but not for other nonwhite racial groups or Hispanics. The 2006-2008 poverty rate was 14 percent, ranking it ninth among the port group areas.

[23] Relatively less efficient vessels are more likely to leave the fishery with associated quota transferred to more efficient operators.

South and Central Washington Coast

Westport and Ilwaco are the main groundfish ports in this region. Shoreside whiting is the principal sector, although other groundfish sectors are also important. Westport and Ilwaco are considered to have reasonably good infrastructure supporting fisheries. Ilwaco is an important processing center, particularly for Pacific whiting. Adjacent fishing grounds are at a disadvantage in terms of bycatch, although not as much as off the northern portion of the Washington coast. Like the North Washington Coast, the groundfish trawl fleet is at a relative disadvantage in terms of efficiency.

The Westport and Ilwaco-Chinook regions accounted for 9.3 percent of west coast recreational trips during the 2007-2009 period. In Westport a little less than a third of the trips were groundfish-directed; in Ilwaco-Chinook only about 2 percent were.

In 2009 South and Central Washington Coast had $4.3 million in ex-vessel revenue from groundfish, 7.1 percent of the coastwide total, ranking fifth among port group areas.

Both Grays Harbor and Pacific Counties are rated as vulnerable in the updated vulnerability analysis. The 2006 analysis rated these two counties as most vulnerable and rated both Westport and Ilwaco as vulnerable. The region is similar demographically to the North Washington Coast with almost the same proportion of nonwhite population and a relatively high Native American population. The 2006-2008 poverty rate was 15.6 percent, ranking it sixth among the port group areas.

Astoria-Tillamook

Although Astoria and Tillamook are separate port group areas they are described together, because Tillamook is relatively minor in terms of groundfish fisheries. Astoria and nearby Warrenton are the main groundfish ports in this region. They are also major groundfish processing centers coastwide, processing the large volume of fish landed locally and also fish trucked in from other ports. Non-whiting groundfish trawl is the most important sector in the Astoria region, making up 67 percent of recent revenue. This port group area also ranks first in terms of share of coastwide revenue from non-whiting trawl, accounting for almost a quarter in recent years. Shoreside whiting is also an important sector. Here it ranks second in terms of coastwide revenue share. Fixed gear sectors are important in Tillamook. Astoria is at an advantage in terms of trawl rationalization based on rating in the comparative advantage model and ranks high in terms of potential QP revenue.

The Astoria and Tillamook regions accounted for 3.5 percent of west coast angler trips during the 2007-2009 period. As in the Ilwaco-Chinook region groundfish trips account for a small proportion of trips in the Astoria region; because of the proximity to the mouth of the Columbia River salmon fishing takes on greater significance.

In 2009 Astoria had $11 million in ex-vessel revenue from groundfish, 18.4 percent of the coastwide total, ranking first among port group areas. Tillamook had $188,000 in revenues, 0.3 percent of the coastwide total, ranking eighteenth.

The updated vulnerability analysis rated Tillamook County as vulnerable while the 2006 analysis rated Clatsop County and Astoria as vulnerable. These areas have the lowest proportion of nonwhite or Hispanic population of all port group areas. The 2006-2008 poverty rate for Astoria was 12.2 percent, ranking it twelfth among the port group areas. Tillamook ranked third with a poverty rate of 17.6 percent.

Newport

Along with Astoria, the port of Newport makes the north Oregon coast the most important region for trawl groundfish. Although there are other ports in the region, they are relatively unimportant in terms of groundfish fisheries. Non-whiting trawl comprises 40.9 percent of total ex-vessel revenue in the port although other groundfish sectors are also important. Newport has a high level of local processing and also processes fish landed elsewhere. Like Astoria, Newport is relatively advantaged in terms the potential effects of trawl rationalization and ranks high in terms of potential QP revenue.

The Newport region accounted for 5.3 percent of west coast angler trips during the 2007-2009 period and 44 percent were groundfish directed.

In 2009 Newport had $10.1 million in ex-vessel revenue from groundfish, 16.8 percent of the coastwide total, ranking second among port group areas.

Both the updated vulnerability analysis and the 2006 analysis rated Lincoln County as most vulnerable. The 2006 analysis also rated Newport municipality as vulnerable. The region ranks sixth in terms of the proportion of the population that is Native American but has relatively small proportion of nonwhite or Hispanic population in comparison to other port group areas. The 2006-2008 poverty rate was 16.8 percent, ranking it fourth among the port group areas.

Coos Bay

The port for Coos Bay is the unincorporated area of Charleston, located near the municipality of Coos Bay. Non-whiting trawl revenue is an important component of ex-vessel groundfish revenue at 73 percent of the total. While the lion's share of shoreside whiting revenue is attributed to the South Washington Coast, Astoria, and Newport, it is modestly important in Coos Bay. The area ranks relatively high on a coastwide basis for fixed gear groundfish revenue but it is a less important component of the port's groundfish revenues. Coos Bay is the major processing center on the southern Oregon coast. Coos Bay also rates at a relative advantage in terms of trawl rationalization and ranks high in terms of potential QP revenue.

The Coos Bay region accounted for 2.8 percent of west coast angler trips during the 2007-2009 period and 35 percent were groundfish directed.

In 2009 Coos Bay had $6.1 million in ex-vessel revenue from groundfish, 10.2 percent of the coastwide total, ranking third among port group areas.

The updated vulnerability analysis rates Coos County vulnerable; the 2006 analysis rated it most vulnerable. The 2006 analysis also rated Coos Bay municipality vulnerable. The area has a relatively low proportion of nonwhite or Hispanic population. The 2006-2008 poverty rate was 15.2 percent, ranking it eighth among the port group areas.

Brookings

The Brookings port group area also includes Port Orford and Gold Beach. Although non-whiting trawl is identified as the primary fishery in Brookings according to ex-vessel revenue, fixed gear sectors are also an important component. As discussed above, a significant portion of live groundfish landings occur in the Brookings port group area, a component of the fixed gear fishery. There is no local groundfish processing in Brookings. Brookings may see modest benefit from trawl rationalization as the proportion of potential QP revenue is comparatively low for this port but it has a relatively efficient trawl fleet and adjacent fishing grounds are more advantageous in terms of avoiding overfished species bycatch.

The Brookings region accounted for 2.6 percent of west coast angler trips during the 2007-2009 period and 70 percent were groundfish directed.

In 2009 Brookings had $4.5 million in ex-vessel revenue from groundfish, 7.6 percent of the coastwide total, ranking fourth among port group areas.

Curry County is rated vulnerable in the updated vulnerability analysis and the 2006 analysis. However, the port of Brookings was not rated vulnerable in the 2006 analysis. Like Coos Bay, Brookings has a low proportion of Hispanic or nonwhite population. The 2006-2008 poverty rate was 15.3 percent, ranking it seventh among port group areas.

Crescent City

In addition to non-whiting trawl, fixed gear fisheries are an important source of revenue for Crescent City. It also has modest amounts of revenue from shoreside whiting. Like Brookings, Crescent City is an important center for the groundfish live fish fishery but also does little or no local processing of groundfish. It is also similar in terms of the potential effects of trawl rationalization; a comparatively small portion of potential QP revenue is associated with Crescent City and its fleet efficiency was rated disadvantageous.

The Humboldt-Del Norte region accounted for 3.2 percent of west coast angler trips during the 2007-2009 period and 62 percent were groundfish directed. Note that this marine recreational region encompasses both Crescent City and Eureka, discussed below.

In 2009 Crescent City had $2.4 million in ex-vessel revenue from groundfish, 4.0 percent of the coastwide total, ranking tenth among port group areas.

The vulnerability analysis update rated Del Norte County as most vulnerable while the 2006 analysis rated both Del Norte County and Crescent City municipality as vulnerable. This port group area ranks first among the port groups in terms of the percent of the population that is Native American. It has the highest poverty rate of all the port group areas at 20.3 percent.

Eureka – Fort Bragg – Bodega Bay

The main port groups for groundfish on the northern California coast are Eureka and Fort Bragg. They rank fourth and fifth respectively in terms of coastwide share of recent ex-vessel revenue from non-whiting trawl. Shoreside whiting landings occur in Eureka but not Fort Bragg. Bodega Bay accounts for a very small share of coastwide groundfish trawl and fixed gear revenue, and no shoreside whiting revenue is recorded south of Eureka for the 2005-2009 period. Fixed gear groundfish fisheries are also important in Fort Bragg. Both Eureka and Fort Bragg are important processing centers for trawl-caught groundfish according to the analysis of processing centers and product flow in Section 3.9.3 of the Amendment 20 FEIS. Eureka rates well in terms of the comparative advantage factors assessed in the Amendment 20 FEIS and has a relatively high proportion of potential QP revenue. Fort Bragg is less advantaged with respect to trawl rationalization.

The Sonoma-Mendocino region accounted for 1.5 percent of west coast angler trips during the 2007-2009 period and 68 percent were groundfish directed.

In 2009 Eureka had $4.2 million in ex-vessel revenue from groundfish and Fort Bragg had $4.1 million, each port area accounting for 6.9 percent of the coastwide total resulting in them ranking sixth and seventh respectively. Bodega Bay had $257,000 in ex-vessel revenue from groundfish in 2009, less than 1 percent of the coastwide share, ranking it second to last among port groups, just above Tillamook.

The updated community vulnerability analysis rated Humboldt County (Eureka) vulnerable and the 2006 analysis rated it most vulnerable. Mendocino County (Fort Bragg) was rated most vulnerable in both analyses. The 2006 analysis rated both Eureka and Fort Bragg municipalities as vulnerable. Eureka ranks second coastwide in terms of poverty rate, at 18.4 percent, and sixth in terms of the proportion of the population that is nonwhite or Hispanic. Fort Bragg ranks sixth in terms of the poverty rate while Bodega Bay has the lowest poverty rate among port groups at 9 percent.

San Francisco – Monterey – Morro Bay

San Francisco is, of course, a major west coast city and traditionally an important center for commercial and recreational fisheries reflected in the city's famed Fishermen's Wharf district. These port areas mark the southern extent of the groundfish trawl fishery; collectively they account for about 10.5 percent of coastwide non-whiting trawl revenues for the 2005-2009 period. Shoreside whiting is generally absent although small amounts have been landed in the Monterey area. These port areas also account for a modest amount of coastwide fixed gear revenue. In San Francisco and Monterey non-whiting groundfish trawl still accounts for the largest share of revenues, while in Morro Bay fixed gear accounts for 65 percent of recent groundfish revenues. San Francisco is a processing center while other processing centers in Central California such as San Jose, Watsonville, Atascadoro are inland. Processing also occurs in the ports of Moss Landing and Monterey. With respect to trawl rationalization, the comparative advantage analysis in the Amendment 20 FEIS shows a mixed picture for these port areas: San Francisco and Monterey rate poorly in terms of potential bycatch issues in adjacent fishing grounds and also poorly in terms of the efficiency of trawl vessels delivering to these ports. Overall, a medium proportion of potential QP revenue is associated with these port areas.

The San Mateo-Marin region accounted for 8.6 percent of west coast angler trips during the 2007-2009 period and 44 percent were groundfish directed. The San Luis Obispo - Santa Cruz region accounted for 8 percent of trips, 70 percent of which were groundfish directed.

Of these three port areas Morro Bay shows the largest proportion of 2009 coastwide groundfish revenue at $3.7 million, or 6.2 percent, ranking it eighth coastwide. San Francisco and Monterey landings earned $1.5 million and 1.3 million respectively, together amounting to 4.6 percent of the coastwide total, placing them eleventh and twelfth overall.

No counties south of Mendocino were rated vulnerable in the updated analysis while the 2006 analysis rated Mendocino vulnerable. San Francisco has the second lowest poverty rate among the port areas at 9.6 percent, and is the most racially and ethnically diverse area on the coast, considering both the proportion of the population that is Hispanic or nonwhite and rankings for constituent groups. Monterey and Morro Bay also have relatively low poverty rates in the coastwide context.

Santa Barbara – Los Angeles – San Diego

Groundfish fisheries are relatively less important in Southern California compared both to other fisheries in the region and as a proportion of coastwide groundfish revenue. Important ports in the region include Santa Barbara, Ventura, Oxnard, San Pedro, Long Beach, and San Diego. As shown in Table 3-23, from San Francisco north groundfish or crab accounts for the largest proportion of revenue in recent years (and in port areas where crab is largest groundfish is generally the next largest fraction); while south of there Coastal Pelagic Species (CPS) or other species are the largest fraction. (The exception is Morro Bay where groundfish is the largest fraction and is substantial at 51 percent.) Groundfish trawl fisheries are generally absent with fixed gear groundfish accounting for about 90 percent of groundfish revenue within these port groups. For this reason these port groups will not likely be directly affected by trawl rationalization.

This region has substantial recreational fisheries. The Los Angeles-San Diego region accounted for almost half of all recreational angler trips coastwide, 2007-2009, and the Ventura-Santa Barbara region accounted for 6 percent. Groundfish targeted trips accounted for a high proportion of trip types, 71 percent in the Santa Barbara-Ventura region, the highest proportion coastwide, and 57 percent in the Los Angeles-San Diego region.

In 2009 these port groups had $2.4 million in groundfish revenue, amounting to 4.1 percent of coastwide revenue.

The updated vulnerability analysis did not rate any of the counties in these port group areas as vulnerable; the 2006 analysis rated Los Angeles County vulnerable. These port group areas have relatively low poverty rates, ranging from 13.8 percent in Los Angeles to 10.3 percent in Santa Barbara. The region is relatively diverse racially and ethnically.

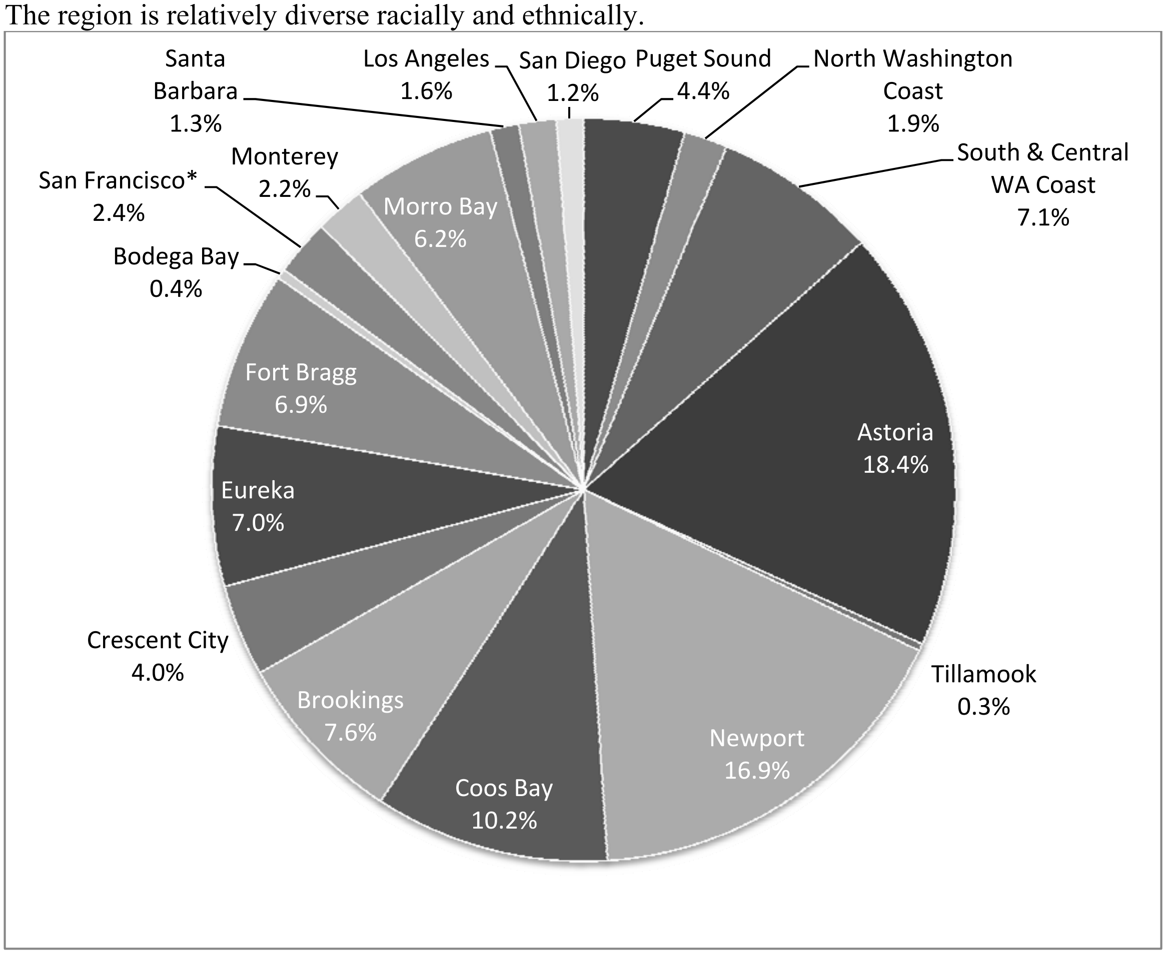

Figure 3-20. Distribution of revenue from groundfish in 2009 by port group area.

Table 3-22. Community status indicators, commercial groundfish fishery.

Port Group Area	Primary Sector	Vulnerable Counties	Rationalization Effects: Fleet Efficiency	Rationalization Effects: Bycatch Dependent Area	Rationalization Effects: Shorebased Infrastructure	Potential QP Revenue
Puget Sound	Non-whiting Trawl (53.5%)	None out of 8*	?	- -	+ +	Medium
North Washington Coast	Tribal Non-whiting (59.7%)	None out of 2	-	- -	- -	Low
S. and Central WA Coast	Shoreside Whiting (41.9%)	2 out of 3	-	-	+	Medium
Astoria	Non-whiting Trawl (67.0%)	None out of 2	+	+	+ +	High
Tillamook	OA Fixed Gear (58.9%)	1 out of 1				Low
Newport	Non-whiting Trawl (40.9%)	1 out of 1 (Most Vulnerable)	+	+	+ +	High
Coos Bay	Non-whiting Trawl (72.8%)	1 out of 3	+	+	+ +	High
Brookings	Non-whiting Trawl (42.7%)	1 out of 1	+	+	-	Low
Crescent City	Non-whiting Trawl (60.7%)	1 out of 1 (Most Vulnerable)	-	+	+	Low
Eureka	Non-whiting Trawl (79.4%)	1 out of 1	+	+	+	High
Fort Bragg	Non-whiting Trawl (67.9%)	1 out of 1 (Most Vulnerable)	-	-	+	Medium
Bodega Bay	Non-whiting Trawl (58.4%)	None out of 2				Low
San Francisco	Non-whiting Trawl (68.1%)	None out of 2	-	- -	+ +	High
Monterey	Non-whiting Trawl (47.3%)	None out of 2	-	- -	+	Medium
Morro Bay	OA Fixed Gear (60.8%)	None out of 1	?	+	-	Medium
Santa Barbara	OA Fixed Gear (51.6%)	None out of 2				None
Los Angeles	LE Fixed Gear (79.5%)	None out of 2				None
Sand Diego	LE Fixed Gear (75.0%)	None out 1				None

Table 3-23. Importance of sectors in port group areas based on ex-vessel revenue, 2005-2009.

Port Group Area	**Shoreside Whiting**		**Non-whiting Trawl**		**Fixed Gear (LE & OA)**	
	Coastwide	**In Port**	**Coastwide**	**In Port**	**Coastwide**	**In Port**
Puget Sound	Medium (0.0%)	Medium (0.1%)	High (6.5%)	Medium (53.5%)	High (9.5%)	Medium (44.6%)
North Washington Coast	Low (0.0%)	Low (0.0%)	Low (2.3%)	Low (17.7%)	Medium (5.2%)	Low (22.4%)
South and Central WA Coast	High (27.4%)	High (41.9%)	Medium (2.9%)	Low (15.3%)	High (6.9%)	Low (20.4%)
Astoria	High (27.7%)	High (23.0%)	High (23.6%)	High (67.0%)	Medium (5.8%)	Low (9.4%)
Tillamook	None (0.0%)	None (0.0%)	Low (0.2%)	Medium (33.1%)	Low (0.8%)	High (63.9%)
Newport	High (35.4%)	High (36.2%)	High (11.7%)	Medium (40.9%)	High (11.1%)	Low (21.9%)
Coos Bay	High (3.7%)	Medium (5.8%)	High (13.7%)	High (72.8%)	High (6.8%)	Low (20.5%)
Brookings	Low (0.0%)	Low (0.0%)	Medium (4.3%)	Medium (42.7%)	High (10.2%)	High (56.8%)
Crescent City	Medium (2.6%)	High (10.2%)	Medium (4.6%)	High (60.7%)	Medium (3.8%)	Medium (28.6%)
Eureka	Medium (3.0%)	Medium (6.4%)	High (11.1%)	High (79.4%)	Low (3.4%)	Low (13.9%)
Fort Bragg	None (0.0%)	None (0.0%)	High (7.4%)	High (67.9%)	Medium (6.1%)	Medium (31.7%)
Bodega Bay	None (0.0%)	None (0.0%)	Low (0.9%)	Medium (58.4%)	Low (1.0%)	Medium (36.3%)
San Francisco	None (0.0%)	None (0.0%)	Medium (4.6%)	High (68.1%)	Low (3.2%)	Medium (26.4%)
Monterey	Low (0.0%)	Low (0.0%)	Medium (3.5%)	Medium (47.3%)	Medium (6.5%)	Medium (49.4%)
Morro Bay	None (0.0%)	None (0.0%)	Medium (2.4%)	Low (32.7%)	High (8.5%)	High (64.9%)
Santa Barabara	None (0.0%)	None (0.0%)	Low (0.0%)	Low (0.4%)	Low (3.5%)	High (87.6%)
Los Angeles	None (0.0%)	None (0.0%)	Low (0.0%)	Low (0.1%)	Medium (4.7%)	High (91.9%)
San Diego	None (0.0%)	None (0.0%)	Low (0.0%)	Low (0.0%)	Low (2.9%)	High (92.5%)

Table 3-24. Selected demographics of port group areas based on estimates for constituent counties. (Source: Population Division, U.S. Census Bureau, County Characteristics Resident Population Estimates File, 7/1/2008.)

Port Group	Total Population	Hispanic or Not White	Rank	Black	Rank	Native American	Rank	Asian	Rank	Pacific Islander	Rank	Hispanic	Rank	No. Times in Top 1/3
Puget Sound	3,985,947	20.0%	4	5.1%	4	1.3%	11	9.5%	4	0.6%	2	7.6%	13	4
N. Washington Coast	100,563	9.2%	12	0.9%	12	4.3%	5	1.5%	12	0.2%	14	4.2%	18	1
S. & Central WA Coast	112,990	9.3%	11	0.5%	16	4.4%	4	1.5%	14	0.1%	15	7.7%	12	1
Astoria	37,404	5.8%	17	0.9%	11	1.2%	14	1.4%	15	0.2%	13	6.6%	15	0
Tillamook	24,927	5.0%	18	0.5%	17	1.4%	10	0.9%	18	0.2%	9	8.3%	11	0
Newport	45,946	8.1%	14	0.6%	15	3.4%	6	1.1%	16	0.2%	12	7.6%	14	1
Coos Bay	514,072	7.7%	15	0.9%	13	1.5%	8	2.3%	10	0.2%	11	5.8%	16	0
Brookings	21,523	6.1%	16	0.3%	18	2.3%	7	1.0%	17	0.1%	17	4.4%	17	0
Crescent City	29,100	17.7%	5	4.5%	5	6.9%	1	2.6%	9	0.1%	18	16.2%	9	3
Eureka	129,000	13.7%	6	1.1%	10	6.3%	2	2.0%	11	0.3%	8	8.4%	10	2
Mendocino	86,221	11.2%	9	0.8%	14	5.7%	3	1.5%	13	0.3%	6	20.6%	6	3
Bodega Bay	715,535	10.9%	10	2.2%	8	1.2%	13	4.4%	7	0.2%	10	20.0%	7	0
San Francisco	4,025,737	37.4%	1	9.4%	1	0.7%	18	23.2%	1	0.8%	1	20.8%	5	5
Monterey	661,375	12.8%	7	2.7%	6	1.3%	12	5.5%	6	0.4%	4	44.0%	2	4
Morro Bay	265,297	9.1%	13	2.1%	9	1.1%	15	3.2%	8	0.1%	16	19.1%	8	0
Santa Barbara	1,203,136	12.2%	8	2.2%	7	1.4%	9	5.9%	5	0.3%	7	38.5%	3	2
Los Angeles	12,872,808	24.9%	2	7.7%	2	1.0%	17	13.9%	2	0.3%	5	44.4%	1	5
San Diego	3,001,072	20.5%	3	5.5%	3	1.0%	16	10.3%	3	0.5%	3	30.9%	4	5

Table 3-25. Distribution of ex-vessel revenue from groundfish within port group areas, 2005-2009.

Port Group Area	Whiting Shoreside	Non-whiting Trawl	Limited Entry Fixed Gear	Open Access Fixed Gear	Incidental Open Access	Tribal Shoreside Whiting	Tribal Non-whiting Groundfish	TOTAL
Puget Sound	0.1%	53.5%	43.8%	0.8%	0.2%	0.0%	1.6%	100%
North Washington Coast	0.0%	17.7%	19.0%	3.4%	0.1%	0.0%	59.7%	100%
South and Central WA Coast	41.9%	15.3%	16.9%	3.6%	0.8%	20.9%	0.6%	100%
Unidentified WA	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	99.9%	100%
Astoria	23.0%	67.0%	8.2%	1.2%	0.6%	0.0%	0.0%	100%
Tillamook	0.0%	33.1%	5.1%	58.9%	3.0%	0.0%	0.0%	100%
Newport	36.2%	40.9%	20.5%	1.4%	1.0%	0.0%	0.0%	100%
Coos Bay	5.8%	72.8%	16.8%	3.7%	0.9%	0.0%	0.0%	100%
Brookings	0.0%	42.7%	23.9%	32.9%	0.5%	0.0%	0.0%	100%
Crescent City	10.2%	60.7%	12.7%	15.9%	0.6%	0.0%	0.0%	100%
Eureka	6.4%	79.4%	8.9%	5.0%	0.3%	0.0%	0.0%	100%
Fort Bragg	0.0%	67.9%	10.9%	20.8%	0.5%	0.0%	0.0%	100%
Bodega Bay	0.0%	58.4%	8.6%	27.7%	5.3%	0.0%	0.0%	100%
San Francisco	0.0%	68.1%	13.4%	13.0%	5.5%	0.0%	0.0%	100%
Monterey	0.0%	47.3%	25.3%	24.1%	3.3%	0.0%	0.0%	100%
Morro Bay	0.0%	32.7%	4.2%	60.8%	2.3%	0.0%	0.0%	100%
Santa Barbara	0.0%	0.4%	36.0%	51.6%	12.0%	0.0%	0.0%	100%
Los Angeles	0.0%	0.1%	79.5%	12.3%	8.1%	0.0%	0.0%	100%
San Diego	0.0%	0.0%	75.0%	17.5%	7.5%	0.0%	0.0%	100%
Unidentified CA	0.0%	0.0%	51.5%	43.0%	5.5%	0.0%	0.0%	100%

Table 3-26. Poverty rate of port group areas, using constituent counties from 2006-2008 ACS Table B17001.

Port Group Area	Poverty Rate	Rank
Puget Sound	10.0%	16
North Washington Coast	14.0%	9
South & Central WA Coast	15.6%	6
Astoria	12.2%	12
Tillamook	17.6%	3
Newport	16.8%	4
Coos Bay	15.2%	8
Brookings	15.3%	7
Crescent City	20.3%	1
Eureka	18.4%	2
Fort Bragg	16.8%	5
Bodega Bay	9.0%	18
San Francisco	9.6%	17
Monterey	11.7%	14
Morro Bay	12.9%	11
Santa Barbara	10.3%	15
Los Angeles	13.8%	10
San Diego	11.7%	13

Table 3-27. Percentage of 2005-2009 revenue from groundfish, and management group accounting for the largest proportion of revenue.

Port Group Area	Groundfish Revenue	Maximum Revenue
Puget Sound	49.9%	Groundfish (49.88%)
North Washington Coast	49.1%	Groundfish (49.06%)
South and Central WA Coast	12.8%	Crab (51.58%)
Astoria	37.5%	Groundfish (37.46%)
Tillamook	6.5%	Crab (59.90%)
Newport	31.1%	Crab (37.91%)
Coos Bay	28.1%	Crab (39.98%)
Brookings	33.7%	Crab (54.14%)
Crescent City	16.7%	Crab (74.58%)
Eureka	32.9%	Crab (55.79%)
Fort Bragg	39.7%	Groundfish (39.69%)
Bodega Bay	8.3%	Crab (44.66%)
San Francisco	15.4%	Crab (40.40%)
Monterey	22.3%	CPS (45.16%)
Morro Bay	50.1%	Groundfish (50.07%)
Santa Barabara	2.4%	CPS (53.55%)
Los Angeles	3.3%	CPS (63.27%)
San Diego	8.5%	Other (50.34%)

Table 3-28. Port group areas, counties and PacFIN ports.

State	Port Group Area	County	PCID	PacFIN Port Name
Washington	**Puget Sound**	Whatcom	BLN	Blaine
		Whatcom	BLL	Bellingham Bay
		San Juan	FRI	Friday Harbor
		Skagit	ANA	Anacortes
		Skagit	LAC	La Conner
		Snohomish	ONP	Other North Puget Sound Ports
		Snohomish	EVR	Everett
		King	SEA	Seattle
		Pierce	TAC	Tacoma
		Thurston	OLY	Olympia
		Mason	SHL	Shelton
	North Washington Coast	Jefferson	TNS	Port Townsend
		Clallam	SEQ	Sequim
		Clallam	PAG	Port Angeles
		Clallam	NEA	Neah Bay
		Clallam	LAP	La Push
	South & Central WA Coast	Grays Harbor	CPL	Copalis Beach
		Grays Harbor	GRH	Grays Harbor
		Grays Harbor	WPT	Westport
		Pacific	WLB	Willapa Bay
		Pacific	LWC	Ilwaco/chinook
		Klickitat	OCR	Other Columbia River Ports
Oregon	**Columbia River**	Multnomah	CRV	Psuedo Port Code for Columbia R.
	Astoria-Tillamook	Clatsop	AST	Astoria
		Clatsop	GSS	Gearhart - Seaside
		Clatsop	CNB	Cannon Beach
		Tillamook	NHL	Nehalem Bay
		Tillamook	TLL	Tillamook / Garibaldi
		Tillamook	NTR	Netarts Bay
		Tillamook	PCC	Pacific City
	Newport	Lincoln	SRV	Salmon River
		Lincoln	SLZ	Siletz Bay
		Lincoln	DPO	Depoe Bay
		Lincoln	NEW	Newport
		Lincoln	WLD	Waldport
		Lincoln	YAC	Yachats
	Coos Bay	Lane	FLR	Florence
		Douglas	WIN	Winchester Bay
		Coos	COS	Coos Bay
		Coos	BDN	Bandon
	Brookings	Curry	ORF	Port Orford
		Curry	GLD	Gold Beach
		Curry	BRK	Brookings
California	**Crescent City**	Del Norte	CRS	Crescent City
		Del Norte	ODN	Other Del Norte County Ports
	Eureka	Humboldt	ERK	Eureka (Includes Fields Landing)
		Humboldt	FLN	Fields Landing

Table 3-28. Port group areas, counties and PacFIN ports (continued).

State	Port Group Area	County	PCID	PacFIN Port Name
		Humboldt	TRN	Trinidad
		Humboldt	OHB	Other Humboldt County Ports
	Fort Bragg	Mendocino	BRG	Fort Bragg
		Mendocino	ALB	Albion
		Mendocino	ARE	Arena
		Mendocino	OMD	Other Mendocino County Ports
	Bodega Bay	Sonoma	BDG	Bodega Bay
	San Francisco	Marin	BOL	Bolinas
		Marin	TML	Tomales Bay
		Marin	RYS	Point Reyes
		Marin	OSM	Other Son. and Mar. Co. Outer Coast Ports
		Marin	SLT	Sausalito
		Alameda	OAK	Oakland
		Alameda	ALM	Alameda
		Alameda	BKL	Berkely
		Contra Costa	RCH	Richmond
		San Francisco	SF	San Francisco
		San Mateo	PRN	Princeton
		San Francisco	SFA	San Francisco Ara
		San Francisco	OSF	Other S.F. Bay and S.M. Co. Ports
	Monterey	Santa Cruz	CRZ	Santa Cruz
		Monterey	MOS	Moss Landing
		Monterey	MNT	Monterey
		Monterey	OCM	Other S.C. and Mon. Co. Ports
	Morro Bay	San Luis Obispo	MRO	Morro Bay
		San Luis Obispo	AVL	Avila
		San Luis Obispo	OSL	Other S.L..O. Co. Ports
	Santa Barbara	Santa Barbara	SB	Santa Barbara
		Santa Barbara	SBA	Santa Barbara Area
		Ventura	HNM	Port Hueneme
		Ventura	OXN	Oxnard
		Ventura	VEN	Ventura
		Ventura	OBV	Other S.B. and Ven. Co. Ports
	Los Angeles	Los Angeles	TRM	Terminal Island
		Los Angeles	SPA	San Pedro Area
		Los Angeles	SP	San Pedro
		Los Angeles	WLM	Willmington
		Los Angeles	LGB	Longbeach
		Orange	NWB	Newport Beach
		Orange	DNA	Dana Point
		Orange	OLA	Other LA and Orange Co. Ports
			OCA	
	San Diego	San Diego	SD	San Diego
		San Diego	OCN	Oceanside
		San Diego	SDA	San Diego Area
		San Diego	OSD	Other S.D. Co. Ports

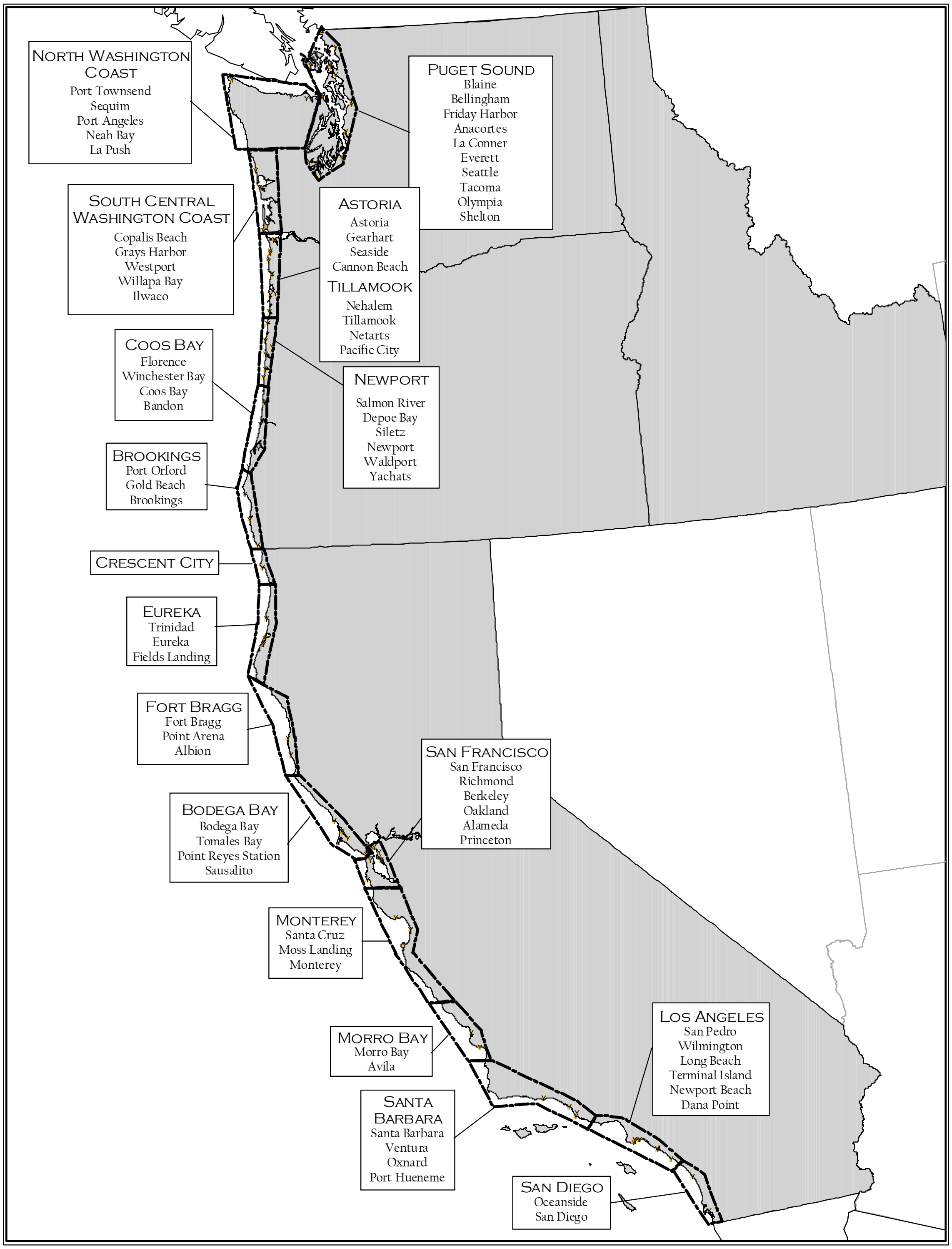

Figure 3-21. Ports and port group areas used to evaluate community impacts.

3.3 Other Components of the Fishery Ecosystem

3.3.1 Protected Species

Four different laws designate a species or stock as "protected" within U.S. waters: the Endangered Species Act (ESA), the Marine Mammal Protection Act (MMPA), the Migratory Bird Treaty Act (MBTA), and Executive Order 13186. For the purposes of this section, a species is considered protected if it falls under the regulatory umbrella of one of these Federal laws.

In November, 2009, the Council and NMFS published the Draft Environmental Impact Statement on Rationalization of the Pacific Coast Groundfish Limited Entry Trawl Fishery. This document describes protected species found in the west coast EEZ, and is summarized briefly below. The June 2008 Final Environmental Assessment (EA) on "A Limited Entry Program for the Non-Tribal Sectors of the Pacific Whiting Fishery" (FMP Amendment 15 EA) and the December 2005 Final EIS on "Pacific Coast Groundfish Fishery Management Plan Essential Fish Habitat Designation and Minimization of Adverse Impacts" (EFH EIS) (NMFS 2005) provided descriptions of west coast EEZ species protected under the ESA, the MMPA, the MBTA and EO 13186 at Section 3.2 and 3.4, and Section 4.6, respectively, and provided information on fisheries interactions, where available and applicable. The December 2006 Final EIS on "Proposed Acceptable Biological Catch and Optimum Yield Specifications and Management Measures for the 2007-08 Pacific Coast Groundfish Fishery" (PFMC 2006) provided descriptions of west coast EEZ species protected under these same laws at Chapter 6, and analyzed the effects of the groundfish fisheries on these species.

In March, 2010, the west coast Groundfish Observer Program (WCGOP) published a report entitled "Bycatch of Marine Mammals, Sea Turtles, and Seabirds in the 2002-2008 U.S. west coast Commercial Groundfish Fishery." The document includes information on one interaction with a leatherback sea turtle (*Dermochelys coriacea*), representing the first documented sea turtle interaction with this fishery in many years (Heery, *et al.* 2010). Leatherback, green (*Chelonia mydas*), and olive ridley (*Lepidochelys olivacea*) turtles are listed as endangered under the ESA, while loggerhead (C*aretta caretta*) turtles are listed as threatened. Heery, *et al.* (2010) also documents interactions with other marine mammals and seabirds, and uses a ratio estimator to estimate bycatch rates (Cochran 1977).

Whales listed under the ESA or the MMPA, and known to be present in west coast waters include humpback, fin, blue, sperm, gray, and orca. However, only the sperm whale (*physeter macrocephalus*) has been observed to have interacted with commercial groundfish vessels on the west coast. Other cetaceans with documented interactions with the west coast groundfish fishery include the harbor porpoise (*Phocoena phocoena*), Pacific white-sided dolphin (*Lagenorynchus obliquidens*), and Risso's dolphin (*Grampus griseus*). These species are protected under the MMPA but not the ESA. Other marine mammals with documented interactions with the west coast groundfish fishery include the California sea lion (*Zalophus californianus*), harbor seal (*Phoca vitulina*), northern elephant seal (*Mirounga angustirostris*), and the steller sea lion (*Eumetopias jubatus*). These species are all protected under the MMPA, and the steller sea lion is also listed under the ESA.

The U.S. west coast supports a diversity of seabird species, including several with documented interactions with the groundfish fishery. These species fall under a variety of protective statutes, listed in Section 6.1, Other Federal Laws.

Based on these NEPA implementing regulations, the relevant content of the aforementioned EAs, EISs, and data report are incorporated by reference.

Species Recently Listed Under the ESA

Lower Columbia River coho (70 Federal Register (FR)37160) the Southern Distinct Population (DPS) of green sturgeon (71FR17757), and the southern DPS of eulachon (75FR13012) have been listed as threatened under the ESA. In addition, Oregon Coast coho was proposed on May 26, 2010, to remain listed as threatened (75FR9489). As a consequence, NMFS has reinitiated its Section 7 consultation on the Council's FMP.

A more detailed description of fishery interactions with protected species can be found in Chapter 4 of this document.

Diets of Protected Species in the Fishery Ecosystem

It is difficult to succinctly characterize the role of protected species because they are represented by a variety of species that play varying roles in the marine environment. However, most of the species listed in Table 4.3-2 are, relatively speaking, higher trophic level predators whose ecosystem role can be somewhat generalized. The recently-listed eulachon and salmonid juveniles are the only protected species considered in this document that are included in functional groups of prey species forming significant portions of diets for higher level predators. These species (primarily eulachon) feed on zooplankton, and are in turn preyed upon by a variety of higher trophic level fishes, mammals, and birds (NMFS 2010).

An analysis of diets of selected species in the California Current (Dufault, *et al.* 2009) performed a hierarchical cluster analysis to group marine species into 10 "guilds" based on diet composition. Chinook salmon, surface seabirds, and migrating seabirds fell into the same cluster, with about 50 percent of the diets of being small planktivores. The remainder of the diets was found to be represented by zooplankton and cephalopods. Baleen whales (in a cluster with English sole, benthic carnivores, small flatfish, shallow small rockfish, and shrimp) fed on deposit feeders and large zooplankton. Diving seabirds (clustered with deep finfishes, skates and rays, sablefish, and pelagic sharks) showed a diverse diet, but fed primarily on small planktivores, other small fish, and zooplankton. Finally, small cetaceans and pinnipeds (clustered with large demersal sharks and toothed whales) also showed a broad diet, but preyed primarily on cephalopods, but also on deposit feeders, hake, miscellaneous rockfish, and salmon.

While these groupings of marine species according to diet similarities is helpful in understanding the trophic pressures on prey species, the groups would look quite different if grouped according to what preys on them. From that perspective, most of the protected species have relatively few natural predators in the marine environment. Pinnipeds and adult salmon are prey for orcas, and certain species of sea turtles are prey of pelagic sharks. Eulachon appear to be in a group of its own as a species that forms a staple of multiple other marine species.

3.3.2 Essential Fish Habitat

A description of west coast marine ecosystems and the affected essential fish habitat are available in volume 1 of the Council's 2008 Stock Assessment and Fishery Evaluation (SAFE) document (PFMC 2008b). Volume 1 of the 2008 SAFE document is available by request to the Council office or online at www.pcouncil.org/groundfish/gfsafe.html. That document is hereby incorporated by reference.

Essential Fish Habitat and Periodic Reviews

EFH has been described within the project area for highly migratory species, CPS, salmon, and groundfish. The MSA defines EFH to mean "those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity" (16 U.S.C. 1802 sec. 3(10)). Regulatory guidelines elaborate that the words "essential" and "necessary" mean EFH should be sufficient to "support a population adequate to maintain a sustainable fishery and the managed species' contributions to a healthy ecosystem." The regulatory guidelines also establish authority for Councils to designate Habitat Areas of Particular Concern (HAPC) based on the vulnerability and ecological value of specific habitat types. Councils are required to minimize, to the extent practicable, the adverse effects of fishing on EFH. NMFS works through a consultation process to minimize adverse effects of non-fishing activities (50 CFR 600 subpart J). Refer to Volume 1 of the Council's 2008 groundfish SAFE document for more information. The Magnuson Act requires councils and NMFS to periodically review EFH and make changes as warranted by newly available information. All four west coast FMPs are either in the review process (salmon and CPS) or pending (Highly Migratory Species (HMS), groundfish).

3.3.3 Trophic Structure

3.3.3.1 West Coast Marine Ecosystems

The California Current Ecosystem is loosely defined as encompassing the entire U.S. west coast, from the northern end of Vancouver Island to Point Conception, California. The trophic interactions in the California Current ecosystem are extremely complex, with tremendous fluctuations over years and decades (Mann and Lazier 1996; Parrish, *et al.* 1981). 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 (Bakun 1996; Schwartzlose, *et al.* 1999), 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 analysis, the ecosystem is considered in terms of physical and biological oceanography, climate, biogeography, essential fish habitat (EFH), marine protected areas, and the role of overfished species' rebuilding in the marine ecosystem.

3.3.3.2 Physical and Biological Oceanography

A divergence in the prevailing wind patterns of the California Current causes the west wind drift 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 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 (Hickey 1979). A more detailed description of the physical and biological oceanography of west coast marine ecosystems can be found in Volume 1 of the 2008 SAFE document.

3.3.3.3 Interannual and Interdecadal Climate Forcing

The effects of climate on the biota of the California Current ecosystem have been recognized for some time. Many of these effects and research illuminating these processes can be found in Volume 1 of the 2008 SAFE document. Additional information regarding anthropogenic climate forcing follows.

Climate change and ocean acidification pose significant additional stresses to managed fisheries on top of fishing mortality (IPCC 1995; IPCC 2007; WBGU 2006). Heat stress from warming waters and changes in the timing and magnitude of upwelling and associated nutrients and prey are just two examples. As climate change proceeds, there will likely be greater departure from historic population trends and increased uncertainty and risk in fisheries management. In addition, the effects of fishing pressure may unexpectedly magnify the effects of climate change and vice versa (Harley and Rogers-

Bennett 2004; Hsieh, *et al.* 2008; IPCC 2001). For example, overfishing and climate interactions are believed to have facilitated the sustained collapse of the Atlantic cod (Beaugrand, *et al.* 2003; Rose and O'Driscoll 2002).

Over the past decade, researchers have observed numerous oceanographic changes along the Pacific Coast which are consistent with anthropogenic climate forcing. They include: warmer surface waters in the California Current (Mendelssohn, *et al.* 2005; Mendelssohn, *et al.* 2003), increased stratification in the Southern region of the current (Roemmick and McGowan 1995), increased rate of eustatic sea level rise (IPCC 2007), declining pH with episodes of aragonite under saturated waters occurring on the continental shelf (Caldeira and Wickett 2008; Feely, *et al.* 2004; Orr, *et al.* 2005), and phenology (changes in the timing and duration of upwelling) (Barth, *et al.* 2007; Chan, *et al.* 2008). Ecological responses have also been observed, including shifts in planktonic community in the California Current from subtropical to tropical (Field, *et al.* 2006; Roemmick and McGowan 1995), reproductive failures in seabird colonies (Peterson, *et al.* 2006; Sydeman, *et al.* 2006), numerous northward range extensions (Carlton 2000; Erickson, *et al.* 1991; Field, *et al.* 2007; Hoff 2002; Roberts, *et al.* 2007; Rogers-Bennet 2007; Tognazzini 2003; Walker, *et al.* 2002), shoaling of the oxygen minimum layer in deep water (Bograd, *et al.* 2008), and reoccurring seasonal dead zones off the coast of Oregon (Chan, *et al.* 2008).

Ludwig, *et al.* (1993) argue the potential for adverse impacts on fish populations from the identified changes, individually and cumulatively and our inability to formulate precise predictions regarding fisheries' responses requires adoption of a more precautionary approach to exploitation than is the norm. As climate change imposes a variety of selective pressures, it will be critical for fish populations to maintain their connectivity and adaptability (Arctic Council Arctic Climate Impact Assessment 2005; FAO 2002; IPCC 1995; IPCC 2001; WBGU 2006). This will require preservation of large, genetically diverse populations which are broadly distributed, and maintenance of a more natural size distribution within populations, to promote productivity.

Between 2007 and the first half of 2009, sea surface temperatures (SST) declined as compared with the prior several years (Peterson, *et al.* 2010). This could indicate strong salmon returns, which have been documented on the Columbia River in spring, 2010. Colder water holds higher oxygen concentrations, benefitting the ocean ecosystem from the bottom up. Upwelling, as a significant driver of SST, carries nutrients to surface waters, also benefitting the marine ecosystem by stimulating plankton growth, forage fish, and higher end predators. Peterson, *et al.* (2010) also noted that in the latter half of 2009, SST increased, which could portend a decline in ocean productivity, at least in the survey area off the Oregon Coast. These results cannot be extrapolated to the entire California Current system, but can be used to illustrate how marine climate changes can affect the entire ocean ecosystem.

3.3.3.4 Biogeography

Biogeography describes spatial patterns of biological distribution. Along the U.S. west coast within the California Current system, such patterns have been observed to be influenced by various factors including depth, ocean conditions, and latitude. Each is discussed in volume 1 of the 2008 groundfish SAFE document, and is hereby incorporated by reference.

3.3.3.5 Marine Protected Areas

There are numerous marine protected areas distributed throughout the U.S. west coast EEZ. The EIS for Pacific Coast Groundfish EFH contains a complete listing and analysis of these sites and is incorporated here by reference.

In addition to those described in the EFH EIS, there are two new no-take marine reserves designated in Oregon: Otter Rock off Depoe Bay and Redfish Rocks off Port Orford.

As part of the same legislative action, the Oregon Legislature also required state agencies to evaluate potential reserves at Cape Falcon south of Cannon Beach, Cascade Head near Lincoln City and Cape Perpetua near Yachats. The legislation also directs Oregon state agencies to support a reserve proposal for the Cape Arago-Seven Devils area, south of Coos Bay.

CHAPTER 4 IMPACTS OF THE ALTERNATIVES

Chapter 4 examines the environmental and economic consequences that are expected to result from adoption of each of the alternatives.   Section 4.1 addresses the biological consequences, and Section 4.2 addresses the socioeconomic consequences. The effects of each alternative are compared to the environmental baseline (No Action) in order to assess the effects of each alternative. Broader issues such as the cumulative effects of the Pacific Coast groundfish fishery are addressed in Section 4.3.

4.1 Biological Consequences

Section 4.1 first considers the consequences of the alternatives on the biological environment. Section 4.1.1 considers the biological effects on all the groundfish stocks. The OFLs and ABCs for all groundfish stocks and stock complexes are addressed in Section 4.1.1.1. The productivity and susceptibility assessment of stocks to overfishing is discussed in Section 4.1.1.2. The biological consequences of ACLs and associated management measures as they affect overfished groundfish species are discussed Section 4.1.1.3. ACL options considered for non-overfished species before the development of the integrated alternatives are described in Section 4.1.1.4. Effects of the alternatives on non-overfished groundfish species and species complexes are discussed in Section 4.1.1.5. Estimated impacts to exploited groundfish stocks of the alternatives are presented in Section 4.1.1.6. The effects of the integrated alternatives on non-groundfish species, protected species, essential fish habitat, and the fishery ecosystem are discussed in Section 4.1.2 through Section 4.1.5.

4.1.1 Effects on Groundfish Species

As discussed in Chapter 2, a holistic or integrated approach was taken in the development of six alternatives in this EIS. Each alternative includes harvest specifications for all stocks managed under the Pacific Coast groundfish FMP plus a suite of management measures that are intended to keep the fishing mortality of all groundfish stocks within the those specifications. Because the OFL and ABC specifications do not vary between the integrated alternatives, the biological consequences of these parameters are addressed first by assessing the risk of overfishing relative to the proposed OFLs and ABC for all groundfish stocks and stock complexes using the best available scientific information (Section 4.1.1.1).   Alternative P* and ABC values are discussed in relation to the risk of overfishing.

The ACLs for each of the overfished species varies between the integrated alternatives, as do the management measures or AMs necessary to constrain the catch of all species, including overfished species to the specified ACLs. The difference in the biological effects between the integrated alternatives are primarily related to the different overfished species ACLs (detailed in Section 2.1.6). For most non-overfished groundfish stocks and stock complexes, a single ACL for each stock was carried forward into the integrated alternatives. However, alternative ACLs for non-overfished species with new stock assessments, stock assessment update or for which new data were available and were considered. The biological consequences of the alternative ACLs for individual non-overfished species are further addressed in Section 4.1.1.4. The biological consequences of the alternative ACLs for non-overfished species that are included within a complex of stocks are discussed in Section 4.1.1.5. Relative to the integrated alternatives, this EIS considers the effect of the groundfish harvest on the groundfish species in the FMP with respect to the following four biological indicators of resource health:

Fishing Mortality

- Are harvest levels likely to result in overfishing.
- For healthy and precautionary zone stocks are harvest levels likely to remove a portion of the spawning population from the stock such that the stock is likely to become overfished.
- For overfished stocks are harvest levels likely to rebuild the stock in as short as time possible.

Stock Productivity - Are fishing practices likely to change the reproductive success of groundfish stocks – are fishing operations likely to interfere with or disturb spawning and reproductive behavior or juvenile survival rates such that it raises concern about a stocks ability to maintain its biomass above B_{MSY}.

Genetic structure - Are changes in the time and location of fishing likely to result in changes to the genetic structure of the groundfish populations – fishing on particular sub stocks or targeting fish with certain characteristics (large size) such that over time it alters the genetic structure of the population.

Prey availability: Is harvesting likely to change the available of groundfish that are prey species such that it could affect the survival of species that prey on them.

4.1.1.1 OFLs and ABCs for All Groundfish Stocks and Stock Complexes

A primary goal of the groundfish FMP is to rebuild to or maintain spawning stock biomass of each groundfish stock and stock complex at or above B_{MSY}. For the non-overfished groundfish stocks, this EIS considers the projected fishing mortality relative to vulnerability to overfishing and becoming overfished. For overfished stocks, this EIS considered the projected fishing mortality relative to the time necessary to rebuild the stock to B_{MSY}.

The OFLs defines the point above which overfishing occurs on a stock. The ABC is a reduction from the OFL to account for scientific uncertainty in the estimate of OFL. The ACL which is set at the ABC level or lower defines the upper limits on allowable total catch (retained plus discarded catch) for a fishing year. The ACLs are set for each species or species complex in the fishery, including overfished species, non-overfished target and non-target species. The management measures developed for each integrated alternative are structured such that the projected total catch, based on the best available data, do not exceed the ACLs for any stock or stock complex. Table 4-1 presents the projected total catch by species or species complex compared to the proposed OFLs and ABCs. Table 4-2 presents the projected total catch by species or species complex as a percentage of the 2011 OFL. Table 4-3 presents the projected total catch by species or species complex relative to the 2012 OFL. The models used for the projections in Table 4-1 through 4-3 are documented in Appendix A of this EIS. Caveats in the data projected by these models and additional tables can be found in Section 4.1.1.6, Estimated Impacts to Exploited Groundfish Stocks.

Overfishing occurs whenever a stock or stock complex is subjected to a rate or level of fishing mortality that is above the stock's capacity to produce MSY (an estimate of the largest average annual catch or yield that can be taken over a significant period of time under prevailing ecological and environmental conditions). This level is also referred to as MFMT in the FMP. Under Amendment 23 provisions, OFLs for all species will be set based on the MFMT. None of the 2011 or 2012 OFLs would be set higher than the MFMT or its proxy applied to a stock's abundance. The corresponding ABCs will be set below the OFLs, and the ACLs will be set at or below the ABCs. The groundfish management measures, including those in the proposed rule, are designed to keep harvest levels within specified ACLs.

As discussed in Chapter 2, the amount by which OFL was reduced to get the ABC for each stock was determined based on the SSC's recommended sigma value and the Council's choice of overfishing risk policy, or P*. Alternative P* values and the associated reduction values for the SSC's recommended sigma values are described in Chapter 2 (2.1.2). Lower P* values are associated with larger reductions from OFL and correspondingly smaller ABC values, and thus a lower risk of the catch of a stock exceeding the "true" OFL, or the OFL which would be determined but for scientific uncertainty regarding that value. However, as will be described in subsequent sections, the projected impacts of the integrated alternatives on the non-overfished stocks are in general significantly lower than the ABCs or the ACLs for these stocks, because of the management measures necessary to keep the catch of the overfished species below their rebuilding ACLs. Therefore, in general, the practical impact of the integrated alternatives with respect to the non-overfished species involves a very low risk of overfishing, and this would be the case even if the ABCs or ACLs for the non-overfished species were higher or lower. An exception to this is the minor nearshore rockfish north sub-complex, which as is discussed later in this document has historically been harvested at levels near its OY.

The data in Table 4-1, based on data presented in Section 4.1.1.5, Estimated Impacts To Exploited Groundfish Stocks, show the projected catch by groundfish species and species complexes for 2011 and 2012 as compared to the ABCs for 2010 and OFLs for 2011 and 2012. Tables 4-2 and 4-3 further look at the projected catch as a percentage of 2010 ABC and 2011 and 2012 OFLs. The projected catch values in these tables are based on the best available data and indicate that none of the OFLs are projected to be exceeded. In 2011, the projected catch levels for all integrated alternatives are below 50 percent of the OFL with the exception of six species. Although these six species exceed 50 percent the projected catch is well below the OFL. The buffer between the ABC and OFL reduces the risk of overfishing. Projected catch of Petrale sole under the Alternatives 2, 3, and the FPA range between 68 and 90 percent of the OFL. Projected catch of Sablefish under the Alternative 1a, 2, 3, and the FPA range between 58 and 63 percent of the OFL. Projected catch of Shortspine Thornyhead exceeds 50 percent under all of the integrated alternatives with projected catch estimated to be between 57 and 63 percent of the OFL. Projected catch of Black rockfish under the Alternative 3 and the FPA range between 51 and 54 percent of the OFL. California scorpionfish projected catch is 56 percent under the FPA. Cabazon projected catch is 54 percent under the FPA. In 2012, the projected catch levels for all integrated alternatives are below 50 percent of the OFL with the exception of seven species. Projected catch of Petrale sole under the Alternatives 2, 3, and the FPA range between 55 and 72 percent of the OFL. Projected catch of Sablefish under the Alternative 1a, 2, 3, and the FPA range between 59 and 64 percent of the OFL. Projected catch of Shortspine Thornyhead exceeds 50 percent under all of the integrated alternatives with projected catch estimated to be between 58 and 64 percent of the OFL. Projected catch of Black rockfish under the Alternative 3 and the FPA range between 51 and 54 percent of the OFL. California scorpion fish projected catch is 60 percent under the FPA. Cabazon projected catch is 57 percent under the FPA. Projected catch of Arrowtooth flounder is 53 percent under Alternative 3 and the FPA.

Table 4-1. Projected catch by groundfish species and species complexes compared to OFL in metric tons.

Stock	No Action Alternative		Integrated Alternatives						
	2010 ABC	Projected catch 2011/2012	OFLs 2011	OFLs 2012	Projected Total Catch (mt) Alt.1a	Alt.1b	Alt.2	Alt. 3	FPA
BOCACCIO S. of 40°10' N. lat.	793	75.8	737	732	44.5	44.5	71.1	75.6	76.2
CANARY	940	63.1	614	622	44.1	44.3	58.4	61.7	62.5
COWCOD S. of 40°10' N. lat.	14	0.8	13	13	0.5	0.5	0.8	0.8	0.8
DARKBLOTCHED	440	239.4	508	497	117.9	115.9	157.4	219.5	219.2
PETRALE SOLE	2,751	1,176.6	1,021	1,279	406.3	406.3	697.4	916.6	904.4
PACIFIC OCEAN PERCH	1,173	137.7	1,026	1,007	63.4	63.4	85.1	133.7	133.4
WIDOW	6,937	339.7	5,097	4,923	142.4	142.1	332.8	339.9	339.8
YELLOWEYE	32	14.0	48	48	11.2	10.4	14.4	15.8	15.9
Lingcod – coastwide	4,829	541.7	NA	NA	485.7	485.7	542.6	603.1	685.2
Lingcod N. of 42º N. lat. (OR & WA)	NA	--	2,438	2,251	--	--	--	--	--
Lingcod S. of 42º N. lat. (CA)	NA	--	2,523	2,597	--	--	--	--	--
Pacific Cod	3,200	400.0	3,200	3,200	400.0	400.0	400.0	400.0	400.0
Pacific Whiting	336,560	192,996	TBA	TBA	96,008.0	96,008.0	192.996.4	289,984.7	192,996.4
Sablefish (coastwide)	9,217	6,208.9	8,808	8,623	5,123.0	4,151.0	5,286.3	5,537.3	5,470.7
Shortbelly	6,950	1.0	6,950	6,950	1.0	1.0	1.0	1.0	1.0
Chilipepper S. of 40°10' N. lat.	2,576	0.0	2,073	1,872	0.0	0.0	0.0	0.0	0.0
Splitnose S. of 40°10' N. lat.	615	7.0	1,529	1,610	7.0	7.0	7.0	7.0	7.0
Yellowtail N. of 40°10' N. lat.	4,562	499.0	4,566	4,573	499.0	499.0	499.0	499.0	499.0
Shortspine Thornyhead (coastwide)	2,411	1,422.0	2,384	2,358	1,370.1	1,370.1	1,504.7	1,474.1	1,487.0
Longspine Thornyhead (coastwide)	3,671	1,559.0	3,577	3,483	1,373.3	1,373.3	1,384.0	1,387.6	1,387.6
Black Rockfish (WA)	464	900.9	445	435	778.2	778.2	828.2	840.2	905.1
Black Rockfish (OR-CA)	1,317		1,217	1,169					
California scorpionfish	155	65.8	141	132	21.0	21.0	65.8	65.8	79.0
Cabezon (CA)	111	70.8	187	176	94.9	94.9	103.8	111.9	128.9
Cabezon (OR)	NA		52	50					
Dover Sole	28,582	15,418.6	44,400	44,826	12,165.2	12,165.2	14,082.0	19,300.4	19,300.4
English Sole	9,745	698.3	20,675	10,620	523.7	523.7	539.0	557.9	557.9
Arrowtooth Flounder	10,112	7,259.1	18,211	14,460	5,524.6	5,524.6	6,685.0	7,601.7	7,601.7
Starry Flounder	1,578	7.0	1,802	1,813	7.0	7.0	7.0	7.0	7.0
Longnose skate	3,269	1,393.9	3,128	3,006	995.1	995.1	1,038.0	1,068.0	1,068.0
Minor Rockfish North	3,678	779.6	3,767	3,821	809.7	994.7	962.0	836.1	1,049.1
Minor Rockfish South	3,382		4,302	4,291					
Other Flatfish	6,731	1,393.9	10,146	10,146	995.1	995.1	1,038.0	1,068.0	1,068.0
Other Fish	11,200	--	11,150	11,150	--	--	--	--	--

Table 4-2. Projected catch of groundfish species and species complexes as a Percentage of 2011 OFL.

Stock	No Action Alternative		Integrated Alternatives						
	2010 ABC	Projected catch 2011/2012 as percentage of 2010 ABC	OFLs		Projected Catch as Percent of 2011 OFL				
			2011	2012	Alt. 1a	Alt. 1b	Alt.2	Alt. 3	FPA
BOCACCIO S. of 40°10' N. lat.	793	9.56%	737	732	6.04%	6.04%	9.65%	10.26%	10.34%
CANARY	940	6.71%	614	622	7.18%	7.21%	9.51%	10.05%	10.18%
COWCOD S. of 40°10' N. lat.	14	5.71%	13	13	3.85%	3.85%	6.15%	6.15%	6.15%
DARKBLOTCHED	440	54.41%	508	497	23.21%	22.81%	30.98%	43.21%	43.15%
PETRALE SOLE	2,751	42.77%	1,021	1,279	39.79%	39.79%	68.31%	89.77%	88.58%
PACIFIC OCEAN PERCH	1,173	11.74%	1,026	1,007	6.18%	6.18%	8.29%	13.03%	13.00%
WIDOW	6,937	4.90%	5,097	4,923	2.79%	2.79%	6.53%	6.67%	6.67%
YELLOWEYE	32	47.50%	48	48	23.33%	21.67%	30.00%	32.92%	33.13%
Lingcod – coastwide	4,829	11.22%	NA	NA	9.79%	9.79%	10.94%	12.16%	13.81%
Lingcod N. of 42º N. lat. (OR & WA)	NA	--	2,438	2,251	--	--	--	--	--
Lingcod S. of 42º N. lat. (CA)	NA	--	2,523	2,597	--	--	--	--	--
Pacific Cod	3,200	12.50%	3,200	3,200	12.50%	12.50%	12.50%	12.50%	12.50%
Pacific Whiting	336,560	57.34%	TBA	TBA	--	--	--	--	--
Sablefish (coastwide)	9,217	67.36%	8,808	8,623	58.16%	47.13%	60.02%	62.87%	62.11%
Shortbelly	6,950	0.01%	6,950	6,950	0.01%	0.01%	0.01%	0.01%	0.01%
Chilipepper S. of 40°10' N. lat.	2,576	--	2,073	1,872	--	--	--	--	--
Splitnose S. of 40°10' N. lat.	615	1.14%	1,529	1,610	0.46%	0.46%	0.46%	0.46%	0.46%
Yellowtail N. of 40°10' N. lat.	4,562	10.94%	4,566	4,573	10.93%	10.93%	10.93%	10.93%	10.93%
Shortspine Thornyhead (coastwide)	2,411	58.98%	2,384	2,358	57.47%	57.47%	63.12%	61.83%	62.37%
Longspine Thornyhead (coastwide)	3,671	42.47%	3,577	3,483	38.39%	38.39%	38.69%	38.79%	38.79%
Black Rockfish (WA)	464	50.58%	445	435	46.82%	46.82%	49.83%	50.55%	54.46%
Black Rockfish (OR-CA)	1,317		1,217	1,169					
California scorpionfish	155	42.45%	141	132	14.89%	14.89%	46.67%	46.67%	56.03%
Cabezon (CA)	111	63.78%	187	176	39.71%	39.71%	43.43%	46.82%	53.93%
Cabezon (OR)	NA	--	52	50					
Dover Sole	28,582	53.95%	44,400	44,826	27.40%	27.40%	31.72%	43.47%	43.47%
English Sole	9,745	7.17%	20,675	10,620	2.53%	2.53%	2.61%	2.70%	2.70%
Arrowtooth Flounder	10,112	71.79%	18,211	14,460	30.34%	30.34%	36.71%	41.74%	41.74%
Starry Flounder	1,578	0.44%	1,802	1,813	0.39%	0.39%	0.39%	0.39%	0.39%
Longnose skate	3,269	42.64%	3,128	3,006	31.81%	31.81%	33.18%	34.14%	34.14%
Minor Rockfish North	3,678	11.04%	3,767	3,821	21.49%	26.41%	25.54%	22.20%	27.85%
Minor Rockfish South	3,382		4,302	4,291					
Other Flatfish	6,731	20.71%	10,146	10,146	9.81%	9.81%	10.23%	10.53%	10.53%
Other Fish	11,200	--	11,150	11,150	--	--	--	--	--

Table 4-3. Projected catch of groundfish species and species complexes as a Percentage of 2012 OFL.

Stock	No Action Alternative		Integrated Alternatives						
	2010 ABC	Projected catch 2011/2012 as percentage of 2010 ABC	OFLs		Projected Catch as Percent of 2012 OFL				
			2011	2012	Alt.1a	Alt.1b	Alt.2	Alt. 3	FPA
BOCACCIO S. of 40°10' N. lat.	793	9.56%	737	732	6.08%	6.08%	9.71%	10.33%	10.41%
CANARY	940	6.71%	614	622	7.09%	7.12%	9.39%	9.92%	10.05%
COWCOD S. of 40°10' N. lat.	14	5.71%	13	13	3.85%	3.85%	6.15%	6.15%	6.15%
DARKBLOTCHED	440	54.41%	508	497	23.72%	23.32%	31.67%	44.16%	44.10%
PETRALE SOLE	2,751	42.77%	1,021	1,279	31.77%	31.77%	54.53%	71.67%	70.71%
PACIFIC OCEAN PERCH	1,173	11.74%	1,026	1,007	6.30%	6.30%	8.45%	13.28%	13.25%
WIDOW	6,937	4.90%	5,097	4,923	2.89%	2.89%	6.76%	6.90%	6.90%
YELLOWEYE	32	47.50%	48	48	23.33%	21.67%	30.00%	32.92%	33.13%
Lingcod – coastwide	4,829	11.22%	NA	NA	10.02%	10.02%	11.19%	12.44%	14.13%
Lingcod N. of 42° N. lat. (OR & WA)	NA	--	2,438	2,251	--	--	--	--	--
Lingcod S. of 42° N. lat. (CA)	NA	--	2,523	2,597	--	--	--	--	--
Pacific Cod	3,200	12.50%	3,200	3,200	12.50%	12.50%	12.50%	12.50%	12.50%
Pacific Whiting	336,560	57.34%	TBA	TBA	--	--	--	--	--
Sablefish (coastwide)	9,217	67.36%	8,808	8,623	59.41%	48.14%	61.30%	64.22%	63.44%
Shortbelly	6,950	0.01%	6,950	6,950	0.01%	0.01%	0.01%	0.01%	0.01%
Chilipepper S. of 40°10' N. lat.	2,576	--	2,073	1,872	--	--	--	--	--
Splitnose S. of 40°10' N. lat.	615	1.14%	1,529	1,610	0.43%	0.43%	0.43%	0.43%	0.43%
Yellowtail N. of 40°10' N. lat.	4,562	10.94%	4,566	4,573	10.91%	10.91%	10.91%	10.91%	10.91%
Shortspine Thornyhead (coastwide)	2,411	58.98%	2,384	2,358	58.10%	58.10%	63.81%	62.51%	63.06%
Longspine Thornyhead (coastwide)	3,671	42.47%	3,577	3,483	39.43%	39.43%	39.74%	39.84%	39.84%
Black Rockfish (WA)	464	50.58%	445	435	46.82%	46.82%	49.83%	50.55%	54.46%
Black Rockfish (OR-CA)	1,317		1,217	1,169					
California scorpionfish	155	42.45%	141	132	15.91%	15.91%	49.85%	49.85%	59.85%
Cabezon (CA)	111	63.78%	187	176	41.99%	41.99%	45.93%	49.51%	57.04%
Cabezon (OR)	NA	--	52	50					
Dover Sole	28,582	53.95%	44,400	44,826	27.14%	27.14%	31.41%	43.06%	43.06%
English Sole	9,745	7.17%	20,675	10,620	4.93%	4.93%	5.08%	5.25%	5.25%
Arrowtooth Flounder	10,112	71.79%	18,211	14,460	38.21%	38.21%	46.23%	52.57%	52.57%
Starry Flounder	1,578	0.44%	1,802	1,813	0.39%	0.39%	0.39%	0.39%	0.39%
Longnose skate	3,269	42.64%	3,128	3,006	33.10%	33.10%	34.53%	35.53%	35.53%
Minor Rockfish North	3,678	11.04%	3,767	3,821	21.19%	26.03%	25.18%	21.88%	27.46%
Minor Rockfish South	3,382		4,302	4,291					
Other Flatfish	6,731	20.71%	10,146	10,146	9.81%	9.81%	10.23%	10.53%	10.53%
Other Fish	11,200	--	11,150	11,150	--	--	--	--	--

4.1.1.2 Productivity and Susceptibility Assessment of Stocks to Overfishing

The vulnerability to the fishery for each groundfish species in the FMP was defined as a first step in assisting with two specific tasks set forth by Amendment 23: 1) to define species as either "in the fishery" or as an "ecosystem component" and 2) identify stock complexes (see Agenda Item E.2.b, GMT Report, March 2010 available online at http://www.pcouncil.org/resources/archives/briefing-books/march-2010-briefing-book/#groundfish). In addition, the vulnerability scores were considered when prioritizing stock assessments, and determining data collection needs.

The Productivity-Susceptibility Assessment (PSA) approach of Patrick et al. (2009) was used to characterize vulnerability and has two components 1) productivity as defined by life histories traits and 2) susceptibility to current fishing practices. Each vulnerability component is comprised of several attributes (10 productivity and 12 susceptibility attributes) and the weighted mean score of all attributes defines the overall productivity and susceptibility score. Table 4-4 includes the vulnerability scores for all species in the FMP relative to the current fishery. Table 4-5 shows the vulnerability scores for currently overfished species relative to the fishery circa 1998. Scores are presented in two-dimensions, with productivity on the x-axis and susceptibility on the y-axis (Figure 4-1).

- $V \geq 2.4$ indicate species of major concern.
- $2.0 \leq V < 2.4$ indicate species of high concern.
- $1.8 \leq V < 2.0$ indicate species of medium concern.
- $V < 1.8$ indicate species of low concern.

Rockfish and elasmobranches showed the highest vulnerabilities (>2.0), with the deepest-residing members of those groups often the most vulnerable, though there were several species of nearshore rockfish (China, quillback, and copper rockfish) with some of the highest scored vulnerabilities. Flatfishes in general showed the lowest vulnerabilities.

In addition to scoring each productivity and susceptibility attribute, the quality of the data used for each score was also recorded (Table 4-4, Table 4-5, Figure 4-2). Data quality is scored for each productivity and susceptibility attribute, with the overall data quality score calculated as the weighed mean of all attributes. A scoring scale of 1-5 was used, with the best data score being 5.

Recording the data quality can highlight vulnerability scores that can be improved with additional data or that should be interpreted with caution because of questionable data contribution. Data quality scores can also be used to justify future data collection on particular attributes.

In general, susceptibility was harder to score (lower data quality) than productivity. Flatfishes as a group had the least informed species, but elasmobranches and several rockfish species also showed low quality data informing vulnerability scores (Table 4-4).

PSA analyses are anticipated to be re-done every biennial specifications cycle. Productivity scores are not expected to vary much over time since they are based on life history traits. However, susceptibility scores may vary based on changes in fishing practices and/or management, and an updated understanding of the stock's interaction with the fishery. As susceptibility scores change, so do the vulnerability scores.

Table 4-4. Overall scores and results of the Productivity and Susceptibility Assessment (PSA) ranked from most to least vulnerable to overfishing relative to the current west coast fishery based on the GMT's scoring.

Stock Name	Stock ID	Productivity	Data Quality	Susceptibility	Data Quality	Vulnerability
Copper rockfish	22	1.36	2.11	2.57	1.48	2.27
Rougheye rockfish	69	1.17	1.78	2.33	3.19	2.27
Shortraker rockfish	74	1.22	2.17	2.38	2.90	2.25
China rockfish	21	1.33	2.22	2.48	1.48	2.23
Quillback rockfish	60	1.31	2.06	2.43	1.48	2.22
Redstripe rockfish	63	1.31	2.50	2.33	2.57	2.16
Cowcod	23	1.06	1.44	1.88	1.88	2.13
Spiny dogfish	79	1.11	1.00	1.98	3.24	2.13
Bronzespotted rockfish	11	1.22	1.94	2.16	1.92	2.12
California skate	17	1.21	3.21	2.14	2.57	2.12
Greenblotched rockfish	36	1.28	1.78	2.24	1.71	2.12
Aurora rockfish	2	1.33	2.11	2.29	1.19	2.10
Speckled rockfish	78	1.33	2.22	2.29	2.52	2.10
Rosethorn rockfish	67	1.19	1.94	2.05	2.86	2.09
Starry rockfish	83	1.25	2.11	2.14	2.38	2.09
Blackgill rockfish	7	1.22	1.78	2.08	1.40	2.08
Tiger rockfish	86	1.25	2.50	2.10	2.19	2.06
Sharpchin rockfish	72	1.36	1.94	2.24	3.71	2.05
Vermilion rockfish	88	1.22	1.67	2.02	2.24	2.05
Widow rockfish	89	1.31	1.44	2.16	2.08	2.05
Chameleon rockfish	19	1.39	2.61	2.24	2.81	2.03
Bank rockfish	3	1.25	2.00	2.00	2.00	2.02
Pink rockfish	56	1.33	2.72	2.14	3.10	2.02
Redbanded rockfish	62	1.28	2.39	2.05	2.48	2.02
Silvergrey rockfish	76	1.22	1.78	1.95	2.19	2.02
Soupfin shark	77	1.11	1.42	1.71	3.33	2.02
Blue rockfish	9	1.39	1.89	2.20	1.52	2.01
Canary rockfish	18	1.28	1.78	2.04	1.56	2.01
Leopard shark	44	1.26	1.89	2.00	2.57	2.00
Yelloweye rockfish	90	1.22	1.44	1.92	2.00	2.00
Big skate	4	1.37	2.68	2.14	2.57	1.99
Brown rockfish	12	1.61	2.33	2.43	1.48	1.99
Dusky rockfish	27	1.28	2.33	0.00	0.00	1.99
Greenspotted rockfish	37	1.39	2.44	2.14	1.90	1.98
Blackspotted rockfish	8	1.17	2.83	1.71	1.48	1.97
Flag rockfish	31	1.33	2.61	2.05	1.48	1.97
Honeycomb rockfish	41	1.36	2.50	2.10	2.76	1.97
Yellowmouth rockfish	91	1.61	1.89	2.38	2.33	1.96
Black rockfish	5	1.33	2.00	2.00	1.44	1.94
Harlequin rockfish	40	1.31	2.83	1.95	3.00	1.94
Petrale sole	55	1.70	1.50	2.44	1.80	1.94
Swordspine rockfish	85	1.33	2.33	2.00	2.19	1.94
Bocaccio	10	1.28	2.11	1.88	1.56	1.93
Darkblotched rockfish	25	1.39	1.67	2.04	1.24	1.92
Grass rockfish	35	1.61	2.67	2.29	1.48	1.89
Rosy rockfish	68	1.61	3.11	2.29	3.52	1.89
Greenstriped rockfish	38	1.28	1.56	1.76	2.00	1.88

Table 4-4. Overall scores and results of the Productivity and Susceptibility Assessment (PSA) ranked from most to least vulnerable to overfishing relative to the current west coast fishery based on the GMT's scoring (continued).

Stock Name	Stock ID	Productivity	Data Quality	Susceptibility	Data Quality	Vulnerability
Yellowtail rockfish	92	1.33	1.78	1.88	2.00	1.88
Olive rockfish	49	1.69	2.22	2.33	1.48	1.87
Squarespot rockfish	81	1.61	2.94	2.24	2.29	1.86
Pacific grenadier	52	1.44	2.50	1.95	1.95	1.82
Pinkrose rockfish	57	1.31	2.72	1.67	2.48	1.82
Splitnose rockfish	80	1.28	1.78	1.60	2.00	1.82
Mexican rockfish	48	1.50	3.17	2.00	2.95	1.80
Shortspine thornyhead	75	1.33	2.22	1.68	2.00	1.80
Stripetail rockfish	84	1.39	2.56	1.81	2.48	1.80
Rock greenling	65	1.78	2.67	2.29	1.48	1.77
Gopher rockfish	34	1.56	2.22	2.00	1.64	1.76
Treefish rockfish	87	1.67	2.33	2.10	2.05	1.73
Ratfish	61	1.63	2.89	2.05	2.71	1.72
Black-and-yellow rockfish	6	1.89	1.89	2.29	1.33	1.70
Pacific ocean perch	51	1.44	2.50	1.67	2.43	1.69
Pacific whiting	54	2.00	2.22	2.36	2.04	1.69
Cabezon	14	1.72	1.89	2.08	1.42	1.68
Longnose skate	46	1.53	1.95	1.80	2.64	1.68
Sablefish	70	1.61	1.78	1.88	1.88	1.64
Kelp rockfish	43	1.83	2.11	2.12	1.48	1.62
Puget Sound rockfish	58	1.89	2.39	2.14	2.29	1.59
Calico rockfish	15	1.75	2.44	1.95	2.05	1.57
Kelp greenling	42	1.83	2.11	2.04	1.52	1.56
Freckled rockfish	33	1.78	3.17	1.95	1.48	1.55
Lingcod	45	1.75	2.22	1.92	1.96	1.55
Pygmy rockfish	59	1.78	2.67	1.95	2.48	1.55
Dover sole	26	1.80	1.90	1.96	2.56	1.54
Dwarf-red rockfish	28	1.83	3.17	0.00	0.00	1.54
Longspine thornyhead	47	1.47	1.67	1.00	2.40	1.53
Finescale codling	30	1.72	3.89	1.75	2.38	1.48
Rock sole	66	1.95	3.00	1.95	3.86	1.42
California scorpionfish	16	1.83	2.00	1.80	1.44	1.41
Halfbanded rockfish	39	2.00	1.89	1.95	2.00	1.38
Chilipepper	20	1.83	1.78	1.68	1.36	1.35
Pacific cod	50	2.11	2.11	2.00	1.57	1.34
Rex sole	64	2.05	2.70	1.86	3.67	1.28
Pacific sanddab	53	2.40	3.80	2.10	2.76	1.25
Curlfin sole	24	2.45	3.80	2.10	3.52	1.23
Sand sole	71	2.35	2.80	2.05	3.95	1.23
Arrowtooth flounder	1	1.95	1.90	1.60	2.96	1.21
English sole	29	2.25	2.10	1.92	2.64	1.19
Butter sole	13	2.45	2.80	2.05	3.52	1.18
Shortbelly rockfish	73	1.94	1.89	1.40	1.12	1.13
Flathead sole	32	2.30	2.40	1.76	2.86	1.03
Starry flounder	82	2.15	2.60	1.56	1.84	1.02

Table 4-5. Retrospective Productivity and Susceptibility Assessment (PSA) vulnerability scores of currently overfished species ranked from most to least vulnerable to overfishing relative to stock status and the fishery circa 1998 based on the GMT's scoring.

Stock Name	Stock ID	Susceptibility	Data Quality	Vulnerability
Cowcod	10_H	2.68	2.36	2.57
Yelloweye	18_H	2.80	2.00	2.53
Canary	23_H	2.84	1.56	2.52
Bocaccio	25_H	2.72	1.56	2.43
Darkblotched	51_H	2.76	1.24	2.39
POP	92_H	2.32	2.04	2.08

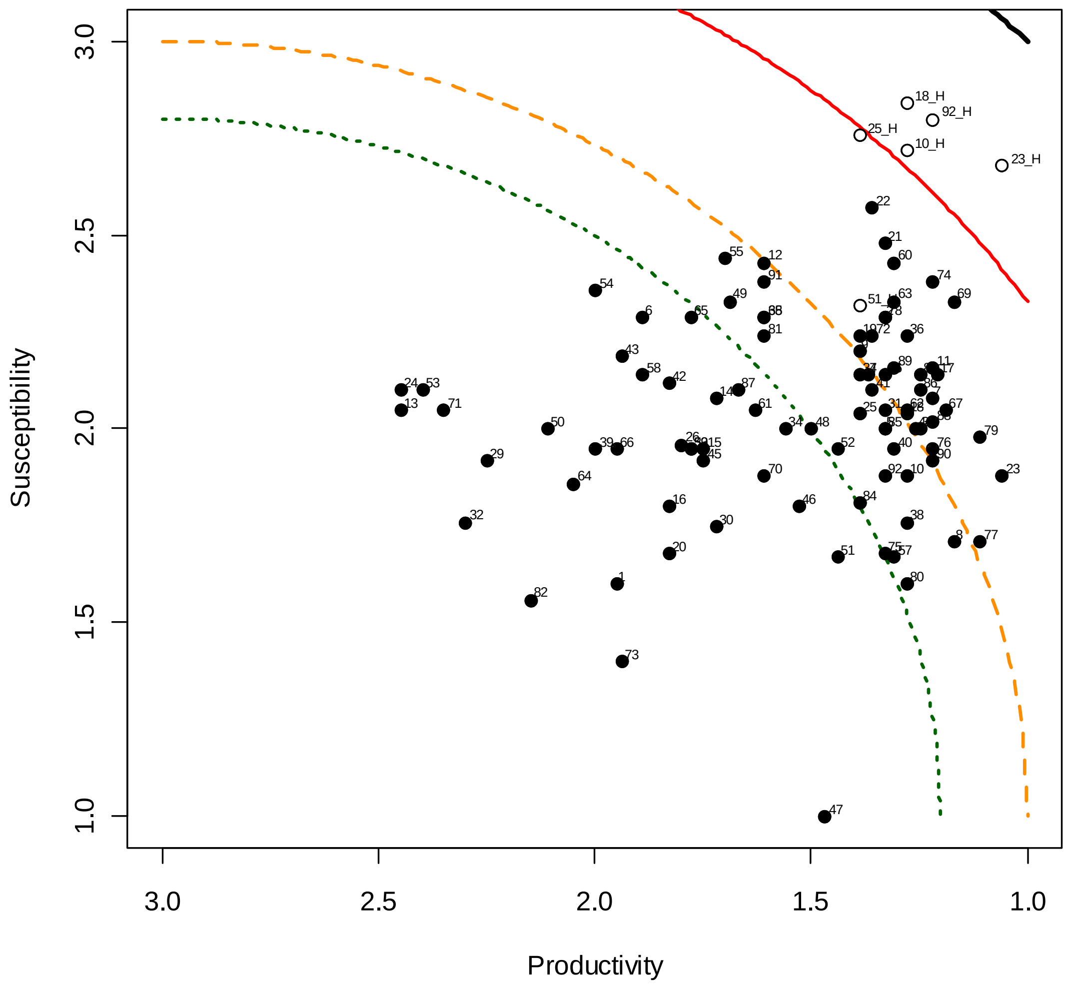

Figure 4-1. Productivity and Susceptibility Analysis (PSA) plot for species in the west coast groundfish FMP. Contours delineate areas of relative vulnerability (V, i.e. distance from the origin), with the highest vulnerability stocks above the solid red line (V = 2.4), high vulnerability above the orange broken line (V=2), medium vulnerability above the green dotted line (V=1.8) and the lowest vulnerability below the green dotted line. The maximum vulnerability (V=2.8) is indicated with the solid black line. Solid circles are based on current PSA scores. Open circles are based on PSA scores circa 1998. Numbers refer to the Stock ID in Table 4-4 and Table 4-5.

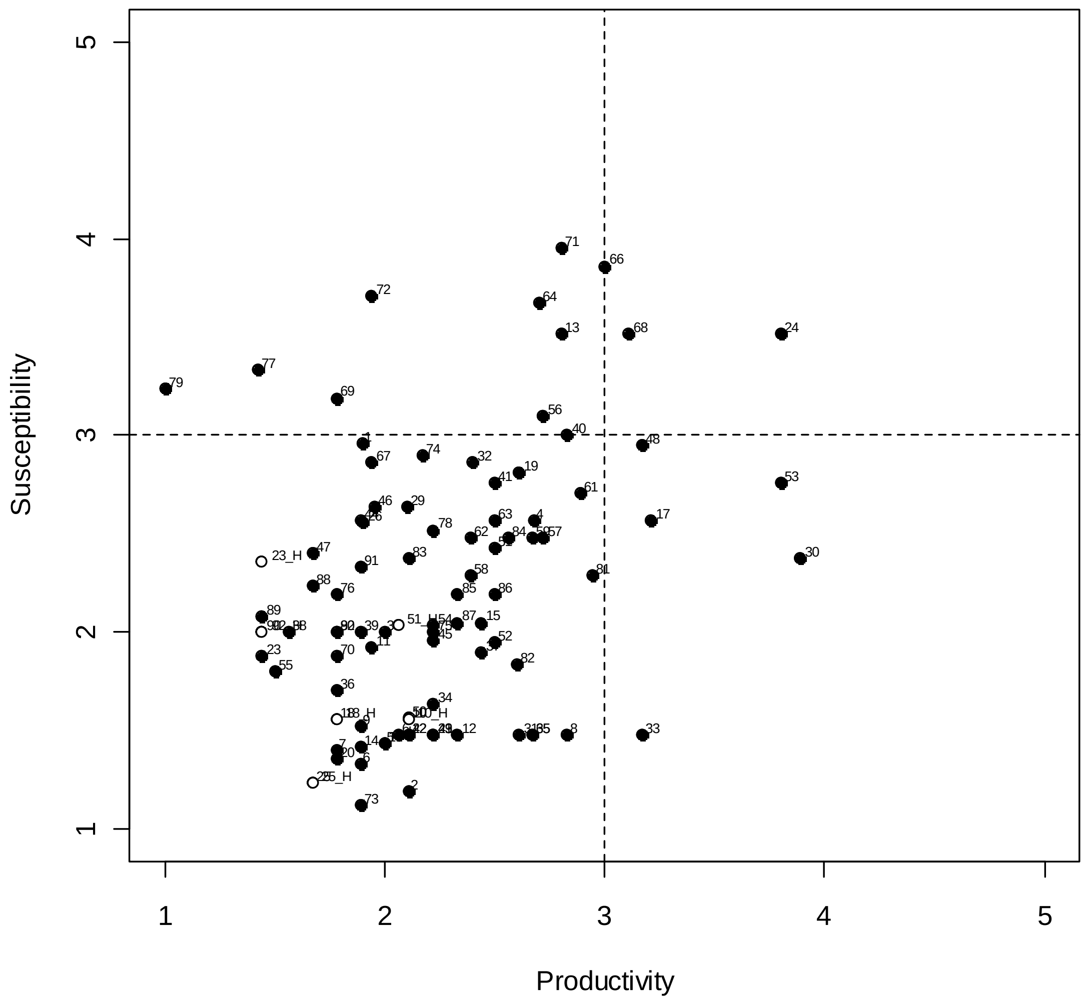

Figure 4-2. Data quality plots for the productivity and susceptibility scores in the PSA for each species (represented numerically in Table 4-4 and Table 4-5) in the west coast groundfish FMP. Higher scores indicate less data quality. Vertical and horizontal lines provide a general guide to relative data quality with values above 3 on either axis considered data poor.

4.1.1.3 Effects on Overfished Species of Rebuilding ACL Alternatives and Integrated Alternatives

The following groundfish species have been declared overfished and are currently being managed under rebuilding plans: bocaccio south of $40^0 10'$ north latitude; canary rockfish; cowcod south of $40^0 10'$ north latitude; darkblotched rockfish, Pacific ocean perch (POP), widow rockfish, and yelloweye rockfish. The proposed action specifies a new rebuilding plan for petrale sole under Amendment 16-5 to the FMP and revises the seven existing overfished species rebuilding plans consistent with the MSA and NRDC v. Locke. Petrale sole was declared overfished in 2010.

Amendment 16-5 would have amended the FMP to reflect the Council's final preferred alternative for 2011-2012 harvest specifications and rebuilding plan revisions as described in this FEIS. As discussed in Chapter 1, NMFS disapproved Amendment 16-5. Therefore, the analysis of alternatives in this EIS, and NMFS' final decision, will serve as the basis for establishing harvest specifications for overfished species, and accordingly the rebuilding plan parameters, such as $T_{TARGETS}$ and SPR harvest rates, that would have been included in the FMP through Amendment 16-5.

The following discussion on the ACL alternative considers the effect on the individual overfished species as well as the projected impacts within the full mix of overfished stocks because of the interrelated nature of the groundfish fisheries. In addition to the biological indicators described in Section 4.1.1., rebuilding duration (median time to rebuild) is also discussed relative to the overfished species and rebuilding plans for each.

Fishing mortality

The management measures developed for each integrated alternative are structured such that the projected total catch of each overfished stock does not exceed the ACLs. The best available data and projection models have been used to project the total catch under each integrated alternative. Table 4-1 presents the projected total catch by species as summarized from data presented in Section 4.1.1.6 Estimated Impacts to Exploited Groundfish Stocks.

Systems for monitoring groundfish mortalities (landings plus discard mortalities) on the west coast vary in their effectiveness depending on whether the species is primarily caught in commercial or recreational fisheries and how well at-sea discards are monitored. In general, fishing-related mortalities of commercially caught species are better known than those for stocks primarily caught by recreational fisheries since commercial landings and discards are tracked much more closely. Commercial landings are recorded on fish receiving tickets, which are used to document the weight and ex-vessel value of landed catch, while recreational catches are mostly monitored using a random, stratified census of anglers. The degree of at-sea monitoring of discards also varies by fishing sector with commercial discards estimated in directed groundfish fisheries estimated in the west coast Groundfish Observer Program (WCGOP). Recreational discards are estimated in the same recreational census programs used to monitor recreational landings. Sampling rates in these discard estimation programs varies by sector, with the limited entry at-sea whiting trawl sector observed at the highest at-sea observer rates (100 percent of trips); followed by shoreside whiting (100 percent retention of catch with electronic monitoring to ensure full retention), limited entry bottom trawl (~25 percent of trips observed), limited entry fixed gear sablefish (~20-25 percent of trips observed); directed open access (~5 percent of trips observed); California commercial passenger fishing vessels (CPFV or California recreational charter); and California (non-CPFV), Oregon, and Washington recreational. The Makah Tribe, the most active tribe targeting groundfish on the west coast, observed their fisheries at a high rate because their groundfish fishery regulations require full retention of rockfish species.

Catch accounting is expected to improve significantly in 2011 for all trawl sectors under Amendment 20 trawl rationalization which will require 100 percent of trips to be observed. Trawl-dominant overfished species, such as petrale sole, darkblotched, POP, and widow rockfish, are therefore subject to a lower level of catch monitoring uncertainty. The Quileute and Quinault tribes have plans to target whiting in 2011 and 2012. NMFS will require a bycatch monitoring plan for these new fisheries; the elements of these plans are not currently known.

Rebuilding Duration

The MSA §304(e) requires overfished stocks to be rebuilt to the MSY biomass in a time period that is as short as possible, taking into account the status and biology of the overfished stocks, the needs of fishing communities, and the interaction of the overfished stock within the marine ecosystem. One criterion used to evaluate the rebuilding duration for an overfished species is $T_{F=0}$, which is the shortest time possible estimated to rebuild a stock. The needs of fishing communities are considered by allowing limited harvest of an overfished species. In general, allowing the harvest of an overfished species increases the rebuilding period relative to $T_{F=0}$.

A new rebuilding analysis was prepared for each overfished stock in 2009. The rebuilding analysis is used to project the status of the overfished resource into the future under a variety of alternative harvest strategies and to estimate the number of years it will take for the stock to reach B_{MSY} (or its proxy). Minimum requirements for rebuilding analyses in routine situations have been established by the SSC and are applied with a computer package developed by Dr. André Punt (University of Washington). The SSC encourages analysts to explore alternative calculations and projections that may more accurately capture uncertainties in stock rebuilding and which may better represent stock-specific concerns. In the event of a discrepancy between the calculations resulting from Dr. André Punt's program, the SSC groundfish subcommittee reviews the issue and recommends which results to use. The SSC also encourages explicit consideration of uncertainty in projections of stock rebuilding, including comparisons of alternative states of nature using decision tables to quantify the impact of model uncertainty.

The rebuilding analyses include: an estimation of B_0 (the unfished biomass); B_{MSY} or its proxy; the selection of a method to generate future recruitment; the specification of the mean generation time; a calculation of the minimum possible rebuilding time (T_{MIN}); and, the identification and analysis of alternative harvest strategies and rebuilding times. Rebuilding analyses also estimate the median number of years needed to rebuild to the target stock size if all future fishing mortality is eliminated from the first year for which the Council is making a decision about ($T_{F=0}$). This will typically differ from T_{MIN}. T_{MIN} is defined as the median time for a stock to recover to the target stock size, starting from the time when a rebuilding plan was actually implemented (usually the year after the stock was declared overfished) to when the target level is first achieved, assuming no fishing occurs. Although no longer used directly in Council decision-making for overfished stocks, rebuilding analyses also report the maximum time to recovery (T_{MAX}).

Stock Productivity Relative to Rebuilding Success

The predicted times to rebuild overfished species (with 50% probability) relative to the amount of allowable harvest are determined in new rebuilding analyses recommended by the SSC and adopted by the Council in 2009. These rebuilding analyses evaluate allowable harvest vs. rebuilding duration relative T_{MAX}.

T_{MAX} is 10 years if T_{MIN} is less than 10 years. If T_{MIN} is greater than or equal to 10 years, T_{MAX} is equal to T_{MIN} plus one mean generation. Defining T_{MAX} with one mean generation, or the number of years predicted for a spawning female to replace herself in the population, is a relative biological index of stock productivity. Therefore, the range of allowable rebuilding periods is bounded by the biological limit of T_{MIN} or $T_{F=0}$, where all stock mortality is natural mortality. Stocks exhibiting low productivity will necessarily have longer predicted rebuilding periods due to longer mean generation times. The probability of rebuilding by T_{MAX} (P_{MAX}) is therefore one of the criteria used to evaluate risk of alternative harvest levels for overfished species, since it is a metric that relates management risk (i.e., risk of not meeting the rebuilding target by T_{MAX}) to a stock's relative productivity. Projections of different $T_{TARGETs}$ are determined from the productivity of the stock, its current status, and the allowable harvest (ACL).

Depending on the productivity of a particular species, fishing mortality or harvest rate will mean different things for different stocks. For fast growing species (those with individuals that mature quickly and produce many young that survive to an age where they are caught in the fishery) a higher fishing mortality rate may be used. Fishing mortality rate policies must account for several complicating factors, including the capacity of mature individuals to produce young over time and the optimal stock size necessary for the highest level of productivity within that stock.

Based on the most recent round of assessments, each overfished species is estimated to be at a different level of spawning stock biomass relative to its unfished spawning stock biomass (relative level of depletion). The relative level of depletion, combined with other biological characteristics of the stock, influences the sensitivity of a stock's rebuilding time to changes in ACLs. The lower the relative depletion of a stock's spawning biomass, the more risk there is in deciding higher ACLs. Therefore, stocks below the $B_{25\%}$ at the start of 2009; such as canary, cowcod, and yelloweye rockfish, are considered to have a higher sensitivity to higher fishing mortality rates.

Risks associated with increased ACLs are higher for stocks with greater uncertainty in fishing mortality estimates (catch and/or discard mortality). Stocks for which recreational fisheries account for a large percentage of total mortality are generally more susceptible to catch uncertainty than commercially targeted species, and this uncertainty increases for stocks that are rarely observed by sampling programs.

Genetic Diversity

Frequently, a fish stock is a collection of somewhat genetically differentiated sub-stocks, with relatively low exchange rates of individuals and genes between the sub-stocks; fishing activity can have greater adverse impacts on some sub-stocks than on others. Geographic and temporal changes in harvest that lead to a detectable reduction in genetic diversity could jeopardize the ability of an overfished stock to rebuild to BMSY. Localized depletion may be a concern if genetically important sub-populations are depleted within a distinct local region. This may be more of a concern for rockfish species that have a stock structure distributed within a relatively small region. In the long-term, targeting fish with certain characteristics (such as large size) can also lead to selection for fish with certain characteristics (such as faster or slower growth rates), often not being the preferred characteristics for the species.

Relative to the integrated alternatives, consideration is given to whether or not the genetic sub-population structure could be altered such that it jeopardizes the ability of a stock to sustain itself at or above MSST or the ability of an overfished stock to rebuild to BMSY, or results in overfishing. In general, if fishing mortality is maintained below the OFL, the likelihood of adverse effects on genetic structure and reproductive success are reduced.

Prey Availability

Harvesting activity may change the availability of a species as prey for other groundfish and non-groundfish species. However, there is relatively little information available on the prey relationships, particularly those involving larval or post-larval rockfish. Part of the reason is that it is hard to distinguish larval rockfish. Genetic methods of identifying individual species are available in some cases, but are expensive and visual identification is not possible. Moreover, the predator-prey relationships are complex in that, for example, the same species may be a predator on and prey of another species at different life stages. The overall result is that fishing can increase or decrease the prey availability for both the fished species and others.

Relative to the integrated alternatives, consideration is given to whether or not the availability of a species as prey could be altered such that it compromises the foraging of other species. Because it is not possible to do a quantitative analysis of this topic because of the limited knowledge on this subject, a qualitative analysis is provided in this EIS.

Bocaccio South of 40°10' north latitude

The new 2009 stock assessment shows that bocaccio is rebuilding ahead of schedule. The rebuilding progress was considered adequate, while the primary sources of data, parameter estimates and relative abundance trends from the 2009 stock assessment were consistent with those from earlier assessments. Estimates of historical depletion and productivity changed moderately in the most recent model, which assumed less severe depletion in the recent historical period and greater productivity (steepness) in the base model. The bocaccio spawning stock depletion of 28.1 percent at the start of 2009 is above the MSST and 70.3 percent of the B_{MSY} target. This is an intermediate level of depletion across the spectrum of overfished west coast rockfish species. Bocaccio spawning output in 2009 is estimated to be 46.4 percent of that in 1980, but 204.6 percent of the minimum in 1998.

<u>Fishing mortality</u>

In the recreational fisheries bocaccio are sought-after by anglers from boats, jetties, and piers, with the latter two types of structures yielding primarily young-of-the-year (Love 1996). In the commercial fishery, bocaccio are caught primarily in bottom trawls, although both gillnet and hook and line were important fisheries sectors historically. Table 4-6 shows the total catch projections of bocaccio by alternative from data presented in Section 4.1.1.6, Estimated Impacts to Exploited Groundfish Stocks, and derived from fishery models described in Appendix A by fishery.

Table. 4-6. Bocaccio Total Catch Projections (mt) by Fishery.

Alt.	Set Aside Tribal	SS Whiting	Non-whiting Trawl	At-Sea Whiting	LE Fixed Gear	Sablefish OA	Nearshore OA	Incidental OA	Set Aside EFP	Re-search	Rec.	Grand Total
No Action	0.0	--	25.1	--	0.0	0.0	0.3	0.7	11.0	1.7	54.6	**93.4**
Alt. 1A	0.0	--	4.5	--	0.0	0.0	0.0	0.7	11.0	1.7	26.6	**44.5**
Alt. 1B	0.0	--	4.5	--	0.0	0.0	0.0	0.7	11.0	1.7	26.6	**44.5**
Alt. 2	0.0	--	5.5	--	0.0	0.0	0.0	0.7	11.0	1.7	52.2	**71.1**
Alt. 3	0.0	--	7.2	--	0.0	0.0	0.0	0.7	11.0	1.7	55.0	**75.6**
FPA	0.0	--	7.1	--	0.0	0.0	0.3	0.7	11.0	1.7	55.4	**76.2**

Under the No Action Alternative the projected fishing mortality is 194.6 mt less than the OY (Table 4-7). Under Alternative 1 (1a and 1b) the management measures are structured such that the projected fishing mortality is 8.5 mt less than the 2011 ACL , and is 11.5 mt less than the 2012 ACL for Alternative 1 (Table 4-7). Under Alternative 2 the management measures are structured such that the projected fishing mortality is 37.9 mt less than the 2011 ACL and 43.9 mt less than the 2012 ACL for Alternative 2. Under Alternative 3 the management measures are structured such that the projected fishing mortality is 187.4 mt less than the 2011 ACL and 198.4 mt less than the 2012 ACL for Alternative 3. Under the FPA, the management measures are structured such that the projected total catch in 2011 is 186.8 mt less than the ACL and in 2012 the projected total catch is 197.8 mt less than the FPA ACL.

Table 4-7. Alternative 2011 and 2012 bocaccio ACLs relative to the criteria described in Section 4.1.1.2.

Evaluation Criteria	**No Action 2010 OY (mt)**	**Alternative 2011 and 2012 ACLs (mt)**				
		Year	**Alt. 1**	**Alt. 2**	**Alt. 3**	**FPA**
		2011	53	109	263	263
	288	2012	56	115	274	274
Projected Fishing mortality	93.4		44.5 (1a & 1b)	71.1	75.6	76.2
Rebuilding Duration Beyond $T_{F=0}$ (yrs.)			0	1	3	3
Rebuilding Probability (P_{MAX})			97.0%	95.2%	86.8%	86.8%

The projected fishing mortality of 55.4 mt under the FPA in the California recreational fishery is 74.6 mt less than HG for that fishery providing a buffer against management uncertainty. This large difference between the projected catch and the ACL under the FPA would accommodate the variable and highly uncertain recruitment pattern exhibited by the bocaccio stock and the high uncertainty in bocaccio catch projections. The preferred management measures for the California fisheries under the FPA show no intent to "fish up" to the ACLs. Bocaccio stock production is characterized by high episodic recruitment and relatively rapid juvenile growth rates (Field et al. 2009; Field et al. 2010). Juvenile bocaccio also recruit to shallow waters and are consequently caught in nearshore recreational fisheries as evidenced by dramatic spikes in both catch rates and the percentage of the total southern California rockfish catch that is bocaccio following strong recruitment events. Unlike most rockfish species where recruitment to fisheries usually takes several years due to low growth rates, juvenile bocaccio can recruit to nearshore fisheries in California within a year or two of parturition. Recruitment of the strong 1999 year class complicated management of California fisheries in 2000 and 2001 as this unpredictable event could not be reacted to in time given the lag in reconciling recreational catch estimates. Most species' rebuilding analyses are able to project recruitment into affected fisheries in time to decide and implement responsive management measures that will not compromise rebuilding plans. However, the fast growth and unpredictable recruitment of bocaccio poses the unique problem of having to react to a large recruitment event in real time. This experience has led the Council to a strategy of adopting higher bocaccio OYs/ACLs and more conservative management measures that are predicted to result in impacts much lower than these harvest limits.

The overfished Bocaccio stock is found south of 40º north latitude in depths from 15-180 fm with the highest density from 54 to 82 fm. Figure 4-3 shows that for bocaccio, bycatch rates (commercial fisheries) are typically highest near the 100 fm line during winter months (periods 1, 2, and 6).

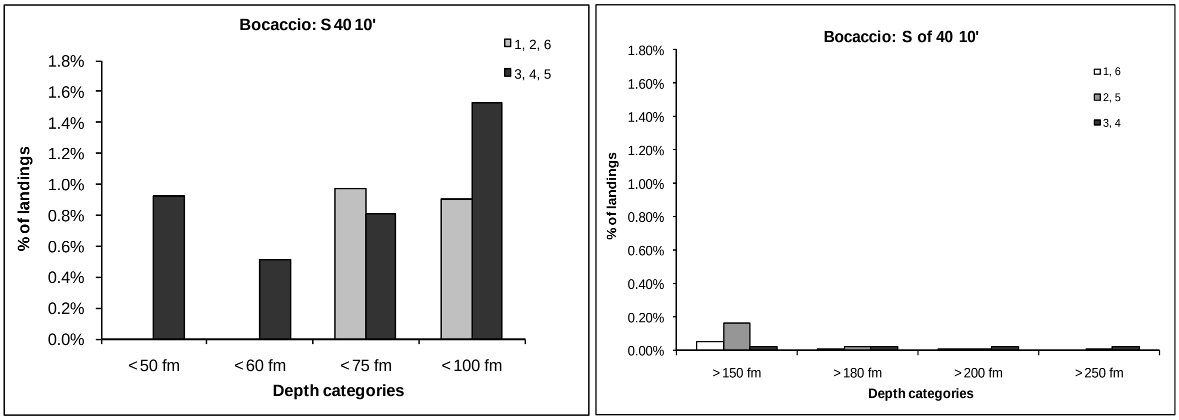

Figure 4-3. Bycatch rates (bocaccio catch / landed species catch) of bocaccio rockfish south of 40° 10' by calendar period and depth category (PFMC, Agenda Item B.7.b, Supplemental GMT Report, June 2010).

Trawl RCAs*:* South of 40°10 north latitude, a trawl RCA with a shoreward boundary of 100 fm and a seaward boundary at 150 fm or deeper is intended to reduces the fishing mortality of bocaccio. Under all of the alternatives (with or without trawl rationalization), the trawl RCA structure south would have a shoreward boundary of 100 and a seaward boundary of 150 fm or deeper. Under the No action Alternative the seaward boundary would be at 200 fm year round. Under Alternative 3 and the FPA if it is not a rationalized fishery, the seaward boundary would be at 200 fm in periods 1 and 6.

Changes to the trawl RCA lines in the Cape Mendocino area are further considered in Appendix B (Section 3.1.5.) The effect of bocaccio fishing mortality is expected to be minor and not result in an ACL being exceeded.

Bocaccio co-occurs with chilipepper rockfish. The FPA, provides the trawl fishery the greatest access to chilipepper south of 40º10' during periods 2-5, when the seaward line of the RCA is at 150 fm. There is some access shoreward of the 100 fathom RCA, year-round in the South, but this strategy would incur greater risk of overfished species bycatch, including bocaccio. The bocaccio trawl allocation under the FPA in 2011, is much higher than the trawl harvest guideline under the No Action Alternative. The 200 fm seaward RCA boundaries in periods 1 and 6 of the FPA without IFQ are more restrictive to chilipepper rockfish access than the 150 fm seaward line year-round in the No Action Alternative. The bocaccio allocation is twice as high under the FPA, although the two have the same RCA structure, more access to chilipepper rockfish could be expected under the FPA.

Non-Trawl RCAs: The seaward boundary of the non-trawl RCA between 36° and 40° 10' North latitude would be at 150 fm under all of the alternatives, and would be expected to reduce fishing mortality of bocaccio rockfish. Since 2003 the shoreward Non-trawl RCA boundary affecting the nearshore fishery has been at 30 fm for the entire area north of 34°27' north latitude and 60 fm south of 34°27' north latitude (No Action). Under the No Action alternative and Alternatives 2b and 3b, the shoreward Non-trawl RCA boundary south of 40°10' north latitude would remain at 30 fm between 40°10' and 34°27' north latitude and at 60 fm south of 34°27' north latitude. Under Alternatives 1a, 1b, 2a and 3a the shoreward Non-trawl RCA boundary would be at 20 fm year round. Under the FPA, the shoreward Non-trawl RCA boundary would be at 30 fm between 40°10' and 36°' north latitude and at 60 fm south of 36° north latitude.

Changes to the trawl RCA lines in the Big Sur area (50 fm, 60 fm) and in the San Diego area (50 fm and 60 fm) and modifications to the Non-trawl RCA line at Catalina Island from 60 fm to 100 fm are further considered in Appendix B (Section 3.1.5., B.4.1). The effects of RCA changes on bocaccio fishing mortality are expected to be minor and not result the ACL being exceeded.

Recreational: Under the No Action Alternative there is some recreational fishing allowed in the CCAs in depths shallower than 20 fm. Only southern minor nearshore rockfish, (both shallow and deeper nearshore rockfish), California scorpionfish, cabezon, greenlings, California sheephead, and ocean whitefish are allowed to be retained in depths less than 20 fm in the CCAs. Changing the CCA depth restrictions to allow fishing out to 30 fm (with the option of 40 fm) and the allowed retention of shelf rockfish would be in place under Alternatives 2, 3, and the FPA. Given the low Bocaccio ACL under Alternative 1 the changes to the CCAs increase the likelihood of the low ACL being exceed. Under the FPA the catch of shelf and slope rockfish, including bocaccio are likely to increase over the No Action Alternative as a result of allowing the retention of shelf rockfish in the open depths of the CCAs for the recreational fisheries, but are not expected to result in the FPA ACL being exceeded. Appendix B (Section 3.2.5) more fully considers changes in shelf rockfish retention in the recreational CCAs.

Catch Accounting: Catch monitoring uncertainty is relatively high given the fact that a significant amount of the total fishing mortality of bocaccio now occurs in the California recreational fishery, the sector with the largest bocaccio take in recent years. Recent recreational catch is estimated using the new CRFS program, which has been in existence since 2004. Prior to 2004, all recreational catch was estimated using the MRFSS program, a survey methodology designed to understand long-term national trends in marine recreational catch and participation.

Management of California fisheries under the bocaccio rebuilding plan is complicated by the fact that a significant bocaccio bycatch occurs in recreational fisheries. While catch monitoring and estimation uncertainty has improved under the current CRFS survey, it is still the highest for any of the west coast groundfish fishing sectors, leading to less precise impact projections. Arguably, the specification of an ACT lower than the ACL may be the best vehicle for addressing this source of management uncertainty. However, an ACT does not adequately address the management complications and socioeconomic impacts posed by potentially high and unpredictable recruitment events. The Council's bocaccio rebuilding strategy of specifying higher annual harvest limits than the projected impacts under adopted management measures may help mitigate the economic hardships that would be imposed on California fishing communities if unpredictable recruitment events forced a sudden closure of inshore fisheries.

Rebuilding Duration

The 2011 and 2012 bocaccio ACL alternatives are all predicted to rebuild the stock within three years of the shortest time possible ($T_{F=0}$ = 2019). Rebuilding is extended by 3 years from $T_{F=0}$ under the harvest rates used to determine the FPA, which is also ACL Alternative 3. ACL Alternative 2 is predicted to rebuild one year longer than $T_{F=0}$ and ACL Alternative 1 is predicted to rebuild by 2019, the shortest time possible. NMFS' preferred alternative ACL for Bocaccio is the same as the Council's FPA.

Stock Productivity Relative to Rebuilding Success

Biomass projections and probabilities are based on the rebuilding analysis and the current understanding of productivity applied forward in time. Bocaccio rebuilding probabilities under all the ACL alternatives are relatively high at 86.8 percent for the preferred ACL alternative (=ACL alternative 3), 95.2 percent for ACL Alternative 2, and 97.0 percent for ACL Alternative 1.

Bocaccio recruitment is highly variable with rare large year classes. Adult abundance is highly variable even in the absence of fishing (MacCall and He 2002). The new bocaccio stock assessment indicates that larval production, as a function of spawning output, has been increasing since a 1999 recruitment event and several subsequent year classes of moderate magnitude. The spawning output trajectory indicates that the stock is likely to continue to increase in coming years under current harvest rates, although the form of this trajectory is highly dependent on the magnitude of several year classes currently thought to be of moderate magnitude, as well as future recruitment events, which are highly uncertain. Although poorly understood, the stock assessment suggests that recovery may be taking place more rapidly in the south, and recovery in the central/northern California region may be dependent on an influx of fish from the southern area.

Changes in spawning/reproductive behavior or juvenile survival rates are not expected to result from the proposed fishing activity under any of the alternatives relative to No Action. In years in which there is strong recruitment of bocaccio, encounter rates of bocaccio as bycatch in other fisheries - particularly fisheries shoreward of the RCAs, can be expected to increase temporarily as juvenile bocaccio have among the highest growth rates of rockfish (certainly the highest of rebuilding species), the juveniles typically occupy shallower habitats with less discrimination to habitat type (found midwater, soft bottom, hard bottom), disperse fairly broadly (as best we can tell), gradually dispersing to deeper habitat with size/age. There is some evidence that 2009 and/or 2010 are strong recruitment years for bocaccio, and if so then catch rates may increase above the long term mean under all of the alternatives. Catch rates of juveniles (age 1-2) in particular should be expected to be highly variable in space and time, particularly in recreational fisheries that tend to take place in shallower habitats.

<u>Genetic Structure</u>

Earlier evaluations of bocaccio indicated that bocaccio from southern California and central California (Monterey) are a well-mixed population, but do not mix extensively with fish sampled from Washington waters (MacCall 2002). This is consistent with the suggestion of a gap in the geographic distribution between southern Oregon and northwest Washington (MacCall 2002, Field et al. 2009). A portion of the bocaccio population also resides in Mexican waters, although there are very little data available for these fish. Genetic similarity of bocaccio from southern California and central California indicates that these two segments are not isolated. The primary implication is that catches taken from either segment are considered to have an equivalent impact on the stock (MacCall 2002). There are no known threats to the genetic integrity of bocaccio (MacCall 2002).

Very limited evidence for modest coastwide genetic structure (with samples ranging from Southern California to British Columbia, but excluding the Oregon and Washington coasts as well as the Salish Sea) was suggested by Matala et al. (2004), but was not conclusive. A reanalysis of these data reported in Field et al. (2009) found no support for the presence of population genetic structure among these samples. Despite this lack of genetic structure, apparent differences in growth rates, size at maturity, and longevity suggest that some level of demographic independence, and thus population structure, is present between the southern DPS and the stock off of British Columbia. Changes in fishing, under any of the alternatives being proposed, are not expected to affect the genetic integrity of bocaccio.

<u>Prey Availability</u>

Juvenile and adult bocaccio are eaten by sharks, salmon, other rockfishes, lingcod, and albacore, as well as seabirds, sea lions, porpoises, and whales (MBC Applied Environmental Sciences 1987). Bocaccio directly compete with chilipepper, widow, yellowtail, and shortbelly rockfishes for both food and habitat resources (Reilly et al. 1992). However, given the relatively small proportion of biomass projected to be taken under each of the alternatives, none of the alternatives is expected to change prey availability such that it would jeopardize the ability of another stock or predator species to sustain itself at or above the MSST. Further discussion of the role of adult and juvenile (mostly juvenile) rockfish in the ecosystem are more generally discussed in Section 4.1.1.5, Effects on Non-Overfished Species in the Integrated Alternatives.

Canary Rockfish

The canary rockfish spawning stock depletion of 23.7 percent at the start of 2009 is below the MSST and 59.3 percent of the B_{MSY} target. This is a low level of depletion across the spectrum of overfished west coast rockfish species, higher only than estimated depletion rates for cowcod and yelloweye rockfish. Canary rockfish spawning biomass in 2009 is estimated to be 45.0 percent of that in 1980, but 194.1 percent of the minimum in 1994. Given the results of the new stock assessment, it is very unlikely that canary rockfish can rebuild by the T_{TARGET} specified in the No Action rebuilding plan.

Fishing Mortality

Canary rockfish is caught coastwide in all sectors of the fishery. Under the No Action Alternative, the canary rockfish mortality is managed using the following measures: prohibited retention in commercial hook-and-line or fixed gear and recreational fisheries; small incidental landing limits in the limited entry trawl fishery to account for unavoidable incidental catch; required use of selective flatfish trawl gear shoreward of the RCA north of 40°10' north latitude, RCA boundaries that limit fishing in high canary rockfish catch rates; suspended yellowtail rockfish target fishing; and bycatch limits in the Pacific whiting trawl fishery. With the exception of incidental trawl limits and Pacific whiting fishery bycatch limits which would be replaced by a quota system under a rationalized trawl fishery, the No Action measures to limit canary rockfish mortality would continue to be used under Alternatives 1, 2, 3, and the FPA. Table 4-8 shows the total catch projections of canary by alternative from data presented in Section 4.1.1.6, Estimated Impacts to Exploited Groundfish Stocks, and derived from fishery models described in Appendix A by fishery.

Table 4-8. Canary total catch projections (mt) by fishery.

Alt.	Set Aside Tribal	SS Whiting	Non-whiting Trawl	At-Sea Whiting	LE Fixed Gear	Sablefish OA	Nearshore OA	Incidental OA	Set Aside EFP	Re-search	Rec.	Grand Total
No Action	9.5	6.2	12.3	8.2	2.2	0.4	2.9	2.0	1.3	7.2	11.0	63.1
Alt. 1A	9.5	2.4	7.3	3.1	0.6	0.1	0.9	2.0	1.3	7.2	9.7	44.1
Alt. 1B	9.5	2.4	7.3	3.1	0.8	0.1	0.9	2.0	1.3	7.2	9.7	44.3
Alt. 2	9.5	6.2	9.7	8.2	1.7	0.3	2.0	2.0	1.3	7.2	10.3	58.4
Alt. 3	9.5	6.2	10.6	8.2	1.9	0.3	2.0	2.0	1.3	7.2	12.5	61.7
FPA	9.5	5.9	10.6	8.2	1.9	0.3	3.0	2.0	1.3	7.2	12.6	62.5

Under the No Action Alternative the projected fishing mortality is 41.9 mt less than the OY (Table 4-9). Under Alternative 1 the management measures are structured such that the projected fishing mortality is 5.4 mt less than the 2011 ACL and 7.4 mt less than the 2012 ACL for Alternative 1 (Table 4-9). Under Alternative 2 the management measures are structured such that the projected fishing mortality is 35.6 mt less than the 2011 ACL and 40.6 mt less than the 2012 ACL for Alternative 2. Under Alternative 3 the management measures are structured such that the projected fishing mortality is 40.3 mt less than the 2011 ACL and 45.3 mt less than the 2012 ACL for Alternative 3. Under the FPA, the management measures are structured such that the projected total catch in 2011 is 57.2 mt less than the ACL and in 2012 the projected total catch is 44.2 mt less than the ACL for the FPA.

Table 4-9. Alternative 2011 and 2012 Canary ACLs relative to the criteria described in Section 4.1.1.2.

Evaluation Criteria	No Action 2010 OY (mt)	Alternative 2011 and 2012 ACLs (mt)				
		Year	Alt. 1	Alt. 2	Alt. 3	FPA
		2011	49	94	102	102
	105	2012	51	99	107	107
Projected Fishing mortality	63.2		44.1 (1a) 44.3 (1b)	58.4	61.7	62.5
Rebuilding Duration Beyond $T_{F=0}$ (yrs.)			1	2	3	3
Rebuilding Probability (P_{MAX})			75.0%	75.0%	75.0%	75.0%

Under the FPA, the California recreational harvest guideline is 14.5 mt, which is 5 mt more than the projected impacts of 9.5 mt. The difference between the projected catch and harvest guideline is expected to prevent the harvest guideline from being exceeded due to variability in the estimated catch of canary rockfish due to effort shifts, good weather or recruitment. Though the overall canary rockfish projected catch under the proposed action is far below the HG, the annual catches of canary rockfish in the recreational fishery can vary greatly between years. Given the error in catch projections, maintaining at least a 5 mt buffer between the overall projected total catch reduces the likelihood that the actual catch will exceed the ACL.

Figure 4-4 shows the catch per tow of canary rockfish in the NMFS bottom trawl survey, which has been used as an index of the stock's depth and latitudinal distribution. While there are instances of canary rockfish occurring south of Pt. Conception at 34°27' north latitude, they are largely distributed north of Pt. Conception with the greatest density in northern waters off Washington. They are most often found in depths from 50-100 fm, but they can occur in the 27-460 fm depth range (although they infrequently occur deeper than 250 fm).

Figure 4-5 shows canary bycatch rates north and south of 40º 10' north latitude with the area north of Cape Alava closed, while Figure 4-6 shows canary bycatch rates north of 40º 10' north latitude with the area north of Cape Alava open.

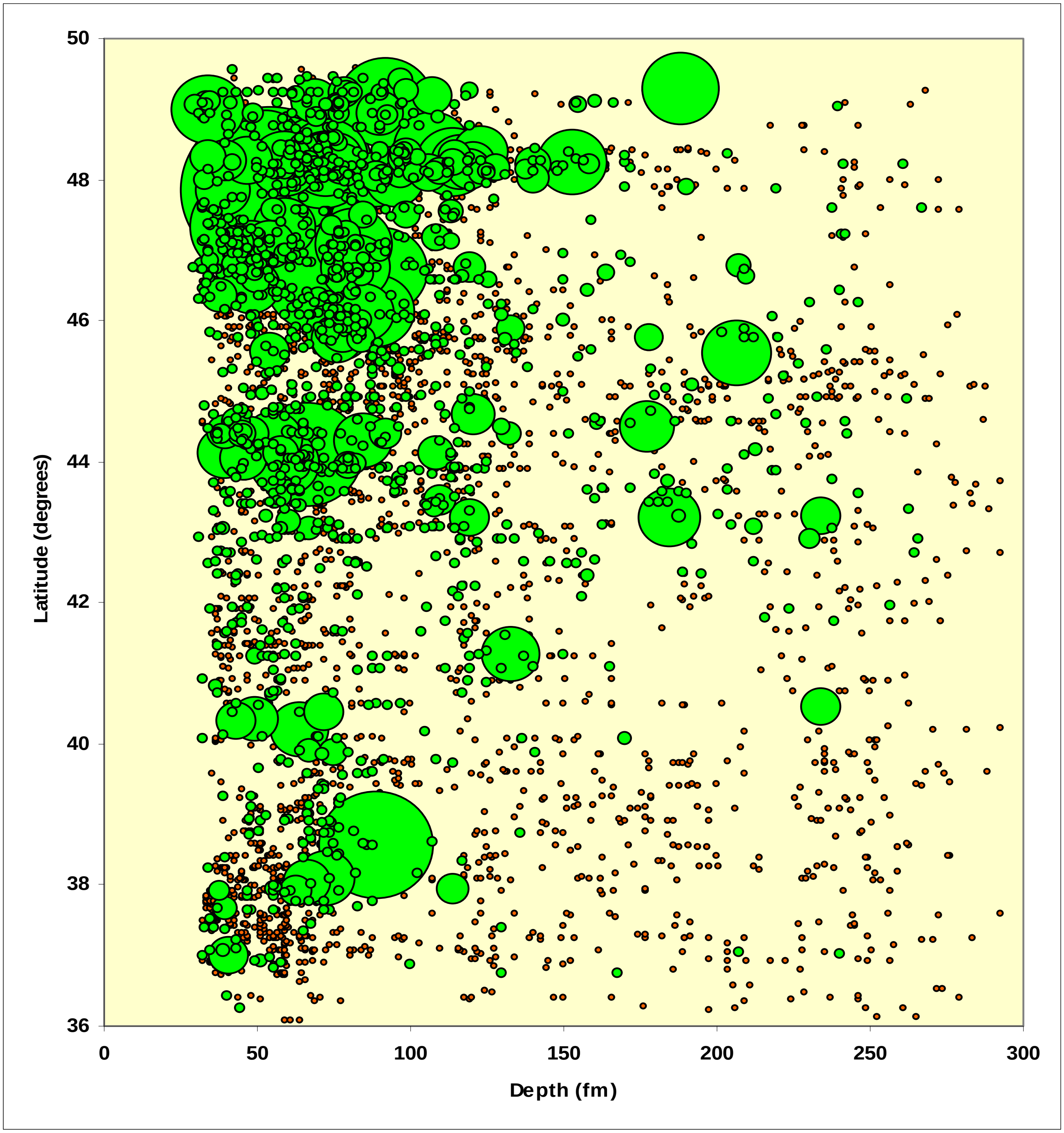

Figure 4-4. Catch per tow of canary rockfish in the NMFS triennial bottom trawl survey by latitude and depth (shaded circles are positive tows with their size proportional to CPUE, empty circles are negative tows).

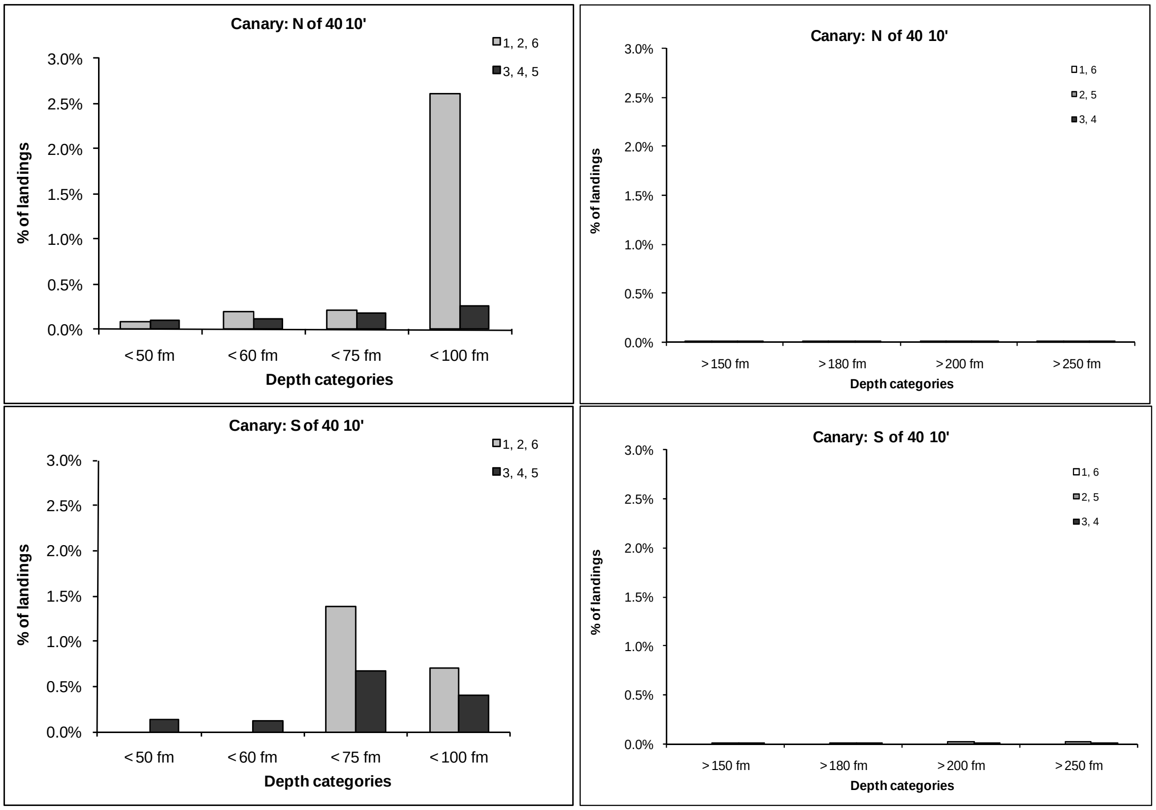

Figure 4-5. Bycatch rates (canary catch / landed species catch) of canary rockfish north and south of 40°10’ by calendar period and depth category, with area north of Cape Alava closed (PFMC, Agenda Item B.7.b, Supplemental GMT Report, June 2010).

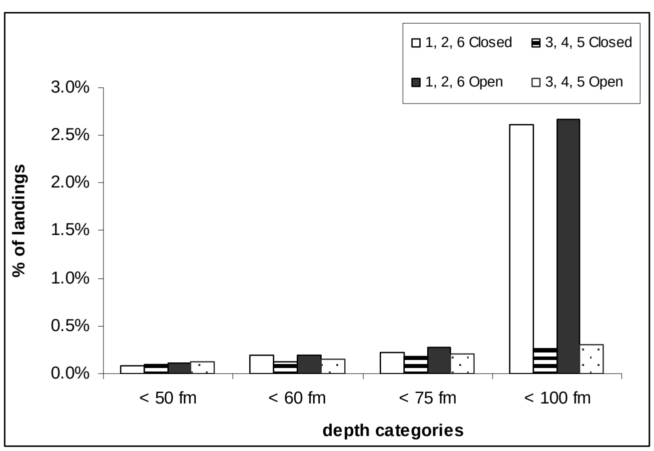

Figure 4-6. Bycatch rates (canary catch / landed species catch) of canary rockfish north of 40° 10’ by calendar period and depth category, with area north of Cape Alava open (PFMC, Agenda Item B.7.b, Supplemental GMT Report, June 2010).

Trawl RCAs: The core depth range of the trawl RCA is 100-150 fm, but vary depending on seasonal movement of overfished species (canary rockfish and other overfished species tend to make seasonal shoreward-seaward migrations with more shallow distributions in the summer months). The core depth range would be maintained under all of the Alternatives. Most of the incidental trawl take of canary rockfish occurs shoreward of the RCA because north of 40°10’ north latitude the seaward boundary is most often extended out to 200 fm to under all of the alternatives. Under the FPA and No Action the modified 200 fm line would be in place in periods 1 and 6. South of 40°10’ north latitude, the RCA seaward boundary is out to 200 fm year round for the No Action Alternatives and FPA if it is managed as a rationalized fishery. Under Alternatives 1, 2, 3 and the FPA when it is managed as a cumulative limit fishery the seaward boundary, is at 150 fm through the year with the exception of periods 1 and 6 under Alternatives 3 and the FPA (cumulative limit fishery) when the seaward boundary is at 200 fm.

Closed areas shoreward of the RCA where the canary catch rate in trawls is relatively high have been effective in reducing canary rockfish fishing mortality. Under the No Action Alternative and the FPA the area north of Cape Alava (48°10’ North latitude) is closed (RCA extended to the shore) to bottom trawling. Initially (2008) this closure was to reduce canary rockfish fishing mortality, but has remained in place in order to reduce trawl impacts to yelloweye rockfish. Under Alternatives 1, 2, and 3 the shoreward boundary of trawl RCA north of 48°10’ north latitude is maintained at 75 fm year round with the exception of period 4 under Alternatives 1 and 2 where the shoreward boundary is set at 100 fm. For canary rockfish north of 40◦ 10’ north latitude, bycatch rates increase when the shoreward RCA is specified at 100 fm relative to the 75 fm line and shallower depths, especially during the summer and fall months (Periods 3, 4, and 5) in the north. South of 40°10 north latitude the shoreward boundary of the trawl RCA is 100 fm under all of the alternatives. South of 40°10 north latitude the canary rockfish bycatch rates are lower when the shoreside RCA is set at 60 fm, compared to 75 fm.

Non-Trawl RCA: The seaward boundary of the non-trawl RCA extends out to 150 fm year round south of 40°10’ north latitude under all alternatives. North of 40°10’ north latitude the seaward boundary of the non-trawl RCA is at 100 fm year round with a few exceptions where the seaward boundary is at 125 fm. Between 45º 03.83 - 43º00’ north latitude the seaward boundary under No Action and Alternatives 1, 1a, and 2b the seaward line is at 125 fm year round. Under Alternative 1a, the seaward boundary is also at 125 fm year round for the area north of 45º 03.83 north latitude. Most of the incidental non-trawl take of canary rockfish occurs seaward of the RCA in the north. More discrete area closures (all Alternatives), such as those used to reduce fishing mortality of cowcod and yelloweye rockfish, may also help reduce canary fishing mortality, but will likely prove to be less effective for canary rockfish due to their mobility and apparent lack of site fidelity.

Since 2003 the shoreward Non-trawl RCA boundary affecting the nearshore fishery has been at 30 fm for the entire area north of 34°27’ north latitude and 60 fm south of 34°27’ north latitude. The more liberal RCA south of 34°27’ north latitude is because of the minimal occurrence of canary rockfish in the Southern California Bight. In 2009, a more restrictive 20 fm depth restriction was in place between 43° north latitude and 40°10’ north latitude and restricted target species landings to reduce yelloweye and canary rockfish fishing mortality. Under the No Action alternative, the shoreward Non-trawl RCA boundary south of 40°10’ north latitude would remain at 30 fm between 40°10’ and 34°27’ north latitude and at 60 fm south of 34°27’ north latitude. Under Alternatives 1, 2 and 3 the shoreward Non-trawl RCA boundary would be at 20 fm year round. Under the FPA, the shoreward Non-trawl RCA boundary would be at 30 fm between 40°10’ and 36°’ north latitude and at 60 fm south of 36° north latitude.

North of 46º16’ north latitude the shoreward boundary of the non-trawl RCA would be closed year round under all of the alternatives. Between 46º16’ and 43°00’ north latitude the shoreward boundary of the non-trawl RCA would be at 30 fm. Between 43º 00 - 42º00’ north latitude the shoreward boundary of the non-trawl RCA would be at 20 fm with the exception of Alternatives 2 and 3 which would have a 30 fm shoreward boundary. Between 42º 00 - 40º10' north latitude the shoreward boundary of the non-trawl RCA would be at 20 fm under all of the alternatives under all alternatives**.**

Recreational: Canary constrains access to target species north and south of 40°10' north latitude. Because the canary catch rates drop in depths shallower than 50 fm , the recreational fisheries from the South Central Morro Bay area north would be restricted to shallower depths (less than 40 fm) under all alternatives. Likewise, the Oregon recreational fisheries would be restricted to depths shallower than 40 fm from April to September under all alternatives and Washington recreational fisheries would be restricted to depth shallower than 30 fm from March through August in area 2 and 20 fm from mid-May to the end of September.

Catch accounting: In recent years, the total fishing mortality has been slightly above the OY (higher in retrospect based on current methods used for total fishing mortality estimates), but well below the ABC. In the nine years between 2000 and 2008, the retrospective total catch estimated indicate that the OY was exceeded in seven of the nine years. Catch monitoring uncertainty is high given the retention of canary is prohibited which requires estimation of bycatch to assess total fishing mortality and that a significant amount of the total fishing mortality of canary occurs in recreational fisheries.

Rebuilding Duration

The 2011 and 2012 canary rockfish ACL alternatives are all predicted to rebuild within 3 years of the shortest time possible ($T_{F=0}$ = 2024). Rebuilding is extended by 3 years from $T_{F=0}$ under the harvest rates used to determine the preferred ACL alternative, which is also ACL Alternative 3. ACL Alternatives 1 and 2 are predicted to rebuild 1 and 2 years longer than $T_{F=0}$, respectively.

Stock Productivity Relative To Rebuilding Success

The canary rebuilding probability under all the ACL alternatives, based on projections using three alternative recruitment scenarios, is 75 percent. Canary rockfish is not rebuilding as projected in the previous rebuilding analysis. The deviation from T_{TARGET} is due primarily to changes in the understanding of stock productivity and depletion due to re-estimation of the time-series of historical catches. The changes represent fundamental revisions to our understanding of the status of this species. The projected increase in the canary rockfish biomass is very sensitive to the value for steepness (state of nature), and is projected to slow as recent (and largely below-average) recruitments begin to contribute to the spawning biomass. For the period 2000-2008, when total catches averaged 83 mt, the spawning biomass is estimated to have increased from 13% to 23% of the unfished biomass level.

Because differences between the No Action OY and the FPA ACL are distributed across the various sectors, minimal redistribution of catch is expected under the FPA. Since retention of canary is prohibited for all gears except trawl, where small amounts of catch will be regulated through the new IQ system, no targeting is expected. Existing management measures for fixed-gear (depth restrictions) and trawl (shelf gear and depth restrictions) protect the prime canary habitat from the directed groundfish fishery.

Genetic Structure

Canary rockfish are distributed in the northeastern Pacific Ocean from the western Gulf of Alaska to northern Baja California; however, the species is most abundant from British Columbia to central California. Adults are primarily found along the continental shelf, with juveniles shallower and inter-tidal areas. There is little direct information regarding the stock structure of canary rockfish off the U.S. Pacific coast. Limited tagging research conducted off Oregon found that, of 10 canary rockfish recovered, 4 moved over 25 km, 3 moved more than 100 km, and one moved 326 km. Early genetic research found patterns suggestive of some population structuring between the northern California/southern Oregon and northern Oregon/southern Washington, but this work was based on limited sampling. There is currently no published research indicating separate stocks of canary rockfish within U.S. waters. Changes in fishing, under any of the alternatives being proposed, is not expected to result in to affect the genetic integrity of canary rockfish.

Prey Availability

The changes in canary mortality, across the range of alternatives considered, is likely to have minimal short-term impact on the availability of canary as prey or predators within their preferred habitats. The rate of canary rebuilding could be affected by the rebounding lingcod stock, which has increased from 13% to 67% since 1999. Adult lingcod are capable of consuming moderately large fish, and co-occur with yelloweye, reducing opportunities for a targeted lingcod fishery. Young lingcod may also serve as prey for older canary. Canary rockfish are reported to have a diverse diet. Pelagic juveniles consume copepods, amphipods and krill; adults consume krill and many species of small fish. The degree to which variability in food supply may affect body condition, spawning success or annual growth is unknown. Canary rockfish are a medium to large-bodied rockfish; achieving a maximum size of around 70 cm.

Cowcod South of 40°10' north latitude

Estimated spawning biomass using reference points and alternative low- and high-productivity models in 2009 was between 3.8% and 21.0% of the unfished level. The poor precision of this estimate was due to 1) a lack of data to inform estimates of stock productivity, and 2) conflicting information from fishery-dependent and fishery–independent data (Dick *et al*. 2009).

Scientific uncertainty is high for cowcod. While scientific uncertainty was considered in adopting the preferred 2011 and 2012 ABC of 10 mt, it may be a consideration in deciding the ACL as well since the stock assessment is extremely data-poor. The SSC categorized cowcod as a category 2 stock in the Conception area, where the assessment informs the OFL contribution, and as a category 3 stock in the Monterey area, where a catch-based approach (DB-SRA; Dick and MacCall, 2010) informs the OFL. The cowcod assessment is considered one of the more data-poor assessments done for any west coast groundfish stock. Fishery-independent information is sparse for the cowcod assessment. The trawl survey cannot fish the high relief habitats where cowcod occur and trawl survey incursions into the CCAs are not allowed. Recent fishery-dependent information for cowcod is also lacking in the assessment since they are a prohibited species and they are rare in the observed or reported discard events that appear to occur very infrequently. The rebuilding plan strategy to avoid cowcod by prohibiting retention and closing critical habitats (i.e., the CCAs) where they are known to occur has effectively ended any signal or index of biomass for this stock.

Fishing Mortality

Because cowcod are significantly depleted and the stock's productivity is extremely low, an extremely low incidental harvest rate in necessary to achieve rebuilding progress. Tenets of the cowcod rebuilding plan are to prohibit harvest in all fisheries and to close the primary habitats where adult cowcod are known to occur. Closure of the CCAs in the southern California Bight in 2001 effectively reduced harvest to very low levels; a strategy anticipated to work well for reducing adult cowcod mortality given their sedentary nature. Table 4-10 shows the total catch projections of cowcod by alternative from data presented in Section 4.1.1.6, Estimated Impacts to Exploited Groundfish Stocks.

Table 4-10. Cowcod Total Catch Projections (mt) by Fishery.

Alt.	Set Aside Tribal	SS Whit-ing	Non-whiting Trawl	At-Sea Whit-ing	LE Fixed Gear	Sable-fish OA	Near-shore OA	Incidental OA	Set Aside EFP	Re-search	Rec.	Grand Total
No Action	0.0	--	0.3	--	--	--	--	0.0	0.2	0.1	0.2	0.8
Alt. 1A	0.0	--	0.2	--	--	--	--	0.0	0.2	0.1	0.0	0.5
Alt. 1B	0.0	--	0.2	--	--	--	--	0.0	0.2	0.1	0.0	0.5
Alt. 2	0.0	--	0.3	--	--	--	--	0.0	0.2	0.1	0.2	0.8
Alt. 3	0.0	--	0.3	--	--	--	--	0.0	0.2	0.1	0.2	0.8
FPA	0.0	--	0.3	--	--	--	--	0.0	0.2	0.1	0.2	0.8

Under the No Action Alternative the projected fishing mortality is 3.2 mt less than the OY (Table 4-11). Under Alternative 1 the management measures are structured such that the projected fishing mortality is 1.4 mt less than the 2011 and 2012 ACLs (Table 4-11). Under Alternative 2 the management measures are structured such that the projected fishing mortality is 2.3 mt less than the 2011 and 2012 ACLs. Under Alternative 3 and the FPA the management measures are structured such that the projected fishing mortality is 3.2 mt less than the 2011 and 2012 ACL.

Table 4-11. Alternative 2011 and 2012 Cowcod ACLs relative to the criteria described in Section 4.1.1.2.

Evaluation Criteria	No Action 2010 OY (mt)	Alternative 2011 and 2012 ACLs (mt)				
		Year	Alt. 1	Alt. 2	Alt. 3	FPA
		2011	2	3	4	4
	4	2012	2	3	4	4
Projected Fishing mortality	0.8		0.5 (1a) 0.5 (1b)	0.8	0.8	0.8
Rebuilding Duration Beyond $T_{F=0}$ (yrs.)			4	8	11	11
Rebuilding Probability (P_{MAX})			72.4%	66.2%	66.2%	66.2%

For 2011 under the FPA, 0.9 mt of cowcod out of the 4 mt ACL would be allocated to the non-trawl fishery including the recreational fishery. Because the recreational catch data do not report maturity status, the proportion of the recreational catch that are adults is unknown. It is unclear how these estimates reflect total mortality. Few cowcod have been observed in the non-trawl commercial fisheries, with less than a tenth of a mt estimated to have been taken in the last five years. Nearly 0.7 mt would accommodate management uncertainty and any unanticipated increase in impacts from the proposed action.

Cowcod are primarily encountered in depths greater than 50 fm (Butler et. al., 2003). Adult cowcod bycatch rates are highest shoreward of 75 fm and 100 fm lines relative to shallower RCAs (Figure 4-7).

Though cowcod do occur from 20 fm to 267 fm (Love et. al., 2003), submersible surveys at the northern end of the Southern California Bight, indicate that juvenile cowcod were most common from 49 fm to 82 fm and adults were most common at depths of 66 fm to 115 fm (Butler et al., 2003). These trends in the depth distribution are repeated in the proportion of catch by depth from the trawl fishery in the Southern California Bight where cowcod were predominantly encountered in depths deeper than 65 fm (Butler et al., 1999). Recent submersible surveys indicate that juvenile cowcod occur over a wide range of habitat types, at depths between 28 and 180 fathoms and typically avoid soft sediment substrate, favoring hard substrate such as cobble and boulder fields or rock ridges (Love and Yoklavich, 2008).

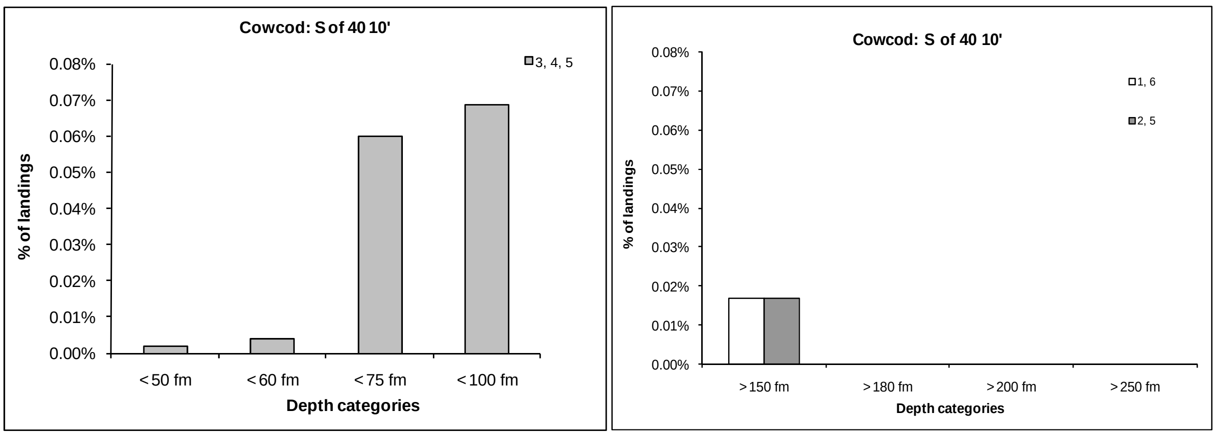

Figure 4-7. Bycatch rates (cowcod / landed species catch) of adult cowcod south of 40° 10’ by calendar period and depth category.

<u>Trawl RCAs:</u> South of 40°10’ north latitude, the RCA has remained at 100 fm to 150 fm to reduce bocaccio, canary, and cowcod encounters.

<u>Recreational</u>: Under Alternatives 2,3, and the FPA, modified depth restrictions in the CCA from the No Action Alternative boundary of 20 fm to 30 fm or 40 fm and allowing retention of shelf rockfish within the open waters of the CCA is not expected to increase adult cowcod catch (see analysis in Appendix B, Section 3.2.5). Fishing shallower than 30 fm should not increase total mortality, given the known depth distribution of cowcod. Juvenile cowcod (45 cm and smaller) occur at depths deeper than 30 fm. Adult cowcod are primarily encountered in depths greater than 50 fm (Butler et. al., 2003), which is deeper than the proposed 30 or 40 fm depth restrictions in the CCA. Juvenile cowcod (less than 45 cm total length) occur at depths greater than 30 fathoms (Love and Yoklavich, 2008), which is within the proposed 40 or 40 fathom depth restriction. Estimated encounter rates in the California recreational fishery have been extremely low since the current depth restrictions (No Action Alternative - 60 fm outside the CCA and 20 fm inside the CCA), prohibition on retention and the CCA were put in place in 2001, resulting in recreational catch below the 0.3 mt.

Though the proposed depth restriction of 30 fathoms (Alternative 2, 3, and the FPA) would extend to the edge of juvenile cowcod habitat, the proposed 40 fathom limit would allow fishing in known cowcod habitat. Juvenile cowcod are found in depths greater than 30 fm, and are vulnerable to recreational fishing gear (Love and Yoklavich, 2008; Dick et al., 2007). The current 20 fathom depth restriction provides a 10 fathom buffer between the fishable area and known cowcod habitat. Encounters with cowcod in the recreational fishery data from the unregulated period increase gradually in depths greater than 40 fm (Appendix B, Table B-46 and Table B-47) thus implementation of the 30 fm depth restriction, rather than 40 fm, reduces the likelihood of encountering cowcod. As noted in the cowcod stock assessment (Dick et al., 2009), projected increases in cowcod biomass have not been verified by observations, but are inferred from the model. No informative abundance indices are available to monitor recent trends in stock status. The estimated status of the stock (5% of unfished biomass) and uncertainty regarding progress toward rebuilding should be taken into account when considering modification to regulations concerning the CCAs.

The main conservation consideration regarding the proposed changes to depth restrictions is whether effort distributed in proposed depths would result in increased encounters with cowcod and thus increase the risk of exceeding the ACL. An increase in the depth restriction from 20 fm to 30 fm or 40 fm may not result in a significant increase in bycatch of adult (greater than 45 cm) cowcod in recreational fishery or appreciably increase the risk of the ACL being exceeded. However, the proposed 40 fm depth restriction may increase encounters with juvenile (less than 45 cm) cowcod by allowing fishing in known juvenile cowcod habitat within the CCAs. Continued disturbance of known nursery habitat could also have long-term, negative effects on rebuilding of this overfished species (Love and Yoklavich, 2008).

<u>Catch Accounting</u>: Catch monitoring uncertainty is high for cowcod. Retention of cowcod is prohibited which requires estimation of bycatch to assess total mortality, and few cowcod have been observed by the WCGOP. Without observer data, the estimates of commercial discard are highly uncertain. Recreational discard rates have not been thoroughly assessed. Recreational observer data are available for the CPFV fleets, but little is known about discard from private boats. In addition, a portion of the recreational rockfish catch has not been identified to species (the “rockfish genus” category in RecFIN), and is not included in current estimates of total fishing mortality for rockfish species. Cowcod are a small component of rockfish catch in recent years but given the low OYs even a small fraction of cowcod in the total unidentified catch may influence management decisions. Recent recreational catch is estimated using the new CRFS program, which has been in existence since 2004. Prior to 2004, all recreational catch was estimated using the MRFSS program, a survey methodology designed to understand long-term national trends in marine recreational catch and participation. Neither survey is designed to produce inseason catch or effort estimates with the precision needed to manage to the low ACLs needed to rebuild cowcod. Observed discards in the limited entry trawl fishery from the WCGOP are also rare events, making the estimates from those data uncertain. IFQ management of cowcod in the trawl fishery with a 100 percent on-board observation rate under trawl rationalization will significantly improve catch monitoring of cowcod in the trawl fishery. Although current total fishing mortality estimates are highly uncertain, the CCAs appear to be effective at minimizing fishing mortality over offshore rocky habitat in the southern California bight. Available catch estimates and mortality reports suggest that landings have not exceeded the OY limits in recent years. In most recent years the total estimated take of cowcod has been well below 4 mt. However, estimated take in 2007 was very close to 4 mt.

<u>Rebuilding Duration</u>

The 2011 and 2012 cowcod ACL alternatives are predicted to rebuild within 4-11 years of the shortest time possible ($T_{F=0}$ = 2060). Rebuilding is extended by 11 years from $T_{F=0}$ under the harvest rates used to determine the FPA, which is also ACL Alternative 3. ACL Alternative 2 is predicted to rebuild 8 years longer than $T_{F=0}$ and ACL Alternative 1 is predicted to rebuild 4 years longer than the shortest time possible. NMFS’ preferred alternative includes the Alternative 2 cowcod ACL of 3 mt and results in a rebuilding period that is three years shorter than the Council’s FPA.

Stock Productivity relative to rebuilding success

Cowcod rebuilding probabilities under all the ACL alternatives are relatively low at 66.2 percent for the preferred ACL alternative (= ACL alternative 2, and ACL alternative 3) and 72.4 percent for ACL Alternative 1. Mean generation time for cowcod is estimated from the net maternity function and is 38 years. Key productivity parameters (e.g. stock-recruitment steepness, recruitment variability) are unknown for cowcod (Dick and Ralston, 2009). Data in the assessment are insufficient to estimate these quantities for cowcod, so values used in the rebuilding analysis are based on meta-analysis of related species, adding to uncertainty in rebuilding progress.

Removing spawning stock or potential spawners from the population has the potential to change reproductive success. Fishing deeper than 30 fm has the potential to reduce juvenile survival rates. The extent of such change in reproductive success or juvenile survival relative to the proposed alternatives is unknown.

Genetic Structure

A recent study has identified genetic stock structure in cowcod, separating the stocks around Point Conception, however the data are currently not available. Until data are available, potential changes to the genetic structure of stock relative to changes in the time and location of fishing under the proposed alternatives is unknown.

Prey Availability

Because cowcod are rare, it is reasonable to assume that it is not a major prey species to the extent that harvesting could affect survival of any predator. However, the effect of the alternatives relative to No Action is unknown because the data to support this is not available.

Darkblotched Rockfish

The darkblotched rockfish spawning stock depletion of 27.5 percent at the start of 2009 is above the MSST, 250 percent of the minimum estimated depletion in 2001 (10.7 percent), and 68.8 percent of the B_{MSY} target. This is an intermediate level of depletion across the spectrum of overfished west coast rockfish species. Darkblotched spawning output in 2009 is estimated to be 68.8 percent of that in 1980, but 256.2 percent of the minimum in 2001.

Fishing Mortality

Darkblotched rockfish are caught almost exclusively by groundfish trawl gear and predominantly bottom trawls operating on the outer continental shelf and slope north of 38° north latitude between 100 and 200 fm. Under the No Action Alternative, the two main strategies used to control darkblotched rockfish catch mortality are limited entry trawl trip limits for the northern and southern minor slope rockfish complexes in which darkblotched rockfish are managed, bycatch limits in the Pacific whiting fisheries, and trawl RCAs. Under Alternatives 1, 2, 3, and the FPA, RCAs will remain as the primary strategy for reducing fishing mortality. Although the trawl rationalization program is being implemented in 2011, limited entry trawl trip limits were also considered with the continuation of bycatch limits in the Pacific whiting fishery. Given limitations of current catch models, the projected trawl fishing mortality is the same under both a trip limit and rationalized trawl fishery. Table 4-12 shows the total catch projections of darkblotched by alternative from data presented in Section 4.1.1.6, Estimated Impacts to Exploited Groundfish Stocks.

Table. 4-12. Darkblotched Rockfish Total Catch Projections (mt) by Fishery.

Alt.	Set Aside Tribal	SS Whit-ing	Non-whiting Trawl	At-Sea Whit-ing	LE Fixed Gear	Sable-fish OA	Near-shore OA	Incidental OA	Set Aside EFP	Re-search	Rec.	Grand Total
No Action	0.1	11.0	190.2	15.0	3.9	0.6		15.0	1.5	2.1		239.4
Alt. 1A	0.1	11.0	68.4	15.0	4.0	0.8		15.0	1.5	2.1		117.9
Alt. 1B	0.1	11.0	68.4	15.0	2.3	0.5		15.0	1.5	2.1		115.9
Alt. 2	0.1	11.0	108.8	15.0	3.2	0.7		15.0	1.5	2.1		157.4
Alt. 3	0.1	11.0	170.6	15.0	3.5	0.7		15.0	1.5	2.1		219.5
FPA	0.1	11.0	170.2	15.0	3.5	0.8		15.0	1.5	2.1		219.2

Under the No Action Alternative the projected fishing mortality is 90.6 mt less than the OY (Table 4-13). Under Alternative 1 the management measures are structured such that the projected fishing mortality is 104.1-106.1 mt less than the 2011 and 2012 ACL (Table 4-13). Under Alternative 2 the management measures are structured such that the projected fishing mortality is 140.5 mt less than the 2011 ACL and 138.5 mt less than the 2012 ACL. Under Alternative 3 the management measures are structured such that the projected fishing mortality is 112.4 mt less than the 2011 ACL and 109.4 mt less than the 2012 ACL. Under the FPA, the management measures are structured such that the projected total catch in 2011 is 78.8 mt less than the ACL and in 2012 the projected total catch is 76.8 mt less than the ACL.

Table 4-13. Alternative 2011 and 2012 Darkblotched Rockfish ACLs relative to the criteria described in Section 4.1.1.2.

Evaluation Criteria	**No Action 2010 OY (mt)**	**Alternative 2011 and 2012 ACLs (mt)**				
		Year	**Alt. 1**	**Alt. 2**	**Alt. 3**	**FPA**
		2011	222	298	332	298
	330	2012	222	296	329	296
Projected Fishing mortality	239.4		117.9 (1a) 115.9 (1b)	157.4	219.5	219.2
Rebuilding Duration Beyond $T_{F=0}$ (yrs.)			6	9	11	9
Rebuilding Probability (P_{MAX})			95.1%	85.2%	78.8%	85.2%

Figure 4-8 shows the catch per tow of darkblotched rockfish in the NMFS bottom trawl survey, which has been used as an index of the stock's depth and latitudinal distribution. While the clustered distribution of darkblotched in Figure 4-8 is informative, the apparent distribution is also affected by the survey sampling regime in that not all of the combined survey data is shown, zero-catch hauls are not shown, and the depths and latitudes sampled by all surveys have been irregular over time. Darkblotched rockfish are found north of 33° north latitude in depth of 16-300 fm, the core distribution is north of 38° north latitude in depths from 96 fm to 220 fm. In 2004, observers noted two very large catches (8,000-15,000 lbs), which were partially discarded (Rogers 2006). They were both from an area that also had large survey catches at approximately 40.5° north latitude in 200 fm. These large catches tended to contain larger than average fish (Rogers 2006). Closure of those areas might be used to further reduce darkblotched rockfish fishing mortality.

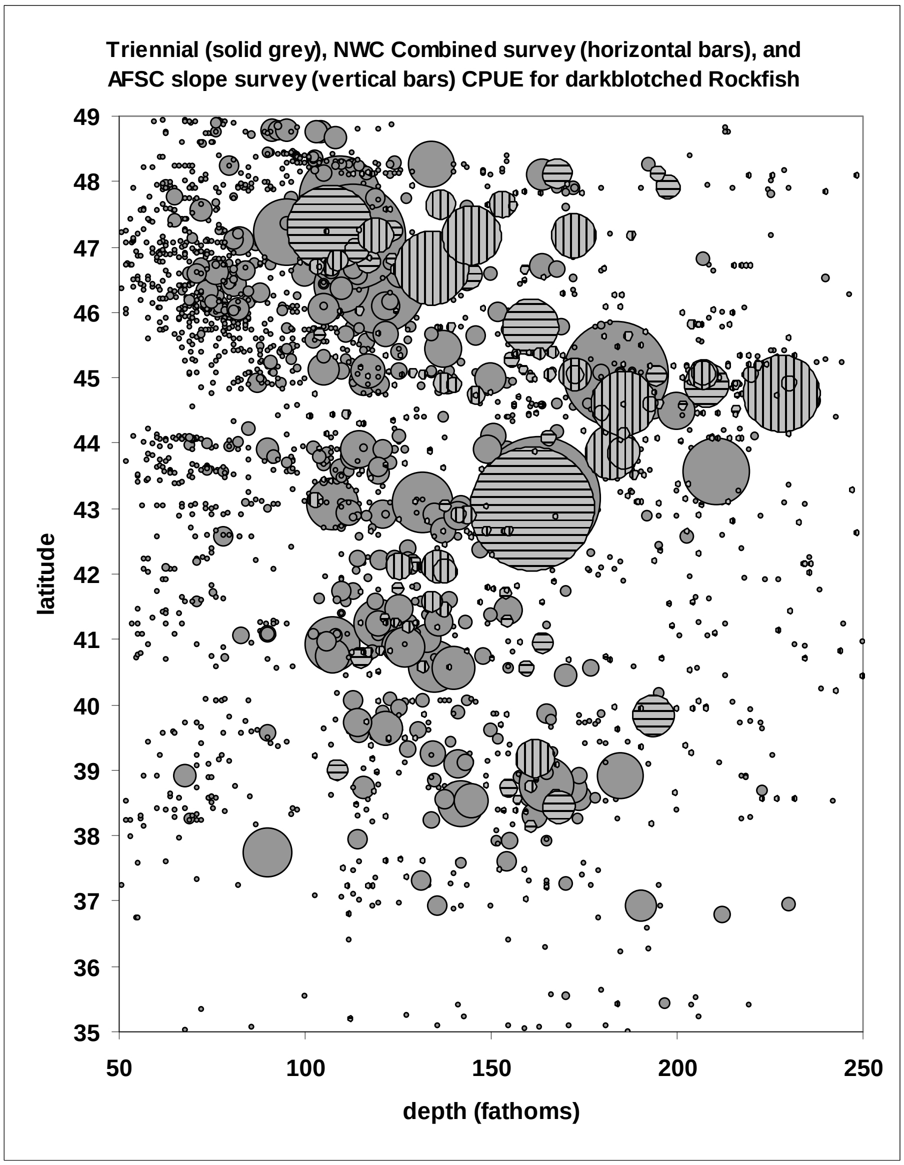

Figure 4-8. Index of west coast distribution of darkblotched rockfish by latitude and depth as determined by catch per tow in NMFS trawl surveys. Size of circle is proportional to darkblotched rockfish density at that location. Data from NWFSC's West Coast Groundfish Survey Database and the AFSC Triennial Shelf and Slope Survey Database.

The core depth range of the trawl RCA is 100-150 fm, and would be maintained under all of the Alternatives. Most of the incidental trawl take of darkblotched rockfish occurs seaward of the RCA. For darkblotched rockfish, there is a significant change in the bycatch rate at 38° north latitude and as such, rates are stratified at 38° rather than 40°10 north latitude. A seasonal trend in darkblotched bycatch rates is apparent when the RCA is set at either 150 fm or 180 fm; rates are highest during winter months (periods 1 and 6). Darkblotched rockfish bycatch can be significantly reduced by moving the RCA deeper than the 200 fm line (Figure 4-9).

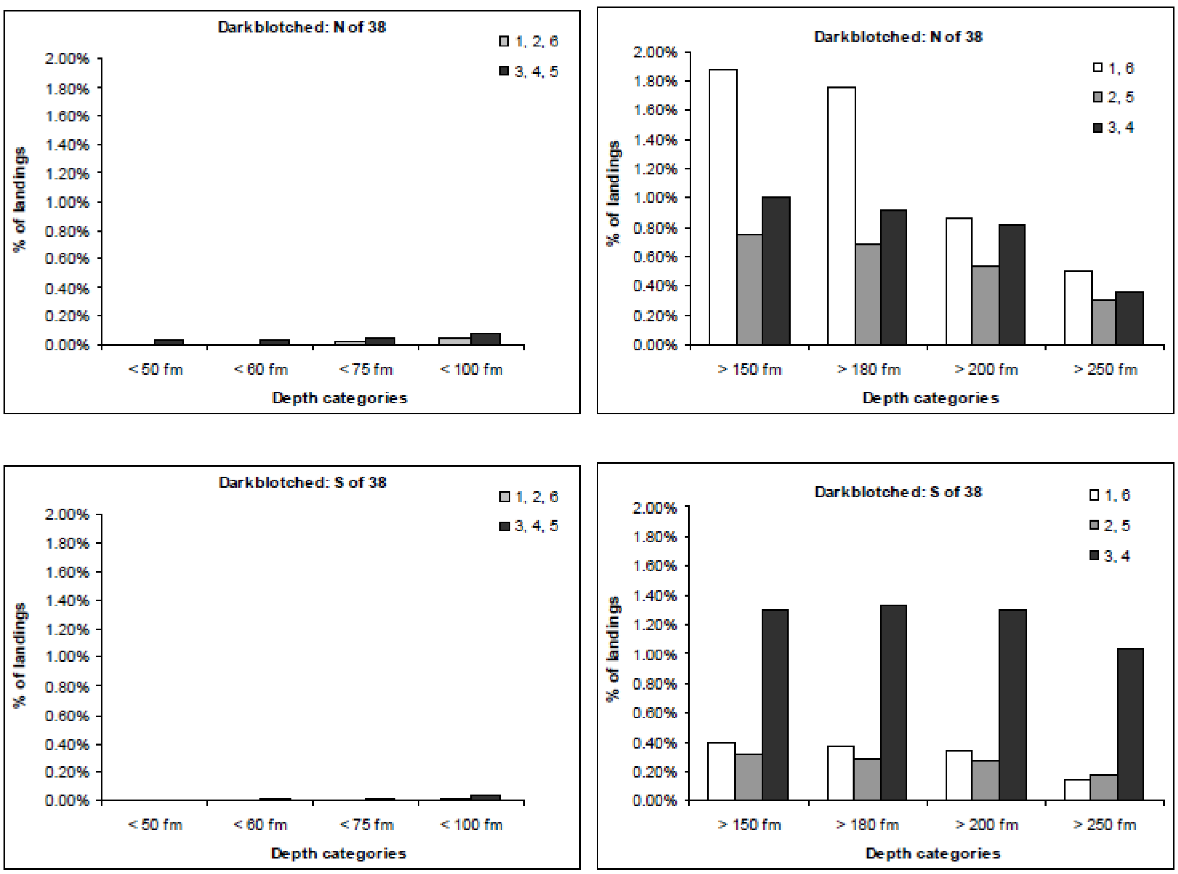

Figure 4-9. Bycatch rates (darkblotched rockfish / landed species catch) of darkblotched rockfish north and south of 40◦ 10’ by calendar period and depth category (PFMC, Agenda Item B.7.b, Supplemental GMT Report, June 2010).

<u>Trawl RCAs</u>: North of 40°10’ north latitude the seaward boundary of the trawl RCA is most often extended out to 200 fm to reduce fishing mortality of darkblotched and POP under all of the alternatives. Under the No Action Alternative and the FPA (rationalized fishery) a modified 200 fm depth contour would be in place in periods 1 and 6. South of 40°10’ north latitude, the trawl RCA seaward boundary is out to 200 fm year round for the No Action Alternatives and FPA (rationalized fishery). Under Alternatives 1, 2, 3 and the FPA (cumulative limit fishery) the seaward boundary is at 150 fm through the year with the exception of periods 1 and 6 under Alternatives 3 and the FPA (cumulative limit fishery) when the seaward boundary is at 200 fm.

South of 40°10' north latitude, the RCA seaward boundary is out to 200 fm year round for the No Action Alternatives and FPA if it is managed as an IFQ fishery. Under Alternatives 1, 2, 3 and the FPA when it is managed as a cumulative limit fishery the seaward boundary is at 150 fm through the year with the exception of periods 1 and 6 under Alternatives 3 and the FPA (cumulative limit fishery) when the seaward boundary is at 200 fm.

None of the proposed alternatives are expected to result in a significant changes in adult or juvenile fishing mortality by location and season when compared to No Action. A thorough investigation of historical darkblotched rockfish fishing mortality in the shrimp fishery has been proposed as a future research need in the 2009 and darkblotched stock assessments (Wallace and Hamel 2009).

Catch Accounting: Because darkblotched is a trawl-dominant species the uncertainty in catch accounting and catch projections are relatively low given the monitoring programs that are in place for trawl fisheries. The non-whiting trawl sector has the largest take of darkblotched. The WCGOP observation rate of non-whiting trawl trips has averaged about 25 percent annually in recent years with total catch data available post season. With trawl rationalization the WCGOP observation rate will increase to 100 percent of all trips with catch data available inseason. The at-sea whiting fishery has nearly 100 percent of the catch on each processing vessel is sampled for catch composition of the at-sea with total catch estimates available inseason. Under No Action, the shore-based whiting fishery generally operates under EFPs in with maximized retention requirements and verified catch accounting on shore.

Rebuilding Duration

The 2011 and 2012 darkblotched rockfish ACL alternatives 3 are predicted to rebuild within 11 years of the shortest time possible ($T_{F=0}$ = 2016). Rebuilding is extended by 9 years from $T_{F=0}$ under the harvest rate used to determine the preferred ACL alternative, which is Alternative 2. ACL Alternative 1 is predicted to rebuild 6 years longer than the shortest time possible. Since darkblotched rockfish are a long-lived species, there is no expectation that this stock would be particularly sensitive to the ACL's proposed under any of the given alternatives. Current fishing operations are not likely to substantially interfere with the spawning behavior or juvenile survival rate of this live-bearing (viviparous) species. NMFS' preferred alternative includes the same darkblotched rockfish ACL as the Council's FPA.

Stock Productivity Relative to Rebuilding Success

Darkblotched rockfish rebuilding probabilities under the ACL alternatives are relatively intermediate to high at 78.8 percent for alternative 3, 85.2 percent for the preferred ACL alternative (and ACL alternative 2), and 95.1 percent for ACL Alternative 1. These probabilities reflect that in both the short and long term, if fishery pressure is reduced, this long-lived species will recovery slowly but consistently under all of the Alternatives, given there are no disastrous change in ocean conditions.

Genetic Structure

No Action genetic impacts are unknown. Since Alternatives 1, 2, 3, and the FPA only reasonably limit the overall ACL's, their impact on the genetic structure of the darkblotched stock would be minimal under current fishing practices. Long-term niche fishing under the new ITQ system would potentially have a greater impact however the impacts are unknown.

Prey Availability

Pelagic young are food for albacore and Chinook salmon (Hart 1973, Love et al. 2002). All the current alternatives limit fishing pressure, which should slowly increase the population size and hence increase the availability of darkblotched young as prey for other species. No information is available to imply that young darkblotched are a significant or uniquely important prey item for any other species.

Petrale Sole

The petrale sole spawning stock depletion of 11.6 percent at the start of 2009 is below the new proposed MSST of 12.5 percent (i.e., half the proposed B_{MSY} target). This is a low level of depletion across the spectrum of overfished west coast species with the second lowest depletion with respect to percent of the B_{MSY} target (cowcod is the lowest). The coastwide petrale sole stock was declared overfished in 2010 based on the results of the 2009 assessment. A new rebuilding plan for petrale sole is therefore contemplated under Amendment 16-5, which is part of the proposed action analyzed in this EIS.

Scientific uncertainty is a consideration in the evaluation of ACLs for a limited number of species, including petrale, in the 2011 and 2012 cycle since the preferred ACLs are set equal to and slightly below 2011 and 2012 ABCs, respectively. Petrale sole was categorized as a category 1 stock and is considered a relatively robust and data-rich assessment. Petrale occur in trawlable areas and are readily caught in the NMFS trawl survey. Catch data is also relatively rich in the assessment, despite the effect the high historical catches before good record-keeping has had on the estimate of high unfished biomass and low current depletion. The base case model fits the survey and compositional data very well and the assessment was considered thorough and technically sound by the STAR Panel and the SSC. Scientific uncertainty in estimating 2011 and 2012 petrale OFLs is relatively low. However, scientific uncertainty is much greater in estimates of unfished biomass and current depletion rate, the implications of which are discussed above.

Fishing Mortality

Most of the petrale sole catch is made by deep-water demersal trawls at depths of 164-252 fm (PMFC 1996). Recent petrale sole catch statistics exhibit marked seasonal variation, with substantial portions of the annual harvest taken from the spawning grounds in December and January. Table 4-14 shows the total catch projections of petrale sole by alternative from data presented in Section 4.1.1.6, Estimated Impacts to Exploited Groundfish Stocks.

Table 4-14. Petrale Sole Total Catch Projections (mt) by Fishery.

Alt.	Set Aside Tribal	SS Whit-ing	Non-whiting Trawl	At-Sea Whit-ing	LE Fixed Gear	Sable-fish OA	Near-shore OA	Incidental OA	Set Aside EFP	Re-search	Rec.	Grand Total
No Action	45.4		1,111.2					1.0	2.0	17.0		1,176.6
Alt. 1A	45.4		340.9					1.0	2.0	17.0		406.3
Alt. 1B	45.4		340.9					1.0	2.0	17.0		406.3
Alt. 2	45.4		632.0					1.0	2.0	17.0		697.4
Alt. 3	45.4		851.2					1.0	2.0	17.0		916.6

FPA	45.4		839.0					1.0	2.0	17.0		904.4

Under the No Action Alternative the projected fishing mortality is 23.4 mt less than the OY (Table 4-15). Under Alternative 1 the management measures are structured such that the projected fishing mortality is 52.7 mt less than the 2011 ACL and 217.7 mt less than the 2012 ACL (Table 4-15). Under Alternative 2 the management measures are structured such that the projected fishing mortality is 78.6 mt less than the 2011 ACL and 462.6 mt less than the 2012 ACL. Under Alternative 3 the management measures are structured such that the projected fishing mortality is 59.4 mt less than the 2011 ACL and 243.4 mt less than the 2012 ACL. Under the FPA, the management measures are structured such that the projected total catch in 2011 is 71.6 mt less than the ACL and in 2012 the projected total catch is 255.6 mt less than the ACL.

Table 4-15. Evaluation of Alternative 2011 and 2012 petrale sole ACLs relative to the criteria described in Section 4.1.1.2.

Evaluation Criteria	**No Action 2010 OY (mt)**	**Alternative 2011 and 2012 ACLs (mt)**				
		Year	**Alt. 1**	**Alt. 2**	**Alt. 3**	**FPA**
		2011	459	776	976	976
	1,200	2012	624	1,160	1,160	1,160
Projected Fishing mortality	1,176.6		406.3 (1a) 406.3 (1b)	697.4	916.6	904.4
Rebuilding Duration Beyond $T_{F=0}$ (yrs.)			0	1	2	2
Rebuilding Probability (P_{MAX})			100.0%	87.2%	86.2%	86.2%

Petrale sole begin to mature between 25-30 cm and the fishery generally selects fish of the same size or larger. Immature fish, generally those less than 25 cm in length, are not subject to high levels of fishery mortality.

Petrale sole exhibit distinct seasonal depth migrations. Hence, RCA structures for this species should vary seasonally (Figure 4-10). The general pattern for petrale sole is a shallower depth distribution during periods 3 and 4 and a deeper depth distribution during periods 1 and 6. Petrale sole are typically in transition as they migrate between shallow and deeper depths during periods 2 and 5.
Figure 4-10 shows the petrale sole bycatch rate by calendar period and depth category.

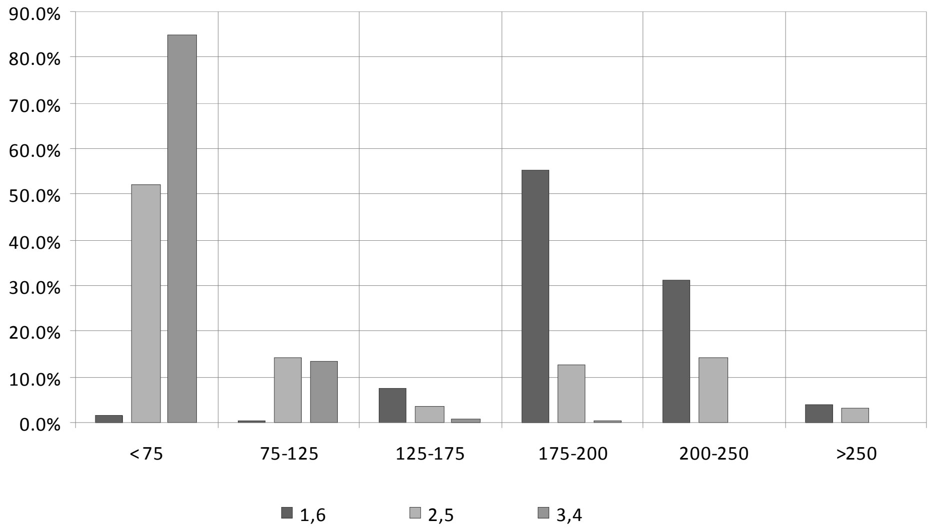

Figure 4-10. Bycatch rates (petrale sole / landed species catch) of petrale sole by calendar period and depth category (PFMC, Agenda Item B.7.b, Supplemental GMT Report, June 2010).

Trawl RCAs: North of 40°10' north latitude the seaward boundary of the trawl RCA is most often extended out to 200 fm under all of the alternatives. With the RCA line at 200 fm it reduces fishing mortality of darkblotched and POP as well as pertale sole. Under the No Action Alternative and the FPA (IFQ) a modified 200 fm depth contour would be in place in period 1 and 6 allowing some targeted access to petrale sole. South of 40°10' north latitude, the trawl RCA seaward boundary is out to 200 fm year round for the No Action Alternatives and FPA (rationalized fishery). Under Alternatives 1, 2, 3 and the FPA (cumulative limit fishery) the seaward boundary is at 150 fm through the year with the exception of periods 1 and 6 under Alternatives 3 and the FPA (cumulative limit fishery) when the seaward boundary is at 200 fm. Should the petrale sole allocation be attained midyear, the seaward RCA could be set at 250 fm in order to provide access to deep water stocks while preventing petrale sole impacts.

Under the No Action Alternative and the FPA the area north of Cape Alava (48°10' North latitude) is closed (trawl RCA extended to the shore) to bottom trawling. Under Alternatives 1, 2, and 3 the shoreward boundary of trawl RCA north of 48°10' north latitude is maintained at 75 fm year round with the exception of period 4 under Alternatives 1 and 2 where the shoreward boundary is set at 100 fm. South of 40°10 north latitude the shoreward boundary of the trawl RCA is 100 fm under all of the alternatives.

Trawl fishery bycatch rate data were considered to determine an acceptable level of risk (see Appendix B) under the FPA. Notable features of this RCA include a modified 200 fm line in the north and a modified 150 fm line in the south during periods 1 and 6. These modified lines are designed to provide access to petrale sole. The RCA structure among Alternatives 1, 2, and 3 is essentially the same. The No Action Alternative, Alternatives 1 and 2 are equal, but in Alternative 3 and the FPA, the shoreward RCA boundary in period 4 was brought in to 75 fathoms in order to further restrict access to summer petrale sole, along with lower trip.

Minor adjustments to the 200 fm petrale RCA contour line near Heceta Bank were considered under the FPA because the 200 fm line exceeded 400 fm in some areas. This change which is discussed in detail in Appendix B, and is not expected to result in the petrale sole ACL being exceeded. The change relative to No Action is unmeasureable. The full analysis of the changes are in Appendix B (Section 3.1.5).

Catch Accounting: Because petrale sole is a trawl-dominant species the uncertainty in catch accounting and catch projections are relatively low given the monitoring programs that are in place for non-whiting trawl fisheries. The WCGOP observation rate of non-whiting trawl trips has averaged about 25 percent annually in recent years with total catch data available post season. With trawl rationalization the WCGOP observation rate will increase to 100 percent of all trips with catch data available inseason.

Rebuilding Duration

Petrale sole is a productive stock and the 2009 rebuilding analysis predicts the stock can be rebuilt within 10 years. Therefore, by statute, the maximum time to rebuild the petrale sole stock (T_{MAX}) that can be considered under Amendment 16-5 is 10 years, or by 2021.

The 2011 and 2012 petrale sole ACL alternatives are predicted to rebuild within 2 years of the shortest time possible ($T_{F=0}$ = 2014). The FPA is the same as ACL Alternative 3, which is predicted to rebuild the stock 2 years longer than $T_{F=0}$. Rebuilding is extended by 1 year from $T_{F=0}$ under ACL alternative 2. ACL Alternative 1 is predicted to rebuild the stock by $T_{F=0}$ or in the shortest time possible. NMFS' preferred ACL alternative for petrale sole is the same as the Council's FPA and is predicted to rebuild the stock 2 years longer than TF=0 .

Stock Productivity Relative To Rebuilding Success

Petrale sole rebuilding probabilities under the ACL alternatives are relatively high at 86.2 percent for the preferred ACL alternative (same as ACL alternative 3), 87.2 percent for ACL Alternative 2, and 100 percent for ACL Alternative 1. The stock is expected to recover relatively rapidly under most of the scenarios investigated in the rebuilding plan.

Petrale sole spawn during the winter at several discrete deepwater sites (270-460 m) off the U.S. west coast, from November to April, with peak spawning taking place from December to February (Harry 1959; Best 1960; Gregory and Jow 1976; Castillo et al. 1993; Carison and Miller 1982; Reilly et al. 1994; Castillo 1995; Love 1996; Moser 1996a; Casillas et al. 1998). The petrale sole stock assessment and rebuilding plans are not spatially explicit. However, both documents consider the seasonality of the catches by the fishery as the winter fishery focuses on spawning aggregations and the summer fishery exploits a mixed stock. Longer recovery times are expected when allowing the winter fishery to catch most of the fish as it focuses on spawning aggregations. However, most of the scenarios examined recover the stock within 10 years. No research has been done regarding spawning behavior and the impact of fishing on spawning aggregations.

Genetic Structure

It is unlikely that fishing practices under any of the alternatives will impact the genetic structure of the stock. Pelagic juveniles spend a fairly long time in the water column and are likely transported long distances maintaining the stocks genetic diversity.

Prey Availability

Petrale sole eggs and larvae are eaten by planktivorous invertebrates and pelagic fishes. Juveniles are preyed upon (sometimes heavily) by adult petrale sole, as well as other large flatfishes. Adults are preyed upon by sharks, demersally feeding marine mammals, larger flatfishes, and pelagic fishes (NOAA 1990). Petrale sole compete with other large sympatric flatfishes and share the same summer feeding grounds with lingcod, English sole, rex sole, and Dover sole (NOAA 1990). Petrale are ambush predators as adults. There is limited information regarding the strength of trophic interactions between the petrale stock and its predators and prey. The effects of prey availability under any of the alternatives is unknown, but is assumed to be similar to this under the No Action alternative.

Pacific Ocean Perch

The POP spawning stock depletion of 28.6 percent at the start of 2009 is above the MSST, 146.9 percent of the minimum estimated depletion in 1997 (19.5 percent), and 71.4 percent of the B_{MSY} target. This is an intermediate level of depletion across the spectrum of overfished west coast rockfish species. POP spawning biomass in 2009 is estimated to be 65.8 percent of that in 1980, but 146.9 percent of the minimum in 1997.

<u>Fishing Mortality</u>

POP are caught almost exclusively by groundfish trawl gear and predominantly bottom trawls operating on the outer continental shelf and slope north of 42° north latitude. Recreationally, it is not an important species (NOAA 1990). POP are found from 30-350 fm, with the core distribution between 110-220 fm. Table 4-16 shows the total catch projections of POP by alternative from data presented in Section 4.1.1.6, Estimated Impacts to Exploited Groundfish Stocks, and derived from fishery models described in Appendix A by fishery.

Table 4-16. POP Total Catch Projections (mt) by Fishery.

Alt.	Set Aside Tribal	SS Whit-ing	Non-whiting Trawl	At-Sea Whit-ing	LE Fixed Gear	Sable-fish OA	Near-shore OA	Incidental OA	Set Aside EFP	Re-search	Rec.	Grand Total
No Action	10.9	13.0	94.5	17.0	0.4	0.1	--	0.1	0.1	1.8	--	137.9
Alt. 1A	10.9	13.0	20.3	17.0	0.2	0.0	--	0.1	0.1	1.8	--	63.4
Alt. 1B	10.9	13.0	20.3	17.0	0.2	0.0	--	0.1	0.1	1.8	--	63.4
Alt. 2	10.9	13.0	41.8	17.0	0.3	0.1	--	0.1	0.1	1.8	--	85.1
Alt. 3	10.9	13.0	90.4	17.0	0.3	0.1	--	0.1	0.1	1.8	--	133.7
FPA	10.9	13.0	90.2	17.0	0.3	0.1	--	0.1	0.1	1.8	--	133.5

Under the No Action Alternative the projected fishing mortality is 62.1 mt less than the OY (Table 4-17). Under Alternative 1 the management measures are structured such that the projected fishing mortality is 16.6-16.7 mt less than the 2011 and 2012 ACL (Table 4-17). Under Alternative 2 the management measures are structured such that the projected fishing mortality is 26 mt less than the 2011 ACL and 28 mt less than the 2012 ACL. Under Alternative 3 the management measures are structured such that the projected fishing mortality is 46.4 mt less than the 2011 ACL and 49.4 mt less than the 2012 ACL. Under the FPA ACL, the management measures are structured such that the projected total catch in 2011 is 46.6 mt less than the ACL and in 2012 the projected total catch is 49.6

mt less than the ACL. However, the FPA with an ACT of 157 the projected catch in 2011 is 23.6 mt less than the ACT and in 2012 the projected total catch is 23.6 mt less than the ACT.

Table 4-17. Evaluation of Alternative 2011 and 2012 Pacific Ocean perch ACLs relative to the criteria described in Section 4.1.1.2.

Evaluation Criteria	No Action 2010 OY (mt)	Alternative 2011 and 2012 ACLs and ACTs (mt)					
		Year	Alt. 1	Alt. 2	Alt. 3	FPA ACL	FPA ACT
		2011	80	111	180	180	157
	200	2012	80	113	183	183	157
Projected Fishing mortality	137.9		63.4 (1a) 63.4 (1b)	85.1	133.7	133.5	133.4
Rebuilding Duration Beyond $T_{F=0}$ (yrs.)			1	1	2	2	2
Rebuilding Probability (P_{MAX})			93.8%	92.9%	89.7%	89.7%	90.2%

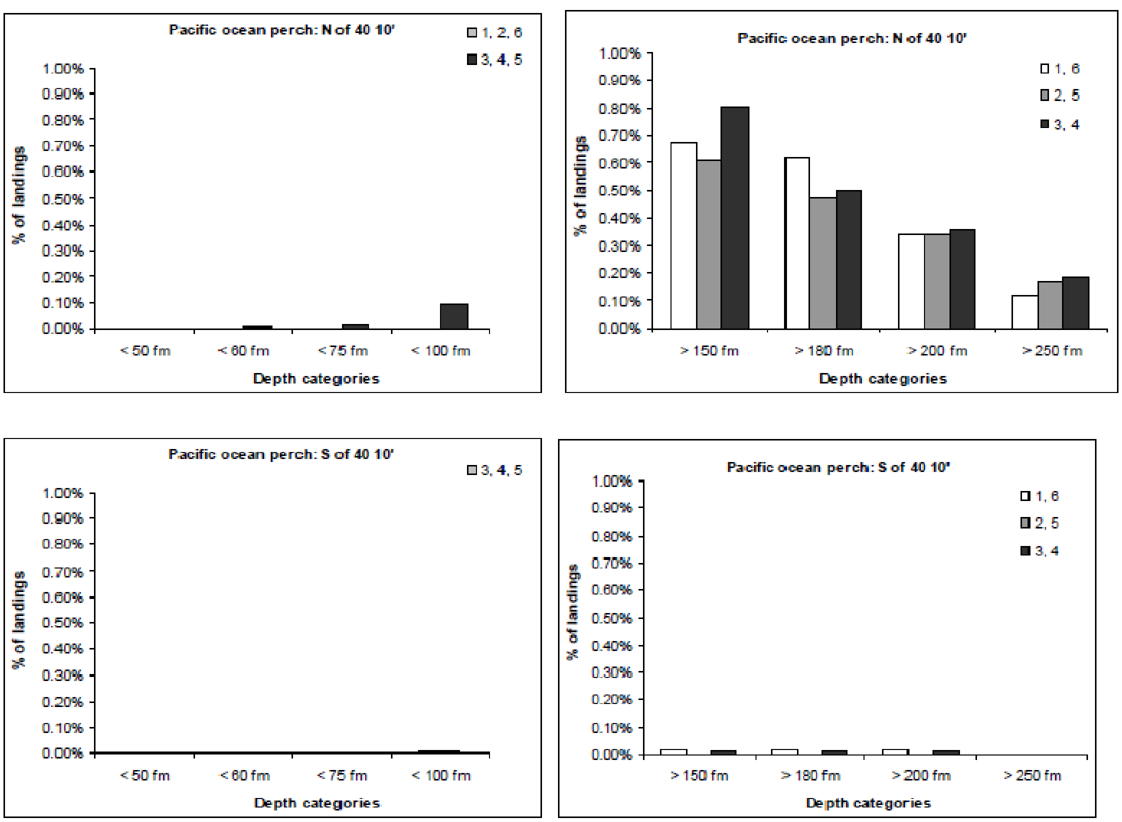

Figure 4-11. Bycatch rates (POP catch / landed species catch) of POP north and south of 40º 10' north latitude. by calendar period and depth category (PFMC, Agenda Item B.7.b, Supplemental GMT Report, June 2010).

Figure 4-11 shows bycatch rates (POP/ landed species catch) of POP north and south of 40° 10' by calendar period and depth category. For POP, bycatch rates are highest when the RCA is specified

at the 150 fm or 180 fm line relative to deeper RCA options. The rates are the highest when the line is specified at 150 fm in periods 3 and 4.
Figure 4-11 shows bycatch rates (POP/ landed species catch) of POP north and south of 40° 10' by calendar period and depth category. For POP, bycatch rates are highest when the RCA is specified at the 150 fm or 180 fm line relative to deeper RCA options. The rates are the highest when the line is specified at 150 fm in periods 3 and 4.

Trawl RCAs: North of 40°10' north latitude the seaward boundary of the trawl RCA is most often extended out to 200 fm to reduce fishing mortality of darkblotched and POP under all of the alternatives. Under the No Action Alternative and the FPA (rationalized fishery) a modified 200 fm depth contour would be in place in periods 1 and 6. South of 40°10' north latitude, the trawl RCA seaward boundary is out to 200 fm year round for the No Action Alternatives and FPA (rationalized fishery). Under Alternatives 1, 2, 3 and the FPA (cumulative limit fishery) the seaward boundary is at 150 fm through the year with the exception of periods 1 and 6 under Alternatives 3 and the FPA (cumulative limit fishery) when the seaward boundary is at 200 fm.

Catch Accounting: Because POP is a trawl-dominant species the uncertainty in catch projections are relatively low given the monitoring programs that are in place for trawl fisheries. The non-whiting trawl sector has the largest take of POP. The WCGOP observation rate of non-whiting trawl trips has averaged about 25 percent annually in recent years with total catch data available post season. With trawl rationalization the WCGOP observation rate will increase to 100 percent of all trips with catch data available inseason. The at-sea whiting fishery has nearly 100 percent of the catch on each processing vessel sampled for catch composition of the at-sea with total catch estimates available inseason. The non-rationalized shore-based whiting fishery generally operates under EFPs in with maximized retention requirements and verified catch accounting on shore.

Rebuilding Duration

The 2011 and 2012 POP ACL alternatives are predicted to rebuild within 2 years of the shortest time possible ($T_{F=0}$ = 2018). The FPA ACL is the same as Alternative 3 and is predicted to rebuild 2 years longer than $T_{F=0}$. Rebuilding is extended by 1 year from $T_{F=0}$ under ACL alternatives 1 and 2. The Council also adopted a 2011 and 2012 ACT of 157 mt for POP, which is the highest level of harvest observed in recent years. The ACT will be the effective harvest limit for POP, which is also predicted to rebuild the stock 2 years later than the shortest time possible. NMFS' preferred alternative includes the same POP ACLs and ACTs as the Council's FPA.

Stock Productivity Relative To Rebuilding Success

POP rebuilding probabilities under the ACL alternatives are relatively high at 89.7 percent for the preferred ACL alternative (same as alternative 3), 92.9 percent for ACL Alternative 2, and 93.8 percent for ACL Alternative 1. The preferred ACT has an estimated rebuilding probability of 90.2 percent.

POP off of the US West Coast (mostly Washington and Oregon) are at the southern end of the range where there are enough POP to be commercially important, and the numbers seen are related to movement across the Canadian border as well as reproductive success (recruitment) and fishing mortality north of the border. The effectiveness of U.S. management depends not only on environmental and ecosystem effects on recruitment and mortality, but on what happens in Canadian waters.

Fishing practices are unlikely to have any effect on the reproductive success of the stock given the quite low fishing mortality levels proposed. There is no indication that fishing operations are likely to substantially interfere with or disturb reproductive behavior or juvenile survival.

Genetic Structure

There is no evidence that the fishing levels proposed will in any substantial way affect the genetic structure of the stock.

Prey Availability

Predators of POP include sablefish and Pacific halibut. Other predators may include Pacific cod and arrowtooth flounder. Pelagic juveniles are consumed by salmon, and benthic juveniles are eaten by lingcod and other large demersal fish (NMFS et al. 1998). The fishing levels proposed are not expected to substantially affect the population of POP off of Oregon and Washington and therefore would not substantially affect their predators or prey.

Widow Rockfish

The widow rockfish spawning stock depletion of 38.5 percent at the start of 2009 is just shy of the B_{MSY} target of 40 percent of unfished biomass. Scientific uncertainty is a consideration in the 2011 and 2012 ABCs for widow rockfish as well as the range of ACLs. In November 2009, a larger range of ACLs including values up to the 3,000 mt, the estimated MSY harvest level in the 2009 assessment, were initially considered. While the SSC categorized widow rockfish as a category 1 stock, the assessment was considered to have high uncertainty given the lack of reliable fishery-independent or fishery-dependent indices of abundance. Therefore, the higher ACL alternatives originally considered for analysis in November 2009 were dropped from consideration. Scientific uncertainty is also a consideration in judging the true status of widow rockfish.

Fishing Mortality

Widow rockfish were a target species historically taken with midwater trawls. The directed midwater trawl fishery for widow and yellowtail rockfish was discontinued in 2002 due to high bycatch of canary rockfish. However widow rockfish continues to be a bycatch species in the Pacific whiting fishery. Widow rockfish have occasionally been taken in central and southern California gill net fisheries (NOAA 1990) and are taken in the recreational fisheries off California. Under the No Action Alternative, the two main strategies used to control widow rockfish catch mortality are limited entry trawl trip limits, bycatch limits in the Pacific whiting fisheries, and trawl RCAs. Under Alternatives 1, 2, 3, and the FPA, RCAs will remain as the primary strategy for reducing fishing mortality. Although the trawl rationalization program is being implemented in 2011, limited entry trawl trip limits were also considered with the continuation of bycatch limits in the Pacific whiting fishery. Given limitations of current catch models, the projected trawl fishing mortality are the same under both a trip limit and rationalized trawl fishery. Table 4-18 shows the total catch projections of widow rockfish by alternative from data presented in Section 4.1.1.6, Estimated Impacts to Exploited Groundfish Stocks, and derived from fishery models described in Appendix A by fishery.

Table 4-18. Widow rockfish total catch projections (mt) by fishery.

Alt.	Set Aside Tribal	SS Whiting	Non-whiting Trawl	At-Sea Whiting	LE Fixed Gear	Sable-fish OA	Near-shore OA	Incidental OA	Set Aside EFP	Re-search	Rec.	Grand Total
No Action	45.0	107.0	15.4	148.0	0.0	0.0	0.3	3.3	11.0	1.6	8.1	339.7
Alt. 1A	45.0	27.6	8.4	38.2	0.1	0.0	0.2	3.3	11.0	1.6	7.0	142.4
Alt. 1B	45.0	27.6	8.4	38.2	0.0	0.0	0.0	3.3	11.0	1.6	7.0	142.1
Alt. 2	45.0	107.0	8.7	148.0	0.1	0.0	0.3	3.3	11.0	1.6	7.8	332.8
Alt. 3	45.0	107.0	14.9	148.0	0.1	0.0	0.2	3.3	11.0	1.6	8.7	339.9
FPA	45.0	107.0	14.8	148.0	0.1	0.0	0.3	3.3	11.0	1.6	8.7	339.8

Under the No Action Alternative the projected fishing mortality is 169.3 mt less than the OY (Table 4-19). Under Alternative 1 the management measures are structured such that the projected fishing mortality is 57.6 mt less than the 2011 and 2012 ACL (Table 4-19). Under Alternative 2 the management measures are structured such that the projected fishing mortality is 67.2 mt less than the 2011 and 2012 ACL. Under Alternative 3 the management measures are structured such that the projected fishing mortality is 260.3 mt less than the 2011 and 2012 ACL. Under the FPA, the management measures are structured such that the projected total catch in 2011 and 2012 is 260.2 mt less than the ACL.

Table 4-19. Evaluation of Alternative 2011 and 2012 widow rockfish ACLs relative to the criteria described in Section 4.1.1.2.

Evaluation Criteria	No Action 2010 OY (mt)	Alternative 2011 and 2012 ACLs (mt)				
		Year	Alt. 1	Alt. 2	Alt. 3	FPA
		2011	200	400	600	600
	509	2012	200	400	600	600
Projected Fishing mortality	339.7		142.4 (1a) 142.1 (1b)	332.8	339.8	339.8
Rebuilding Duration Beyond $T_{F=0}$ (yrs.) b/			NA	NA	NA	NA
Rebuilding Probability (P_{MAX})			100%	100%	100%	100%

b/ The 2009 widow rockfish rebuilding analysis predicts the stock will rebuild in 2010 before new harvest specifications are implemented. Therefore, the duration of rebuilding criterion is not valid or used in the alternative ACL evaluation for widow rockfish.

Widow rockfish is a coastwide species primarily encountered north of 37° north Latitude. Although widow is distributed in areas with bottom depths from 13 to 200 fm, the primary concentrations are between 55 and 160 fm. Figure 4-12 shows Bycatch rates (widow rockfish catch / landed species catch) of widow rockfish north and south of 40º 10’ by calendar period and depth category.

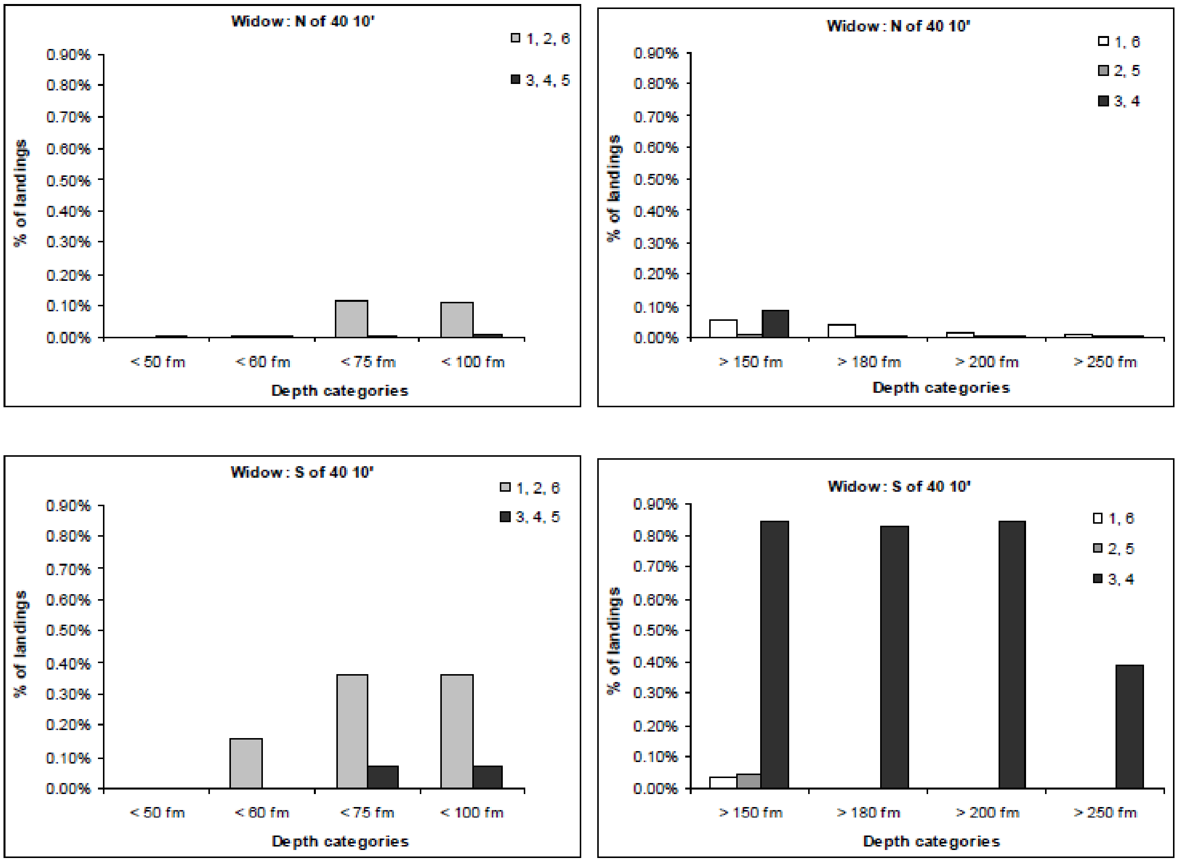

Figure 4-12. Bycatch rates (widow rockfish catch / landed species catch) of widow rockfish north and south of 40º 10’ by calendar period and depth category (PFMC, Agenda Item B.7.b, Supplemental GMT Report, June 2010).

Trawl RCAs: The core depth range of the trawl RCA is 100-150 fm, but vary depending on seasonal movement of overfished species (overfished species tend to make seasonal shoreward-seaward migrations with more shallow distributions in the summer months). The core depth range would be maintained under all of the Alternatives. Under the FPA and No Action the modified 200 fm line would be in place in periods 1 and 6. South of 40°10’ north latitude, the RCA seaward boundary is out to 200 fm year round for the No Action Alternatives and FPA if it is managed as a rationalized fishery. Under Alternatives 1, 2, 3 and the FPA when it is managed as a cumulative limit fishery the seaward boundary, is at 150 fm through the year with the exception of periods 1 and 6 under Alternatives 3 and the FPA (cumulative limit fishery) when the seaward boundary is at 200 fm.

Under the No Action Alternative and the FPA the area north of Cape Alava (48°10’ North latitude) is closed (RCA extended to the shore) to bottom trawling. Initially (2008) this closure was to reduce canary rockfish fishing mortality, but has remained in place in order to reduce trawl impacts to yelloweye rockfish. Under Alternatives 1, 2, and 3 the shoreward boundary of trawl RCA north of 48°10’ north latitude is maintained at 75 fm year round with the exception of period 4 under Alternatives 1 and 2 where the shoreward boundary is set at 100 fm.

The directed midwater trawl fishery for yellowtail rockfish was discontinued in 2002 due to high bycatch of canary and widow rockfish. There would be little or no opportunity for targeting yelloweye rockfish with midwater trawl gear under any of the alternatives except the FPA under a rationalized fishery. Under the FPA with a rationalized fishery there may be some limited targeting opportunity. With increased catch accounting requirements and structure of the rationalized fishery, the ACL is not projected to be exceeded.

Catch Accounting: Catch monitoring uncertainty is relatively low given the fact that widow rockfish is a trawl-dominant species primarily caught in the whiting fishery. With trawl rationalization the WCGOP observation rate will increase to 100 percent of all trips with catch data available inseason. The at-sea whiting fishery has nearly 100 percent of the catch on each processing vessel sampled for catch composition of the at-sea with total catch estimates available inseason. In the non-rationalized fishery, the shore-based whiting fishery generally operates under EFPs with maximized retention requirements and verified catch accounting on shore. The non-whiting trawl sector only had a significant take of widow rockfish when the stock was targeted along with yellowtail rockfish. The WCGOP observation rate of non-whiting trawl trips has averaged about 25 percent annually in recent years with total catch data available post season. With trawl rationalization the WCGOP observation rate will increase to 100 percent of all trips with catch data available inseason.

Rebuilding Duration

The duration of rebuilding criterion does not apply in the evaluation of 2011 and 2012 widow rockfish ACL alternatives since the stock is predicted to be rebuilt in 2010 before these ACLs would be implemented. The 2009 assessment indicates an MSY harvest level of approximately 3,000 mt annually; however, ACL alternatives higher than ACL Alternative 3 (600 mt) were not adopted for detailed analysis in April 2009. Assessment uncertainty led to that decision.

Stock Productivity Relative To Rebuilding Success

Widow rockfish rebuilding probabilities under the ACL alternatives are near 100 percent given that the stock is predicted to be rebuilt in 2010.

Genetic Structure

There is no evidence that the fishing levels proposed will in any substantial way affect the genetic structure of the stock.

Prey Availability

The fishing levels proposed under the range of alternatives are not expected to substantially affect the widow rockfish population such that the survival of predator species is substantially affected.

Yelloweye Rockfish

The yelloweye rockfish spawning stock depletion was estimated at 20.3 percent of the unfished biomass at the start of 2009. This is a low level of depletion across the spectrum of overfished west coast rockfish species, higher only than estimated depletion rate for cowcod. Data for yelloweye rockfish are sparse and relatively uninformative, especially regarding current trends. Parameters that generally contribute significant model uncertainty to stock assessments, including those defining steepness, natural mortality and growth are estimated, but may be poorly determined due to the short time-series of available data. Currently available fishery-independent indices of abundance are imprecise and not highly informative. It is unclear whether increased rates of recovery (or lack thereof) will be detectable without more precise survey methods applied over broad portions of the coast. Fishery data are also unlikely to produce conclusive information about the stock for the foreseeable future, due to retention prohibitions and active avoidance of yelloweye among all fleets.

Fishing Mortality

Yelloweye rockfish are caught coastwide in all sectors of the fishery, but are believed to be most vulnerable to hook-and-line gear. Yelloweye rockfish bycatch rates in the nearshore fixed gear fisheries are much greater than the trawl fishery bycatch rates, largely because fixed-gear fishermen are able to fish over bottom with structure (e.g., rocky bottom). They are also a bycatch species in the Pacific halibut fishery (Love et al. 2002).

Under the No Action Alternative, yelloweye rockfish mortality is managed using the following measures: prohibited retention in commercial hook-and-line or fixed gear and recreational fisheries; small incidental landing limits in the limited entry trawl fishery to account for unavoidable incidental catch, RCA boundaries that limit fishing in area with high canary rockfish catch rates; recreational fishery seasons, and YRCAs. With the exception of incidental trawl limits which would be replaced by a quota system under a rationalized trawl fishery, the No Action measures to limit yelloweye rockfish mortality would continue to be used under Alternatives 1, 2, 3, and the FPA. Table 4-20 shows the total catch projections of yelloweye rockfish by alternative from data presented in Section 4.1.1.6, Estimated Impacts to Exploited Groundfish Stocks, and derived from fishery models described in Appendix A by fishery.

Table 4-20. Yelloweye Rockfish Total Catch Projections (mt) by Fishery.

Alt.	Set Aside Tribal	SS Whit-ing	Non-whiting Trawl	At-Sea Whit-ing	LE Fixed Gear	Sable-fish OA	Near-shore OA	Incidental OA	Set Aside EFP	Re-search	Rec.	Grand Total
No Action	2.3		0.3		0.7	0.1	1.1	0.2	0.1	3.3	7.0	15.1
Alt. 1A	2.3		0.1		0.5	0.1	0.4	0.2	0.1	3.3	4.2	11.2
Alt. 1B	2.3		0.1		0.3	0.0	0.0	0.2	0.1	3.3	4.1	10.4
Alt. 2	2.3		0.2		0.7	0.1	0.7	0.2	0.1	3.3	6.8	14.4
Alt. 3	2.3		0.2		0.8	0.1	0.7	0.2	0.1	3.3	8.1	15.8
FPA	2.3		0.3		0.8	0.1	1.1	0.2	0.1	3.3	7.7	15.9

Under the No Action Alternative the projected fishing mortality is 0.8 mt less than the OY (Table 4-21). Under Alternative 1 the management measures are structured such that the projected fishing mortality is 1.8-2.5 mt less than the 2011 and 2012 ACL. Under Alternative 2 the management measures are structured such that the projected fishing mortality is 2.6 mt less than the 2011 and 2012 ACL. Under both Alternative 3 and the FPA the management measures are structured such that the projected fishing mortality is 4.1 mt less than the 2011 and 2012 ACL. Under the FPA the ACT is 1.1 mt greater than the projected total catch.

Table 4-21. Evaluation of Alternative 2011 and 2012 yelloweye rockfish ACLs relative to the criteria described in Section 4.1.1.2.

Evaluation Criteria	**No Action 2010 OY (mt)**	**Alternative 2011 and 2012 ACLs (mt)**					
		Year	**Alt. 1**	**Alt. 2**	**Alt. 3**	**FPA ACL**	**FPA ACT**
		2011	13	17	20	20	17
	14	2012	13	17	20	20	17
Projected Fishing mortality	14.0		11.2 (1a) 10.4 (1b)	14.4	15.8	15.9	15.9
Rebuilding Duration Beyond $T_{F=0}$ (yrs.)			18	27	37	37	27
Rebuilding Probability (P_{MAX})			75.6%	68.9%	58.1%	58.1%	68.9%

Yelloweye rockfish is a coastwide species mostly encountered north of 36° north Latitude. Yelloweye rockfish occur in water 25–475 m deep (Orr et al. 2000); they most commonly occur at depths from 91 to 180 m (Love et al. 2002). Figure 4-13 shows the catch per tow of yelloweye rockfish in the NMFS bottom trawl survey, which has been used as an index of the stock's depth and latitudinal distribution.

North of 40° 10' north latitude, the highest bycatch rates of yelloweye rockfish occur in waters less than 100 fm. During periods 1, 2, and 6, the trawl catch of yelloweye rockfish is low shoreward of a 50 fm trawl RCA line. Yelloweye rockfish have a patchy distribution and as such using fleetwide bycatch rates over a large area (north and south of 40° 10' north latitude) may misrepresent actual catch rates. North of Cape Alava, yelloweye bycatch rates are lowest inside of the 60 fm line; bycatch rates would increase substantially if shoreward RCAs were moved from the 60 fm line to the 75 fm line. Figure 4-14 shows bycatch rates yelloweye rockfish north and south of 40° 10' north latitude with the area north of Cape Alava closed. Figure 4-15 shows yelloweye bycatch rates north of 40º 10' north latitude with the area north of Cape Alava open.

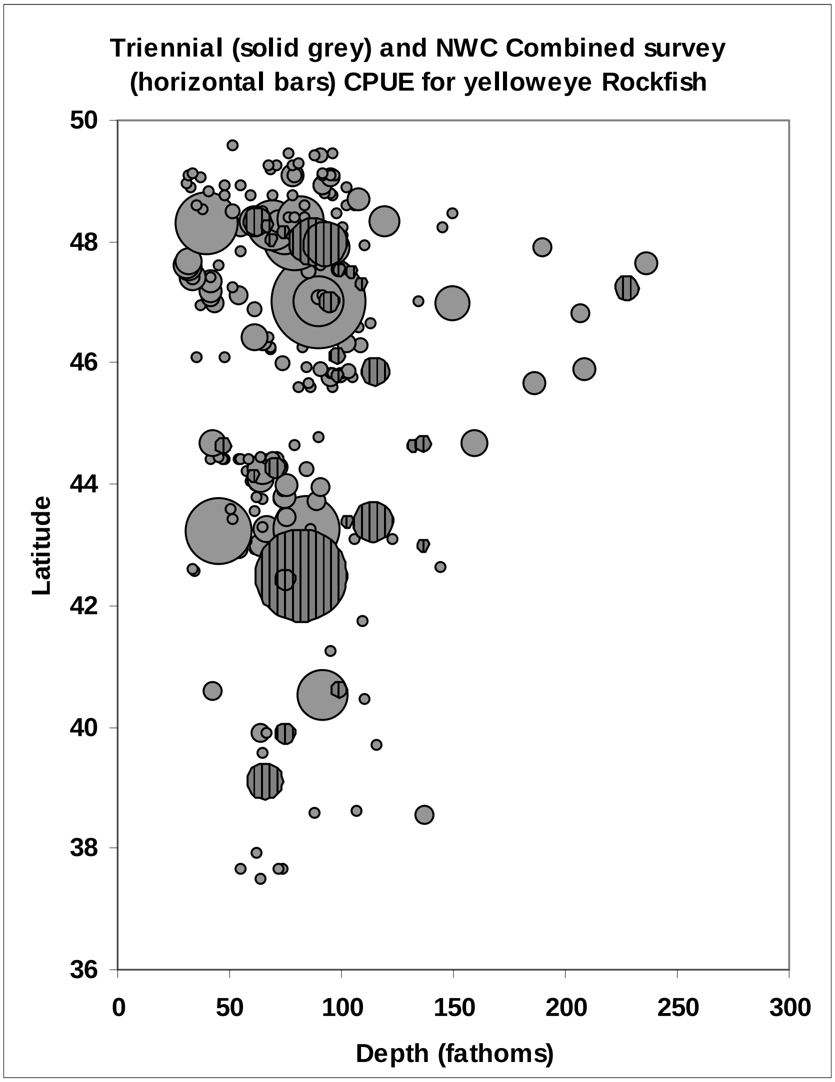

Figure 4-13. Index of west coast distribution of yelloweye rockfish by latitude and depth as determined by catch per tow in NMFS trawl surveys. Size of circle is proportional to yelloweye rockfish density at that location. Data from NWFSC's West Coast Groundfish Survey Database and the AFSC Triennial Shelf and Slope Survey Database.

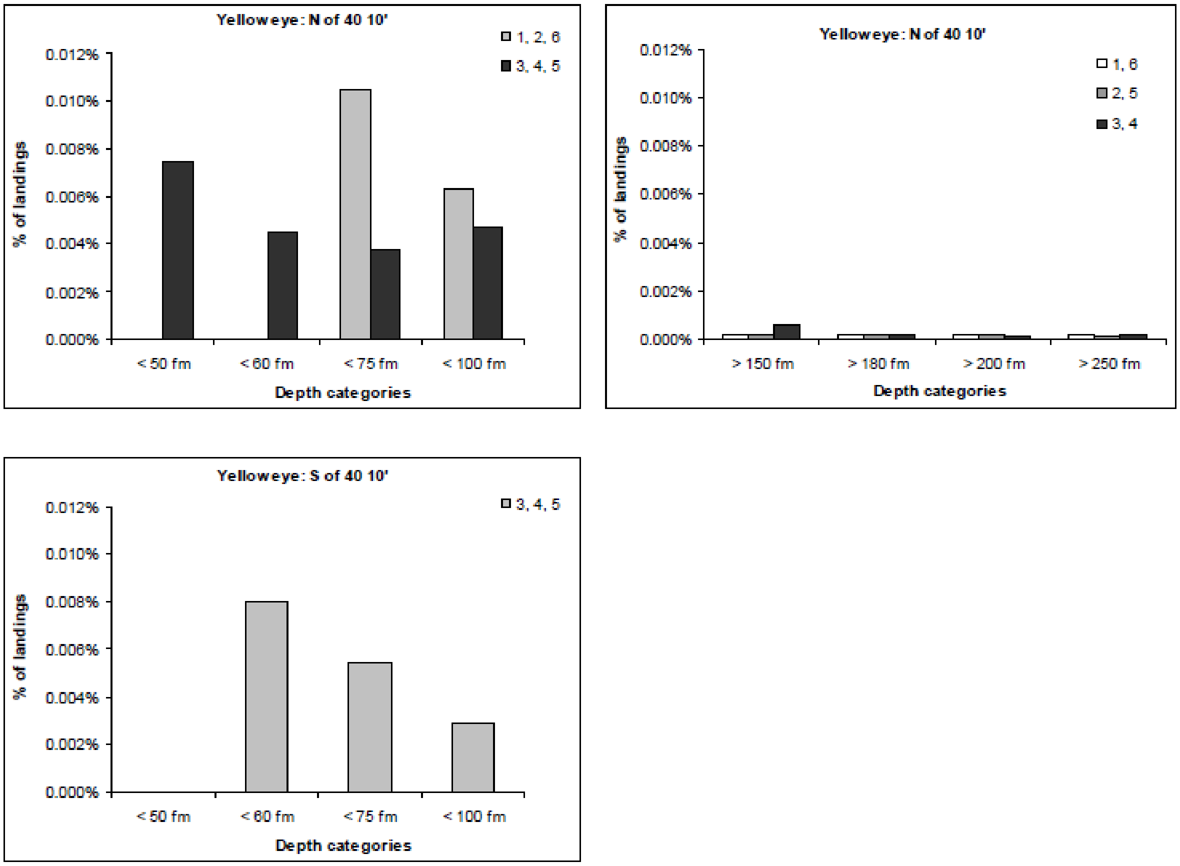

Figure 4-14. Bycatch rates (yelloweye rockfish / landed species catch) of yelloweye rockfish north and south of 40° 10’ by calendar period and depth category; north of Cape Alava closed (PFMC, Agenda Item B.7.b, Supplemental GMT Report, June 2010).

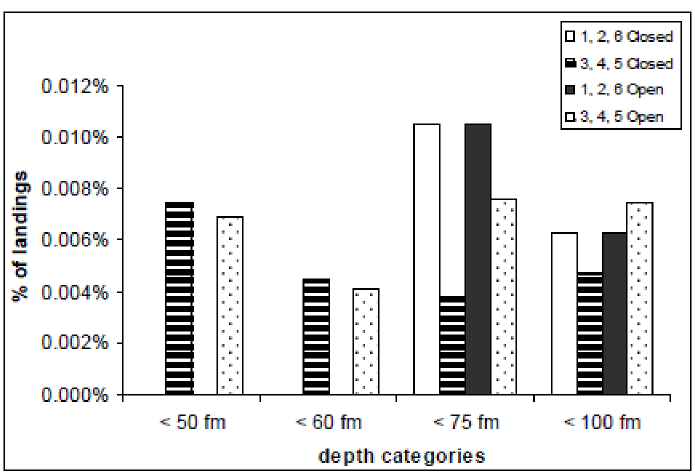

Figure 4-15. Bycatch rates (yelloweye rockfish catch / landed species catch) of yelloweye rockfish north of 40°10’ by calendar period and depth category; north of Cape Alava open (PFMC, Agenda Item B.7.b, Supplemental GMT Report, June 2010).

<u>Trawl RCAs</u>: The core depth range of the trawl RCA is 100-150 fm, but vary depending on seasonal movement of overfished species (overfished species tend to make seasonal shoreward-seaward migrations with more shallow distributions in the summer months). North of 40°10' north latitude the core depth range would be maintained under all of the Alternatives. Under the FPA and No Action the modified 200 fm line would be in place in periods 1 and 6. South of 40°10' north latitude, the RCA seaward boundary is out to 200 fm year round for the No Action Alternatives and FPA if it is managed as a rationalized fishery. Under Alternatives 1, 2, 3 and the FPA when it is managed as a cumulative limit fishery the seaward boundary, is at 150 fm through the year with the exception of periods 1 and 6 under Alternatives 3 and the FPA (cumulative limit fishery) when the seaward boundary is at 200 fm.

Closed areas shoreward of the RCA where the yelloweye rockfish catch rate in trawls is relatively high have been effective in reducing fishing mortality. Under the No Action Alternative and the FPA the area north of Cape Alava (48°10' North latitude) is closed (RCA extended to the shore) to bottom trawling. Initially (2008) this closure was to reduce canary rockfish fishing mortality, but has remained in place in order to reduce trawl impacts to yelloweye rockfish. Under Alternatives 1, 2, and 3 the shoreward boundary of trawl RCA north of 48°10' north latitude is maintained at 75 fm year round with the exception of period 4 under Alternatives 1 and 2 where the shoreward boundary is set at 100 fm.

The 100 and 125 fm lines at the southwest corner of Heceta Bank were moved seaward to better follow the bathymetry that they represent; the unmodified lines were, in many cases, extremely shallow. The industry has reported this to be an area of high yelloweye rockfish bycatch. While the impacts to yelloweye rockfish are not quantifiable, it is assumed that the modification will reduce yelloweye rockfish impacts. (See Appendix B)

<u>Non-trawl RCAs</u>: The current non-trawl RCA boundaries were put in place to reduce yelloweye rockfish fishing mortality. Yelloweye rockfish bycatch rates in the nearshore fixed gear fisheries are much greater than the trawl fishery bycatch rates, largely because fixed-gear fishermen are able to fish over bottom with structure (e.g., rocky bottom). Yelloweye bycatch rates in the fixed gear sectors have remained relatively stable over recent years, with the lowering of the bycatch projections resulting from the decreasing sablefish ACLs.

The seaward boundary of the non-trawl RCA extends out to 150 fm year round south of 40°10' north latitude under all alternatives. North of 40°10' north latitude the seaward boundary of the non-trawl RCA is at 100 fm year round with a few exceptions where the seaward boundary is at 125 fm. Between 45º 03.83 - 43º00' north latitude the seaward boundary under No Action and Alternatives 1, 1a, and 2b the seaward line is at 125 fm year round. Under Alternative 1a, the seaward boundary is also at 125 fm year round for the area north of 45º 03.83 north latitude.

Since 2003 the shoreward Non-trawl RCA boundary affecting the nearshore fishery has been at 30 fm for the entire area north of 34°27' north latitude and 60 fm south of 34°27' north latitude. In 2009, a more restrictive 20 fm depth restriction was in place between 43° N. latitude and 40°10' N. latitude and restricted target species landings to reduce yelloweye and canary fishing mortality. Under the No Action alternative and Alternatives 2b and 3b, the shoreward Non-trawl RCA boundary south of 40°10' north latitude would remain at 30 fm between 40°10' and 34°27' north latitude and at 60 fm south of 34°27' north latitude. Under Alternatives 1a, 1b, 2a and 3a the shoreward Non-trawl RCA boundary would be at 20 fm year round. Under the FPA, the shoreward non-trawl RCA boundary would be at 30 fm between 40°10' and 36°' north latitude and at 60 fm south of 36° north latitude.

North of 46º16' north latitude the shoreward boundary of the non-trawl RCA would be closed year round under all of the alternatives. Between 46º16' and 43°00' north latitude the shoreward boundary of the non-trawl RCA would be at 30 fm with the exception of Alternative 3a which would have a 20 fm shoreward boundary. Between 43º 00 - 42º00’ north latitude the shoreward boundary of the non-trawl RCA would be at 20 fm with the exception of Alternatives 2b and 3b which would have a 30 fm shoreward boundary. Between 42º 00 - 40º10’ north latitude the shoreward boundary of the non-trawl RCA would be at 20 fm under all of the alternatives.

The shoreward non-trawl RCA south of 40°10' north latitude to Point Conception (34°27' north latitude) under the FPA is defined by management lines specified with waypoints at roughly 30 fm. There is an additional closure between zero fm and 10 fm around the Farallon Islands to reduce impacts on shallow nearshore rockfish in that area. The shoreward non-trawl RCA south of Point Conception (34°27' north latitude) is defined by management lines specified with waypoints at roughly 60 fm. This more liberal RCA, compared to the north, can be accommodated by the minimal occurrence of canary and yelloweye rockfish in the Southern California Bight.

The 100 and 125 fm lines at the southwest corner of Heceta Bank were moved seaward to better follow the bathymetry that they represent; the unmodified lines were, in many cases, extremely shallow. (See Appendix B)

<u>Recreational</u>: The Washington recreational groundfish and Pacific halibut fisheries would be prohibited from fishing for, retention or possession of groundfish and halibut in the C-shaped yelloweye rockfish conservation area in the north coast and South Coast and Westport YRCAs in the south coast as they were in the 2009 and 2010 seasons and in the No Action Alternative and would remain under all of the alternatives.

CDFG evaluated and has available four potential YRCAs which include habitat in both state and Federal waters where high yelloweye encounter rates have been documented. If implemented, YRCAs are anticipated to reduce yelloweye impacts during the open fishing seasons in both the Northern Groundfish Management Area and the North-Central North of Pt. Arena Groundfish Management Area, possibly allowing for a longer fishing season (Appendix X). To date, these YRCAs have not been implemented but would remain available management measures under the No Action Alternative and all other alternatives.

Depth management is the main tool used for controlling yelloweye rockfish fishing mortality in the Oregon recreational fishery. The options range from the least restrictive (Oregon Recreational Option 1, Figure 2-15), a year-round season with April through September open only shoreward of 20 fm to the most restrictive option (Oregon Recreational Option 5, Figure 2-15), a year-round season open only shoreward of 20 fm. All options are more restrictive than the 2009-2010 Oregon recreational groundfish seasons under the No Action Alternative. Appendix C fully considers these alternatives.

<u>Catch Accounting</u>: Catch monitoring uncertainty is high given the relatively small contribution of yelloweye to rockfish market categories and the relatively large scale of recreational removals. In addition, since 2001, management restrictions have required nearly all yelloweye rockfish caught by recreational and commercial fishermen to be discarded at sea. Precisely tracking recreational catch inseason, especially in the California recreational fishery, has been a challenge, which led the Council to recommend an ACT for this stock.

<u>Rebuilding Duration</u>

The harvest rates used to determine 2011 and 2012 yelloweye rockfish ACL alternatives are all predicted to have long rebuilding periods from 18 years under the lowest ACLs analyzed up to 37 years beyond the shortest time possible ($T_{F=0}$ = 2047) for the Alternative 3 and the FPA. The FPA ACL is predicted to rebuild 37 years beyond $T_{F=0}$ (same as ACL Alternative 3). The FPA ACT, which is the same as ACL Alternative 2, is predicted to rebuild the stock 27 years after $T_{F=0}$. Rebuilding is extended by 18 years from $T_{F=0}$ under the harvest rate used to determine ACL Alternative 1. NMFS' preferred alternative yelloweye rockfish is 17 mt, which is the same as the Alternative 2 ACL, and results in a rebuilding period that is 10 years shorter than the Council's FPA.

Stock Productivity Relative To Rebuilding Success

The yelloweye rebuilding probabilities are relatively low for the yelloweye ACL alternatives. The No Action ACL alternative has a 52.8 percent rebuilding probability. This compares to a 58.1 percent rebuilding probability for the FPA ACL and Alternative 3; and a 68.9 percent rebuilding probability under the Alternative 2 ACL (same as FPA ACT). ACL Alternative 1 has a 75.6 percent probability of rebuilding by T_{MAX}.

From 2002 through 2008, the largest and smallest total catches were 19.6 mt and 12.3 mt, respectively. These catch amounts represented 1.0% and 0.7%, respectively, of the estimated biomasses of yelloweye that were at least 8 years of age. In 2008, the catch 16.7 mt was about 0.8% of the age-8+ biomass, roughly the average for these seven years over which the spawning biomass increased from 16% to 20% of the unfished level. With reductions in retention of yelloweye rockfish (and hence, biological sampling of catch) and the absence of a highly-informative, fishery-independent source of data for yelloweye (e.g., a survey), very little is known regarding general yelloweye recruitment variability, or how recruitment success has been affected by past actions to rebuild the stock.

Because differences between the No-Action OY and the FPA ACT are distributed across the various sectors, minimal redistribution of catch is expected under the FPA. Since retention of yelloweye is prohibited for all gears except trawl, where catch will be regulated through the new IQ system, no targeting is expected and the Council's proposed ACT for yelloweye serves only as a constraint on the incidental bycatch that can be allowed before other fisheries are closed. Existing management measures for fixed-gear (depth restrictions) and trawl (shelf gear and depth restrictions) protect the prime yelloweye habitat from the directed groundfish fishery.

Genetic Structure

Yelloweye rockfish are a transboundary stock distributed in the northeastern Pacific Ocean from the western Gulf of Alaska to northern Baja California. The species is most abundant from southeast Alaska to central California, with adults found along the continental shelf. There is relatively little direct information regarding the stock structure of yelloweye rockfish off the U.S. and Canadian coasts. The limited available genetic data suggest some separation between coastal areas and the inside waters of Puget Sound and the Strait of Georgia, however there is no indication of differentiation among coastal yelloweye throughout the U.S. and Canada. There is no evidence that the fishing levels proposed under any of the alternatives will in any substantial way affect the genetic structure of the stock.

Prey Availability

The changes in yelloweye mortality, across the range of alternatives considered, is likely to have minimal short-term impact on the availability of yelloweye as prey or predators within their preferred habitats. The rate of yelloweye rebuilding could be affected by the rebounding lingcod stock, which has increased from 13% to 67% since 1999. Adult lingcod are capable of consuming moderately large fish, and co-occur with yelloweye, reducing opportunities for a targeted lingcod fishery. Young lingcod may also serve as prey for older yelloweye. Juvenile rockfishes consume primarily zooplankton, as well as fish eggs. Adult rockfishes eat a variety of food items. Yelloweye are a predatory fish that consume shrimp and small fish, including rockfishes.

4.1.1.4 ACLs Options Considered for Non-Overfished Species

For non-overfished species or species complexes where there was new scientific information including stock assessments or harvest policy changes, the Council considered more than one ACL prior to the development of the integrated alternatives. However, with the exception of Dover sole and Pacific whiting only a single ACL was brought forward for the development of the integrated alternatives. This section provides further information on the biological effects of the alternative ACL (ACL options) considered for non-overfished species prior to the development of integrated alternatives. The biological effects in this section focus on the risk to the stock of becoming overfished.

Lingcod

The Council recommended separate ACLs for the northern and southern stocks, which are delineated north and south of the California-Oregon border at 42° north latitude. ACL Options 1 and 2 (developed prior to the development of Amendment 23 provisions) accommodate scientific uncertainty for both the northern and southern lingcod stocks. ACL Option 1 is 50 percent of the OFL and ACL Option 2 is based on projections from the less likely low natural mortality (M) model scenario analyzed in the 2009 assessment. The Council preferred ACLs (options 3 both north and south) are set equal to the ABCs. In the past, the Council expressed concern with the higher scientific uncertainty and lower level of stock depletion estimated in the southern lingcod assessment. The No Action 2010 OY was a coastwide specification, but the southern contribution to the coastwide OY had a 50 percent reduction to address higher scientific uncertainty and estimated depletion.

The PSA analysis vulnerability score for lingcod coastwide is 1.55, meaning there is little concern for overfishing of the lingcod cod stock under and any of the options that were considered. Despite some liberalization of 2011 and 2012 lingcod management measures (e.g., higher proposed daily bag limits in the California recreational fishery), it is likely that 2011 and 2012 total catches will be well below the preferred lingcod ACLs since fishing on the shelf will be limited by the RCAs recommended under the proposed action. The lingcod stock in both the southern (74 percent of the unfished biomass) and northern areas (62 percent of the unfished biomass) were estimated to be healthy in 2009. The lingcod biomass is not expected to become overfished or approach an overfished condition under any of the options.

Sablefish

The coastwide sablefish stock was last assessed in 2007 (Schirripa 2008). The spawning stock biomass was estimated to be at 38.3 percent of its unfished biomass at the beginning of 2007. The assessment projected spawning stock depletion would decrease in the next five years if the full OY was annually taken based on somewhat erratic levels of estimated recruitment from 2001-2006. Projected sablefish depletion rates in 2011 and 2012 are 36 and 35.1 percent of unfished biomass, respectively. Alternative 2011 and 2012 sablefish harvest specifications were determined using the 2007 assessment. The PSA vulnerability score for sablefish is 1.64 which indicates a low concern of overfishing.

The 2011 and 2012 ACL alternatives for sablefish considered two options for translating the 40-10 ACL harvest control rule under the new Amendment 23 framework (since the sablefish stock is in the precautionary zone), three options for apportioning the estimated coastwide biomass to the areas north and south of 36° north latitude, and two options to address further scientific and management uncertainty in the area south of 36° north latitude. The options considered for sablefish are described in detail in Section 2.1.4.4.

Since the sablefish stock is in the precautionary zone with a stock biomass below target MSY biomass (i.e., < $B_{40\%}$), the default harvest control rule specified in the FMP is an ACL adjustment called the 40-10 rule. The 40-10 rule applies a progressively larger downward adjustment of the ACL as depletion decreases below target biomass with the objective of more quickly rebuilding stock biomass to the target level. Two alternatives for redefining the 40-10 rule were contemplated in the Amendment 23 process: option 1 where the ACL adjustment is made from the OFL and before the ABC adjustment; and option 2 where the ACL adjustment is made from the ABC or after the ABC adjustment. The option 1 40-10 rule is less precautionary than the option 2 rule because the ABC adjustment can subsume any ACL adjustment, especially at higher levels of depletion. The Council's preferred option for redefining the 40-10 rule under Amendment 23 is the option 2 control rule. The Council recommended using the more precautionary Option 2 control rule for adjusting the 2011 and 2012 sablefish ACLs under their preferred alternative. The risk of the stock becoming overfished is less under option 2 than under option 1.

Apportioning the stock using the swept area biomass estimates is inherently undesirable and may not reflect true distribution of sablefish on the U.S. west coast. It would be far better to use area-specific assessments north and south of 36° north latitude. A new full sablefish assessment will be conducted in 2011. The concept of separate area assessments to apportion the coastwide stock is expected to be explored in the next assessment.

A further 50 percent adjustment to account for this higher scientific uncertainty was considered for the Conception area sablefish ACL. This greater assessment uncertainty is largely due to the fact that a small proportion of the Conception area is surveyed in the NMFS trawl survey given the high proportion of untrawlable habitat and the prohibition of bottom trawling in the CCAs. While higher scientific uncertainty would conceptually be accommodated in specifying the ABC, the higher scientific uncertainty in the Conception area is accommodated in consideration of the ACL for the sablefish stock south of 36° north latitude since the SSC recommended a coastwide OFL and ABC. The Council's preferred Conception area sablefish ACL includes this additional 50 percent adjustment, which was also used to determine the status quo 2010 Conception area sablefish OY.

In summary, the Council's preferred 2011 and 2012 sablefish ACL alternatives are based on a 68:32 north:south apportionment using the 2003-2008 average swept area biomass by area estimated from the NMFS trawl survey, the option 2 40-10 rule, and application of an additional 50 percent uncertainty adjustment for the Conception area ACL. Given the precautionary adjustments made to address the lower level of stock depletion (i.e., use of the option 2 40-10 rule) and scientific uncertainty (i.e., the 50 percent adjustment to the southern ACL) the stock is not expected to become overfished as a result of the fishing mortality under the preferred option.

Shortbelly Rockfish

Shortbelly rockfish is a healthy species that is not targeted in any commercial or recreational fisheries, and which is a valuable forage fish species. PSA vulnerability score is 1.13 which is a low concern for overfishing. The Council considered two ACL options. Option 1 with an ACL of 50 mt was somewhat above the recent landing level and under option 2 the ACL values were set equal to the ABC (5,789 in both 2011 and 2012). The 50 mt ACL was recommended by the Council and was intended to be adequate to accommodate incidental catch while preventing the development of fisheries specifically targeting shortbelly rockfish. The Council recognized shortbelly rockfish for its value as a forage fish. Given the low level of fishing mortality because shortbelly rockfish is not a target species and only small amounts being caught incidentally the stock is not expected to experience overfishing or become overfished as a result of either of the ACL options being considered.

Chilipepper Rockfish

The last full assessment of chilipepper rockfish was conducted in 2007 (Field 2008). The 2007 assessment indicated the stock was healthy with a spawning stock biomass estimated to be at 70 percent of its initial, unfished biomass in 2006. The projected spawning biomass depletion rates for 2011 and 2012 are 63 and 64 percent of estimated unfished biomass, respectively. The PSA vulnerability score of 1.35 indicates a low concern for overfishing.

Consideration was given to removing chilipepper rockfish from the minor rockfish north complex. Chilipepper rockfish are predominantly found south of 40°10' north latitude. Prior to 2007 they were only assessed in the area south of 40°10' north latitude (Ralston, *et al.* 1998). To date, chilipepper rockfish has been managed with stock-specific harvest specifications south of 40°10' north latitude and within the northern minor shelf rockfish sub-complex north of 40°10' north latitude. When the stock assessment area was extended for the 2007 chilipepper stock assessment it was extended to the stock's entire west coast range through waters off Oregon (chilipepper rockfish are not believed to occur in waters off Washington). From the 2007 stock assessment, it was estimated that 7 percent of the biomass is found in the area north of 40°10' north latitude. The Council recommended continuing the management of chilipepper rockfish within the complex north of 40°10' north latitude for 2009-2010. The chilipepper rockfish is not expected to become overfished or approach an overfished condition.

Consideration was given to the potential for a target species within a complex becoming overfished due to the contribution of a non-target species (chilipepper rockfish in the north) that are managed within the same species complex. If stocks within a complex are caught in proportion to their contribution to the OFL the risks of overfishing an individual stock is low. If stocks are not caught in such proportions, then it is possible for overfishing to occur on a component species. This is more of a concern with stocks that are targeted and that only contribute a small proportion of the overall OFL. The lack of species specific historical landing data for stocks within complexes makes an analysis difficult. The trawl IFQ program will require full observer coverage for catch accounting, and it is expected to provide catch by species data that could be used in such an analysis.

Splitnose Rockfish South of 40°10' north latitude

A new splitnose rockfish assessment was done in 2009 (Gertseva, *et al.* 2009). Splitnose rockfish is a healthy stock with spawning depletion estimated at 66 percent of its unexploited level at the beginning of 2009. Splitnose rockfish have been taken incidentally in fisheries such as the trawl fisheries targeting for POP, mixed slope rockfish and other deepwater targets, but have not been a commercial target species. The Council recommended that splitnose rockfish continue to be managed with stock-specific specifications south of 40°10' north latitude and within the minor slope rockfish sub-complex in the north. The splitnose rockfish is not expected to become overfished or approach an overfished condition under any of the options.

Consideration was given to removing splitnose rockfish from the minor rockfish north complex. Concern was expressed about the potential for a target species within a complex becoming overfished and the contribution of a non-target species (splitnose rockfish north) managed within a species complex. If stocks within a complex are caught in proportion to their contribution to the OFL the risks of overfishing an individual stock is low. If stocks are not caught in such proportions, then it is possible for overfishing to occur on a component species. This is more of a concern with stocks that are targeted and that only contribute a small proportion of the overall OFL. The lack of species specific historical landing data for stocks within complexes makes an analysis difficult. The trawl IFQ program will require full observer coverage for catch accounting, and it is expected to provide catch by species data that could be used in such an analysis.

Shortspine Thornyheads

The most recent stock assessment (Hamel 2006b) estimated the shortspine thornyhead spawning stock biomass to be at 62.9 percent of its initial, unfished biomass in 2005. The projected spawning stock biomass depletion rates in 2011 and 2012 are 58.8 and 57.9 percent of unfished biomass, respectively. The PSA vulnerability relative to overfishing is 1.80, which is at the lowest end on the range for sticks of medium concern. Data quality for both stock productivity and susceptibility to current fishing practices had as a relatively high rate.

Shortspine thornyhead is managed with separate OYs north and south of Point Conception at 34°27' north latitude (Conception area). Due to conservation concerns in the Conception area and a new specifications structure under Amendment 23, two ACL options, based on projections from the 2005 stock assessment, were considered for shortspine thornyhead south. Option 1 represents 34 percent (the portion of the biomass estimated to occur south of Point Conception) of the coastwide ACL, reduced by 50 percent for conservation concerns. Option 2 ACLs represented 34 percent of the coastwide ACL with no conservation reductions. The shortspine thornyhead stock is not expected to become overfished as a result of either of the options. The option with the precautionary adjustment in the Conception area is preferred by the Council, and further reduced the likelihood for development of the integrated alternatives, the stock is not expected to become overfished as a result of the fishing mortality under the preferred option.

Longspine Thornyheads

The most recent stock assessment (Fay 2006) indicated that the longspine thornyhead stock was healthy with an estimated spawning stock biomass at 71 percent of its initial, unfished biomass in 2005. Projected spawning biomass depletion rates in 2011 and 2012 are 62 and 61 percent, respectively. The PSA vulnerability relative to overfishing is 1.53, which is a lowest concern. Data quality for susceptibility to current fishing practices had as a relatively high rate.

Longspine thornyhead is a trawl-dominant species in the north and caught in association with Dover sole, shortspine thornyhead, and sablefish in the deep water DTS strategy. Under trawl rationalization with the 100 percent observer requirement, any catch monitoring uncertainty is anticipated to be significantly diminished. The trawl fishery is also restricted to operate in waters shallower than 700 fm, which is much shallower than the distribution of longspine. This significantly reduces any biological risk to the stock resulting from fishing pressure. Longspine thornyhead is not targeted in the Conception area and is caught in incidental amounts that are well below the preferred ACLs.

Longspine thornyhead has been managed with separate OYs north and south of Point Conception at 34°27' north latitude (Conception area). Due to conservation concerns in the Conception area, two ACL options were considered for longspine thornyhead south. Option 1 represents 21 percent (the portion of the biomass estimated to occur south of Point Conception) of the coastwide ACL, reduced by 50 percent for conservation concerns. Option 2 ACLs represented 21 percent of the coastwide ACL with no conservation reductions. For the northern area two ACL options were also considered. Option 1 represents 79 percent (the portion of the biomass estimated to occur north of Point Conception) of the coastwide ACL, reduced by 25 percent for conservation concerns. Option 2 ACLs represented 79 percent of the coastwide ACL with no conservation reductions. The Council preferred option for development of the integrated alternatives was Option 1. Because there is very little fishing pressure and the stock is healthy, the longspine thornyhead stock both north and south is not expected to become overfished from the proposed ACLs and fishing activity.

California Scorpionfish

California scorpionfish were assessed in 2005 (Maunder, *et al.* 2006) in the southern California area south of Point Conception at 34°27' north latitude to the U.S.-Mexico border. The stock assessment indicated the California scorpionfish stock was healthy with an estimated spawning stock biomass of 79.8 percent of its initial, unfished biomass in 2005. Projected spawning biomass depletion rates in 2011 and 2012 are 53 and 51 percent, respectively.

The PSA vulnerability score of 1.41 indicates a low concern for overfishing. In most years, 99 percent or more of the landings occur in the southern California ports. The California nearshore fishery management plan includes California scorpionfish. The stock is managed by the state under provisions for improved fishery monitoring and research data collection.

Two alternative ACLs were considered for managing scorpionfish. ACL Option 1 assumes the California state precautionary 60-20 harvest control rule, which results in a slightly lower ACL (133 and 124 mt in 2011 and 2012, respectively) since the stock is below $B_{60\%}$. The second option, that preferred by the Council is the ACL set equal to the ABC. Neither option is expected to result in the stock becoming overfished, however Option 1 would have a lower risk.

Cabezon off California

A new cabezon assessment was done in 2009 retains the two California sub-stocks, and also evaluated the population as a coastwide California stock. The assessment was also extended to a third cabezon sub-stock in the waters off of Oregon. The SSC recommended combining the results of the area models for the two California sub-stocks of cabezon for use in deciding statewide harvest specifications. The assessment results for the Oregon cabezon sub-stock were recommended to be used to decide statewide Oregon harvest specifications. The new assessment estimates a healthy spawning biomass of cabezon off California at the start of 2009 of 48.3 percent of unfished biomass. Projected spawning biomass depletion rates for cabezon off California in 2011 and 2012 are 50.9 and 47.5 percent of unfished biomass, respectively. The PSA vulnerability score of 1.68 indicates (coastwide Oregon and California score) a low concern for overfishing.

Two alternative ACLs were considered for managing cabezon off California in 2011 and 2012. ACL Option 1, 2011 and 2012 ACLs, assumes the less likely and more risk-averse low natural mortality (M) model in the 2009 assessment. The Council-preferred ACL alternative is Alternative 2 which sets the 2011 and 2012 ACLs equal to the ABCs. Because scientific uncertainty is addressed in the ABC specification and the new assessment indicates that Cabezon off Oregon is a healthy stock status, neither of the ACL options are expected to result in the stock off Oregon becoming overfished.

Cabezon off Oregon

The 2009 assessment of the Oregon sub-stock of cabezon is the first ever for cabezon in Oregon waters. Only one index of abundance was used for modeling the Oregon cabezon sub-stock (the Oregon Recreational Boat Survey or ORBS CPUE index). The Oregon model was robust to almost all data and parameter manipulation trials except the removal of the ORBS survey. Removal of the only abundance index causes the population to drop sharply below the overfished level and absolute biomass to be much smaller than in the base case. The 2009 assessment indicated a healthy stock status for Oregon cabezon at 52.4 percent depletion at the start of 2009. Unlike the assessments for the California sub-stocks, the assessment of the Oregon cabezon sub-stock does not show recent increases in spawning biomass. While the uncertainty in the estimated depletion level of the Oregon sub-stock is generally low, uncertainty in the estimated spawning biomass is high. The PSA vulnerability score of 1.68 indicates (coastwide Oregon and California score) a low concern for overfishing.

Two option ACLs were considered for managing cabezon off Oregon. ACL option 1, a 2011 and 2012 ACL of 29 mt, assumes the less likely and more risk-averse low natural mortality model in the 2009 assessment. The Council-preferred ACL option is Option 2 which sets the 2011 and 2012 ACLs equal to the ABCs, or 50 and 48 mt, respectively. Because scientific uncertainty is addressed in the ABC specification and the new assessment indicates that Cabezon off Oregon is a healthy stock status, neither of the ACL options are expected to result in the stock off Oregon becoming overfished. In, addition, removing the stock from the "other fish" complex is expected to improve management of the stock and catch accounting and further reduce the risk of the stock becoming overfished.

Dover Sole

The last full Dover sole assessment (Sampson 2005) indicated the stock was healthy and had an increasing abundance trend. The projected 2011 spawning stock biomass depletion is 79 percent of unfished biomass assuming the full removal of status quo OYs. The PSA vulnerability score of 1.54 indicates a low concern for overfishing.

Four Dover sole ACL options were considered. ACL options 1 (16,500 mt) is the 2010 OY based on the equilibrium harvest level when the stock is at $B_{40\%}$ (the old B_{MSY} target) under the old proxy MSY harvest rate of $F_{40\%}$. ACL options 2 (17,560 mt) is based on the equilibrium harvest level[24] when the stock is at $B_{25\%}$ (the new B_{MSY} target) under the new proxy MSY harvest rate of $F_{30\%}$. ACL Options 3 sets the ACLs equal to the ABCs of 42,436 and 42,843 mt, respectively. ACL Option 4 (25,000 mt), is significantly lower than the ABCs. Given the productivity of the stock and constraints on fishing, even under the highest ACL option (Option 3) projections estimates the stock would remain above the new target B_{MSY} level as well as above $B_{40\%}$, the old B_{MSY} target. Therefore, none of the ACL options is expected to result in the stock becoming overfished, including the Council preferred ACL of 25,000 mt

English Sole

The last assessment of English sole (Stewart 2008a) estimated the spawning biomass to be at 116 percent of the exploited equilibrium level. However, the influence of the strong 1999 year class on projected spawning biomass is rapidly diminishing through natural and fishing mortality, leading to a projected depletion rate of 54 percent of unfished biomass at the start of 2011 assuming the entire OY is taken in 2009 and 2010.

The PSA vulnerability score of 1.19 shows a very low concern of overfishing on the stock. The English sole assessment is relatively data-rich and this species is readily tracked in the trawl survey. English sole are a trawl-dominant species. Management uncertainty is also low with the 100 percent observer coverage for the trawl fleet anticipated under trawl rationalization

There are two 2011 and 2012 English sole ACL options considered. ACL Options 1 is based on application of the old proxy $F_{40\%}$ MSY harvest rate, which projects 2011 and 2012 ACLs of 7,158 and 5,790 mt, respectively. ACL options is the preferred alternative and sets the ACLs equal to the ABCs of

[24] The equilibrium harvest level is the harvest level for a population at the biomass target using the Fmsy harvest rate when the population has a fully recruited and healthy age structure. If the biomass and Fmsy targets are truly accurate, this level of harvest could theoretically be sustained without causing a stock decline.

19,761 and 10,150 mt in 2011 and 2012, respectively. The preferred 2011 and 2012 English sole ACLs are set equal to the ABCs given low scientific and management uncertainty. None of the ACL options is expected to result in the stock becoming overfished, including the Council preferred ACL for development of the integrated alternatives.

Arrowtooth Flounder

The last full stock assessment of arrowtooth flounder (Kaplan and Helser 2008) estimated the spawning biomass to be at 79 percent of the estimated unfished spawning biomass. Projected spawning biomass depletion at the start of 2011 is 66 percent of unfished biomass assuming the entire 2009 and 2010 OYs are taken. Scientific uncertainty in the arrowtooth flounder assessment is relatively high. The SSC categorized the arrowtooth stock as a category 2 species since highly uncertain historical discards and estimates of natural mortality make this a less certain assessment than those for other assessed stocks. The PSA vulnerability score of 1.21 indicated a low concern of overfishing.

There are two 2011 and 2012 arrowtooth flounder ACL options considered. ACL option 1 is based on application of the old proxy $F_{40\%}$ MSY harvest rate, which projects 2011 and 2012 ACLs of 9,109 and 8,241 mt, respectively. ACL option 2 is the preferred alternative and sets the ACLs equal to the ABCs of 15,174 and 12,049 mt in 2011 and 2012, respectively. Arrowtooth flounder are a trawl-dominant species. Management uncertainty is low with the 100 percent observer coverage for the trawl fleet anticipated under trawl rationalization. Given the low management uncertainty none of the ACL options are expected to result in the stock becoming overfished.

Starry Flounder

Starry flounder was assessed in 2005 (Ralston 2006) and both the northern and southern populations were estimated to be above the target level of 40 percent of unfished spawning biomass (44 percent of B_0 in Washington-Oregon and 62 percent in California), although the status of this data-poor species remains fairly uncertain compared to that of many other groundfish species. Projected spawning biomass depletions at the start of 2011 for the Washington-Oregon and California sub-stocks are 27.7 and 28.5 percent of unfished biomass, respectively assuming the entire 2009 and 2010 OYs are taken. The PSA vulnerability score of 2.09 for starry flounder in at the lowest end of those score of high concern. The SSC categorized starry flounder as a category 2 stock due to a very uncertain catch history, a lack of age or size composition data, and poor tracking in the NMFS trawl survey. Management uncertainty is also relatively high due to a significant recreational catch.

ACL option 1 (1,130 in 2011 and 1,166 mt in 2012), was based on application of the old proxy $F_{40\%}$ MSY harvest rate with a 25 percent reduction to account for management uncertainty. ACL option 3 (1,502 mt in 2011 and 1,511 mt in 2012) is based on the new proposed $F_{30\%}$ F_{MSY} harvest rate. ACL option 2 (1,352 mt in 2011 and 1,360 mt in 2012) is preferred because it is based on the SSC-recommended $F_{30\%}$ F_{MSY} harvest rate and incorporates a further 25 percent reduction to account for greater management uncertainty. None of the ACL options is expected to result in the stock becoming overfished, including the Council preferred ACL for development of the integrated alternatives. With the added precautionary reduction under the preferred option, the risk of the stock becoming overfished as a result of fishing mortality is further reduced.

Stock Complexes

Historically, harvest specifications for the complexes were set at a level that was not expected to constrain the fishery. A precautionary OY reduction (25 or 50 percent) was applied to address scientific and management uncertainty. Management measures were designed to ensure that total take of all component species did not exceed the aggregate limit.

The vulnerability of a stock to overfishing is defined in the National Standard 1 guidelines as a function of its productivity and its susceptibility to the fishery. The guidelines note that the "vulnerability" of fish stocks should be considered when: (1) deciding if a stock considered is to be "in the fishery" or if it is an ecosystem component stock; (2) considering the management of stocks managed within complexes and the need to re-structure the stock complexes; and (3) creating management control rules. The GMT and the NMFS Vulnerability Evaluation Work Group considered the productivity and susceptibility of each groundfish stock by providing PSA scores for each stock. The PSA structure and scoring is described above in section 4.1.1.2.

In the consideration of stock complex structure, a four step approach for defining the relationship between fisheries and appropriate stock complexes was developed using the PSA score: (1) calculate PSA scores for each species in the PCGFMP; (2) identify the overlap in distributions of each species based on latitude and depth range; (3) assign each species to the various fisheries; and (4) overlay the groupings onto the PSA plot. The GMT provided the PSA vulnerability scores for all of the Pacific coast groundfish and completed a cluster analysis based on latitude and depth to identify spatial overlaps. The results of the preliminary cluster analysis indicate that there is a need to adjust the assignment of PCGFMP stocks to complexes. The following sections describe the relative vulnerability of stocks in complexes to overfishing according to the PSA of each stock in the complex.

The proposed action does not include the reorganization of the existing stock complexes for the 2011-12 biennium. However, the Council's advisory bodies recommended that further analysis be conducted for the purpose of reorganizing the complexes to the extent needed to account for the relative vulnerability of stocks in the complexes in future biennial cycles.

<u>Minor Rockfish North of 40°10' north latitude</u>

The preferred OFLs, ABCs, and ACLs for the minor rockfish complex north of 40°10' north latitude are the summed contribution of those specifications for the northern nearshore, shelf, and slope sub-complexes. The SSC approved the approach for determining these specifications. The relative vulnerability of stocks to overfishing in the minor rockfish north complex as rated in the GMT's PSA analysis are shown in Table 4-22.

Table 4-22. The relative vulnerability of rockfish stocks as rated by the GMT in their PSA analysis managed in the minor rockfish complex north of 40°10' N. latitude by stock sub-complex and relative level of vulnerability within the sub-complex.

Stock Complex and Component Stocks	**PSA Results**	
	Vulnerability	
	Score	**Level**
Minor Rockfish North	NA	NA
Minor Nearshore Rockfish North	NA	NA
China	2.23	High
Copper	2.27	High
Quillback	2.22	High
Blue (CA)	2.01	Med/High
Blue (OR & WA)	2.01	Med/High
Brown	1.99	Med/High
Grass	1.89	Med
Olive	1.87	Med
Black and yellow	1.70	Low
Calico	1.57	Low
Gopher	1.76	Low
Kelp	1.59	Low
Treefish	1.73	Low
Minor Shelf Rockfish North	NA	NA
Bronzespotted	2.12	High
Cowcod	2.13	High
Greenblotched	2.12	High
Redstripe	2.16	High
Speckled	2.10	High
Bocaccio	1.93	Med/High
Chameleon	2.03	Med/High
Flag	1.97	Med/High
Greenspotted	1.98	Med/High
Harlequin	1.94	Med/High
Honeycomb	1.97	Med/High
Pink	2.02	Med/High
Rosethorn	2.09	Med/High
Silvergray	2.02	Med/High
Swordspine	1.94	Med/High
Tiger	2.06	Med/High
Vermilion	2.05	Med/High
Greenstriped	1.88	Med
Mexican	1.80	Med
Pinkrose	1.82	Med
Rosy	1.89	Med
Squarespot	1.86	Med
Stripetail	1.80	Med
Freckled	1.55	Low
Halfbanded	1.38	Low
Puget Sound	1.59	Low
Pygmy	1.55	Low
Starry	1.02	Low
Minor Slope Rockfish North	NA	NA
Aurora	2.10	High

Stock Complex and Component Stocks	PSA Results Vulnerability	
	Score	Level
Rougheye	2.27	High
Shortraker	2.25	High
Bank	2.02	Med/High
Blackgill	2.08	Med/High
Redbanded	2.02	Med/High
Sharpchin	2.05	Med/High
Yellowmouth	1.96	Med/High
Splitnose	1.82	Med

Minor Nearshore Rockfish North: The minor nearshore rockfish sub-complex north of 40°10' north latitude is composed of unassessed species except for the portion of the blue rockfish stock occurring in waters off California (i.e., 40°10' north latitude to the California-Oregon border at 42 north latitude). All stocks other than blue rockfish off California are category 3 stocks with catch-based approaches for determining the OFL contribution of the stock. The OFL contribution for blue rockfish off California is based on a 2007 assessment (Key, et al. 2008) and is recommended as a category 2 stock based on relatively high assessment uncertainty.

Stock assessments have not yet been conducted for many of the nearshore species, due in part to the lack of available information. Thus the overall stock biomass and age structure is unknown. Although these stocks are managed north and south of 40°10' north latitude; this was done for ease of management and is not based on biological differences in stocks. Most of the OFLs for component species were calculated on a coastwide basis and then apportioned north and south of 40°10' north latitude into the respective nearshore sub-complexes based on proportion of catches during 1983-1989 and 1993-1999. Biological impacts to the component stocks should be considered on both a coastwide level and within each management area where there is evidence of finer-scale stock structure. Current evidence suggests that population structuring, both genetically and biologically, may occur in many nearshore populations, but any short term impacts to sub-populations under the final preferred ACLs are unknown (Cope 2004), (Gunderson, *et al.* 2008), and (Waples, *et al.* 2008).

The preferred northern minor nearshore rockfish ACL is equal to the ABC of 99 mt and may necessitate some further fishery restrictions to nearshore fisheries as evidenced by the fact that total catch for the sub-complex has exceeded the preferred ACL in 2 of the 3 most recent years of reconciled catches after the fishing year. Nearshore rockfish species are commercially landed under state permits in California and Oregon (Washington does not allow nearshore commercial fishing) and all commercial landings must be sorted. The states have catch accounting programs to actively monitor and manage these species inseason. Management uncertainty is therefore lower in the commercial fisheries for nearshore rockfish species. There is less monitoring for recreational fisheries that target or otherwise interact with these species.

The trip limits for the complex may be restructured inseason if necessary to limit take of a particular nearshore species to reduce the risk of overfishing that species. Such action was taken in 2009 for blue rockfish in California, based on the results from a new assessment. The trip limit in northern California (between 42° north latitude and 40°10' north latitude was previously *"6,000 lb/ 2 months, no more than 1,200 lb of which may be species other than black or blue rockfish"* and was restructured to *"7,000 lb/ 2 months, no more than 1,200 lb of which may be species other than black rockfish"* as a means to limit take of blue rockfish and keep it within the statewide harvest guideline.

Concerns have been raised about overfishing component stocks within the minor nearshore sub-complexes. When considering the risk of overfishing to the nearshore species, the biological impact to the stock must be considered. All rockfish comprising the nearshore complexes have longevities of at least 20 years, with many being much greater. Stocks with greater longevities are more resilient to short term fluctuations in environmental conditions or fishing practices, assuming older individuals are retained in the population. I older individuals are not retained and the stock becomes overfished, rebuilding the stock would likely require a lengthy rebuilding period.

The states may also take inseason action independent of NMFS if necessary to prevent exceeding an ACL. Both the nearshore commercial and recreational fisheries will be constrained by the low availability of yelloweye in 2011 and 2012. As such, catches for both fisheries are not expected to increase and exceed the ACLs. Because the nearshore fisheries will be more restricted in 2011-12, it is unlikely that the ACL will be exceeded.

The blue rockfish stock was estimated to be at 29.7 percent of its unfished biomass in 2007 and is considered to be in the precautionary zone. During the 2009 and 2010 biennial specification process, the Council contemplated removing blue rockfish from the minor rockfish complex. Blue rockfish was managed within the minor nearshore complex because of scientific uncertainty and management needs, given the interaction of blue rockfish with other nearshore species. When blue rockfish occur offshore they can be targeted separately from other nearshore rockfish, but those that occur inshore mix with other nearshore rockfish stocks. Blue rockfish are managed under the California State nearshore management plan which has mandatory sorting requirements for landed catch. Landings are routinely tracked and monitored, thereby reducing management uncertainty. For more efficient state management, blue rockfish remains within the minor rockfish complex (PFMC I2 b Supplemental GMT statement April 2010).

Concern was expressed regarding the potential for overfishing vulnerable species within the northern minor nearshore complex, particularly China, copper, and quillback rockfish. These species were all identified as highly vulnerable based on the GMT's PSA analysis. All three of these species are structure-based, longer-lived, deeper-dwelling nearshore rockfish, and thus prone to serial depletion. Concern for these species could arise if catch allocated within the nearshore complex is shifted to these highly vulnerable species.

Two of these species, China and quillback rockfish, also are estimated to have a relatively high probability that recent years' catch would exceed the OFL. That analysis showed that the most recent two years of data had about a 50 percent probability of exceeding the estimated OFL. That analysis was conducted on the coastwide OFL level; a finer scale analysis with the OFL apportioned north and south of 40°10' north latitude was not available for consideration in this management cycle.

As, mentioned above, the need to revisit stock complex composition and specification to better align with the guidance under new NS1 guidelines has been previously identified by the GMT and SSC. Minor nearshore rockfish sub-complexes and their component species should be included in such an analysis. Given workload and competing regulatory deadlines, the Council and its advisory bodies were unable to conduct these analyses in time for the 2011-2012 management cycle. For the 2013-2014 biennial management cycle, the Council and NMFS have proposed to revisit considerations for the specification of harvest levels for, and reconfigure where appropriate, the complexes to ensure that they meet the requirements of the MSA, particularly the NS1 guidance to prevent overfishing. Consideration of the vulnerability of stocks will be useful in re-specifying complexes in the future to better align with the definition of complexes from NS1 including possible indicator stocks (see the proposed action under Amendment 21; (PFMC 2010a).

Minor Shelf Rockfish North: These are all unassessed species except for chilipepper rockfish, which was assessed in 2007 (Field 2008), and greenstriped rockfish, which was newly assessed in 2009 (Hicks, et al. 2009). All stocks other than chilipepper and greenstriped rockfish are category 3 stocks with catch-based approaches for determining the OFL contribution of the stock.

Given that the minor shelf rockfish north ACL (Alternatives 1, 2, 3, and the FPA) is well below the SSC-recommended OFL and the SSC-approved ABC, there is little risk of overfishing this sub-complex. There will also be similar RCA protections for the core areas of the northern shelf in 2011 and 2012, as for prior years, which will limit access to shelf rockfish in general. This is evidenced by the 2006-2008 catches of northern minor shelf rockfish being well under the preferred ACL, with the highest catch in that period (153 mt in 2007) only 15.8 percent of the ACL.

The GMT PSA analysis of the relative vulnerability of stocks to overfishing indicated that a number of the component rockfish stocks have a medium to high relative vulnerability to overfishing (Table 4-22). However, the Rockfish conservation area (RCAs) implemented to reduce mortality on overfished species greatly protect shelf rockfish leading to few concerns regarding overfishing.

Minor Slope Rockfish North: These are all unassessed species except for splitnose rockfish, which was newly assessed in 2009 (Gertseva, *et al.* 2009). All stocks other than splitnose rockfish are category 3 stocks with catch-based approaches for determining the OFL contribution of the stock. The OFL contribution for splitnose rockfish (35.8 percent) is based on the new assessment using the $F_{50\%}$ MSY harvest rate applied to the projected exploitable biomass each year. The splitnose rockfish stock is categorized as a category 1 stock by the SSC.

The preferred 2011 and 2012 ACL for northern minor slope rockfish of 1,160 mt is the No Action OY. Given that this ACL is well below the SSC-recommended OFL and the SSC-approved ABC there is little risk of overfishing this sub-complex. The 2006-2008 catches of northern minor slope rockfish have been well under the preferred ACL, with the highest catch in that period (522 mt in 2007) only 45 percent of the ACL.

The GMT PSA analysis of the relative vulnerability of stocks to overfishing indicated that most of these rockfish stocks have a medium to high vulnerability to overfishing. Aurora, rougheye, and shortraker rockfish are the stocks within the minor slope rockfish south sub-complex that are most at risk of overfishing. There is some concern regarding the most vulnerable species in the northern minor slope rockfish sub-complex, most notably rougheye rockfish, which the GMT's PSA analysis indicates is one of the two most vulnerable groundfish species to overfishing. Table 4-23 indicates a relatively high probability (64 percent) that rougheye will be subject to overfishing in 2010 assuming the catch is as high as it was estimated to be in recent years. While overfishing is legally exceeding an OFL specified in regulations and the rougheye rockfish OFL contribution will not be specified in regulations (only the ACLs at the sub-complex level are in regulations), there could be effective overfishing of rougheye and perhaps other component stocks based on the best information currently available. The best remedy for this other than assessing these stocks may be the restructuring of complexes to aggregate species of similar vulnerabilities and distributions. While there was a consideration for restructuring the complexes this year under Amendment 23, the SSC and GMT recommended deferring these considerations until the next management cycle when more time and resources could be brought to bear to take on this task.

Table 4-23. Recent average annual catches (2008-2009) and median OFLs for 2010 from DB-SRA. Sorted in descending order of the probability that recent catch levels would exceed the OFL in 2010.

Species	Average Catch, 2008-2009	Median OFL in 2010	Probability Recent Catch Exceeds the 2010 OFL
Rougheye rockfish	127.6	80.7	0.64
Quillback rockfish	15.9	14.8	0.52
China rockfish	33.4	31.2	0.52
Tiger rockfish	1.1	1.1	0.49
Shortraker rockfish	18.0	22.1	0.44
Black-and-yellow rockfish	22.2	26.9	0.40
Aurora rockfish	28.7	46.9	0.36
Vermilion rockfish	136.2	314.3	0.28
Treefish	7.7	12.8	0.25
Copper rockfish	65.0	179.0	0.24
Spiny dogfish	839.2	2,221.6	0.24
Starry rockfish	23.6	67.6	0.22
Redbanded rockfish	22.1	63.7	0.22
Grenadier complex	488.0	1,796.2	0.18
Grass rockfish	24.1	52.3	0.15
Leopard shark	37.6	154.1	0.15
Brown rockfish	80.9	194.0	0.13
Flag rockfish	5.3	24.5	0.12
Bank rockfish	94.3	585.0	0.09
Speckled rockfish	5.1	40.2	0.07
Kelp rockfish	5.5	24.1	0.03
Olive rockfish	34.6	183.5	0.01
Rosy rockfish	6.0	37.5	0.01
Rex sole	595.1	4,283.0	0.01
Cowcod, North	0.1	6.3	0.01
Kelp greenling, California	13.7	101.3	0.00
Yellowtail rockfish, South	36.1	1,200.5	0.00
Rock sole	5.3	62.8	0.00
Greenblotched rockfish	0.7	26.0	0.00
Greenspotted rockfish	11.2	205.5	0.00
Pacific sanddab	408.9	4,509.2	0.00
Pink rockfish	0.0	2.7	0.00
Redstripe rockfish	0.4	277.5	0.00
Rosethorn rockfish	0.2	16.8	0.00
Sharpchin rockfish	1.8	235.0	0.00
Silvergray rockfish	0.9	175.7	0.00
Sand sole	41.0	706.4	0.00
Stripetail rockfish	0.1	53.6	0.00
Swordspine rockfish	0.0	12.6	0.00
Yellowmouth rockfish	3.6	179.7	0.00
Bocaccio, North	2.7	255.3	0.00
Bronzespotted rockfish	0.0	6.8	0.00

Minor Rockfish South of 40°10' north latitude

The preferred OFLs, ABCs, and ACLs for the minor rockfish complex south of 40°10' north latitude are the summed contribution of those specifications for the southern nearshore, shelf, and slope sub-complexes. The SSC approved the approach for determining these specifications. The relative vulnerability of stocks to overfishing in the minor rockfish south complex as rated in the GMT's PSA analysis are shown in Table 4-24.

Table 4-24. The relative vulnerability of rockfish stocks as rated by the GMT in their PSA analysis managed in the minor rockfish complex south of 40°10' north latitude by stock sub-complex and relative level of vulnerability within the sub-complex.

Stock Complex and Component Stocks	**PSA Results**	
	Vulnerability	
	Score	**Level**
Minor Rockfish South	NA	NA
Minor Nearshore Rockfish South	NA	NA
China	2.23	High
Copper	2.27	High
Quillback	2.22	High
Blue (assessed area)	2.01	Med/High
Blue (S of 34°27' N. latitude)	2.01	Med/High
Brown	1.99	Med/High
Grass	1.89	Med
Olive	1.87	Med
Black and yellow	1.70	Low
Calico	1.57	Low
Gopher (N of Pt. Conception)	1.76	Low
Gopher (S of Pt. Conception)	1.76	Low
Kelp	1.59	Low
Treefish	1.73	Low
Minor Shelf Rockfish South	NA	NA
Bronzespotted	2.12	High
Greenblotched	2.12	High
Redstripe	2.16	High
Speckled	2.10	High
Chameleon	2.03	Med/High
Flag	1.97	Med/High
Greenspotted	1.98	Med/High
Harlequin	1.94	Med/High
Honeycomb	1.97	Med/High
Pink	2.02	Med/High
Rosethorn	2.09	Med/High
Silvergray	2.02	Med/High
Swordspine	1.94	Med/High
Tiger	2.06	Med/High
Vermilion	2.05	Med/High
Greenstriped	1.88	Med
Mexican	1.80	Med
Pinkrose	1.82	Med
Rosy	1.89	Med
Squarespot	1.86	Med
Stripetail	1.80	Med

Stock Complex and Component Stocks	PSA Results	
	Vulnerability	
	Score	Level
Yellowtail	1.88	Med
Freckled	1.55	Low
Halfbanded	1.38	Low
Pygmy	1.55	Low
Starry	1.02	Low
Minor Slope Rockfish South		
Aurora	2.10	High
Rougheye	2.27	High
Shortraker	2.25	High
Bank	2.02	Med/High
Blackgill	2.08	Med/High
Redbanded	2.02	Med/High
Sharpchin	2.05	Med/High
Yellowmouth	1.96	Med/High
Pacific ocean perch	1.69	Low

Minor Nearshore Rockfish South: These are all unassessed species except for the portion of the blue rockfish stock occurring in waters off California north of Pt. Conception (i.e., 34°27' north latitude to 40°10' north latitude) and gopher rockfish north of Pt. Conception. All stocks other than the assessed portions of the blue and gopher rockfish stocks off California are category 3 stocks with catch-based approaches for determining the OFL contribution of the stock. The OFL contribution for blue rockfish off California is based on the 2007 assessment (Key, et al. 2008) and is recommended as a category 2 stock based on relatively high assessment uncertainty. The OFL contribution for gopher rockfish is based on the 2005 assessment (Key, et al. 2006) and is recommended as a category 1 stock by the SSC.

Stock assessments have not yet been conducted for many of the nearshore species, due in part to the lack of available information. Thus the overall stock biomass and age structure is unknown. Although these stocks are managed north and south of 40°10' north latitude, this was done for ease of management and is not based on biological differences in stocks. Biological impacts to the component stocks should be considered on both a coastwide level and within each management area where there is evidence of finer-scale stock structure. Current evidence suggests that population structuring, both genetically and biologically, may occur in many nearshore populations, but any short term impacts to subpopulations under the final preferred ACLs are unknown (Cope 2004), (Gunderson, *et al.* 2008), and (Waples, *et al.* 2008).

Historically, harvest specifications for the southern minor nearshore rockfish sub-complex were set at a level that was not expected to constrain the fishery and a 50 percent precautionary OY reduction was applied to address scientific and management uncertainty. Management of the sub-complex was designed to ensure that total take of all component species did not exceed the aggregate limit. Given the improved methods of calculating component species contributions to the sub-complexes, as well as the guidance under the new NS1 guidelines to prevent overfishing, management of sub-complexes such as minor nearshore rockfish is expected to be refined in future biennial cycles.

It is unlikely that the ACL considered for development of the integrated alternatives will be exceeded. Nearshore rockfish species are commercially landed under state permits in California and all commercial landings must be sorted. The state has catch accounting programs to actively monitor and manage these species inseason. The state may also take inseason action independent of NMFS if necessary to prevent exceeding an ACL. Both the nearshore commercial and recreational fisheries will be constrained by the low availability of yelloweye in 2011 and 2012. As such, catches for both fisheries are not expected to increase and exceed the ACLs.

The trip limits for the complex may be restructured inseason if necessary to limit take of a particular nearshore species to reduce the risk of overfishing that species. Such action was taken in 2009 for blue rockfish in California, based on the results from a new assessment. The trip limit in northern California (between 42° north latitude and 40°10' north latitude was previously *"6,000 lb/ 2 months, no more than 1,200 lb of which may be species other than black or blue rockfish"* and was restructured to *"7,000 lb/ 2 months, no more than 1,200 lb of which may be species other than black rockfish"* as a means to limit take of blue rockfish and keep it within the statewide harvest guideline.

Concerns have been raised about overfishing component stocks within the minor nearshore sub-complexes. When considering the risk of overfishing to the nearshore species, the biological impact to the stock must be considered. All rockfish comprising the nearshore complexes have longevities of at least 20 years, with many being much greater. Stocks with greater longevities are more resilient to short term fluctuations in environmental conditions or fishing practices, assuming older individuals are retained in the population. I older individuals are not retained and the stock becomes overfished, rebuilding the stock would likely require a lengthy rebuilding period.

Particular concern was expressed regarding the potential for overfishing vulnerable species within the northern minor nearshore complex, particularly China, copper, and quillback rockfish. These species were all identified as highly vulnerable based on the GMT's PSA analysis (Table 4-24). All three of these species are structure-based, longer-lived, deeper-dwelling nearshore rockfish, and thus prone to serial depletion. Concern for these species could arise if catch allocated within the nearshore complex is shifted to these highly vulnerable species.

Two of these species, China and quillback rockfish, also are estimated to have a relatively high probability that recent years' catch would exceed the OFL. That analysis showed that the most recent two years of data had about a 50 percent probability of exceeding the estimated OFL. That analysis was conducted on the coastwide OFL level; a finer scale analysis with the OFL apportioned north and south of 40°10' north latitude was not available for consideration in this management cycle.

Minor Shelf Rockfish South: These are all unassessed species except for greenstriped rockfish, which was newly assessed in 2009 (Hicks, *et al.* 2009). All stocks other than greenstriped rockfish are category 3 stocks with catch-based approaches for determining the OFL contribution of the stock. The OFL contribution for greenstriped rockfish is based on application of the proxy MSY harvest rate of $F_{50\%}$ to the projected OFLs from the new 2009 assessment. The greenstriped rockfish stock is recommended as a category 2 stock based on relatively high assessment uncertainty due to uncertain estimates of historical discards (greenstriped rockfish are rarely landed due to their small size and lack of market value and desirability). The greenstriped assessment was a coastwide assessment and the harvest specifications were apportioned using the mean of the 2003-2008 swept area biomass estimates south of 40°10' north latitude (15.5 percent) from the NMFS trawl survey.

Given that this ACL is well below the SSC-recommended OFL and the SSC-approved ABC, there is little risk of overfishing this sub-complex. There will also be similar RCA protections for the core areas of the northern shelf in 2011 and 2012, which will limit access to shelf rockfish in general. This is evidenced by the 2006-2008 catches of northern minor shelf rockfish being well under the preferred ACL.

The GMT PSA analysis of the relative vulnerability of stocks to overfishing indicated that a number of the component rockfish stocks have a medium to high relative vulnerability to overfishing (Table 4-24). However, the RCAs implemented to reduce mortality on overfished species greatly protect shelf rockfish leading to few concerns regarding overfishing.

Minor Slope Rockfish South: These are all unassessed species except for bank rockfish, which was assessed in 2000 (Piner, *et al.* 2000), and blackgill rockfish, which was assessed in 2005 (Helser 2006). All stocks other than bank and blackgill rockfish are category 3 stocks with catch-based approaches for determining the OFL contribution of the stock. The OFL contribution for bank rockfish is based on the 2000 assessment and is recommended as a category 2 stock by the SSC. The OFL contribution for blackgill rockfish is based on the 2005 assessment and is recommended as a category 1 stock by the SSC. Both OFLs are determined by applying the proxy harvest rate of $F_{50\%}$ to projected exploitable biomass.

Given that this ACL is well below the SSC-recommended OFLs and the SSC-approved, there is little risk of overfishing this sub-complex. The 2006-2008 catches of southern minor slope rockfish have been well under the preferred ACL, with the highest catch in that period (198 mt in 2006) only 31.6 percent of the ACL.

There is some concern regarding the most vulnerable species in the southern minor slope rockfish sub-complex. The GMT PSA analysis of the relative vulnerability of stocks to overfishing indicated that aurora, rougheye, and shortraker rockfish stocks have a relatively high vulnerability to overfishing (Table 4-24); however, rougheye and shortraker rockfish are rare south of 40°10’ north latitude. Aurora rockfish has an estimated probability of being subject to overfishing of 36 percent if catches are as high as they have been in recent years Given the rarity of rougheye and shortraker rockfish in the south, there is less risk and concern of overfishing component stocks in the southern minor slope rockfish sub-complex than there is in the north.

<u>Other Flatfish</u>

The Other Flatfish complex is the most reasonably constructed complex since all the species have similar life history characteristics, distributions, and low relative vulnerabilities to overfishing (Table 4-25). A systematic overhaul of the Other Flatfish complex in 2004 for the 2005-2006 biennial specifications is documented in the 2005-2006 EIS documents (PFMC 2004b).

Table 4-25. The relative vulnerability of stocks managed under the Other Flatfish complex as rated by the GMT in their PSA analysis.

Stock Complex and Component Stocks	**PSA Results Vulnerability**	
	Score	**Level**
Other Flatfish		
Butter sole	1.18	Low
Curlfin sole	1.23	Low
Flathead sole	1.03	Low
Pacific sanddab	1.25	Low
Rex sole	1.28	Low
Rock sole	1.42	Low
Sand sole	1.23	Low

Other Fish

A new assessment of the cabezon stock off Oregon was done in 2009 (Cope and Key 2009) and the stock is proposed to be managed with stock-specific harvest specifications under the preferred alternative. The Other Fish complex is comprised of species with dissimilar life histories, distributions, and vulnerabilities to overfishing. The Other Fish complex has historically been the "accumulation complex" for all non-rockfish, non-flatfish species that are taken in groundfish fisheries. The No Action and final preferred harvest specifications for the Other Fish complex do not have an analytical basis and many of the dissimilar component species have relatively high vulnerabilities to overfishing (Table 4-26). The GMT and SSC recommend a complete overhaul of the Other Fish complex for the 2013-2014 biennial cycle. The recommended approach to doing this is consideration for adding new species related to the component species of the complex into the FMP and re-grouping species with similar vulnerabilities, ecological interactions, and distributions. The effects on the biology of stocks in the Other Fish complex are as a result of Alternatives 1, 2, 3 and the FPA are expected to be similar to No Action. However, Alternatives 1, 2, 3, and the FPA are somewhat more precautionary in that provisions would be implemented for the trawl fishery that would allow trip limits to be established on stocks within the Other Fish complex the through routine inseason measures, should targeting become a conservation concern.

Table 4-26. The relative vulnerability of stocks managed under the Other Fish complex as rated by the GMT in their PSA analysis.

Stock Complex and Component Stocks	**PSA Results**	
	Vulnerability	
	Score	**Level**
Other Fish		
California skate	2.12	High
Leopard shark	2.00	High
Soupfin shark	2.02	High
Spiny dogfish	2.13	High
Big skate	1.99	Med/High
Pacific rattail	1.82	Med
Cabezon (WA)	1.68	Low
Finescale codling	1.48	Low
Kelp greenling	1.56	Low
Ratfish	1.72	Low

4.1.1.5 Effects of the Integrated Alternatives on Non-overfished Species

This section evaluates the biological effects of the 2011 and 2012 harvest specifications for non-overfished species within the integrated alternatives. ACLs for all non-overfished groundfish stocks and stock complexes were based on the proposed ABCs. For non-overfished species and species complexes where there was no new scientific information or changes in harvest policy, only a single annual ACL was considered and carried forward into Integrated Alternatives 1, 2, 3, and the FPA. Species with a single ACLs are: Pacific cod; chilipepper rockfish, yellowtail rockfish, shortspine thornyhead north of 34º27’ north latitude, black rockfish (Washington), black rockfish (Oregon/California), longnose skate, other flatfish, and other fish.

Because there were new harvest policies applicable or new scientific information available, as described in the previous section, a range of values were considered in the development of ACL values for the following stocks: lingcod north of 42º north latitude; lingcod south of 42º north latitude; sablefish; shortbelly rockfish; shortspine thornyhead south of 34º27’ north latitude; longspine thornyhead north of 34º27’ north latitude; longspine thornyhead south of 34º27’ north latitude; California scorpionfish; cabezon (California); cabezon (Oregon); Dover sole; English sole; arrowtooth flounder; starry flounder; and minor rockfish complexes north and south of 40º10’ north latitude. In general, the Council considered the range of values and recommended that a specific value be carried forward into the development of the integrated alternatives. For these species the ACL values are the same under Alternatives 1, 2, 3, and the FPA. For Pacific whiting and Dover sole the ACL do vary between the integrated alternatives. Because Pacific whiting is assessed annually and is managed consistent with the U.S.-Canada Pacific Whiting agreement, the EIS for the 2011 and 2012 management measures considers a range for Pacific whiting ACLs and the resulting impacts.

The discussion in the following section compares the biological effects on the non-overfished groundfish species under the integrated alternatives. As described above in Section 4.1.1, this section considers fishing mortality, stock productivity, genetic structure, and prey availability. Because the risk of overfishing primarily relates to the OFL and ABC values and has been addressed above in Sections 4.1.1.1 and 4.1.1.2, it is not repeated here. For healthy and precautionary zone stocks the ACL harvest levels are considered relative to the status of the stock and whether the fishing mortality is likely to result in the stock becoming overfished.

Fishing mortality

Table 4-27 presents the estimated impacts to the non-overfished groundfish stocks by Alternative. The values in the tables are also presented in tables found in Section 4.1.1.1. How the values were derived and the limitations of the data are further explained in Section 4.1.1.2.

Table 4-27. Estimated total catch (mt) of groundfish species by integrated alternative.

Species	No Action	Alternative 1A a/	Alternative 1B a/	Alternative 2	Alternative 3	FPA
Lingcod	541.7	485.7	485.7	542.6	603.1	685.2
Pacific Cod	400.0	400.0	400.0	400.0	400.0	400.0
Pacific whiting	192,996.4	96,008.0	96,008.0	192,996.4	289,984.7	192,996.4
Sablefish	6,208.9	5,123.0	4,151.0	5,286.3	5,537.3	5,470.7
Shortbelly rockfish	1.0	1.0	1.0	1.0	1.0	1.0
Chilipepper	0.0	0.0	0.0	0.0	0.0	0.0
Splitnose rockfish	7.0	7.0	7.0	7.0	7.0	7.0
Yellowtail rockfish	499.0	499.0	499.0	499.0	499.0	499.0
Shortspine thornyhead	1,422.0	1,370.1	1,370.1	1,504.7	1,474.1	1,487.0
Longspine thornyhead	1,559.0	1,373.3	1,373.3	1,384.0	1,387.6	1,387.6
Black rockfish	900.9	778.2	778.2	828.2	840.2	905.1
Blue rockfish	206.3	185.0	185.0	186.6	218.8	240.7
Minor Nearshore Rockfish	334.6	306.7	306.7	312.7	371.3	387.7
Shallow nearshore RF	47.3	0.0	0.0	51.3	51.3	51.0
Deeper nearshore RF	27.4	0.0	0.0	29.0	29.0	29.0
Minor shelf rockfish	56.0	56.0	56.0	56.0	56.0	56.0
Minor Slope Rockfish	95.0	435.0	435.0	499.3	95.0	505.4
Other minor RF	13.0	12.0	12.0	13.7	14.7	20.0
Cabezon	70.8	94.9	94.9	103.8	111.9	128.9
Dover sole	15,418.6	12,165.2	12,165.2	14,082.0	19,300.4	19,300.4
English sole	698.3	523.7	523.7	539.0	557.9	557.9
Arrowtooth flounder	7,259.1	5,524.6	5,524.6	6,685.0	7,601.7	7,601.7
Starry Flounder	7.0	7.0	7.0	7.0	7.0	7.0
Other flatfish	1,393.9	995.1	995.1	1,038.0	1,068.0	1,068.0
Kelp greenling	37.1	20.6	20.6	25.2	29.7	37.6
Longnose Skate	129.0	129.0	129.0	129.0	129.0	129.0
Other groundfish	0.0	0.0	0.0	0.0	0.0	0.0
California Scorpionfish	65.8	21.0	21.0	65.8	65.8	79.0

a/ See Appendix C for detailed description of Alternative 1a and 1b

The OFL is calculated by applying an estimated or proxy F_{MSY} harvest rate to the estimated abundance of the exploitable stock. The biomass level that produces MSY (i.e., B_{MSY}) is generally unknown and assumed to be variable over time due to long-term fluctuations in ocean conditions, so that no single value is appropriate. The proxy MSY abundance for most west coast groundfish species is 40 percent of the unfished biomass ($B_{40\%}$). The proxy threshold for declaring most groundfish stocks overfished is 25 percent ($B_{25\%}$). The MSA and National Standard guidelines refer to this threshold as the Minimum Stock Size Threshold or MSST. Any stock that is below its MSST is defined as overfished. Any stock that is expected to fall below its MSST in the next two years is defined to be approaching an overfished condition. Overfishing is defined as any rate of fishing in excess of the MFMT. The catch corresponding to fishing at a rate equal to the MFMT is referred to as the overfishing level (OFL). A thorough description of the rationale for the MSST can be found in the National Standard Guidelines 50 CFR Part 600 (63 FR 24212 - 24237). Sections 4.1.1.1. and 4.1.1.2 above further address the risk of overfishing relative to the OFL and ABC specifications. This section further discussed the risk of a stock becoming overfished as a result of the projected fishing mortality under the range of alternatives.

Healthy groundfish species are those with estimated spawning biomass levels at or greater than $B_{40\%}$ (the B_{MSY} Proxy). Table 3-5 (Chapter 3, Section 3.1.1.3) lists those species considered to be "healthy" following the 2009 stock assessment cycle. Healthy species with new stock assessments in 2009 include cabezon (including sub-stocks off California and Oregon), lingcod, greenstriped rockfish, and splitnose rockfish. The biological status of the newly assessed stocks are summarized in Section 3.1.1.3. As discussed above in Section 4.1.1.1, the probability that overfishing would occur is low for all of the stocks. Harvest levels within the ACLs considered for healthy stocks under all the alternatives are not expected to result in any healthy stock approaching an overfished condition. The Council has taken a precautionary approach to fisheries management; the current approach reflects the uncertainties associated with the scientific understanding of groundfish biology, and ecosystem relationships. Multiple layers of precaution are built into catch levels for stocks that have been assessed with age structured models.

As discussed in Chapter 3, Section 3.1.1.1, abundance-based reference points are defined in the FMP. For each species with a stock assessment a level of depletion is estimated, which is current biomass relative to its unfished stock biomass. Stocks estimated to be above the depletion threshold, yet below an abundance level that supports MSY, are considered to be in the "precautionary zone" (between $B_{25\%}$ and $B_{40\%}$). For stocks in the "precautionary zone," the FMP specifies precautionary reductions in harvest rate to better ensure future increases in the stock's abundance to B_{MSY}. Chapter 3, Section 3.1.1.4 provides information on the biological characteristics of species considered to be precautionary zone stocks following the 2009-2010 stock assessment cycle. The precautionary zone stocks include: blue rockfish, Pacific whiting, and sablefish.

Blue rockfish: Blue rockfish was last assessed in 2007 and was estimated to be at 29.7 percent of its unfished biomass. From the 2007 assessment the projected depletion in 2011 and 2012 remained at approximately 30 percent. The result of the PSA analysis resulted in a vulnerability score of 2.01 for blue rockfish, indicating a relatively high concern relative to overfishing.

Blue rockfish is currently managed within the minor rockfish complex. During the 2009 and 2010 biennial specification process, the Council contemplated removing blue rockfish from the minor rockfish complex. The decision to continue managing blue rockfish within the minor nearshore complex was based on both scientific uncertainty and management needs, given the interaction of blue rockfish with other nearshore species. When blue rockfish occur offshore they can be targeted separately from other nearshore rockfish, but those that occur inshore mix with other nearshore rockfish stocks. Blue rockfish is managed under the state of California nearshore management plan which is a limited entry program with mandatory sorting requirements. Landings are routinely tracked and monitored, thereby reducing management uncertainty. In 2009-2010 (No Action Alternative), blue rockfish in the California fisheries were managed with a HG to prevent overfishing. Under the FPA, The 2011 HG will be 242 mt and the 2012 HG will be 239 mt.[25]

[25] The HG contribution for the unassessed portion of the stock south of Pt. Conception was calculated by first

Some of the most constraining species and species groups in the Central Groundfish Management Area are blue rockfish and the Minor Nearshore rockfish group. Appendix B (Section B.4.5.2) considers the catch mortality of these species from increasing depth restriction to 50 fm in the Monterey and Morro Bay recreational GCAs. Although considered, the measures were not carried forward into the integrated alternatives due to increased yelloweye rockfish catch mortality.

Pacific whiting: Pacific whiting is assessed annually, with the last stock assessment conducted in 2010, with two models were used to estimate the status of the stock. The depletion estimate under the NMFS SS3 model was 31 percent, with estimates of uncertainty in current ranging from 17%-45% of unfished biomass. Under the TNSS model the depletion is estimated at 38 percent with a range of 17 percent and 73 percent. Under both models the biomass is projected to decline in 2011 and 2012 (18 percent -26 percent) under the No Action Alternative action harvest policies. With a PSA value of 1.69, the risk of overharvesting Pacific whiting is considered to be low.

The 2010 Pacific whiting OY is 193,935 mt (No Action). Alternative 1 informs the bycatch impacts relative to a low whiting ACL (96,968 mt) and low overfished species ACLs. Alternative 2 informs the bycatch impacts relative to the intermediate whiting ACL (193,935 mt) and the intermediate overfished species ACLs. Alternative 3 informs the bycatch impacts relative to a high whiting ACL that is 1.5 times higher (290,903 mt) than the No Action whiting OY (193,935 mt). Under Alternative 1, 2, 3 and the FPA the analysis assumes that Amendment 21: Intersector Allocation is implemented on January 1, 2011 and as such formal allocations of darkblotched, POP, and widow rockfish are made to the whiting sectors. Under Amendment 21, projecting of overfished species impacts relative to the whiting ACL are not used to establish darkblotched, POP, and widow rockfish catch limits or allocations. For canary rockfish, Alternative 1 was analyzed using the Council's preliminary preferred 2-year allocation of canary to the whiting sectors. The analysis of the incidental catch in the whiting fishery by alternative is detailed in Appendix C.

Sablefish: The 2007 coastwide sablefish stock assessment indicates the stock is at 36 percent of its unfished biomass and is therefore considered to be in the precautionary zone. The strength of the stock is reliant upon the strong 1999 and 2000 year classes, with the possibility of a strong incoming 2004 year. From the 2005 assessment the projected depletion in 2011 and 2012 is expected to drop to 34 percent. With a PSA value of 1.64, the risk of overharvesting is considered to be low. Management uncertainty for sablefish is also considered to be low with increased monitoring of the trawl fisheries occurring in 2011 under the trawl rationalization and because the limited entry fixed gear sector tends to under harvest their allocation.

The 2010 OY (No Action Alternative) applied a 40-10 harvest control rule to the coastwide ABC (in 2010 the ABC was equivalent to the OFL). The 2010 coastwide OY (No Action Alternative) was then apportioned north and south of 36° north latitude, using the average 2003-2006 proportions of the swept-area biomass estimates of sablefish from the NWFSC shelf-slope trawl survey (72 percent north; 28 percent south). The 2010 OY (No Action Alternative) south of 36° north latitude was then reduced by 50 percent to account for greater assessment and survey uncertainty in that area. The sablefish ACL under the integrated alternatives (Alternatives 1,2,3, and the FPA), consider a more risk-averse adjustment of applying the 40-10 reduction to the ABC value as adjusted for scientific uncertainty under

estimating an OFL using the DCAC methodology and then applying an ABC adjustment (σ=1.44 with a P* of 0.45). The HG contribution for the assessed area was calculated by determining the OFL from the 2007 stock assessment, deriving an ABC using a P* of 0.45 for a category 2 stock, then adjusting the ABC value using the 40-10 harvest control rule. The 2011 and 2012 blue rockfish ABC contributions for the assessed and unassessed areas are then summed to determine the HGs.

the Amendment 23 structure. The apportionment of biomass under the integrated alternatives (Alternatives 1, 2, 3, and the FPA) uses the averaged 2003-2008 trawl survey data on the sablefish stock distribution with 68 percent going to the north and 32 percent going to the south, based on using averaged 2003-2008 data. To account for the uncertainty inherent in the abundance estimates of sablefish south of 36° north latitude (due to the short time-series of survey data from the southern area and advisory body advice), the Council recommended making a 50 percent reduction to the 2011 and 2012 southern apportionment of the coastwide ACLs. Given the precautionary measures built into the sablefish ACLs, harvest levels within the ACLs considered for healthy stocks under all the alternatives are not expected to result in any healthy stock approaching an overfished condition.

Management uncertainty for sablefish is also considered to be low with increased monitoring of the trawl fisheries occurring in 2011 under the trawl rationalization and because the limited entry fixed gear sector tends to under harvest their allocation.

Unassessed groundfish stocks: Unassessed groundfish stocks are category 3 species, which includes species managed in complexes such as minor rockfish, other flatfish and other fish. These species are caught in the fishery, but at best there is only information on landed biomass. For category 3 species, it is impossible to quantitatively determine stock status or an overfished threshold. The information available for individual species managed within species complexes (minor rockfish, other flatfish, other fish) is much more limited than that available for target fish species. Estimates of biomass, seasonal distribution of biomass, and natural mortality are unavailable for most species managed within complexes. Under Alternatives 1, 2, 3, and the FPA, all catch mortality is expected to be within the complex ACLs. Determinations cannot be made relative to the risk of these unassessed stocks becoming overfished.

Trawl rationalization: Trawl rationalization is expected to make large changes to the way the fisheries are managed and to primarily affect the allocation of harvest amounts. The future effects on the risk of overfishing or causing a stock to become overfished are minimal because rationalization would not change the setting of harvest specifications, which control the impacts of the fisheries on fishing mortality. However, to the extent rationalization improves fishing practices the manageability of the fisheries, and catch accounting, it could reduce the adverse effects of the proposed action on groundfish species that are predominately caught in the trawl fisheries. Figure 3-2 in Chapter 3, Section 3.2.2.2 shows the species that are predominately caught in the trawl fisheries. Increase observer coverage and improve the use of scales, are expected to lead to better estimates of catch in these fisheries.

Cumulative Limit Management: The future effects on the risk of overfishing or causing a stock to become overfished are minimal because cumulative limit management does not change the setting of harvest specifications, which control the impacts of the fisheries on fishing mortality. The entire groundfish fleet now carries VMS for maintaining the integrity of the conservation areas and for monitoring the fishing activity relative to trip limit restrictions.

Genetic structure of the population

Little information is available on genetic diversity, genetic sub-stock structure or genetic integrity of non-overfished groundfish. Changes in genetic structure of the groundfish populations are not expected in the short-term as a result of any of the integrated alternatives. Localized depletion may be a concern if genetically important sub-populations are depleted within a distinct local region. This may be a concern for some rockfish because some species may have stock structure within relatively small regions. Effects in the long-term effects of fishing under No Action or any of the alternative are unknown. If fishing mortality remains below the ACLs and ABCs as projected changes in genetic structure would not be expected to result for any non-overfished groundfish stock such that the stock was not able to sustain itself above MSST.

Reproductive success

Reproductive success in considered within the stock assessments for most assessed stocks. For many assessed and unassessed groundfish little is known about reproductive success under No Action. Changes in reproductive success of the groundfish populations are not expected in the short-term as a result of any of the integrated alternatives. Effects in the long-term under No Action or any of the alternatives are unknown. Because all harvest levels are projected to be at or below the ACLs, changes in none of the integrated alternatives would be expected to result in effects on the reproductive success of any non-overfished groundfish stock such that the stock was not able to sustain itself above MSST.

Prey availability

A great many non-groundfish species occupy similar trophic levels in the food chain as groundfish species and are preyed upon by higher trophic levels at some period during their life history. Groundfish fishing may have complex impacts on the availability of groundfish as prey. Estimates of biomass and seasonal distribution of biomass are unavailable for groundfish as forage fish species, therefore it is not possible to do a quantitative analysis of this topic because of the limited knowledge on this subject. Information necessary to assess how fishing may reduce competition for groundfish as prey by harvesting fish that consume prey used by other fish is not available. However, given the relatively small proportion of biomass projected to be taken under each of the alternatives considered in this EIS none of the alternatives is expected to change prey availability such that it would jeopardize the ability of another stock or predator species to sustain itself at or above the MSST. The Pacific Coast Groundfish FMP, Appendix B, further discussed trophic interactions and the role of different groundfish species a prey.

Both juvenile and adult life history stages of rockfish are important prey items to a wide range of other rockfish, other piscivorous fishes (such as lingcod, salmon and halibut, predation on adults has also been noted in various species of sharks and in swordfish), seabirds, and marine mammals. Few attempts have been undertaken to rigorously evaluate the consequences of fishing on marine food webs, be it to “target” (sustainable) levels, or of overfishing. Thus, there is currently no effective way to quantitatively assess the relative impacts or risk to other components of the food web or ecosystem of rebuilding overfished species at slightly (or even greatly) different rates. While adult rockfish typically represent only a modest fraction of the diet of any specific predator, and there is little evidence that any predators on adult rockfish specialize on any particular species, there is greater evidence that juvenile (particularly age 0) stages of rockfish at times may a significant trophic linkage throughout the ecosystem.

For example, Merkel (1957) reported that juvenile rockfish were particularly important prey of Chinook salmon along the central California coast, representing on the order of 22 percent of prey by volume throughout the year, with most predation occurring between May and July, when pelagic juveniles move inshore to settle. Juvenile rockfish have also been noted to be important prey to salmonids in the Pacific Northwest (Brodeur and Pearcy 1990, Daly et al. 2009). A wide range of seabirds also prey heavily on juvenile rockfish, and for some species as much as 90 percent of their diet is comprised of “winter spawning” juvenile rockfish during the late spring and early summer, which coincides with the breeding season for many resident species (Ainley, et al. 1993; Miller and Sydeman 2004). However, there is considerable interannual, and interdecadal variability in the frequency of rockfish in seabird diets, related primarily to the availability of juveniles to seabirds. While many studies have not attempted to identify juvenile Sebastes to species, for those that have (largely off of the central and southern

California coasts) unexploited species such as shortbelly rockfish generally account for more than two-thirds of the juvenile rockfish identified, although the currently rebuilding species (particularly widow, canary and bocaccio) can also represent a significant fraction. Throughout the 1990s, declines in juvenile rockfish predation by central California seabirds occurred in both exploited and unexploited rockfish species (Miller and Sydeman 2004; Mills, et al. 2007; Sydeman, et al. 2001). It is reasonable to expect that fisheries removals have contributed to overall declines in juvenile rockfish availability, with proportionately greater declines in production for stocks that have been historically overfished and are now rebuilding.

The interactions between seabirds and their forage base has been explored in Central California for decades, and this work has generally shown has shown that these species of seabirds prefer to forage locally for juvenile rockfish during the breeding season (May-June, when juvenile rockfish are most abundant), as the close proximity to the breeding grounds reduces foraging trip duration and, presumably, energy expenditure (Ainley and Boekelheide 1990, Miller and Sydeman 2004, Thayer and Sydeman 2007). Based on this observation and several decades’ worth of data on Central California seabirds and juvenile rockfish abundance, Field et al. (2010) developed an approximation of the ecosystem impacts of fishing on seabirds. This was based on quantifying the relationships between juvenile rockfish abundance and seabird productivity, using fisheries models to estimate the relative abundance of juvenile rockfish in the absence of fishing, and compared the differences in seabird productivity that would have resulted without rockfish fisheries. As the relationship between juvenile rockfish abundance and seabird productivity is most likely non-linear, the results show that while the relative abundance of all species of juvenile rockfish has declined to approximately 50% of the estimated unfished biomass, seabirds achieved 75% to 95% of the estimated un-impacted levels of productivity, depending upon the species of bird and various model assumptions. The results also suggest that the impacts of local rockfish fisheries on seabird productivity are less than impacts that have occurred to the prey resources themselves due to ocean climate, and that seabirds are able to buffer against changes in prey availability through prey-switching and other behavioral mechanisms.

The relative declines in juvenile rockfish abundance varied by species, as the reduction of historically overfished species (such as canary, bocaccio and widow rockfish) is greater, and the reduction in non-target species (such as shortbelly, halfbanded and stripetail rockfish) as a result of fishing is assumed to be minimal. As an assemblage, the overall reduction in juvenile availability is comparable to that envisioned under single-species target fishing mortality rates, and to the results of Hilborn (2007) who found that as a collective whole, the groundfish biomass in the California Current was close to 40% of the unfished biomass, despite heavy depletion of some species and moderate to no depletion in others. While all of the stock assessments used to estimate the relative difference between the observed and unfished levels of juvenile abundance include a significant range of uncertainty, the cumulative consequences of fishing to the spawning biomass and reproductive output of the rockfish assemblage are reasonable, and well within the range of the expected consequence of fishing. Given that both the abundance and species composition of the juvenile rockfish assemblage is highly variable from year, as indicated both by food habit studies and juvenile rockfish surveys, there is no reason to expect that species-specific changes in juvenile abundance have a greater impact on dependent species relative to changes in the abundance of this community as a whole. Moreover, given the nonlinear nature of the response of seabirds to changes in juvenile abundance (and the reasonable assumption that other potentially dependent predators would demonstrate similar functional responses), there is little reason to expect that minor changes in the rebuilding rates of these species will have measurable impacts on seabird productivity or that of other dependent predators.

4.1.1.6 Estimated Impacts to Exploited Groundfish Stocks

This section summarizes the total catch mortality of selected exploited groundfish stocks under the integrated alternatives. The total catch mortality of selected non-overfished species under each alternative was projected using the GMT's impact projection models. These models also project how much target species yield might be accessed given the overfished species constraints under each alternative. Not all models project catch mortality for all species. For example, catches of petrale sole in the non-trawl sector are so infrequent that they are not quantitatively modeled. Catch mortality that is not modeled are still counted against the ACL (see Section 2.1.3), but are not displayed in this section since this section only represents modeled impacts for targeted species.

The estimated catch mortality to exploited groundfish stocks are best estimates of target species catch given model assumptions and variable fishing strategies. For example, estimates of target species catch are heavily influenced by the West Coast Groundfish Observer Program (WCGOP) bycatch rates, which are updated with the latest available data between the time in which the biennial decisions are made (i.e., June) and the first month of the biennial management cycle (i.e., January).[26] Overfished species bycatch rates generated from the WCGOP and state recreational sampling data vary as a result of changing fishery behaviors as well as differences in stock distributions (e.g., increased abundance through rebuilding, ecosystem dynamics, etc.). For both the commercial and recreational fisheries, complex dynamics relative to other fishing opportunities (e.g., salmon and tuna) affect realized effort and estimated total groundfish take. Additionally, the way in which the sectors perform under the management measures assumed under the action alternatives is not well understood and cannot be precisely predicted by the models. In summary, the models are useful for conceptually understanding how the overfished species ACLs affect access to target stocks but the estimates of target species catch should be treated as performance indices rather than precise estimates.

Table 4-28 through Table 4-33 summarize the estimated impacts to exploited fish stocks under the integrated alternatives. As discussed in Appendix A, the following models and considerations were used to predict the total catches in Table 4-28 through Table 4-33:

- Limited entry non-whiting trawl model: estimates total catch of selected species in the non-whiting trawl sector under both the rationalized and cumulative trip limit management regimes[27].
- Limited entry whiting trawl: under No Action and the FPA, the impacts represent the 2010 whiting OY and the bycatch limits currently specified in regulation. Under the Alternatives, the Amendment 21 allocations and a range of whiting ACLs are presented.
- Non-nearshore model: estimates total catch of sablefish and overfished species for the limited entry fixed gear and open access vessels seaward of the non-trawl RCA.

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[26] We assume that the most recent bycatch rate estimates best represent how fisheries will perform in the future.

[27] Relative to the projected impacts for the non-whiting trawl fishery, a single "trawl bycatch model" was used to estimate catch non-whiting trawl fishery weather managed as a rationalized trawl fishery or cumulative limit fishery (see Appendix A for model documentation). The most recently available bycatch rate information, stratified by depth and latitude, (provided by the WCGOP) was used in the trawl bycatch model. The trawl bycatch model was developed to determine what mix of cumulative trip limits and RCA configurations would constrain overfished species bycatch within the overall limits dictated by OYs (now ACLs).

- Nearshore model: estimates total catch of selected nearshore species, including overfished species, for vessels operating shoreward of the RCA, generally in the state managed nearshore fisheries.

For Alternative 1, there are two sub-options which represent different management measures in the non-nearshore fisheries. Option 1a closes the area north of Point Chehalis in order to reduce canary rockfish impacts while still harvesting the entire sablefish allocation. Option 1b makes reductions to the allowable sablefish harvest in order to reduce canary rockfish impacts. Catch projections are presented for both Alternative 1a and 1b.

The Amendment 20 FEIS (PFMC 2010c) includes an extensive analysis of the potential for IFQs to reduce bycatch rates of constraining overfished species, because of the individual accountability feature of IFQ management. This analysis is partly based on comparison of fishing under status quo management constraints and fishing under Arrowtooth Flounder EFP, "a project that occurred over 4 years with requirements nearly identical to what would be expected under a rationalized fishery" (PFMC 2010c, Appendix C, page C-14).[28] This comparison showed a marked reduction in the bycatch rate for canary rockfish. The analysis was used to illustrate potential bycatch reduction under the incentive structure of IFQ management, but was not used as a predictive tool, because of a variety of factors that limit is direct applicability to all potential fishing conditions. These factors include the fact that the EFP was conducted in a limited time and place and the analysis only considered the change in the bycatch rate of one overfished species. Different locations, target strategies, and overfished species interactions could produce different results.

The limitations in the application of this type of modeling indicate why a predictive model of trawl catches under IFQ management could not be developed for the Amendment 20 EIS. Because the trawl bycatch model uses bycatch rates observed from the fishery under status quo management, it likely underestimates potential target species catches. (It is important to note that measures under IFQ management, combined with 100 percent observer coverage requirements, make it unlikely that catch will exceed shoreside trawl sector allocations.)

Once the fishery is managed with IFQs, bycatch rate information will become available that could be used to develop a model to predict catch for future harvest specifications analyses. On the other hand, there may be less need to make such predictions. As noted above, the principal purpose of the trawl bycatch model is to determine appropriate status quo management measures (trip limits, RCAs) to constrain catch within harvest limits. IFQ management is not "top down"; the requirement to possess sufficient quota pounds to match to catch, combined with full monitoring, is the catch control mechanism. Indirect measures to control catch do not have to be developed by managers, as is the case under status quo management.

From an environmental impact perspective, it can be said that the maximum biological impact on exploited fish stocks would be the full attainment of the shoreside trawl allocation under a given alternative. However, the full attainment of the allocation for all management units is very unlikely. First, harvesters may not be able to reduce the incidental catch rate of constraining species (whether overfished or not) to allow them to fully attain allocations of less constraining species. Put another way, collectively, trawl harvesters would have to perfectly match their catch to the portfolio of quota pounds in their possession, which seems highly unlikely. Second, market demand for species may limit the volume that can be landed, at least in the short term.

[28] The EFP was conducted from 2001 to 2004.

Under all of the alternatives, management measures are in place to ensure that ACLs will not be exceeded. It is reasonable to expect the combination of 2 year ACLs under each integrated alternative, which are set at a level that accounts for uncertainty, in combination with management measures that ensure that are designed to keep total catch within the ACLs will not result in any of these species be depleted below the MSST. Detailed descriptions of the management measures associated with each alternative can be found in Appendix B. Generally, total catch increases as the overfished species ACLs increase across the alternatives, that is from Alternative 1 to Alternative 3. As noted above, the catch estimates for the non-whiting trawl fishery under a rationalized trawl structure may be below actual catches, because the modeling approach does not account for changes in fleet performance due to IFQ management. This may be especially relevant for trawl-dominant target species such as Dover sole, sablefish, and longspine thornyheads.

Table 4-28. No Action. Estimated impacts to exploited species in mt.

Species	Set Aside Tribal	SS Whiting	Non-whiting Trawl	At-Sea Whiting	LE Fixed Gear	Sablefish OA	Nearshore OA	Incidental OA Est.	Set Aside EFP	Research Est.	Rec.	Grand Total
Lingcod	250.0						67.7	23.0	0.0	5.0	196.0	541.7
Pacific Cod	400.0							0.0	0.0	0.0		400.0
Pacific whiting	50,000.0	59,218.5		81,777.9				2,000.0	0.0	0.0		192,996.4
Sablefish	552.0		2,914.9		2,140.0	529.0		6.0	65.0	2.0		6,208.9
Pacific Ocean Perch	10.9	13.0	94.5	17.0	0.4	0.1		0.0	0.1	1.8		137.7
Shortbelly rockfish	0.0							0.0	0.0	1.0		1.0
Widow rockfish	45.0	107.0	15.4	148.0	0.0	0.0	0.3	3.3	11.0	1.6	8.1	339.7
Canary rockfish	9.5	6.2	12.3	8.2	2.2	0.4	2.9	2.0	1.3	7.2	11.0	63.1
Chilipepper	0.0							0.0	0.0	0.0		0.0
Bocaccio	0.0		7.5		0.0	0.0	0.3	0.7	11.0	1.7	54.6	75.8
Splitnose rockfish	0.0							0.0	0.0	7.0		7.0
Yellowtail rockfish	490.0							3.0	2.0	4.0		499.0
Shortspine thornyhead	38.0		1,335.0					43.0	0.0	6.0		1,422.0
Longspine thornyhead	30.0		1,512.0					3.0	0.0	14.0		1,559.0
Cowcod rockfish	0.0		0.3					0.0	0.2	0.1	0.2	0.8
Darkblotched rockfish	0.1	11.0	190.2	15.0	3.9	0.6		15.0	1.5	2.1		239.4
Yelloweye rockfish	2.3		0.3		0.7	0.1	1.1	0.2	0.1	1.3	7.0	14.0
Black rockfish	14.0						224.0	0.0	0.0	0.0	662.9	900.9
Blue rockfish							7.6				198.7	206.3
Minor Nearshore Rockfish											334.6	334.6
Shallow nearshore RF							47.3					47.3
Deeper nearshore RF							27.4					27.4
Minor shelf rockfish	9.0							35.0	6.0	6.0		56.0
Minor Slope Rockfish	36.0		0.0					36.0	4.0	19.0		95.0
Other minor RF							13.0					13.0
Cabezon	0.0						47.5	0.0	0.0	0.0	23.3	70.8
Dover sole	1,497.0		13,828.6					55.0	0.0	38.0		15,418.6
English sole	91.0		598.3					4.0	0.0	5.0		698.3
Petrale sole	45.4		1,111.2					1.0	2.0	17.0		1,176.6
Arrowtooth flounder	2,041.0		5,181.1					30.0	0.0	7.0		7,259.1
Starry Flounder	2.0							5.0	0.0	0.0		7.0
Other flatfish	60.0		1,195.9					125.0	0.0	13.0		1,393.9
Kelp greenling							22.0				15.1	37.1
Longnose Skate	56.0							65.0	0.0	8.0		129.0
Other groundfish	0.0							0.0	0.0	0.0		0.0
California Scorpionfish	0.0							2.0	0.0	0.0	63.8	65.8
California Sheephead											31.7	31.7
TOTAL	**55,679.2**	**59,355.7**	**27,997.4**	**81,966.1**	**2,147.2**	**530.2**	**461.0**	**2,457.2**	**104.2**	**169.8**	**1,607.0**	**232,474.9**

Table 4-29. Alternative 1a. Estimated impacts to exploited species in mt.

Species	Set Aside Tribal	SS Whiting	Non-whiting Trawl	At-Sea Whiting	LE Fixed Gear	Sablefish OA	Nearshore OA	Incidental OA Est.	Set Aside EFP	Research Est.	Rec.	Grand Total
Lingcod	250.0						11.0	23.0	0.0	5.0	196.7	485.7
Pacific Cod	400.0							0.0	0.0	0.0		400.0
Pacific whiting	33,009.8	25,619.2		35,378.9				2,000.0	0.0	0.0		96,008.0
Sablefish	552.0		2,161.0		1,874.0	463.0		6.0	65.0	2.0		5,123.0
Pacific Ocean Perch	10.9	13.0	20.3	17.0	0.2	0.0		0.0	0.1	1.8		63.4
Shortbelly rockfish	0.0							0.0	0.0	1.0		1.0
Widow rockfish	45.0	27.6	8.4	38.2	0.1	0.0	0.2	3.3	11.0	1.6	7.0	142.4
Canary rockfish	9.5	2.2	7.3	3.1	0.6	0.1	0.9	2.0	1.3	7.2	9.4	43.6
Chilipepper	0.0							0.0	0.0	0.0		0.0
Bocaccio	0.0		4.5		0.0	0.0	0.0	0.7	11.0	1.7	26.6	44.5
Splitnose rockfish	0.0							0.0	0.0	7.0		7.0
Yellowtail rockfish	490.0							3.0	2.0	4.0		499.0
Shortspine thornyhead	38.0		1,283.1					43.0	0.0	6.0		1,370.1
Longspine thornyhead	30.0		1,326.3					3.0	0.0	14.0		1,373.3
Cowcod rockfish	0.0		0.2					0.0	0.2	0.1	0.0	0.6
Darkblotched rockfish	0.1	11.0	68.4	15.0	4.0	0.8		15.0	1.5	2.1		117.9
Yelloweye rockfish	2.3		0.1		0.5	0.1	0.4	0.2	0.1	3.3	4.1	11.2
Black rockfish	14.0						107.0	0.0	0.0	0.0	657.2	778.2
Blue rockfish							14.0				171.0	185.0
Minor Nearshore Rockfish											306.7	306.7
Shallow nearshore RF							0.0					0.0
Deeper nearshore RF							0.0					0.0
Minor shelf rockfish	9.0							35.0	6.0	6.0		56.0
Minor Slope Rockfish	36.0		340.0					36.0	4.0	19.0		435.0
Other minor RF							12.0					12.0
Cabezon	0.0						75.0	0.0	0.0	0.0	19.9	94.9
Dover sole	1,497.0		10,575.2					55.0	0.0	38.0		12,165.2
English sole	91.0		423.7					4.0	0.0	5.0		523.7
Petrale sole	45.4		340.9					1.0	2.0	17.0		406.3
Arrowtooth flounder	2,041.0		3,446.6					30.0	0.0	7.0		5,524.6
Starry Flounder	2.0							5.0	0.0	0.0		7.0
Other flatfish	60.0		797.1					125.0	0.0	13.0		995.1
Kelp greenling							7.0				13.6	20.6
Longnose Skate	56.0							65.0	0.0	8.0		129.0
Other groundfish	0.0							0.0	0.0	0.0		0.0
California Scorpionfish	0.0							2.0	0.0	0.0	19.0	21.0
California Sheephead											10.3	10.3
TOTAL	**38,689.0**	**25,756.4**	**20,803.2**	**35,567.1**	**1,879.4**	**464.1**	**227.5**	**2,457.2**	**104.2**	**169.8**	**1,441.6**	**127,559.5**

Table 4-30. Alternative 1b. Estimated impacts to exploited species in mt.

Species	Set Aside Tribal	SS Whiting	Non-whiting Trawl	At-Sea Whiting	LE Fixed Gear	Sablefish OA	Nearshore OA	Incidental OA Est.	Set Aside EFP	Research Est.	Rec.	Grand Total
Lingcod	250.0						11.0	23.0	0.0	5.0	196.7	485.7
Pacific Cod	400.0							0.0	0.0	0.0		400.0
Pacific whiting	33,009.8	25,619.2		35,378.9				2,000.0	0.0	0.0		96,008.0
Sablefish	552.0		2,161.0		1,095.0	270.0		6.0	65.0	2.0		4,151.0
Pacific Ocean Perch	10.9	13.0	20.3	17.0	0.2	0.0		0.0	0.1	1.8		63.3
Shortbelly rockfish	0.0							0.0	0.0	1.0		1.0
Widow rockfish	45.0	27.6	8.4	38.2	0.0	0.0	0.0	3.3	11.0	1.6	7.0	142.4
Canary rockfish	9.5	2.2	7.3	3.1	0.8	0.1	0.0	2.0	1.3	7.2	9.4	43.6
Chilipepper	0.0							0.0	0.0	0.0		0.0
Bocaccio	0.0		4.5		0.0	0.0	0.0	0.7	11.0	1.7	26.6	44.5
Splitnose rockfish	0.0							0.0	0.0	7.0		7.0
Yellowtail rockfish	490.0							3.0	2.0	4.0		499.0
Shortspine thornyhead	38.0		1,283.1					43.0	0.0	6.0		1,370.1
Longspine thornyhead	30.0		1,326.3					3.0	0.0	14.0		1,373.3
Cowcod rockfish	0.0		0.2					0.0	0.2	0.1	0.0	0.6
Darkblotched rockfish	0.1	11.0	68.4	15.0	2.3	0.5		15.0	1.5	2.1		115.9
Yelloweye rockfish	2.3		0.1		0.3	0.0	0.0	0.2	0.1	3.3	4.1	10.5
Black rockfish	14.0						107.0	0.0	0.0	0.0	657.2	778.2
Blue rockfish							14.0				171.0	185.0
Minor Nearshore Rockfish											306.7	306.7
Shallow nearshore RF							0.0					0.0
Deeper nearshore RF							0.0					0.0
Minor shelf rockfish	9.0							35.0	6.0	6.0		56.0
Minor Slope Rockfish	36.0		340.0					36.0	4.0	19.0		435.0
Other minor RF							12.0					12.0
Cabezon	0.0						75.0	0.0	0.0	0.0	19.9	94.9
Dover sole	1,497.0		10,575.2					55.0	0.0	38.0		12,165.2
English sole	91.0		423.7					4.0	0.0	5.0		523.7
Petrale sole	45.4		340.9					1.0	2.0	17.0		406.3
Arrowtooth flounder	2,041.0		3,446.6					30.0	0.0	7.0		5,524.6
Starry Flounder	2.0							5.0	0.0	0.0		7.0
Other flatfish	60.0		797.1					125.0	0.0	13.0		995.1
Kelp greenling							7.0				13.6	20.6
Longnose Skate	56.0							65.0	0.0	8.0		129.0
Other groundfish	0.0							0.0	0.0	0.0		0.0
California Scorpionfish	0.0							2.0	0.0	0.0	19.0	21.0
California Sheephead											10.3	10.3
TOTAL	**38,689.0**	**25,756.4**	**20,803.2**	**35,567.1**	**1,098.6**	**270.7**	**226.0**	**2,457.2**	**104.2**	**169.8**	**1,441.6**	**126,583.9**

Table 4-31. Alternative 2. Estimated impacts to exploited species in mt.

Species	Set Aside Tribal	SS Whiting	Non-whiting Trawl	At-Sea Whiting	LE Fixed Gear	Sablefish OA	Nearshore OA	Incidental OA Est.	Set Aside EFP	Research Est.	Rec.	Grand Total
Lingcod	250.0						54.9	23.0	0.0	5.0	209.7	542.6
Pacific Cod	400.0							0.0	0.0	0.0		400.0
Pacific whiting	50,000.0	59,218.5		81,777.9				2,000.0	0.0	0.0		192,996.4
Sablefish	552.0		2,324.3		1,874.0	463.0		6.0	65.0	2.0		5,286.3
Pacific Ocean Perch	10.9	13.0	41.8	17.0	0.3	0.1		0.0	0.1	1.8		85.0
Shortbelly rockfish	0.0							0.0	0.0	1.0		1.0
Widow rockfish	45.0	107.0	8.7	148.0	0.1	0.0	0.3	3.3	11.0	1.6	7.8	332.8
Canary rockfish	9.5	6.2	9.7	8.2	1.7	0.3	2.0	2.0	1.3	7.2	10.3	58.4
Chilipepper	0.0							0.0	0.0	0.0		0.0
Bocaccio	0.0		5.5		0.0	0.0	0.0	0.7	11.0	1.7	52.2	71.1
Splitnose rockfish	0.0							0.0	0.0	7.0		7.0
Yellowtail rockfish	490.0							3.0	2.0	4.0		499.0
Shortspine thornyhead	38.0		1,417.7					43.0	0.0	6.0		1,504.7
Longspine thornyhead	30.0		1,337.0					3.0	0.0	14.0		1,384.0
Cowcod rockfish	0.0		0.3					0.0	0.2	0.1	0.2	0.7
Darkblotched rockfish	0.1	11.0	108.8	15.0	3.2	0.8		15.0	1.5	2.1		157.5
Yelloweye rockfish	2.3		0.2		0.7	0.1	0.7	0.2	0.1	3.3	6.8	14.4
Black rockfish	14.0						152.0	0.0	0.0	0.0	662.2	828.2
Blue rockfish							21.1				165.5	186.6
Minor Nearshore Rockfish											312.7	312.7
Shallow nearshore RF							51.3					51.3
Deeper nearshore RF							29.0					29.0
Minor shelf rockfish	9.0							35.0	6.0	6.0		56.0
Minor Slope Rockfish	36.0		404.3					36.0	4.0	19.0		499.3
Other minor RF							13.7					13.7
Cabezon	0.0						80.0	0.0	0.0	0.0	23.8	103.8
Dover sole	1,497.0		12,492.0					55.0	0.0	38.0		14,082.0
English sole	91.0		439.0					4.0	0.0	5.0		539.0
Petrale sole	45.4		632.0					1.0	2.0	17.0		697.4
Arrowtooth flounder	2,041.0		4,607.0					30.0	0.0	7.0		6,685.0
Starry Flounder	2.0							5.0	0.0	0.0		7.0
Other flatfish	60.0		840.0					125.0	0.0	13.0		1,038.0
Kelp greenling							11.3				13.9	25.2
Longnose Skate	56.0							65.0	0.0	8.0		129.0
Other groundfish	0.0							0.0	0.0	0.0		0.0
California Scorpionfish	0.0							2.0	0.0	0.0	63.8	65.8
California Sheephead											31.7	31.7
TOTAL	**55,679.2**	**59,355.7**	**24,668.2**	**81,966.1**	**1,879.9**	**464.3**	**416.1**	**2,457.2**	**104.2**	**169.8**	**1,560.6**	**228,721.4**

Table 4-32. Alternative 3. Estimated impacts to exploited species in mt.

Species	Set Aside Tribal	SS Whiting	Non-whiting Trawl	At-Sea Whiting	LE Fixed Gear	Sablefish OA	Nearshore OA	Incidental OA Est.	Set Aside EFP	Research Est.	Rec.	Grand Total
Lingcod	250.0						61.9	23.0	0.0	5.0	263.2	603.1
Pacific Cod	400.0							0.0	0.0	0.0		400.0
Pacific whiting	66,990.2	92,817.7		128,176.8				2,000.0	0.0	0.0		289,984.7
Sablefish	552.0		2,575.3		1,874.0	463.0		6.0	65.0	2.0		5,537.3
Pacific Ocean Perch	10.9	13.0	90.4	17.0	0.3	0.1		0.0	0.1	1.8		133.6
Shortbelly rockfish	0.0							0.0	0.0	1.0		1.0
Widow rockfish	45.0	107.0	14.9	148.0	0.1	0.0	0.2	3.3	11.0	1.6	8.7	339.7
Canary rockfish	9.5	6.2	10.6	8.2	1.9	0.3	2.0	2.0	1.3	7.2	12.5	61.7
Chilipepper	0.0							0.0	0.0	0.0		0.0
Bocaccio	0.0		7.2		0.0	0.0	0.0	0.7	11.0	1.7	55.0	75.6
Splitnose rockfish	0.0							0.0	0.0	7.0		7.0
Yellowtail rockfish	490.0							3.0	2.0	4.0		499.0
Shortspine thornyhead	38.0		1,387.1					43.0	0.0	6.0		1,474.1
Longspine thornyhead	30.0		1,340.6					3.0	0.0	14.0		1,387.6
Cowcod rockfish	0.0		0.3					0.0	0.2	0.1	0.2	0.8
Darkblotched rockfish	0.1	11.0	170.6	15.0	3.5	0.8		15.0	1.5	2.1		219.6
Yelloweye rockfish	2.3		0.2		0.8	0.1	0.7	0.2	0.1	3.3	8.1	15.9
Black rockfish	14.0						143.9	0.0	0.0	0.0	682.3	840.2
Blue rockfish							22.1				196.7	218.8
Minor Nearshore Rockfish											371.3	371.3
Shallow nearshore RF							51.3					51.3
Deeper nearshore RF							29.0					29.0
Minor shelf rockfish	9.0							35.0	6.0	6.0		56.0
Minor Slope Rockfish	36.0		0.0					36.0	4.0	19.0		95.0
Other minor RF							14.7					14.7
Cabezon	0.0						83.0	0.0	0.0	0.0	28.9	111.9
Dover sole	1,497.0		17,710.4					55.0	0.0	38.0		19,300.4
English sole	91.0		457.9					4.0	0.0	5.0		557.9
Petrale sole	45.4		851.2					1.0	2.0	17.0		916.6
Arrowtooth flounder	2,041.0		5,523.7					30.0	0.0	7.0		7,601.7
Starry Flounder	2.0							5.0	0.0	0.0		7.0
Other flatfish	60.0		870.0					125.0	0.0	13.0		1,068.0
Kelp greenling							13.3				16.4	29.7
Longnose Skate	56.0							65.0	0.0	8.0		129.0
Other groundfish	0.0							0.0	0.0	0.0		0.0
California Scorpionfish	0.0							2.0	0.0	0.0	63.8	65.8
California Sheephead											31.7	31.7
TOTAL	**72,669.4**	**92,954.9**	**31,010.5**	**128,365.0**	**1,880.5**	**464.3**	**421.9**	**2,457.2**	**104.2**	**169.8**	**1,738.8**	**332,236.6**

Table 4-33. Final Preferred Alternative. Estimated impacts to exploited species in mt.

Species	Set Aside Tribal	SS Whiting	Non-whiting Trawl	At-Sea Whiting	LE Fixed Gear	Sablefish OA	Nearshore OA	Incidental OA Est.	Set Aside EFP	Research Est.	Rec.	Grand Total
Lingcod	250.0						86.0	23.0	0.0	5.0	321.2	685.2
Pacific Cod	400.0							0.0	0.0	0.0		400.0
Pacific whiting	50,000.0	59,218.5		81,777.9				2,000.0	0.0	0.0		192,996.4
Sablefish	552.0		2,508.7		1,874.0	463.0		6.0	65.0	2.0		5,470.7
Pacific Ocean Perch	10.9	13.0	90.2	17.0	0.3	0.1		0.0	0.1	1.8		133.4
Shortbelly rockfish	0.0							0.0	0.0	1.0		1.0
Widow rockfish	45.0	107.0	14.8	148.0	0.1	0.0	0.3	3.3	11.0	1.6	8.7	339.8
Canary rockfish	9.5	6.2	10.6	8.2	1.9	0.3	3.0	2.0	1.3	7.2	12.6	62.8
Chilipepper	0.0							0.0	0.0	0.0		0.0
Bocaccio	0.0		7.1		0.0	0.0	0.3	0.7	11.0	1.7	55.4	76.2
Splitnose rockfish	0.0							0.0	0.0	7.0		7.0
Yellowtail rockfish	490.0							3.0	2.0	4.0		499.0
Shortspine thornyhead	38.0		1,400.0					43.0	0.0	6.0		1,487.0
Longspine thornyhead	30.0		1,340.6					3.0	0.0	14.0		1,387.6
Cowcod rockfish	0.0		0.3					0.0	0.2	0.1	0.2	0.8
Darkblotched rockfish	0.1	11.0	170.2	15.0	3.5	0.8		15.0	1.5	2.1		219.2
Yelloweye rockfish	2.3		0.3		0.8	0.1	1.1	0.2	0.1	3.3	7.7	15.9
Black rockfish	14.0						203.0	0.0	0.0	0.0	688.1	905.1
Blue rockfish							20.0				220.7	240.7
Minor Nearshore Rockfish											387.7	387.7
Shallow nearshore RF							51.0					51.0
Deeper nearshore RF							29.0					29.0
Minor shelf rockfish	9.0							35.0	6.0	6.0		56.0
Minor Slope Rockfish	36.0		410.4					36.0	4.0	19.0		505.4
Other minor RF							20.0					20.0
Cabezon	0.0						95.0	0.0	0.0	0.0	33.9	128.9
Dover sole	1,497.0		17,710.4					55.0	0.0	38.0		19,300.4
English sole	91.0		457.9					4.0	0.0	5.0		557.9
Petrale sole	45.4		839.0					1.0	2.0	17.0		904.4
Arrowtooth flounder	2,041.0		5,523.7					30.0	0.0	7.0		7,601.7
Starry Flounder	2.0							5.0	0.0	0.0		7.0
Other flatfish	60.0		870.0					125.0	0.0	13.0		1,068.0
Kelp greenling							21.0				16.6	37.6
Longnose Skate	56.0							65.0	0.0	8.0		129.0
Other groundfish	0.0							0.0	0.0	0.0		0.0
California Scorpionfish	0.0							2.0	0.0	0.0	77.0	79.0
California Sheephead											31.7	31.7
TOTAL	**55,679.2**	**59,355.7**	**31,354.1**	**81,966.1**	**1,880.6**	**464.3**	**529.7**	**2,457.2**	**104.2**	**169.8**	**1,861.5**	**235,822.3**

4.1.1.7 Alternative Status Determination Criteria for Petrale Sole and Other Flatfish Species

The 2009 petrale assessment concluded that since 1943 the stock has experienced chronic annual overfishing, defined as fishing mortality rates in excess of $F_{40\%}$, which is the rate that would reduce the expected lifetime egg production of a new recruit to 40% of that expected to occur in the absence of fishing. Moreover, the assessment concluded that the abundance of the stock has been below the MSST since 1953, which would require the development of a stock rebuilding plan. For all Council groundfish stocks, the MSST is defined to be 25% of the biomass if there were no fishing ($B_{25\%}$). In contrast to these conclusions, the assessment also showed that the stock has supported very steady annual catches in excess of 2,000 mt for the last half century. Moreover, the stock assessment team (STAT) pointed out that the Council's proxy flatfish reference points ($F_{40\%}$ and $B_{25\%}$) were inappropriate, given the estimated productivity of the stock. The STAR panel review concurred with the STAT's evaluation and recommended that the reference points (B_{MSY} and F_{MSY}) developed specifically for petrale sole be used by the Council in developing ABC and OY recommendations for the 2011-2012 biennial management cycle (Tsou, *et al.* 2009a). They noted that the estimate of B_{MSY} was robust to both an assumed Beverton-Holt stock-recruitment relationship, as in the base model, and an assumed Ricker stock-recruitment function (Table 4-34). A sensitivity run assuming a Ricker stock-recruitment relationship showed very similar trends in biomass estimates from the early 1950s to 2008 to the base case Beverton-Holt function, but a substantially smaller $B_{0,}$ resulting in a higher depletion rate (i.e., higher current biomass relative to estimated B_0) (Figure 4-16). These results and generally good fits to survey and compositional data for the base model led to the STAR panel recommendation to consider using the deterministic B_{MSY} estimate from the assessment of 19 percent of unfished biomass as the B_{MSY} target for petrale.

Table 4-34. Results of sensitivity analyses conducted in the 2009 petrale sole assessment. Estimated biomass and harvest rate reference points for petrale sole are shown under different assumptions for the stock-recruitment relationship, down-weighting compositional data in the NWFSC trawl survey, and whether to include the 2008 NWFSC trawl survey data point.

Description	**Base Case**	**Ricker**	**½ Effective N NWFSC Survey Comps**	**No 2008 NWFSC Survey Data**
B_0	25,334	14,415	25,501	26,206
2009 Spawning biomass	2,938	3,179	2,702	4,280
2009 Depletion	**0.12**	**0.22**	0.11	0.16
2009 1-*SPR*	0.9	0.86	0.91	0.85
2008 instantaneous fishing mortality	0.29	0.26	0.31	0.24
B_{MSY}	**4,796**	**5,447**	4,566	4,395
1-SPR MSY	0.8	0.76	0.81	0.83
F_{MSY}	0.23	0.22	0.24	0.25
2009 %B_{MSY}	**0.61**	**0.58**	0.59	0.97

It was also noted that total catches of petrale sole from 1951 to present have averaged less than the deterministic MSY estimated in the 2009 assessment (Figure 4-17). Figure 4-17 also depicts the time series of estimated spawning biomass since 1951 relative to the deterministic B_{MSY} harvest level ($B_{19\%}$) and an MSST of half that amount ($B_{9.5\%}$). It is noted that biomass estimates are much more certain in the recent period since 1951 because the data informing year class strength (i.e., compositional data), surveys informing relative biomass trends, and more accurate catch records are only available during this period.

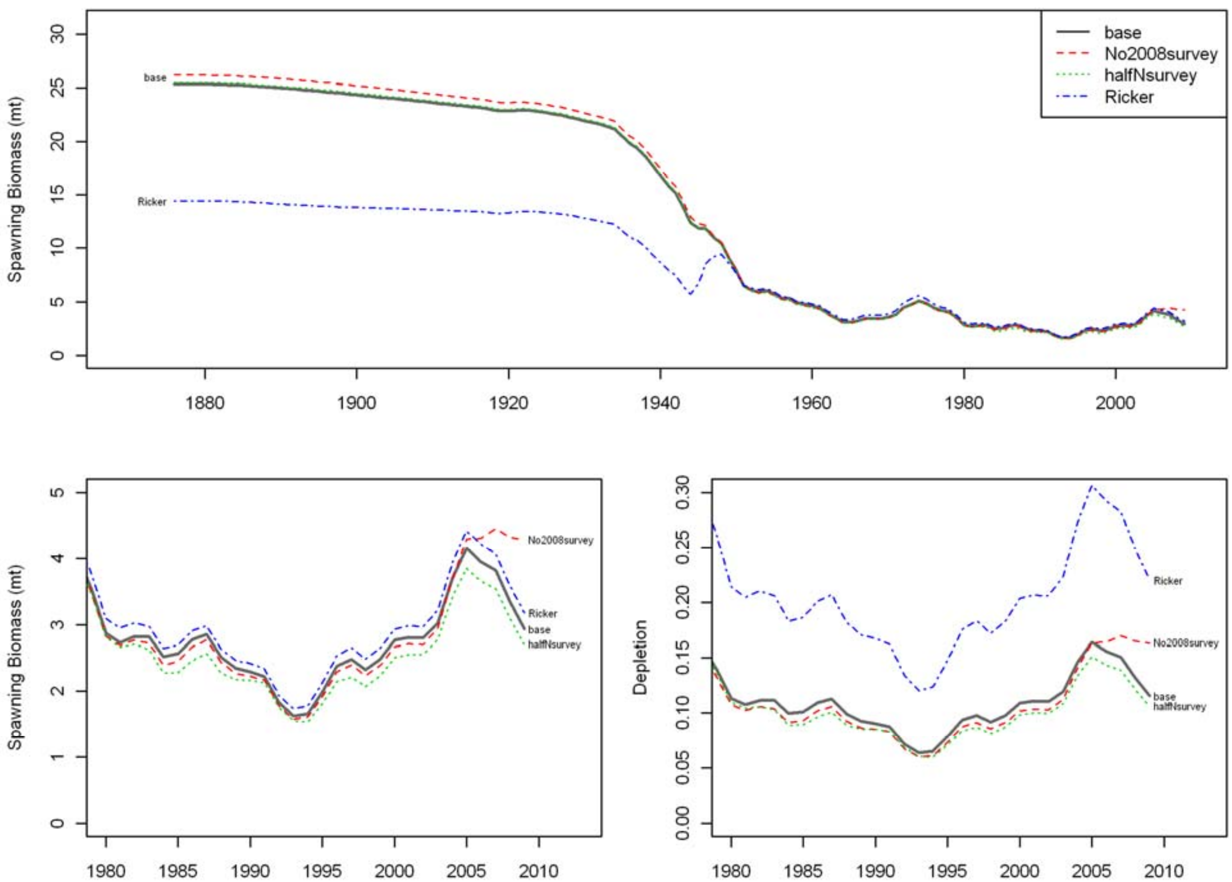


Figure 4-16. Sensitivity analyses presented in the 2009 petrale sole assessment. The figure panels depict trends in spawning biomass and depletion of petrale sole relative to the assumed stock-recruitment relationship, not counting the 2008 trawl survey, and down-weighting the survey compositional data by halving the effective sample size (i.e., effective N). Note the significantly different biomass and depletion trends when assuming a Beverton-Holt stock recruitment as in the base model (solid black line) vs. an assumed Ricker stock-recruitment relationship (dashed blue line).

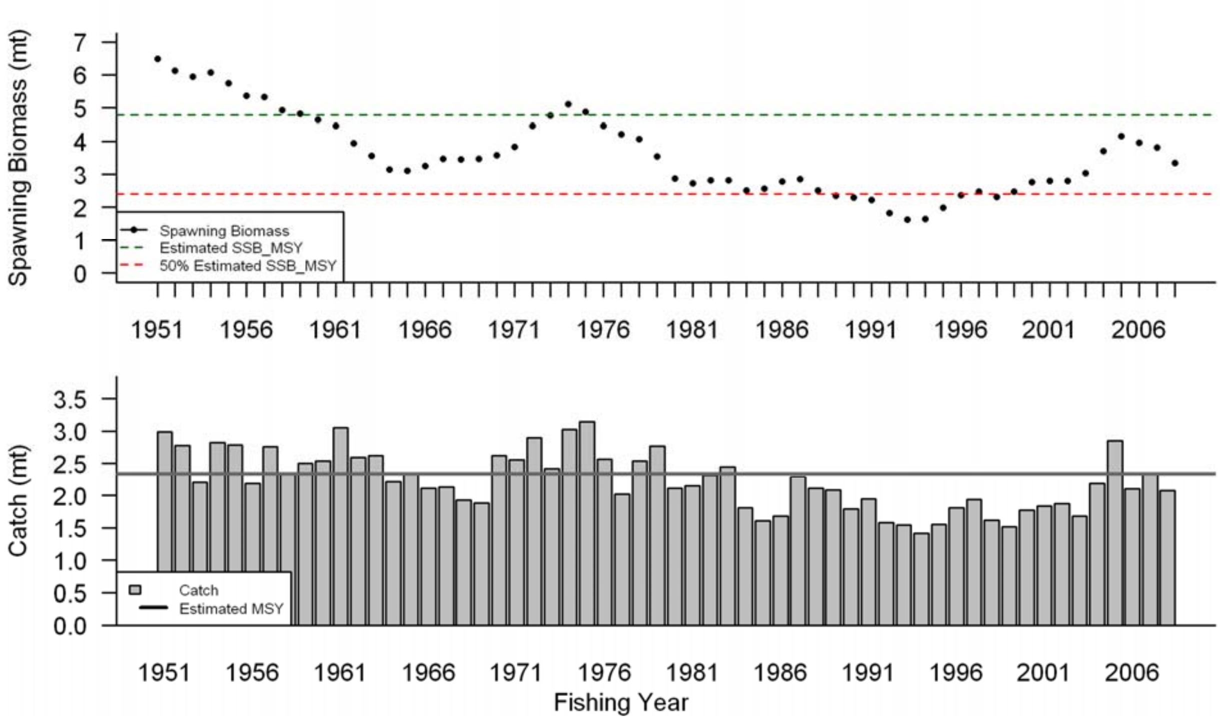


Figure 4-17. Estimated spawning biomass of petrale sole from 1951 to present relative to the estimated BMSY ($B_{19\%}$) and an MSST of 50 percent of BMSY ($B_{9.5\%}$) (top panel). Estimated MSY relative to estimated catches of petrale sole from 1951 to present (bottom panel).

The B_{MSY} target may be either a proxy value or deterministic as estimated in a quantitative assessment. The FMP specifies how B_{MSY} target levels are set in Section 4.2 as follows:

> "Harvest policies are to be specified according to standard reference points such as MSY (MSY, interpreted as a maximum average achievable catch under prevailing ecological and environmental conditions over a prolonged period). The long-term average biomass associated with fishing at F_{MSY} is B_{MSY}. In this FMP, MSY generally refers to a constant F control rule that is assumed to produce the maximum average yield over time while protecting the spawning potential of the stock. … Absent a more accurate determination of F_{MSY}, the Council will apply default MSY proxies. … A biomass level of 40% (i.e., $0.4*B_{unfished}$) is a reasonable proxy for B_{MSY}. … If available information is sufficient, values of F_{MSY}, B_{MSY}, and more appropriate harvest control rules may be developed for any species or species group."

Section 4.4.3 of the FMP specifies how overfished levels are set as follows:

> "The default overfished/rebuilding threshold for category 1 groundfish (i.e., stocks with quantitative assessments) is $0.25*B_{unfished}$. The Council may establish different thresholds for any species based on information provided in stock assessments, the SAFE document, or other scientific or groundfish management-related report. For example, if B_{MSY} is known, the overfished threshold may be set equal to 50% of that amount."

In June 2009, the Council requested the SSC review the deterministic B_{MSY} estimated in the new petrale assessment as a potential target biomass for managing the stock. The SSC Groundfish Subcommittee met on August 31, 2009 to evaluate the case for a using a deterministic B_{MSY} for petrale sole and, alternatively, a new proxy B_{MSY} for petrale and other flatfish species.

The use of proxy estimates of F_{MSY} and B_{MSY} was adopted by the Council due to inherent statistical difficulties in estimating these quantities in any single stock assessment and because of a well-developed scientific literature supporting the use of proxies. Nonetheless, the Council has previously been confronted with peculiarities associated with the use of its proxies. For example, in the case of Pacific whiting where, if fished at the proxy harvest rate, the spawning biomass would be expected to drop below the MSST with some regularity. Fundamentally, as the productivity of a stock increases, the fishing mortality rate that produces MSY increases and, concomitantly, the relative biomass of the stock when fished at that rate decreases. Hence, flatfishes would be expected to have a lower relative B_{MSY} value than rockfishes and logically might have a lower MSST than rockfishes as well.

In June 2009 the SSC developed a list of analyses for the petrale sole stock assessment team (STAT) to explore the use of generalized proxies versus petrale-specific management quantities, including: 1) characterization of uncertainty in estimates of B_0, B_{MSY}, $B_{40\%}$, and F_{MSY}; 2) evaluation of the effect of time-blocked selectivity's on the estimate of B_{MSY}, and 3) providing a clear argument to support the use stock-specific estimates.

The SSC groundfish subcommittee endorsed the use of proxies as a general practice for two important reasons. First, as noted previously, it is usually quite difficult to obtain reliable stock-specific estimates of B_{MSY} and F_{MSY} in any particular assessment (Haltuch, *et al.* 2008). From a meta-analytical perspective there is no doubt that useful inference about stock productivity can be drawn by comparative analysis of information drawn from studies of related species in comparable habitats. Second, the use of proxies has a stabilizing influence on stock reference points, which is beneficial to the management process. However, given the marked discrepancies between the Council's existing flatfish proxies and the stock-specific reference points derived from the approved base model ($F_{20\%}$ and 19% depletion), the subcommittee recommended that new flatfish proxies be developed for Council management. To that end, the subcommittee reviewed an analysis of productivity parameters for west coast flatfish (Dover sole, petrale sole, English sole, arrowtooth flounder, and starry flounder) developed by Dr. Martin Dorn and concluded that steepness was at least h = 0.80. Moreover, recent results presented in Punt et al. (2008) show that for a diverse set of west coast groundfish stocks (Pacific whiting, sablefish, petrale sole, and canary rockfish), a steepness value of 0.80 is associated with an F_{MSY} value that is roughly equivalent to $F_{30\%}$ when the stock-recruit relationship has a Beverton-Holt form (Figure 4-18). Moreover, the level of stock depletion associated with fishing at F_{MSY} is approximately $B_{25\%}$ (Figure 4-19). The subcommittee noted that use of the Beverton-Holt stock-recruitment relationship is appropriate in this case because: (a) all stock assessments for west coast groundfish are based on this relationship and (b) the data for petrale sole support the Beverton-Holt curve over the Ricker relationship.

Based on these considerations the SSC's groundfish subcommittee recommended that the Council tentatively adopt those values as new west coast flatfish MSY proxies. In addition, given that the current MSST ($B_{25\%}$) for groundfish is 62.5% of the target biomass ($B_{40\%}$), the subcommittee recommended that, for west coast flatfish under Council management, the MSST be set at $B_{15\%}$, which is 60% of the target stock size. Because the estimate of petrale sole stock depletion in 2009 from the STAT's base model is 11.6%, if this MSST is adopted the stock would be declared overfished.

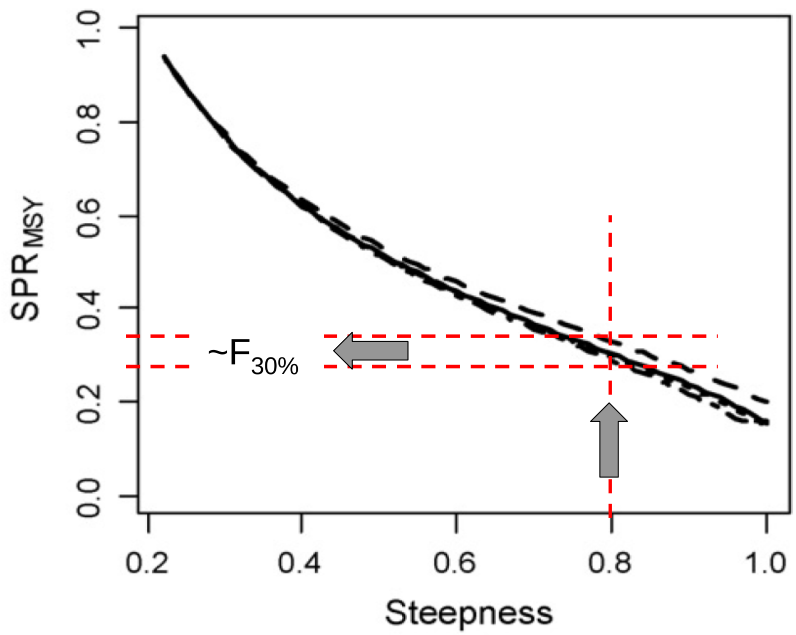


Figure 4-18. Relationship between spawner-recruit steepness (*h*) and the fishing mortality rate, expressed as spawning potential ratio (SPR), that maximizes sustainable yield among four west coast groundfish stocks (taken from (Punt, *et al.* 2008)).

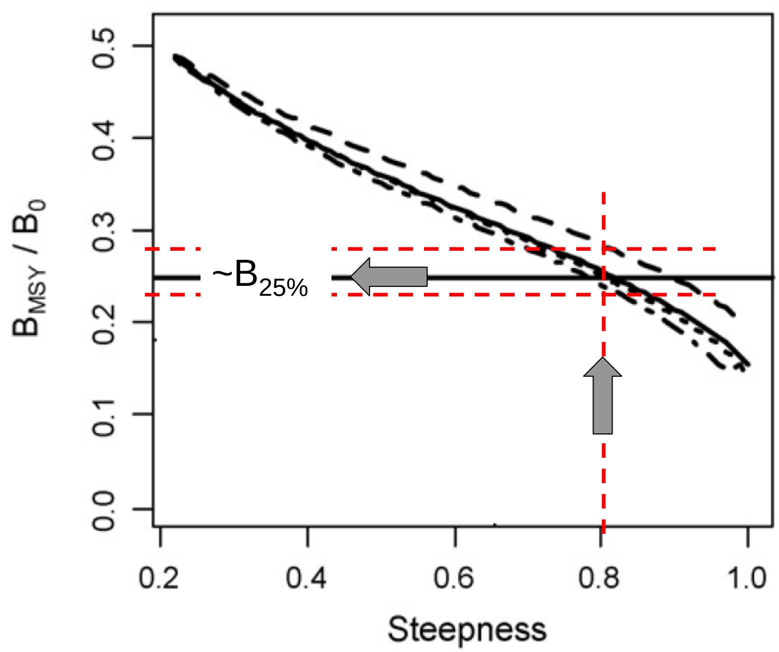


Figure 4-19. Relationship between spawner-recruit steepness (*h*) and the level of stock depletion that is consistent with attainment of MSY among four west coast groundfish stocks (taken from Punt *et al.* 2008).

The SSC reviewed the SSC groundfish subcommittee recommendations at their September 2009 meeting and recommended consideration of a proxy B_{MSY} of $B_{25\%}$ and an MSST of $B_{15\%}$ as per the subcommittee's recommendations. The Council requested further analysis of two alternatives for petrale sole reference points: 1) the proxy B_{MSY} and MSST proxy flatfish target and overfished thresholds recommended by the SSC in September (i.e., $B_{25\%}$ and $B_{15\%}$, respectively); and 2) the estimated biomass target of $B_{19\%}$ from the new assessment with an overfished threshold of half that amount or $B_{9.5\%}$.

The SSC groundfish subcommittee met September 30 - October 1, 2009 to discuss the justification for the proxy target spawning biomass level, which was proposed for all flatfish stocks at the September Council meeting. Two major points of discussion were: (1) when is it better to use a stock-specific estimate of B_{MSY} as opposed to a proxy and (2) why is a value of steepness equal to 0.8 appropriate for defining a flatfish proxy.

There are a number of reasons for basing management advice for flatfish stocks on a proxy for B_{MSY}:

- proxies incorporate information from a number of species rather than one species – in contrast stock-specific estimates of B_{MSY} could vary substantially from one assessment to the next;
- proxies provide a constant target offering stability in interpretation and management advice; and
- B_0 and $B_{CURRENT}$ are generally more precisely estimated than B_{MSY}.

Although the SSC concluded that the best scientific approach at present is to base management advice for flatfish stocks on a proxy for B_{MSY}, it also agrees that stock-specific estimates of B_{MSY} could potentially be used as reference points in appropriate situations. Conditions for doing so would include: (a) robustness to assessment specifications, and (b) stability of estimates of B_{MSY} among assessments over a number assessment cycles. While the estimate of B_{MSY} from the 2009 petrale stock assessment does appear to be relatively robust to certain assumptions, it remains to be seen whether the estimate will be robust in future assessments. The estimate of B_{MSY}/B_0 for petrale sole is less than 0.2, which is below most national and international standards regarding the range for this quantity. For example, the general guidance under NS1 suggests ranges for B_{MSY} and F_{MSY}, and the values of $B_{25\%}$ and $F_{30\%}$ are at the lower limits of those ranges. This does not imply that B_{MSY}/B_0 must be greater than 0.2, but rather that B_{MSY}/B_0 estimates below 0.25 should be subject to increased scrutiny to confirm their reliability. Finally, although proxies are unlikely to equal the true value of B_{MSY}/B_0 for any single stock, the yield function is generally flat at biomass levels near B_{MSY}, so there is little loss in yield from the use of a proxy reference point.

The use of 0.8 for steepness when selecting the proxy target biomass and fishing mortality levels is based on a number of considerations. The resultant proxies should provide "Pretty Good Yield" (as conceived by MacCall and defined by Hilborn (2010)) across a number of related stocks and, in this case, should reflect the uncertainty in the correct value for B_{MSY} for petrale sole.

Although the likelihood profile for petrale sole puts little density below the value of 0.8, fixed values and assumptions in the assessment necessarily decrease the perceived uncertainty in estimated parameters, including steepness. Steepness, in particular, should be better estimated in an assessment model after a partial return trip (i.e., a rebuilding period). In the 2005 assessment, the average value of steepness for the northern (0.88) and southern (0.72) stocks was 0.8. Moreover, the prior for Pleuronectid flatfish from Myer's meta-analysis is centered at 0.8.

The SSC endorsed the conclusion of the groundfish subcommittee report that proxy target reference points for west coast flatfish of $B_{25\%}$ and $F_{30\%}$ are the best scientific information available. This conclusion is based on a number of considerations, including information on stock-recruit relationships for all west coast flatfish that have been assessed, national and international guidance on proxies for

B_{MSY} and F_{MSY}, and the results of a meta-analysis of flatfish stock-recruit relationships. Any of these factors when considered in isolation could give the impression that reference points based on a steepness of 0.8 (i.e., $B_{25\%}$ and $F_{30\%}$) are either overly aggressive for flatfish, or too precautionary. Neither view is tenable when the information is considered comprehensively (Figure 4-20). The SSC supported the use of proxy reference points for status determination and harvest control rules. A key criterion for selecting a proxy is that it will perform well for the group of stocks to which it will be applied, and perform at least adequately for each member of the group. Consequently proxies would not necessarily be based on the average or the midpoint of the available information.

The SSC has noted previously that other aspects of the Council's harvest policy, such as the overfished threshold and the point at which the precautionary reduction for OY becomes zero (40-10), are policy decisions that are at the discretion of the Council. A policy that mimics the Council's default proxies for groundfish would be to set the MSST to $B_{15\%}$, which is 60 percent of the target stock size, and to implement a 25-6.25 precautionary adjustment for OY. Alternatively, the Council could set the MSST to 50% of $B_{25\%}$, which is the lowest value recommended by the NS1 guidelines and allowed in the FMP.

The Council heeded the SSC's advice and adopted a proxy B_{MSY} target of $B_{25\%}$ and a proxy F_{MSY} harvest rate of $F_{30\%}$ for petrale sole and other assessed flatfish. Additionally, they adopted a proxy MSST of half the new B_{MSY} target, or $B_{12.5\%}$ for managing petrale and other flatfish species. The analogous ACL harvest control rule to the 40-10 rule under these new reference points would be the 25-5 precautionary adjustment. When a flatfish stock is in the precautionary zone above the MSST of $B_{12.5\%}$ and below the B_{MSY} target of $B_{25\%}$, the ACL is progressively decreased below the ABC[29] as the stock is further depleted until, at 5 percent of unfished biomass, the ACL would be set equal to zero. In effect, the slope of the line describing the ACL adjustment is set by the $B_{25\%}$ and $B_{5\%}$ points and the adjustment is made to the ACL according to the depletion rates estimated between B_{MSY} and MSST. When a stock drops below the MSST, ACLs are not necessarily decided by the 25-5 rule, but by a rebuilding plan. In the case of petrale, the Council's preferred alternative implements the 25-5 adjustment after 2011.

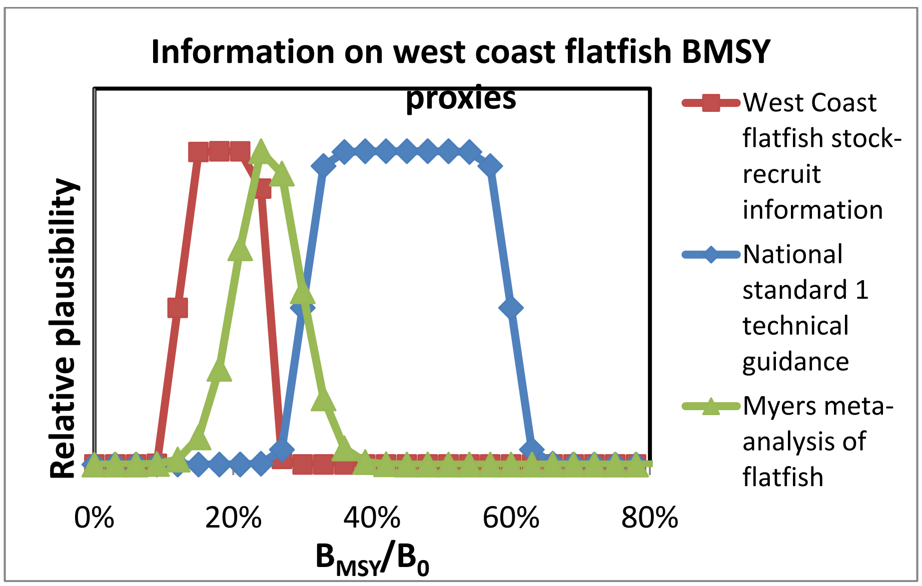


Figure 4-20. Schematic of information considered when recommending a $B_{25\%}$ proxy for B_{MSY}.

[29] The Council recommended the option 2 40-10 and 25-5 ACL control rules under Amendment 23, where the ACL adjustment is made from the ABC and not the OFL, which was the option 1 control rule.

4.1.2 Non-groundfish Species Impacts

4.1.2.1 Pacific Halibut

Pacific halibut is a bottom dwelling flatfish species, that is incidentally taken in the groundfish fisheries as they co-occur with groundfish, including canary and yelloweye rockfish, Pacific cod, other rockfish, and flatfish. The stocks off the west coast are considered to be at healthy biomass levels. Pacific halibut are taken with trawl, as well as commercial and recreational fixed gears. Through bycatch allocations and the issuance of individual bycatch quotas in the IFQ fishery, the take of Pacific halibut in the trawl fisheries will be restricted to levels that are not expected to result in the overfishing of Pacific halibut or result in Pacific halibut becoming overfished. The expected effect from the trawl fishery is expected to be similar under all of the alternatives considered. The reduced sablefish ACL under Alternatives 1, 2, 3, and the FPA would likely result in Pacific halibut interactions by fixed gear vessels as compared to No Action.

4.1.2.2 Coastal Pelagic Species

CPS are taken incidentally in the groundfish fishery, and are believed to be most vulnerable to midwater trawl gear. Incidental take of CPS species is well documented in the at-sea and shore-based whiting fisheries. Total catch in the mothership, catcher/processor, shoreside and tribal whiting fisheries from 2007-2009 are shown in Table 4-35. There is little information on the incidental take of CPS by the other segments of the fishery; however, given that CPS are not associated with the ocean bottom, the interaction is expected to be minimal. The fishing mortality of CPS species is expected to be similar under all of the alternatives and similar to catches in recent years. Since most know catch occurs in the whiting fisheries, changes in fishing mortality could be associated with changes in the Pacific whiting ACL. Incidental catch similar to catches in recent years is not expected to result in ovefishing of CPS species or in any CPS species becoming overfished.

Table 4-35. Coastal Pelagic Species catch in the Pacific whiting fisheries (mt).

Species	2007	2008	2009
Squid (unidentified)	233	1,226	644
Jack Mackerel	8	51	2
Pacific Mackerel	4	1	0
Pacific Sardine	2	1	1

4.1.2.3 Highly Migratory Species

HMS, such as tunas and billfish, are largely pelagic, open ocean species infrequently caught in groundfish directed fisheries. Very low levels of fishing mortality are expected from directed groundfish fishing under any of the alternatives. Although data are not available to fully understand the mortality levels they are not expected to result in overfishing or any HMS species becoming overfished.

4.1.2.4 Dungeness Crab

Dungeness crab stocks off the west coast are considered healthy and are most abundant in nearshore areas from central California to the Washington-Canada border. Incidental catch occurs in the trawl fisheries. One potential consideration in adjusting the trawl RCA to depths shallower than 75 fm during the summer months is that smaller vessels would be forced to fish shoreward of the RCA, where Dungeness Crab are most abundant. Concentrating vessel effort in shallow water affects Dungeness crab in the north because they are less likely to survive discard during their summer molting season.

4.1.2.5 Greenlings (Other than Kelp Greenling), Ocean Whitefish, and California Sheephead

Greenlings of the genus Hexagrammos (except kelp greenling), ocean whitefish, and California sheephead are managed by the state of California. Due to their co-occurrence with groundfish and their popularity as recreational target species, California often takes state regulatory action for these species when recreational fisheries for federal groundfish fisheries are closed or limited. Therefore, any of the groundfish actions anticipated for constraining groundfish species are likely to constrain impacts for these species as well. The fishing mortality of these species is expected to be similar under all of the alternatives, including the No Action Alternative.

4.1.2.6 Pink Shrimp

Most of the pink shrimp catch is taken with trawl gear with a minimum mesh size of one inch to three eighths inch between the knots. Pink shrimp would likely only be vulnerable to trawl gear, however give the large mesh used in the groundfish fishery only minor amounts would be expected to be caught. Overall, very little is known about the catch of pink shrimp in the groundfish fishery. The impacts are expected to be similar under all of the alternatives.

4.1.2.7 California Halibut

The impacts on California halibut are expected to be similar under all of the alternatives.

4.1.2.8 Ridgeback and Spot Prawns

The ridgeback and Spot prawns impacts are expected to be similar under all of the alternatives.

4.1.2.9 Sea Cucumbers

The sea cumber impacts are expected to be similar under all of the alternatives. A significant increase in sea cucumber impacts is not anticipated under any of the action alternatives analyzed in this EIS.

4.1.3 Protected Species Impacts

This section addresses impacts of the considered alternatives on protected resources in the west coast marine ecosystem, including migratory species that depend on the west coast marine ecosystem as part of their life history. This section relies to some degree on the analysis presented in the 2009-2010 Groundfish Harvest Specifications FEIS (PFMC 2008a). However, several protected species are included here that were not included previously. These include recent ESA listings and certain species of sea turtles, sea birds, and marine mammals.

4.1.3.1 Evaluation Criteria

The nature of impacts to protected species will vary depending on the nature of the fishery and the life history behavior of the particular species or population. Any changes in fishing location, effort, and gear switching will all likely result in changes to bycatch and other interactions with protected species.

However, the impacts will not be uniform across the spectrum of protected species, due to the variability in the behavior and susceptibility to various fishing practices of each protected species. The conceptual matrix below (Table 4-36) provides a method for making general inferences regarding impacts, and is used as a basis for the qualitative statements about impacts. This matrix provides information on fishing opportunities in response to different management regimes on a relative basis. It does not attempt to provide quantitative information on the likely impacts to protected species. Rather, it represents a starting point for discussions of impacts to protected species.

Table 4-36. Conceptual matrix of impacts relative to fishing alternatives.

Management Scenarios	Change in Fishing Opportunities (Trawl and Fixed Gear)	Alternative
Higher ACLs for shelf spp.	Increased inshore opportunities	Alternative 3 and the FPA
Lower ACLs for shelf spp.	Decreased inshore opportunities	Alternative 1 & 2
Higher ACLs for slope spp.	Increased offshore opportunities	Alternative 3 and the FPA
Lower ACLs for slope spp.	Decreased offshore opportunities	Alternative 1 & 2

Table 4-37 below lists the protected species considered in the 2009-2010 Groundfish Harvest Specifications FEIS (PFMC 2008a), from Heery, *et al.* (2010). As indicated above, the nature and magnitude of impacts of various fishing permutations depend on the nature of the species, migratory patterns, seasonality, etc. Note that extremely limited number of observations precludes developing statistically significant estimates of bycatch fishery-wide. Therefore, the WCGOP typically excludes single observations in the development of bycatch ratio estimates. For species with more bycatch data available, the WCGOP generated bycatch estimates, but only if the coefficient of variation (CV) for the observed number of bycatch observations was less than 80 percent. Observations with greater than 80 percent CV were excluded in bycatch estimates. Those species with bycatch estimates are indicated by an asterisk (*) in Table 4-36. Those bycatch estimates can be found in Heery, *et al.* (2010).

Table 4-37. West Coast Groundfish Observer Program observed interactions of protected species. Primary fishery is indicated when the interactions occurred primarily in that fishery (Adapted from Heery, *et al*. 2010).

Species	Taxonomic Name	# of Observed bycatch, 2002-2008	Fishery
Marine Mammals			
Steller sea lion*	*Eumetopias jubatus*	15	Trawl, non-nearshore
California sea lion*	*Zalophus californianus*	94	Trawl
Harbor seal*	*Phoca vitulina*	9	Mixed
Northern elephant seal*	*Mirounga angustirostris*	14	Trawl
Pacific white-sided dolphin	*Lagenorhynchus obliquidens*	1	N/A
Humpback whale	*Megaptera novaeangliae*		
Gray whale	*Eschrichtius robustus*		
Sperm whale	*Physeter macrocephalus*	1	N/A
Harbor porpoise	*Phocoena phocoena*	1	N/A
Risso's dolphin	*Grampus griseus*	1	N/A
Finfish (ESA-listed)			
Green sturgeon**	*Acipenser medirostrum*	54	N/A
Eulachon	*Thaleichthys pacificus*		
Chinook salmon	*Oncorhynchus tschawytscha*	493	
Coho salmon	*Oncorhynchus kisutch*	8	
Sea turtles			
Green	*Chelonia mydas*		
Leatherback	*Dermochelys coriacea*	1	N/A
Olive ridley	*Lepidochelys olivacea*		
Loggerhead	*Caretta caretta*		
Sea Birds			
Black footed albatross	*Phoebastria nigripes*	132	Fixed gear
Brandt's cormorant*, and other non-specified cormorants	*Phalacrocorax penicillatus, etc.*	10	Mostly trawl; some Fixed gear
Brown pelican	*Pelecanus occidentalis*	1	N/A
Common murre*	*Uria aalge*	50	Trawl
Leach's storm petrel*	*Oceanodroma leucorhoa, and unspecified petrels*	8	Trawl
Western gull* and other unspecified gulls	*Larus occidentalis, etc.*	10	Fixed gear
Northern fulmar*	*Fulmarus glacialis*	79	Trawl, offshore
Sooty shearwater	*Puffinus griseus, and unspecified shearwaters*	30	Mostly offshore trawl; some offshore fixed gear

*Species with sufficient data to generate fishery-wide bycatch estimates (by WCGOP).

**Numbers reflect observed bycatch in CA halibut trawl fishery.

Unpublished data from the Marine Mammal Stranding Network indicates additional interactions not reflected in the WCGOP reports. Because this information is anecdotal, it is not included in our assessment of impacts to protected species. However, it is important to note that many of these interactions are not observed (and perhaps not observable) by the WCGOP, but may nonetheless be the likely result of a fishery interaction. This is the case when an animal is found injured or dead, entangled by fishing gear. Circumstantially the injury or mortality may appear to be the result of a fishing gear interaction. However, this is difficult to confirm, and perhaps even more difficult to determine exactly which fishery. The same holds true for ship strikes, which, unless observed, would be difficult to trace to a particular vessel with any degree of certitude.

Between 1990 and 2008, there were three mortalities of leatherback sea turtles attributed to entanglements with pot/trap gear, and five entanglements resulting in the live release of the animals. Most occurred off California, with one occurring near Depot Bay, Oregon. Between 2001 and 2007, there were 9 interactions with "unidentified whales" but several of these may have been repeated observations of the same animal. None were known to be fatal, but anecdotal information assumed serious injury. Finally, between 2000 and 2008 there were 24 humpback whale interactions with fishing gear resulting in an unknown number of mortalities. Most incidents were listed as "serious injury," and several of these observations may have been duplicates.

4.1.3.2 Direct and Indirect Impacts of the Alternatives

Chapter 2 describes the integrated alternatives including the No Action Alternative, with sub-options considered under Alternative 1. In general terms, fishing opportunities that would result in gear changes, geographic distribution, or timing of fishing effort are likely to have varying impacts to protected species. However, fishing behavior and therefore impacts, is difficult to predict at this time. This section provides a discussion of possible scenarios, based largely on bycatch information from the WCGOP.

Salmon

Alternatives that would result in greater slope opportunities would likely result in reduced incidental take of Chinook and coho salmon, as well as other shelf species, in comparison with the No Action Alternative. Quantitative models assessing bycatch of salmon species under various alternatives have not been developed, in part because factors external to the fishery are major drivers of bycatch rates. Oceanic conditions in particular affect migration patterns spatially and temporally, as does prey availability and other factors. A qualitative assessment of changes in bycatch is therefore presented in this document. For Chinook salmon, NMFS completed a supplemental biological opinion (NMFS 2006) which establishes incidental take limits of 11,000 Chinook in the whiting fishery and 9,000 in the non-whiting groundfish bottom trawl fishery. For other salmonid species, incidental take limits have not yet been established.

There is considerable uncertainty about bycatch of salmon in the bottom trawl fishery. The magnitude and distribution of bycatch in the trawl fishery since 2002 has been affected by significant changes in management measures to protect overfished groundfish stocks, including implementation of regulations for use of selective flatfish trawl gear, smaller scale spatial closed area management, and closing trawl fishing in some areas shoreward of the RCA. The uncertainty will remain until more years of observer data are available and changes in groundfish fishery management and effort distribution are analyzed in relation to the incidental take of salmon.

Few Chinook salmon are encountered south of Cape Mendocino, therefore changes in Chinook incidental take would likely be minimal in response to changes in bottom trawl effort in this area. Setting zero ACLs for all overfished species would likely require closure of most, if not all, groundfish fisheries (and other fisheries with groundfish incidental catch). In that case, incidental take of Chinook salmon, coho salmon, and other shelf species subject to trawl bycatch in west coast groundfish fisheries would be effectively eliminated.

Beginning in 2007, NMFS established automatic action authority to implement an Ocean Salmon Conservation zone in response to Chinook catches observed in 2005-06. When NMFS projects the catch of Chinook salmon in the Pacific whiting fishery will exceed the 11,000 fish threshold, the Ocean Salmon Conservation Area could be put in place for all sectors of the whiting fishery though a single Federal Register notice. The Ocean Salmon Conservation Zone will still be available in 2011 and beyond under all of the alternatives, should the 11,000 fish threshold be reached.

ESA-listed Salmon

As discussed above, since 1998 management restrictions reduced landings of many groundfish species. Past groundfish management measures authorized fishing, indirectly affecting the incidental take of Chinook salmon, as described in Section 4.3.2.4. The groundfish fishery, even with management measures in place to reduce impacts to Chinook salmon, has a persistent effect on stock productivity; however, given the life cycle of Chinook and coho salmon, fishing mortality in more recent years would have a much greater contributory effect on population status.

As with past harvest specifications, future harvest specifications (all alternatives) are likely to have an indirect effect on the incidental take of listed Chinook salmon and coho, which in combination with incidental take during 2011-2012 will have cumulative effects on year classes intercepted by the fisheries during that time; however, it is unlikely that impacts to listed Chinook salmon will exceed the 20,000 fish threshold for multiple years. (No incidental take threshold has been established for Oregon Coast coho). This cumulative effect will only persist as long as the affected year classes. For the 2011-2012 harvest specifications and management measures this is of relatively short duration. Projected rebuilding times for overfished species are much longer, and rebuilding alternatives are thus likely to affect groundfish harvest levels, thus indirectly affecting interactions with Chinook salmon for decades. However, it is likely that rebuilding strategies will continue to be modified in the future based on new information, so it is probably unrealistic to expect that any strategy adopted as part of this proposed action will remain unchanged for the duration of a given rebuilding period. Nonetheless, in very general terms groundfish fishing effort is likely to be constrained to mitigate overfished species catch for the foreseeable future.

The Amendment 20 FEIS (PFMC 2010c, Section 4.18) describes impacts of trawl rationalization on ESA-listed salmon. Rationalization of the trawl fishery is not expected to fundamentally change the mixed stock fishery structure where catch of healthy species will be constrained in order to meet rebuilding requirements for overfished groundfish species. It will increase flexibility of fishers to harvest their quotas; however, this increase in flexibility will also increase uncertainty in predicting Chinook and coho salmon interactions due to the changes that are likely to occur in fishing behavior due to changes in management measures that will regulate the trawl fishery under the new quota system.

ESA-listed salmon are also affected by commercial and recreational salmon fisheries that target non-listed salmon but incidentally take listed Chinook and coho salmon. All fisheries have a similar persistent effect, contributing to total fishing mortality and attendant effects on stock productivity. Commercial and recreational salmon fisheries are managed to optimize harvest of hatchery-produced fish while keeping the take of wild, ESA-listed stocks within limits that will ensure their continued existence. Thus, in managing these stocks, all sources of fishing mortality are estimated or accounted for, including incidental take in groundfish fisheries.

Salmon are vulnerable to human-caused degradation of freshwater habitat used for spawning. These effects are generally well-known and diverse. They include physical barriers to migration (dams), changes in water flow and temperature (often a secondary effect of dams or water diversion projects), and degradation of spawning environments due to increased silt in the water due to adjacent land use. A very large proportion of the long-term, and often permanent, declines in salmon stocks are attributable to this class of impacts. For a detailed summary of nonfishing impacts to salmon habitat see Section 3.2.5 of the EFH Appendix in Amendment 14 to the Pacific Coast Salmon FMP (PFMC 2000). Adverse impacts to freshwater salmon habitat are likely to continue for the foreseeable future.

Marine Mammals

The WCGOP documents interactions with marine mammals. Several species are protected under the ESA and the MMPA. Again, a qualitative approach is used here to assess the significance of the impacts to marine mammal populations, based on reported interactions and, when available, the Potential Biological Removal (PBR) established for a species.

NMFS prepared a Biological Opinion in 1990 that concluded the groundfish fisheries are not likely to jeopardize the continued existence of listed marine mammals. Species-specific discussions are available in the EFH FEIS (NMFS 2005, Section 4.6.3). The effects of the harvest limit alternatives on endangered and threatened marine mammal species are difficult to quantify, but recent WCGOP data (Heery, *et al.* 2010) provides some ability to make inferences about potential relative impacts of various management scenarios. NMFS is currently in the process of analyzing available data on the interactions of the groundfish fishery with marine mammals.

The effect of the management measure alternatives on marine mammals may be negative if fishing effort intensifies in areas where they congregate. However, the effects of the alternatives on effort displacement are not predictable and the effects of the alternatives are unknown. NMFS is currently in the process of analyzing available data on the interactions of the groundfish fishery with marine mammals.

NMFS is in the process of analyzing available data on the interactions of fisheries conducted under the Pacific Coast groundfish FMP with marine mammals and seabirds. Humpback whale interactions have been documented in fisheries using pot and trap gear off the west coast, including the west coast crab fisheries. Recovery plans for endangered southern resident killer whales have identified reduced prey availability as a risk to the population. A recent study (March, 2010) indicates that Chinook salmon was by far the most frequent prey item, confirming previous studies. There is a potential for reduced prey availability as a result of Chinook salmon bycatch in the groundfish fishery. Additional species specific information on other fisheries is available in Section 4.6.3 of the Groundfish FMP Amendment 19 EFH FEIS (NMFS 2005). Section 4.19 of the Amendment 20 FEIS describes the effects of trawl rationalization on marine mammals. Generally, the impact mechanisms described above for ESA-listed salmon operate for marine mammals and other protected species. Increased flexibility in trawl fleet operations combined with other changes in the overall structure of the trawl sector (such as fleet consolidation) may have variable effects on the likelihood of marine mammal interactions. The trawl sector will be subject to 100 percent observer coverage under the trawl rationalization program, which would improve the reliability of incidental take estimates for marine mammals and other protected species.

Sea Turtles

The WCGOP reported one documented interaction with a leatherback sea turtle, in 2008. The rarity of documented interactions precludes meaningful analysis of bycatch estimates. Therefore, the impacts analysis will be limited to a qualitative description of the past interaction, and the possibility of future interactions based on the alternatives presented.

Based on information available for the EFH FEIS (NMFS 2005, Section 4.6.4), trawl and longline fisheries, as occur in the west coast groundfish fishery, could adversely affect sea turtles; however, the relative effects of fisheries occurring under the Groundfish FMP on sea turtles are difficult to assess. Species specific discussions are available in the EFH FEIS (NMFS 2005, Section 4.6.4). There is very little information available to estimate total mortalities of sea turtles, with the exception of the drift gillnet fishery, which is not a part of the Groundfish FMP; therefore, the effects of the harvest limit alternatives on endangered and threatened sea turtle species are unknown. The effect of the management measure alternatives on sea turtles may be negative if fishing effort intensifies in areas where sea turtles congregate. However, the effects of the alternatives on effort displacement are not predictable and the effects of the alternatives are unknown. NMFS prepared a Biological Opinion in 1990 that concluded fisheries conducted under the groundfish FMP are not likely to jeopardize the continued existence of listed sea turtles.

There is very little information available to estimate total mortalities of sea turtles, with the exception of the drift gillnet fishery, a fishery not directly managed under the Groundfish FMP; therefore the cumulative effects of fisheries conducted under the Groundfish FMP on endangered and threatened sea turtle species are unknown. Sea turtle capture has been documented in purse seines, gillnets, and other types of fishing gear that are not commonly used or are not authorized for use in fisheries conducted under the groundfish FMP.

Recently Listed Species

Eulachon

The Southern DPS of Eulachon (*Thaleichthys pacificus*), or Columbia River smelt, was listed as threatened under the ESA onMarch 18, 2010, under the ESA (75 FR 13012). NMFS has reinitiated consultation on the groundfish fishery, including impacts on eulachon, green sturgeon, marine mammals , and turtles, but has not yet developed an Incidental Take Statement. However, the Status Review (Eulachon Biological Review Team 2010) describes the most likely threats to eulachon recovery, allowing for a qualitative assessment of the potential significance of impacts to eulachon from the U.S. west coast commercial groundfish fishery. After reviewing the available information, NMFS has concluded that, consistent with Sections 7(a)(2) and 7(d) of the ESA, the proposed action would not jeopardize any listed species, would not adversely modify any designated critical habitat, and would not result in any irreversible or irretrievable commitment of resources that would have the effect of foreclosing the formulation or implementation of any reasonable and prudent alternative measures.

Green Sturgeon

The Southern DPS of the North American green sturgeon (*Acipenser medirostris*) was listed as threatened in April, 2006 (71 FR 17757, April 7, 2006), with Critical Habitat designated October 9, 2009. NMFS has not yet concluded ESA consultation and therefore has not yet established an Incidental Take Statement for the groundfish fishery. Documented interactions with the California halibut trawl fishery provide background for a qualitative assessment of the potential significance of impacts to green sturgeon. However, quantitative modeling or bycatch estimates have not yet been developed. Bycatch in the limited entry fishery (LE) bottom trawl fishery is much lower than that of the California halibut fishery, which is state managed.

The effect of the management measure alternatives on the Southern DPS of green sturgeon may be negative if fishing effort intensifies in areas where they congregate. However, the effects of the alternatives on effort displacement are not predictable and the effects of the alternatives are unknown.

NMFS has reinitiated its Section 7 consultation on the Council's groundfish FMP for the Southern DPS of green sturgeon. Green sturgeon are caught incidentally in estuaries by the white sturgeon fishery (NMFS 2002).

As discussed above for listed salmon, past and future groundfish harvest specifications indirectly affect the level of fishing effort by regulated fishing vessels, which in turn has a general influence on the likelihood of interaction with protected species, including green sturgeon. As noted, fishing mortality from all sources, including non-groundfish fisheries, will likely continue to affect the status of green sturgeon population.

Seabirds

Seabird species with documented interactions with the U.S. west coast commercial groundfish fishery represent a diverse suite of life histories, migration patterns, and reproductive strategies. Three distinct spatial/temporal seasons have been identified for the west coast: the Upwelling, Oceanic, and Davidson Current seasons (Ford *et al.* 2004). Distribution of seabird species also varies latitudinally. These seasons coincide with winter (January-April), summer (May-August), and fall (September-December).

Based on information available for the EFH FEIS (NMFS 2005, Section 4.6.3), seabird interactions in the west coast groundfish fishery were described as "rare and infrequent." NMFS prepared a Biological Opinion in 1990 that concluded the groundfish fisheries are not likely to jeopardize the continued existence of listed seabirds. The effects of the harvest limit alternatives on endangered and threatened seabird species are unknown. NMFS is currently in the process of analyzing available data on the interactions of the groundfish fishery with seabirds.

However, the WCGOP provides information on the relative impacts of certain seabird species by fishing activity. The effect of the management measure alternatives on seabirds (listed and non-listed) may be negative if fishing effort intensifies in areas where seabirds congregate. Nonetheless, the effects of the alternatives on effort displacement are not predictable and the effects of the alternatives are unknown. NMFS is currently in the process of analyzing available data on the interactions of the groundfish fishery with seabirds.

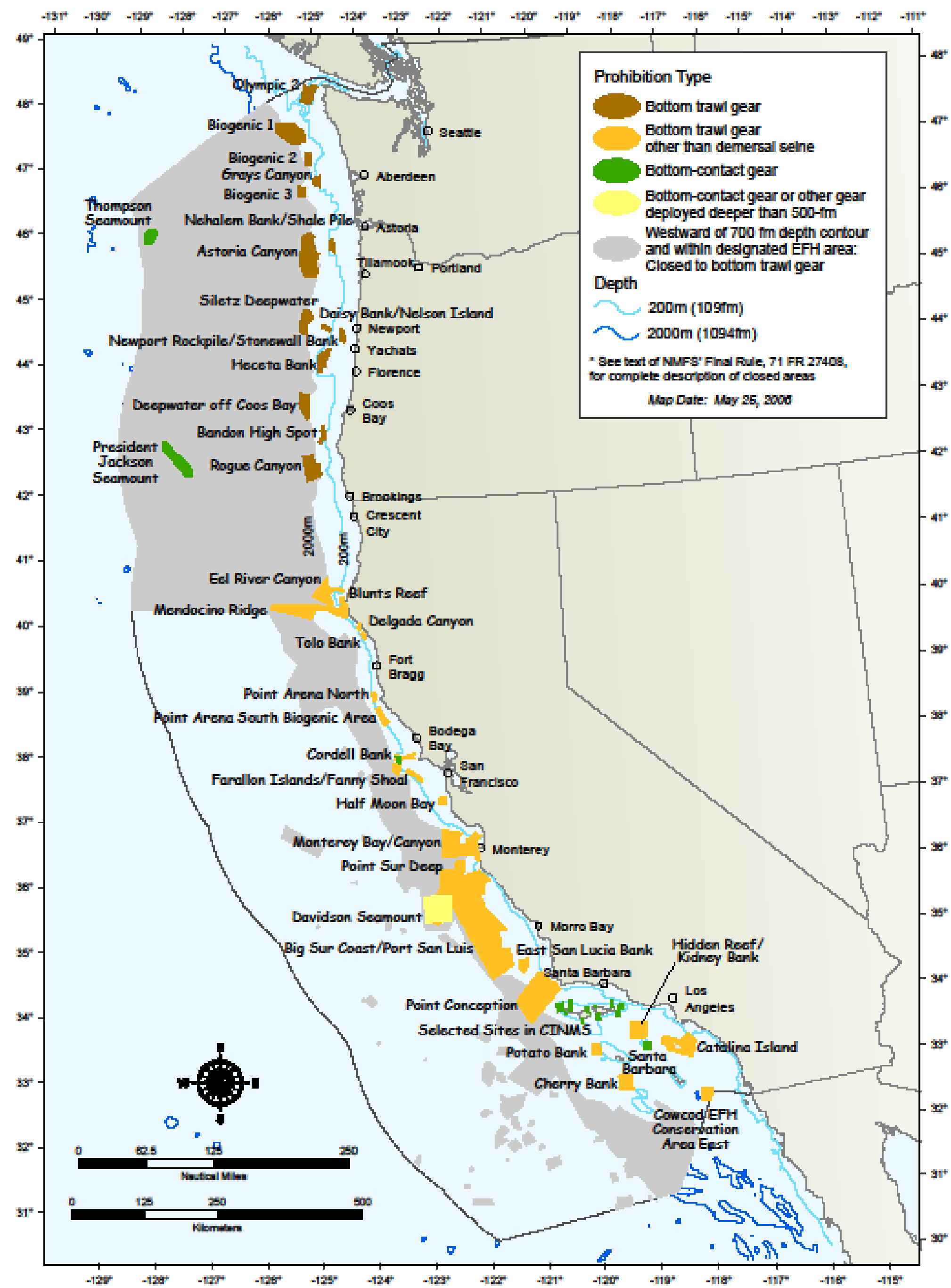
Besides entanglement in fishing gear, seabirds may be indirectly affected by commercial fisheries in various ways. Change in prey availability may be linked to directed fishing and the discarding of fish and offal. Vessel traffic may affect seabirds when it occurs in and around important foraging and breeding habitat and increases the likelihood of bird strikes. In addition, seabirds may be exposed to at-sea garbage dumping and the diesel and other oil discharged into the water associated with commercial fisheries. As stated in Section 4.6.4 of the EFH FEIS (NMFS 2005), numerous human-induced factors have adversely affected sea bird populations in the North Pacific. Indirect effects to seabirds by commercial fisheries are likely to continue for the foreseeable future. Section 4.19 of the Amendment 20 FEIS describes the effects of trawl rationalization on seabirds.

4.1.4 Essential Fish Habitat

With regard to EFH, NMFS completed an EIS (NMFS 2005) to comprehensively evaluate groundfish habitat and the effects of groundfish fishing on that habitat, in response to litigation (*American Oceans Campaign v. Daley et al.*, Civil Action No 99-982[GK]). Amendment 19 of the Groundfish FMP, approved on March 8, 2006, provides for a comprehensive strategy to conserve EFH, including its identification, designation of HAPC, and the implementation of measures to minimize to the extent practicable adverse impacts to EFH from fishing. The final rule implementing Amendment 19 provides measures necessary to conserve EFH and no additional EFH recommendations are necessary for this proposed action. Figure 4-21 shows groundfish EFH areas on the Pacific Coast that are currently closed to groundfish fishing.

The general effects of fishing on habitat and the marine ecosystem are further described in volume 1 of the 2008 groundfish SAFE document. Impacts to EFH are difficult to predict under a partially-rationalized fishery. However, inferences can be made based on likely scenarios.

To the extent that management alternatives will alter geographic area or gear type, there could be impacts to EFH. Increased RCA spatial extent could result in a decreased impact to EFH. However, if fishing effort is relocated to other areas of EFH, this positive effect may be nullified. The alternatives considered in Chapter 2 would likely result in geographic impacts at too fine a scale to make significant changes to EFH. It is not possible to determine how direct and indirect impacts would differ among the alternatives. Effects are expected to be similar to those described in previous harvest specifications EISs (PFMC 2004b; PFMC 2006; PFMC 2008a). Effects are primarily cumulative due to a variety of external actions and trends discussed in Section 4.4.



EFH area closures to protect Pacific Coast groundfish habitat - Coastwide.

Figure 4-21. Groundfish EFH closed areas on the Pacific Coast (NMFS 2005).

4.1.5 Fishery Ecosystem

This EIS analyzes the effects of implementing the 2011-2012 West Coast groundfish harvest specifications and management measures, which govern fishing on stocks that are primarily a part of the California Current large marine ecosystem. Affected physical and biological environment descriptions of the groundfish fishery ecosystem are found in a broad range of sources, including several Council- and NMFS-generated documents. The 2008 *Status of the Pacific Coast Groundfish Fishery Stock Assessment and Fishery Evaluation Report* (SAFE Report,) Volume 1, discusses West Coast marine ecosystems and essential fish habitat (EFH) in Chapter 2 (PFMC 2008). That chapter includes, among other things, discussions of: the role of rebuilding groundfish species within the marine ecosystem, the effects of fishing on habitat and the marine ecosystem, the effects of fishing on the food web, genetic and demographic effects of fishing, and possible impacts of Council harvest policies. The SAFE Report also includes summary descriptions of EFH for each of the Council's four species group FMPs: coastal pelagic species, groundfish, highly migratory species, and salmon. The SAFE Report is incorporated herein by reference. More detail on groundfish EFH in particular may be found in the 2005 FEIS on Pacific Coast Groundfish Fishery Management Plan Essential Fish Habitat Designation and Minimization of Adverse Impacts (NMFS 2005). That document is also incorporated herein by reference. The MSA requires fishery management councils and NMFS to periodically review EFH designations and to make changes as warranted by newly available information. As of August 2010, all four West Coast FMPs are either in the EFH review process (salmon and CPS) or pending for review (HMS, groundfish).

As discussed throughout this EIS, the need to rebuild eight groundfish species strongly influences the ranges of available harvest levels and types of management measures needed for the entire groundfish complex. Under Section 304 of the MSA (104-297), fishery management plans, plan amendments, or proposed regulations for overfished species must take into account status and biology of any overfished stocks of fish as well as the interaction of overfished stocks within the marine ecosystem. The role of rebuilding rockfish within the California Current ecosystem and the interactions of those stocks within the ecosystem are discussed in the 2008 SAFE document.

The following paragraph from the 2009 stock assessment discussed the role of petrale sole in the ecosystem:

> "Ecosystem factors have not been explicitly modeled in this assessment, but there are several important aspects of the California current ecosystem that may impact petrale sole population dynamics. Castillo (1992) and Castillo et al. (1995) suggest that density-independent survival of early life stages is low and show that offshore Ekman transportation of eggs and larvae may be an important source of variation in year-class strength in the Columbia INPFC area. The effects of the Pacific Decadal Oscillation (PDO) on California current temperature and productivity (Mantua et al. 1997) may also contribute to non-stationary dynamics for petrale sole. The prevalence of a strong 1999 year-class for many west coast groundfish species suggest that environmentally driven recruitment variation may be correlated among species with relatively diverse life-history strategies. Although current research efforts along these lines are limited, a more explicit exploration of ecosystem processes may be possible in future petrale sole stock assessments."

4.1.5.1 Management Measure Alternatives

The management measure alternative's principal function is to constrain short-term fishing mortality to levels consistent with the rebuilding targets established in rebuilding plans, or other stock management goals for precautionary zone and healthy stocks. In this respect the management measures that have been implemented by the Council in recent years appear to have contributed to increasing abundance and productivity levels for rebuilding depleted (and other) species, although such improvement may be as much a result of factors outside the control of the management regime, such as changes in climate. Components of the management measure alternatives, and the management framework generally, that employ spatial closures, which effectively eliminate fishing mortality from broad areas of habitat that are optimal for both the rebuilding species and other, healthier groundfish stocks in the California Current, likely have an ancillary mitigating effect with respect to the ecosystem impacts of fishing. The protection of intact functional patches of habitat was identified by Baskett, et al. (2006) as one of the management measures that had the greatest potential to avoid or reverse changes in species composition on small rocky reef habitats. These area closures, intended to reduce catch of overfished species, are sited in those depth zones and habitats in which these species are most frequently encountered. As such, they tend to represent the optimal habitat for these species, and are either known or suspected (from catch rate data, trawl surveys, ROV surveys, and other means) to sustain the highest densities of overfished species. Consequently, this approach would be expected to effectively maintain functioning habitat areas and/or metapopulations of rebuilding species with an extremely high degree of protection.

Management measures' effects on the ecosystem operate in two ways: by affecting fish populations directly through measures to reduce fishing mortality and the protection of intact patches of habitat. Thus, management measure alternative 1, intended to constrain total catch to the low end of the range, is likely to have the least adverse impacts with respect to the ecosystem because of the extent of area closures and reductions in fishing mortality for rebuilding species. The Council-preferred alternative implements area closures generally similar to those currently in place (no action) except for the addition of a new YRCA off Westport, Washington and the potential implementation of YRCAs off northern California. In particular, the configuration and extent of the area closures within this alternative represents a short-term effect over the next biennium, which may be less relevant, in terms of the ecosystem, than how these types of management measures will be applied over the long term. In summary, it is intuitive that the lower the fishing mortality rate, and the greater the extent of spatial closures over the long term, the greater the potential for rebuilding species to fill their niche or role in the ecosystem relative to the risk of changes or shifts in equilibrium or ecosystem states. But both the precision of multispecies or ecosystem models and their ability to accurately reflect the potential cumulative impacts to the ecosystem that result in slightly differing rebuilding trajectories are extremely low, particularly with respect to any ability to detect thresholds that may exist with respect to alternative stable states within either small or broad-scale habitats and ecosystems.

In comparing the FPA Alternative to No action, the cumulative effect of recent action taken to mitigate the adverse effects of fishing to EFH through the implementation of Groundfish FMP Amendment 19 needs to be taken into account. That action not only protects additional habitat areas from trawl fishing impacts into the foreseeable future, but also prohibits the use of large-footrope gear shoreward of the 100 fm depth contour, mitigating impacts to remaining nearshore high-relief reef communities. These measures became effective in June 2006 and will likely further mitigate the effects of fishing in the next biennium.

4.1.5.2 Trophic and Other Ecosystem Impacts

Trophic and other ecosystem impacts may be manifested in a variety of ways, from primary producer impacts, to loss of habitat, to disruption of predator-prey relationships. A major driver of the California Current large marine ecosystem is interannual climactic variations such as El Niño/Southern Oscillation phenomenon, as well as the larger and less-understood long term global climate change. It is likely that these types of non-fishing impacts will dwarf the ecosystem and trophic impacts resulting from fishing activities.

The El Niños in the early 1980s and late 1990s had major deleterious effects on the California Current system (Peterson, *et al.* 2010). This was exemplified by extremely poor ocean survival and subsequent returns of salmonids, but was not limited to one species group or trophic level. During El Niño events, the breakdown of coastal upwelling is a symptom of major shifts in currents, winds, and temperatures that results in low nutrient availability, higher SSTs, and typically lower survival for a variety of marine species.

The considered alternatives would not have perceptible impacts on climactic changes, but could have impacts to trophic interactions. However, these impacts are not readily quantifiable.

4.1.5.3 Direct and Indirect Impacts of the Alternatives

As discussed above for other non-fish ecosystem components, it is not possible to determine how direct and indirect impacts would differ among the alternatives. Effects are expected to be similar to those described in previous harvest specifications EISs (PFMC 2004b; PFMC 2006; PFMC 2008a). The California Current large marine ecosystem is not predicted to be substantially impacted by any of the alternatives, although it is difficult to make predictions about a complicated system that has many inputs to productivity. Changes in catch, induced by moving from status quo management to share-based management, may result in changes to the ecosystem's food web that are perceptible. Changes in location of catch and changes in the type of gear utilized may result in changes to the amount and kind of essential fish habitat impacted. Such changes in habitat impacts may have an effect on the ecosystem. However, that link, while logical, is difficult to demonstrate, as noted in the EFH EIS (NMFS 2005).

It is unlikely that the 2011-2012 Groundfish harvest specifications (Alternatives 1, 2, 3, or the FPA) will result in a significant impact to the ecosystem, especially when considered in the context of the No Action Alternative. A summary of ecosystem impacts is found in the EIS on Groundfish Amendment 20, and is hereby incorporated by reference.

4.2 Socioeconomic Impacts

4.2.1 Methods: Types of Impacts and Mechanisms, Metrics and Indicators

This section describes the types of impacts and measures used to evaluate the socioeconomic impacts under the alternatives. Impacts are assessed on the following components of the affected environment: commercial groundfish fisheries sectors, groundfish processors, recreational fisheries, tribal fisheries, fishing communities, and non-market or non-consumptive users of the groundfish fisheries resource.

As described in Sections 2.4.3 and 4.2, for purposes of analyzing economic impacts on commercial fisheries, processors and communities, two sub-options are examined under Alternative 1. These sub-options differ only in their treatment of non-trawl sablefish fisheries sectors: the non-nearshore fixed gear open access sector, and the limited entry fixed gear sector. Alternative 1a assumes these two sectors will be able to take their entire sablefish allocation, while Alternative 1b assumes management measures adopted to protect canary rockfish stocks will result in considerably reduced sablefish landings for both sectors. For the nearshore fisheries, the economic analysis under Alternatives 2 and 3 only incorporated option a, the higher landings more restrictive RCA structure because there were too many dimensions (e.g., option b: lower landings, less restrictive RCA and two overfished species sharing options) to fully analyze and interpret.

4.2.1.1 Assessing Impacts on Commercial Groundfish Fisheries

Table 4-38 shows the average and maximum year-to-year changes in groundfish ex-vessel revenue experienced by groundfish sectors over the recent past. These statistics will be used in the following sections to compare against the estimated change in revenue from No Action projected under the alternatives.

Table 4-38. Change in Groundfish ex-vessel revenue from previous year by Sector, 1999-2009.

	Change in ex-vessel revenue				
	$ thousand			Percentage*	
SECTOR Name	**Average**	**Maximum Decrease**	**Maximum Increase**	**Maximum % Decrease**	**Maximum % Increase**
Whiting catcher processor sector	- 4	- 20,137	+ 13,433	- 83.6%	+ 126.0%
Whiting mothership sector	- 58	- 12,329	+ 8,281	- 81.5%	+ 120.8%
Shoreside whiting sector	+ 16	- 6,229	+ 3,961	- 53.3%	+ 54.7%
Shoreside non-whiting trawl sector	- 265	- 6,095	+ 6,273	- 17.9%	+ 24.7%
Limited entry fixed gear sector	+ 830	- 2,310	+ 3,169	- 21.7%	+ 45.6%
Open access fixed gear sector	+ 247	- 823	+ 1,727	- 13.8%	+ 30.6%
Incidental open access sector including exempted trawl	- 118	- 501	+ 69	- 46.4%	+ 6.9%
Treaty mothership whiting sector	- 20	-2,296	+2,593	-77.6%	+318.4%
Treaty shoreside groundfish sector (incl. shoreside whiting)	+420	-1,483	+ 1,933	- 22.3%	+ 80.6%
Shoreside Total (including Treaal)	+1,131	-10,883	+10,845	-17.5%	+18.4%

* Maximum dollar changes do not necessarily correspond with maximum percentage changes.

4.2.1.2 Assessing Impacts on Tribal Fisheries

Table 4-38 also shows the average and maximum year-to-year changes in the Tribal (Treaty) shoreside groundfish sector's ex-vessel revenue. These statistics will be used in the following sections to compare against the change in revenue projected under the alternatives compared with No Action.

4.2.1.3 Assessing Impacts on Processors

Table 4-38 also shows the average and maximum year-to-year changes in the total shoreside groundfish ex-vessel revenue. These statistics will be used in the following sections to compare against the change in total revenue projected under the alternatives compared with No Action.

4.2.1.4 Assessing Impacts on Recreational Fisheries

Impacts on recreational groundfish fisheries are assessed by comparing the change in the estimated numbers of groundfish angler trips under the action alternatives compared with No Action. Groundfish angler trips are stratified by state, management region, and "mode" (i.e., whether the trips occur in commercial charter or private/rental boats). Although the value of an angler trip experience certainly differs considerably by mode, target species and region fished along the coast, this analysis does not attempt to "monetize' the value of the trips either in terms of angler expenditures, income impacts, or net economic value (e.g., willingness to pay). Impact analyses provided in previous groundfish documents were based on income coefficients in a version of the Fisheries Economic Assessment Model that has been ruled out-of-date under a recent Federal court decision (*NRDC v. Locke*), and configuration of a replacement model for conducting economic impact analyses of west coast recreational fisheries is not yet complete.

4.2.1.5 Assessing Impacts on Communities

Impacts on communities are assessed at the port group area level. Table 4-39 shows the average and maximum year-to-year changes in groundfish ex-vessel revenue experienced by port group areas over the recent past. These statistics will be used in following sections to compare with the estimated change in income impacts from No Action projected under the alternatives. While not strictly comparable to income impacts, in the absence of a time series of community income impacts, the revenue change statistics provide historical context to assess the relative magnitude and potential disproportionality of projected impacts on communities.

Table 4-39. Change in Groundfish ex-vessel revenue from previous year by Port Group Area, 1999-2009.

	Change in ex-vessel revenue				
	$ thousand			Percentage*	
Community (Port Group Area)	Average	Maximum Decrease	Maximum Increase	Maximum Decrease	Maximum Increase
Puget Sound	+ 28	- 1,299	+ 685	- 31.8%	+ 26.1%
North Washington Coast	+ 210	- 879	+ 1,101	- 21.2%	+ 48.5%
South and Central WA Coast	+ 206	- 4,524	+ 3,046	- 46.0%	+ 71.9%
Unidentified WA	+ 84	- 381	+ 455	- 47.7%	+ 62.4%
Astoria	+ 193	- 3,692	+ 2,222	- 29.6%	+ 25.1%
Tillamook	+ 7	- 80	+ 90	- 39.8%	+ 74.5%
Newport	+ 338	- 2,280	+ 2,760	- 31.5%	+ 34.3%
Coos Bay	+ 81	- 1,477	+ 1,431	- 29.7%	+ 35.5%
Brookings	+ 197	- 709	+ 931	- 28.2%	+ 44.6%
Crescent City	- 58	- 638	+ 796	- 37.1%	+ 45.4%
Eureka	+ 26	- 1,361	+ 857	- 28.3%	+ 22.1%
Fort Bragg	+ 91	- 824	+ 695	- 25.6%	+ 24.5%
Bodega Bay	- 105	- 419	+ 102	- 60.6%	+ 73.4%
San Francisco	- 80	- 631	+ 501	- 28.8%	+ 30.6%
Monterey	- 165	- 549	+ 295	- 29.1%	+ 14.5%
Morro Bay	+ 49	- 957	+ 1,767	- 30.0%	+ 90.0%
Santa Barabara	- 17	- 354	+ 322	- 40.7%	+ 50.9%
Los Angeles	+ 14	- 294	+ 359	- 26.5%	+ 58.3%
San Diego	+ 31	- 279	+ 395	- 52.6%	+ 142.6%

* Maximum dollar changes do not necessarily correspond with maximum percentage changes.

4.2.1.6 Assessing Impacts of on Non-market and Non-use Values

Results of an analysis of the present value of projected catch streams for yelloweye and canary rockfish under the current range of rebuilding scenarios are summarized to illustrate tradeoffs between current and future benefits and between use-based and non-market non-use values associated with fisheries resources. The analysis examines the effect of discounting, how the scenario that maximizes present value compares with fastest rebuilding alternative, and the implications for use and non-market non-use values for the resource held by stakeholders and the general public.

4.2.2 Direct and Indirect Impacts of the Alternatives

4.2.2.1 Projected Change in Ex-vessel Revenue by Commercial Groundfish Fisheries Sector

Ex-vessel revenue impacts under the alternatives were estimated by projecting estimated landings derived from the commercial fisheries sector models (i.e., trawl, non-nearshore, and nearshore) over the harvesting and landing patterns observed in a PacFIN monthly vessel summary data file for the most recent year available: 2009. Trawl fishery impacts were modeled using the trawl "trip limit" model which was originally designed to recommend bi-monthly catch limits given a set of bycatch rates, RCA configurations, and ACLs or ACTs for target and constraining species. Although trip limit management would no longer be applicable under Amendment 20 trawl fisheries, this analytical structure was used in order to compare key elements of the action alternatives with the No Action fishery. However, while this structure may prove to be reasonably close to reality for 2011 and possibly 2012, its resemblance to the rationalized trawl fishery of the future is expected to decrease over time. For a discussion of expected impacts under the Amendment 20 trawl rationalization program see the Amendment 20 FEIS (PFMC 2010c).

For this analysis the geographic distribution of landings among west coast ports under the alternatives is assumed to remain the same as observed in 2009. However, projected landings amounts have been scaled according to the sector model outputs given the set of ACLs and management measures proposed for target and constraining species under the alternatives. Average ex-vessel prices by port under the alternatives are assumed to be the same as recorded in the 2009 PacFIN data.

Table 4-40 compares projected ex-vessel revenue impacts under the management alternatives for 2011 and 2012. The table shows the projected change in estimated groundfish sector ex-vessel revenues in 2011 compared with No Action ranging from -$28.5 million under Alternative 1b to +$8.7 million under the Preliminary Preferred Alternative (PPA). Under the FPA, total 2011 revenues are $2.8 million lower than No Action. Much of the decline under Alternative 1b derives from the assumed low ACL for Pacific whiting. The effect of this shows up in the combined at-sea whiting, shoreside whiting trawl, and tribal groundfish sectors. Impacts under Alternative 1b also contain large reduction in projected sablefish harvest in order to protect overfished species. Under the FPA, non-whiting trawl appears the most adversely affected in terms of absolute revenue loss; however in percentage terms, limited entry fixed gear and non-nearshore open access sectors are most adversely affected largely due to the reduction in sablefish ACL compared with No Action. A similar pattern is shown for 2012, except that the reductions compared with No Action under Alternatives 1a, 1b, 2 and FPA are magnified due to a further reduction in 2012 sablefish ACL.

Projected changes from No Action in commercial groundfish sector revenues under the alternatives (except the PPA) are somewhat less favorable than the average inter-annual changes witnessed over the recent past for most sectors shown in Table 4-38. While changes to the sablefish-dependent sectors (limited entry fixed gear, open access fixed gear) resulting from the projected reduction in sablefish landings appear much worse than average in dollar terms, these changes fall well within the wide range of inter-annual percentage changes witnessed over the recent past (Table 4-38).

Table 4-40. Estimated Groundfish Revenue Impacts by Fishery Sector Under the 2011-2012 Groundfish Alternatives.

Sector Name	**No Action**	**2011 Alt 1a**	**2011 Alt 1b**	**2011 Alt 2**	**2011 Alt 3 (PPA)**	**2011 FPA**	**2012 Alt 1a**	**2012 Alt 1b**	**2012 Alt 2**	**2012 Alt 3 (PPA)**	**2012 FPA**
Combined At-Sea Whiting sectors[a/]	13,802	6,814	6,814	13,802	20,789	13,802	6,814	6,814	13,802	20,789	13,802
Shoreside whiting trawl	7,873	3,944	3,944	7,849	11,761	7,860	3,944	3,944	7,849	11,759	7,859
Non-whiting trawl	29,297	21,104	21,104	24,031	29,084	28,816	21,104	21,104	24,031	29,073	28,801
Limited entry fixed gear	15,303	13,708	9,234	13,708	13,708	13,708	13,330	9,938	13,330	13,330	13,330
Open access fixed gear Nearshore	3,541	3,286	3,285	3,757	3,783	4,217	3,286	3,285	3,757	4,012	4,217
Open access fixed gear Non-nearshore	4,681	4,210	3,265	4,212	4,212	4,214	4,039	3,323	4,041	4,041	4,042
Incidental open access	32	32	32	32	32	32	32	32	32	32	32
Tribal groundfish (incl. shoreside whiting)	7,151	5,491	5,491	6,254	7,018	6,254	5,398	5,398	6,162	6,926	6,162
Grand Total	81,680	58,589	53,170	73,644	90,388	78,903	57,948	53,838	73,003	89,963	78,245
Shoreside Only Total	67,878	51,775	46,355	59,843	69,599	65,101	51,133	47,024	59,201	69,174	64,443
Change from No Action ($ thousand)											
Combined At-Sea Whiting sectors[a/]		- 6,988	- 6,988	+ 0	+ 6,988	+ 0	- 6,988	- 6,988	+ 0	+ 6,988	+ 0
Shoreside whiting trawl		- 3,929	- 3,929	- 24	+ 3,888	- 13	- 3,929	- 3,929	- 24	+ 3,886	- 14
Non-whiting trawl		- 8,193	- 8,193	- 5,267	- 214	- 482	- 8,193	- 8,193	- 5,267	- 224	- 497
Limited entry fixed gear		- 1,595	- 6,068	- 1,595	- 1,595	- 1,595	- 1,973	- 5,365	- 1,973	- 1,973	- 1,973
Open access fixed gear Nearshore		- 256	- 256	+ 215	+ 242	+ 675	- 256	- 256	+ 215	+ 471	+ 675
Open access fixed gear Non-nearshore		- 470	- 1,415	- 469	- 469	- 467	- 641	- 1,358	- 640	- 640	- 638
Incidental open access		+ 0	+ 0	+ 0	+ 0	+ 0	+ 0	+ 0	+ 0	+ 0	+ 0
Tribal groundfish (incl. shoreside whiting)		- 1,660	- 1,660	- 896	- 133	- 896	- 1,753	- 1,753	- 989	- 225	- 989
Grand Total		- 23,091	- 28,510	- 8,036	+ 8,708	- 2,777	- 23,733	- 27,842	- 8,677	+ 8,283	- 3,435
Shoreside Only Total		- 16,104	- 21,523	- 8,036	+ 1,720	- 2,777	- 16,745	- 20,854	- 8,677	+ 1,296	- 3,435
Change from No Action (%)											
Combined At-Sea Whiting sectors[a/]		- 50.6%	- 50.6%	+ 0.0%	+ 50.6%	+ 0.0%	- 50.6%	- 50.6%	+ 0.0%	+ 50.6%	+ 0.0%
Shoreside whiting trawl		- 49.9%	- 49.9%	- 0.3%	+ 49.4%	- 0.2%	- 49.9%	- 49.9%	- 0.3%	+ 49.4%	- 0.2%
Non-whiting trawl		- 28.0%	- 28.0%	- 18.0%	- 0.7%	- 1.6%	- 28.0%	- 28.0%	- 18.0%	- 0.8%	- 1.7%
Limited entry fixed gear		- 10.4%	- 39.7%	- 10.4%	- 10.4%	- 10.4%	- 12.9%	- 35.1%	- 12.9%	- 12.9%	- 12.9%
Open access fixed gear Nearshore		- 7.2%	- 7.2%	+ 6.1%	+ 6.8%	+ 19.1%	- 7.2%	- 7.2%	+ 6.1%	+ 13.3%	+ 19.1%
Open access fixed gear Non-nearshore		- 10.0%	- 30.2%	- 10.0%	- 10.0%	- 10.0%	- 13.7%	- 29.0%	- 13.7%	- 13.7%	- 13.6%
Incidental open access		+ 0.0%	+ 0.0%	+ 0.0%	+ 0.0%	+ 0.0%	+ 0.0%	+ 0.0%	+ 0.0%	+ 0.0%	+ 0.0%
Tribal groundfish (incl. shoreside whiting)		- 23.2%	- 23.2%	- 12.5%	- 1.9%	- 12.5%	- 24.5%	- 24.5%	- 13.8%	- 3.1%	- 13.8%
Grand Total		- 28.3%	- 34.9%	- 9.8%	+ 10.7%	- 3.4%	- 29.1%	- 34.1%	- 10.6%	+ 10.1%	- 4.2%
Shoreside Only Total		- 23.7%	- 31.7%	- 11.8%	+ 2.5%	- 4.1%	- 24.7%	- 30.7%	- 12.8%	+ 1.9%	- 5.1%

a/ Includes tribal at-sea whiting fishery.

4.2.2.2 Projected Change in Tribal Groundfish Fisheries Sector Ex-vessel Revenue

Table 4-40 also shows projected ex-vessel revenue impacts under the management alternatives for the tribal (or treaty) groundfish sector. Tribal groundfish fisheries land in ports exclusively along the north and central Washington coast. Shoreside whiting landings by tribal vessels are included in the revenue impact totals. There is also a tribal whiting fishery that delivers to at-sea motherships; however, revenue impacts from this sector are shown combined with the combined at-sea whiting sectors in the table. Sablefish is a very large component of shoreside tribal groundfish revenue. Under the FPA, 2011 tribal groundfish revenues are $0.9 million lower than No Action. In percentage terms, under the FPA the Tribal groundfish sector is the most adversely affected of all groundfish sectors largely due to the reduction in the sablefish ACL compared with No Action. A similar pattern emerges for 2012, except that the reductions compared with No Action are magnified due to even further reduction in 2012 sablefish ACL.

The projected change from No Action in the tribal groundfish sector revenue under the alternatives (except the PPA) is somewhat less favorable than the average inter-annual changes witnessed over the recent past shown in Table 4-38. While the change in tribal groundfish sector revenue resulting from the projected reduction in sablefish appears much worse than average in dollar terms, it falls well within the range of inter-annual percentage variation witnessed over the recent past (Table 4-38).

4.2.2.3 Projected Change in Groundfish Deliveries to Processors

Table 4-40 also shows total shoreside projected ex-vessel revenue impacts under the management alternatives. While processor revenues are a function of several factors outside the scope of this analysis including the market prices for processed fish, change in total shoreside revenue is used here as a measure of projected change in the flow of raw fish inputs to production processes. The table shows change in total 2011 shoreside purchases of groundfish ranging from -$21.5 million under Alternative 1b to +$1.7 million under the PPA. Under the FPA, total 2011 shoreside revenues are $2.8 million lower than under No Action. Much of the decline under Alternative 1b derives from the assumed low ACL for Pacific whiting, lower sablefish ACL and projected reduction in sablefish harvest to protect overfished species. A similar pattern is shown for 2012, except that the reductions compared with No Action under Alternatives 1a, 1b, 2 and FPA are magnified due to a further reduction in 2012 sablefish ACL.

Projected changes from No Action in total shoreside groundfish deliveries under the Alternatives (except the PPA) are less favorable than the average inter-annual change witnessed over the recent past shown in Table 4-38. The projected change in total shoreside groundfish revenue under the alternatives (except the PPA) appears much worse than the average variation experienced between 1999 and 2009 in dollar terms. In percentage terms the projected change in total shoreside groundfish revenue under Alternatives 1a and 1b also falls well below the range of inter-annual percentage change witnessed over the recent past. Projected change from No Action in total shoreside groundfish revenue under the FPA is less favorable than the average but within the range inter-annual changes witnessed over the recent past (Table 4-38).

4.2.2.4 Projected Change in Recreational Effort by Region

Table 4-41 shows estimated change from No Action in groundfish-related recreational angler trips by state management district. As noted above, changes are enumerated as angler-trips rather than in terms of trip-related expenditures or income impacts that were used to assess previous groundfish management actions. Compared with No Action, groundfish angler trips are projected to increase coastwide under the FPA by 6 percent. Alternative 2 and the PPA show increases of 0.5 percent and 3.4 percent respectively. Coastwide angler effort is projected to decline under Alternative 1 by 25.9 percent. For Oregon

Table 4-41. Estimated Bottomfish Recreational Angling Trips by Management Region Under No Action and Change from No Action (%) Under the Alternatives.

	No Action			Alt 1			Alt 2			Alt 3 - PPA			FPA		
State / District	**Charter**	**Private**	**Total**	**Charter**	**Private**	**Total**	**Charter**	**Private**	**Total**	**Charter**	**Private**	**Total**	**Charter**	**Private**	**Total**
Washington															
La Push-Neah Bay	*659*	*3,492*	*4,151*	-4.7%	-7.1%	-6.7%	+4.7%	+7.1%	+6.7%	+4.7%	+7.1%	+6.7%	+4.7%	+7.1%	+6.7%
Westport	*10,882*	*1,637*	*12,519*	+0.0%	+0.0%	+0.0%	+0.7%	+1.0%	+0.8%	+0.7%	+1.0%	+0.8%	+0.7%	+1.0%	+0.8%
Ilwaco-Chinook	*341*	*630*	*971*	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%
Washington Total	***11,882***	***5,759***	***17,641***	**-0.3%**	**-4.3%**	**-1.6%**	**+0.9%**	**+4.6%**	**+2.1%**	**+0.9%**	**+4.6%**	**+2.1%**	**+0.9%**	**+4.6%**	**+2.1%**
Oregon															
Astoria**															
Tillamook	*3,842*	*4,946*	*8,788*	-16.2%	-16.2%	-16.2%	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%
Newport	*20,636*	*6,874*	*27,510*	-1.3%	-1.3%	-1.3%	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%
Coos Bay	*3,895*	*7,729*	*11,624*	-10.3%	-10.3%	-10.3%	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%
Brookings	*3,903*	*17,809*	*21,711*	-6.0%	-6.0%	-6.0%	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%
Oregon Total	***30,897***	***38,736***	***69,633***	**-6.2%**	**-6.2%**	**-6.2%**	**+0.0%**	**+0.0%**	**+0.0%**	**+0.0%**	**+0.0%**	**+0.0%**	**+0.0%**	**+0.0%**	**+0.0%**
California															
North Coast: Del Norte and Humboldt Counties	*2,718*	*16,534*	*19,252*	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%	+25.7%	+11.5%	+13.5%	+25.7%	+11.5%	+13.5%
North-Central Coast: Mendocino and Sonoma Counties	*4,849*	*5,881*	*10,730*	-47.9%	-72.2%	-61.2%	-7.7%	-26.8%	-18.2%	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%
North-Central Coast: Marin through San Mateo Counties	*25,311*	*23,841*	*49,152*	-4.9%	-4.6%	-4.8%	-4.9%	-4.6%	-4.8%	+16.7%	+29.0%	+22.7%	+73.2%	+34.7%	+54.5%
South-Central Coast: Santa Cruz through San Luis Obispo Counties	*30,413*	*34,629*	*65,042*	-3.8%	-3.1%	-3.5%	+11.5%	+9.3%	+10.4%	+11.5%	+9.3%	+10.4%	+11.5%	+9.3%	+10.4%
South Coast: Santa Barbara and Ventura Counties															
South Coast: Los Angeles through San Diego Counties	*208,845*	*168,730*	*377,576*	-39.5%	-35.2%	-37.6%	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%
California Total	***272,137***	***249,615***	***521,751***	**-32.1%**	**-26.3%**	**-29.3%**	**+0.7%**	**+0.2%**	**+0.5%**	**+3.1%**	**+4.8%**	**+3.9%**	**+8.4%**	**+5.4%**	**+6.9%**
Washington - Oregon - California Total	***314,916***	***294,110***	***609,026***	**-28.3%**	**-23.3%**	**-25.9%**	**+0.6%**	**+0.3%**	**+0.5%**	**+2.7%**	**+4.2%**	**+3.4%**	**+7.3%**	**+4.7%**	**+6.0%**

** Less than 2% of angler trips originating from Astoria Port Group Area in 2009 were bottomfish-target trips.

management districts, the distribution of groundfish angler effort under the FPA is not expected to change from No Action. Groundfish angler effort is expected to increase or remain the same under the FPA for all management districts in Washington and California, with the largest percentage increase projected for the North-Central California coast.

4.2.2.5 Projected Community Personal Income Impacts

Table 4-42 shows estimated change from No Action in community income impacts from commercial groundfish activities by port group area under the alternatives. These estimates exclude impacts from the tribal groundfish and at-sea whiting fisheries. The table shows coastwide income impacts falling by 3.7 percent under the FPA. The decline is much greater under the restrictive Alternative 1a due to reduced projected whiting harvests, and Alternative 1b due to a combination of reduced projected whiting and sablefish harvests. In percentage terms under the FPA, Bodega Bay shows the largest decline in income impacts and Santa Barbara the largest increase, albeit both communities are starting from a very low base under No Action. While most communities show decreases in income impacts under the FPA, changes shown for Morro Bay and Santa Barbara result from projected increases in nearshore open access sector landings which are a prominent component of commercial fisheries in those communities.

Compared with No Action, all communities except Tillamook and Brookings would benefit the most (or be harmed the least) under the PPA. Coastwide income impacts also increase from No Action under the PPA. Of the alternatives analyzed, the FPA presents communities with the next best alternative to the PPA, providing income impact benefits that are somewhat lower than the PPA for most communities, while potentially reducing risks to rebuilding of overfished species. Changes in income impacts are the most adverse for all communities under Alternative 1b due to reduced projected whiting and sablefish harvests. Although Santa Barbara shows an increase from No Action under this alternative, the amount of increase is the lowest among the action alternatives.

The percentage changes in community income impacts projected under the FPA fall well within the range of inter-annual percentage changes in community ex-vessel revenue witnessed over the recent past (Table 4-39). This suggests that even though impacts under the FPA represent a reduction in economic activity for most communities compared with No Action, the reduction can probably be accommodated without causing severe disruption in most communities. However, among communities that are most adversely affected under the FPA, Brookings (Curry County), Newport (Lincoln County), South and Central Washington Coast (Grays Harbor and Pacific Counties) are also listed as vulnerable or most vulnerable using economic resiliency scores (see analysis in Appendix E). Projected changes in community income impacts under Alternative 1b approach or exceed the maximum inter-annual percentage decreases for most communities north of Morro Bay.

Table 4-42. Estimated Community Income Impacts from Commercial Fishing and Processing Activities by Port Group Area Under No Action ($ million) and Change from No Action (%) Under the Action Alternatives.

Community (Port Group Area)	No Action	Alt 1a	Alt 1b	Alt 2	Alt 3 PPA	FPA
Puget Sound	*5.69*	-18.7%	-42.6%	-14.7%	-7.7%	-7.9%
North Washington Coast	*1.31*	-10.4%	-44.9%	-10.0%	-9.9%	-9.8%
South and Central WA Coast	*5.62*	-33.2%	-47.1%	-9.2%	+16.0%	-5.4%
Astoria	*16.78*	-33.7%	-37.0%	-13.8%	+11.1%	-1.4%
Tillamook	*0.24*	-50.9%	-52.8%	-31.0%	-27.6%	-2.4%
Newport	*10.54*	-27.8%	-40.8%	-11.9%	+4.6%	-5.5%
Coos Bay	*8.01*	-25.7%	-35.3%	-16.0%	-0.5%	-3.8%
Brookings	*3.98*	-22.3%	-38.3%	-16.5%	-10.4%	-6.0%
Crescent City	*1.66*	-25.8%	-34.4%	-14.3%	-2.2%	-3.1%
Eureka	*6.08*	-23.2%	-29.4%	-15.1%	-1.8%	-2.9%
Fort Bragg	*5.19*	-12.7%	-25.7%	-11.0%	-1.9%	-2.5%
Bodega Bay	*0.36*	-19.8%	-36.7%	-15.5%	-10.9%	-11.5%
San Francisco	*1.85*	-18.1%	-28.7%	-12.6%	-5.8%	-6.2%
Monterey	*1.42*	-6.8%	-21.6%	-3.5%	-3.1%	-3.2%
Morro Bay	*3.22*	+1.2%	-0.2%	+3.0%	+3.1%	+3.1%
Santa Barabara	*0.76*	+16.8%	+16.8%	+18.2%	+18.2%	+17.0%
Los Angeles	*1.70*	-2.2%	-2.6%	-2.1%	-2.1%	-2.1%
San Diego	*0.72*	-1.3%	-1.3%	-1.2%	-1.2%	-1.2%
Total	*75.16*	-23.6%	-33.6%	-12.1%	+2.4%	-3.7%

4.2.2.6 Effect on Non-market and Non-use Values

Actions described in this document are not expected to have significant impacts on non-market or non-use (NMNU) values. For a general discussion of these issues in the context of west coast groundfish fisheries refer to Section 7.1.4 in the 2009-2010 groundfish management specification EIS.

An analysis of the long-term benefits under alternative rebuilding strategies for yelloweye and canary rockfish was conducted in an attempt to assess the NMNU values associated with the choice of rebuilding schedule for overfished species (see Appendix G). The analysis examined both a shorter-term and longer-term time horizon, showing that the present value (PV) of the canary rebuilding scenario that had highest PV is at least 51% higher than the PV of the F=0 scenario (i.e., zero canary harvest until rebuilt). For yelloweye the corresponding ratio is 78 percent. These results imply that in order for F=0 to have higher value to society than the highest PV rebuilding scenario, the total of all NMNU values (e.g., ecosystem services, option, existence, and bequest values) associated with allowing canary to rebuild completely before it can be harvested must be at least 51 percent of the market value of the spectrum of fishing opportunities accommodated by the level of canary harvest allowed under the rebuilding scenario that has the highest PV. For yelloweye, the analysis showed that total NMNU values must be at least 78 percent of the market value of the fishery that would be accommodated under the rebuilding scenario with highest PV.

The analysis showed that none of the alternative ACLs maximizes PV for either yelloweye or canary. Under the short-term time horizon for canary, F=0 shows higher PV than the FPA for discount rates up to about +5 percent. Under the long-term time horizon, the FPA for canary generally shows higher PV than F=0 for discount rates greater than zero. For yelloweye, the FPA always shows higher PV than F=0 for all discount rates greater than zero; and the gap is much greater than the difference between PVs of FPA and F=0 for canary.

These results imply that since the differences between PVs under the use and non-use rebuilding scenarios are much wider for yelloweye than for canary, it seems unlikely that total NMNU values for yelloweye could balance the use values achievable under the non-zero harvest rebuilding scenarios. Also, while use and NMNU values may be relatively more likely to be in balance for canary, species management in a mixed-stock fishery is so interlinked that measures designed to rebuild certain stocks more quickly will negate efforts to allow more liberal harvest of other stocks, and vice versa. The choice of FPA for canary reflects the pervasiveness of canary bycatch affecting virtually every west coast groundfish fishery. This creates an aggregation of affected stakeholder interests with a relatively high preference for near-term harvest benefits over potential benefits in the future arising from implementing zero harvest policies today.

4.3 Cumulative Impacts

CEQ regulations at 40 CFR 1508.25 identify three types of impacts that must be considered in an EIS: direct, indirect, and cumulative effects. Direct effects are directly related to the action (occurring at the same time and place); for indirect effects there is some intermediate cause-and-effect between the proposed action and the actual effect being evaluated (occurring at a distance in time and/or place). The regulations also define a cumulative impact as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable actions regardless of what agency (Federal or nonfederal) or person undertakes such actions.” Although the regulations and guidance identify cumulative effects as a separate, third class of impacts, all effects can be viewed as cumulative to the extent they are part of some causal chain that results in an ultimate effect on an environmental component. Using this concept of cumulative effects, this EIS frames the cumulative effects analysis in terms of an additive model. To arrive at the final, cumulative effect on an environmental component, the effects in a causal chain are traced out and measured qualitatively or quantitatively, in terms of the metrics that have been identified in this EIS. The components in this additive model include baseline conditions, reasonably foreseeable future actions (RFFAs), the effect of the proposed action, and any mitigation that is proposed separately from the alternatives. Baseline conditions in the affected environment are described in Chapter 3. Section 4.1 through Section 4.3 describe the direct and indirect impacts of the alternatives on fish stocks, fishery sectors, fishing communities, protected species, essential fish habitat, and the ecosystem. The next section, below, summarizes the “external actions” and “ongoing trends” that contribute to the effects of the proposed action under the different alternatives to produce a cumulative effect. These actions and trends represent the past, present and reasonably foreseeable future actions that add to the effect of the proposed action.

4.3.1 External Actions and Ongoing Trends

Actions are defined as regulatory and programmatic activities affecting the operational environment for groundfish fisheries and the status of related resources. Trends are ongoing changes in baseline conditions that have occurred and may be reasonably expected to continue; these trends can be shaped by either environmental forces (e.g., climate forcing affecting animal populations) or human behavior in the aggregate (e.g., consumption patterns). This information supports the evaluation of cumulative effects in Section 4.4.2. In identifying external actions that may combine with the effects of the proposed action it is important to consider their temporal aspect. An action may have occurred at some discrete time in the past but resulted in a permanent change in baseline conditions. Alternatively, an action that was initiated in the past may be continuing; this is common for the types of programmatic actions that have the greatest effect on the management system and managed resources. So, although CEQ regulations reference "past, present, and reasonably foreseeable future actions," from an analytical standpoint what is of interest is the net effect on baseline conditions at the start of the management period (2011-2012) and any ongoing effects of these actions, because they continue to exist programmatically. While the direct and indirect impacts of the proposed action may be confined to the 2011-2012 management cycle, cumulative effects are as likely to manifest themselves beyond this 2-year period. This is especially true of the effects of actions intended to achieve optimum yield from fish stocks, because the underlying policies, such as a rebuilding strategy, can take many years to achieve its intended effect of returning stock size to B_{MSY} (or its proxy).

The Amendment 20 FEIS includes a catalogue of external actions and trends relevant to that action. Although the Amendment 20 action will only directly affect the groundfish trawl sector, most of the actions and trends described in that EIS are relevant to groundfish fisheries generally. Therefore the list of past, present, and reasonably foreseeable actions and trends described therein (see Sections 3.3, 3.4, and 4.1.3 of the Amendment 20 FEIS) are incorporated by reference and summarized here. In that EIS past actions with ongoing effects were categorized as follows:

- Harvest management, overfishing and overfished species (since this category covers harvest specifications, in the context of the current EIS the 2011-2012 harvest specifications and management measures is the proposed action while past and future specifications are external actions)
- Bycatch reduction and monitoring
- Rationalization and fleet consolidation (which also includes Amendment 20)
- Allocation of yield to the trawl sector under Amendment 21
- Habitat and ecosystem protection
- Wave energy proposals
- Mitigation measures that are trailing actions from trawl rationalization; the adaptive management program and the framework for community fishing associations

Extending from the catalog in the Amendment 20 FEIS the following external actions are likely to have the greatest effect in combination with the proposed action:

- Past and future harvest specifications. The range of direct and indirect effects analyzed in this EIS is also cumulative through the successive establishment of harvest specifications and management measures for each biennial period. ACLs set an overall limit on the amount of a managed groundfish stock or stock complex that may be caught. Controlling fishing mortality is the only mechanism available to fishery managers to directly affect the status of a stock. The overall objective of the catch limits is to achieve optimum yield while maintaining or returning to MSY harvest levels. However, both scientific uncertainty and management uncertainty can result in under- or over-harvest, because 1) the status and characteristics of a stock are not fully understood (scientific uncertainty), or 2) actual catch is different from estimated catch (management uncertainty). Amendment 23, in addressing National Standard 1 guidelines, revises the management framework to better account for these sources of uncertainty. Harvest specifications also indirectly control the amount of fishing effort expended in regulated fisheries and, in combination with Amendment 21 (see below), the distribution of effort among groundfish sectors and gear types. This indirectly affects EFH and the relative level of protected species take, due to the differential effects of different gear types.

- Non-groundfish fisheries. Other fisheries contribute to mortality of environmental components also affected by groundfish fisheries, particularly protected species. (Catch of groundfish in non-groundfish fisheries is regulated and accounted for through the biennial management process.) Adverse impacts from other gear types may also combine with impacts to EFH from groundfish gear. Fishery removals from all sources also have long-term effects on the trophic structure of the California Current ecosystem.
- Amendment 20, trawl rationalization. Amendment 20 substantially changes the way in which the groundfish trawl fishery is managed by introducing a common IFQ management system for shoreside whiting and non-whiting groundfish fisheries and co-op management for the whiting mothership sector. Measures to facilitate continued operation of the single voluntary co-op in the catcher-processor sector will also be implemented. Amendment 20 also relaxes gear restrictions for the non-whiting trawl sector so that vessels operating under an endorsed limited access permit may use any legal groundfish gear. This is expected to result in some level of trawl-endorsed permitted vessels using fixed gear, occasionally to permanently.
- Amendment 21, intersector allocation. This amendment establishes trawl-nontrawl allocations for most of the managed species and complexes not already allocated. The principal impact mechanisms of this action are to indirectly affect the relative amount of fishing effort expended by different gear types (affecting EFH and protected species) and the relative amount of fishing opportunity available to groundfish sectors (a socioeconomic effect). However, as discussed in the Amendment 21 FEIS, the proposed allocation scheme reflects the distribution of fishing opportunity between the groundfish trawl sector and other fishery sectors in the recent past, so Amendment 21 allocations are unlikely to result in substantially different impacts than under No Action.
- Amendment 23, National Standard 1 Guidelines framework. As discussed above, Amendment 23 modified the framework in the Groundfish FMP for determining harvest levels. A principal objective is to develop mechanisms to explicitly consider uncertainty about what are appropriate harvest levels needed to achieve optimum yield.

The Amendment 20 FEIS identifies the following trends in baseline conditions that are applicable to environment affected by this 2011-2012 harvest specifications proposed action:

- Change in the use of ocean areas: Habitat protection measures (e.g., Marine Protected Areas (MPAs) and offshore energy projects (e.g., wind and wave power) limiting the area open to fisheries.
- Changes to coastal economies and land use: Population increase in coastal areas and related growth in nonfishery-related economic activities and land use.
- Increased demand for protein affecting real prices: Population growth and rising living standards globally are likely to increase demand for fishery products. This could lead to price increases unless aquaculture increases supply at lower cost than wild-caught fish (and consumers consider the two products substitutable).
- Increased consumer awareness affecting purchasing decisions: Certification and consumer awareness programs may affect buying decisions. Consumers may become more aware of or form opinions about how effectively a fishery is managed both in terms of the status of target stocks and the effect of a particular fishery on other resources (e.g., protected species). Consumer awareness may have a marginal effect on demand for specific products (based on source) over the long term.
- Overfished species will continue to rebuild to their target biomass levels: Current policies will rebuild overfished stocks, although the expected year in which a stock is rebuilt (the target year or median year, based on new scientific information) is likely to change on occasion. New stocks may be declared overfished, based on new scientific information. Although policy and practice is

to prevent overfishing, undetected changes in stock productivity (due to ocean regime, for example), change in understanding or estimates of stock reference points (e.g., unfished biomass), or assessment of previously unassessed stocks could reveal that overfishing has occurred and catch must be reduced to rebuild the stock and maintain it at the target biomass (B_{MSY} or proxy).
- Cyclical and ongoing climate change will affect stock productivity in the northeast Pacific: cyclical events (El Nino Southern Oscillation (ENSO), Pacific Decadal Oscillation (PDO)) and long-term climate change affect the relative productivity of different marine organisms with attendant ecosystem effects.

4.3.2 Description of the Cumulative Effects of the Action

4.3.2.1 Fishery Resources Including Overfished Groundfish Stocks

In many ways the management framework takes into account cumulative effects on exploited fish stocks through the policy framework, with its objective of obtaining optimum yield over the long term, and the stock assessment process. Rebuilding of overfished species must account for or adjust to cumulative effects since fishing mortality and stock productivity over time periods longer than the current biennial management cycle affect stock size. Thus ACLs for the 2011-2012 period are mainly relevant in the context of stock status over longer time periods. Achieving optimum yield involves monitoring stock characteristics (fishing mortality, recruitment, etc.) and formally assessing stocks where the data are available. The management framework is adaptive such that the receipt of new information informs decisions about setting harvest limits in future years through each biennial harvest specifications cycle. Overfished species ACLs for the current management period are evaluated in the context of a long-term strategy based on a target rebuilding year objective. Consistent with the adopted strategy (i.e., an SPR harvest rate) and objective (target year), the overfished species ACLs for 2011-2012 are explicitly related to past harvest specifications (and resulting fishing mortality) and future harvest specifications (and assumed fishing mortality), representing the cumulative effects of all these actions. In principal, this process accounts for all fishing mortality (not just that from directed groundfish fisheries). However, broad environmental trends also affect stock status in combination with fishing mortality. In practice, the current state of science is not sufficiently advanced to formally integrate trends such as climate forcing on stock productivity into formal stock assessments, except in limited cases. From a stock assessment perspective natural mortality accounts for all of these effects (in other words, all sources of mortality other than fishing) but is not estimated by explicitly accounting for these sources of mortality. Rather, it is usually indirectly estimated from estimates of the age structure of the population and age-specific fishing mortality).

4.3.2.2 Groundfish and Other Fisheries Subject to the Harvest Specifications Regulations

Amendment 20 was implemented at the start of the 2011-2012 biennial period. This will directly affect groundfish trawl fisheries and indirectly affect other fishery sectors. The Amendment 20 FEIS analyzes the impacts of that action. The following impacts are identified relative to groundfish harvesters, which have a cumulative effect in combination with proposed harvest specifications:

Limited entry trawl groundfish harvesters

- Consolidation would shrink fleet size with only the most efficient vessels remaining, leading to a decrease in the cost of harvesting.
- Harvest of under-utilized target species would increase, leading to higher gross revenue per vessel and per-vessel profits.

- Co-op harvest privileges in the at-sea Pacific whiting sectors would create less motivation to "race for fish," allowing harvesters to time fishing operations in a manner that optimizes revenue and improves product quality.
- A variety of factors, including bycatch avoidance, ease in transferring harvest privileges, and the use of non-trawl gear, would likely lead to changes in the geographic distribution and timing of harvest.
- Increased profits and greater flexibility would improve safety conditions on board trawl vessels.
- Harvesters not receiving an initial allocation (or one of sufficient size) would have to buy the quota necessary to participate in the fishery, increasing costs.
- Rationalization is expected to result in a decrease in the number of captain and crew jobs, while those who remain in these jobs are expected to receive higher wages.

Non-trawl commercial harvesters

- Fleet consolidation may lead to the spillover of excess vessels into the pink shrimp, Dungeness crab, or other fisheries that are operationally similar.
- Bycatch of non-target species, such as Pacific halibut, in the trawl fishery could change. Bycatch most likely will decrease due to IBQs, providing a benefit, but could increase as currently under-utilized target species catch increases.
- Resource, grounds, and market competition could increase due to greater operational flexibility and gear switching opportunities in the trawl sector.

Information presented in Section 3.2 indicates that since 1998 overall ex-vessel revenue in commercial trawl fisheries has declined. The non-whiting trawl fishery had the biggest decline in revenue at $12.2 million, 1998-2009. Revenue increased in tribal fisheries, as it did in limited entry and open access fixed gear sectors. These declines were likely due principally to management restrictions implemented through previous harvest specifications for these fisheries to reduce the catch of overfished species, and changes in the OYs (now called ACLs) for commercially valuable target species needed to prevent overfishing and increase the size of precautionary zone stocks. Historical landings data shown in Figure 4-22 provides some perspective on how fishing opportunity may change in the future (data for the figure is drawn from Table F-3 in Appendix F). The dramatic decline in rockfish landings since 1998 reflects restrictions related to overfished species rebuilding. Landings of other target stocks have been variable, such as Pacific whiting, or been stable (sablefish) to increasing (Dover sole). Commercial sectors saw decline in participation over this period so that in many cases per-vessel revenue increased over the same period. Management constraints imposed on fisheries to rebuild overfished stocks may have favored the most skilled and efficient harvesters who were able to maintain financial viability in the face of these restrictions. However, it is hard to tell whether a "shake out" has occurred and whether or not groundfish fisheries have reached a new equilibrium with respect to participation.

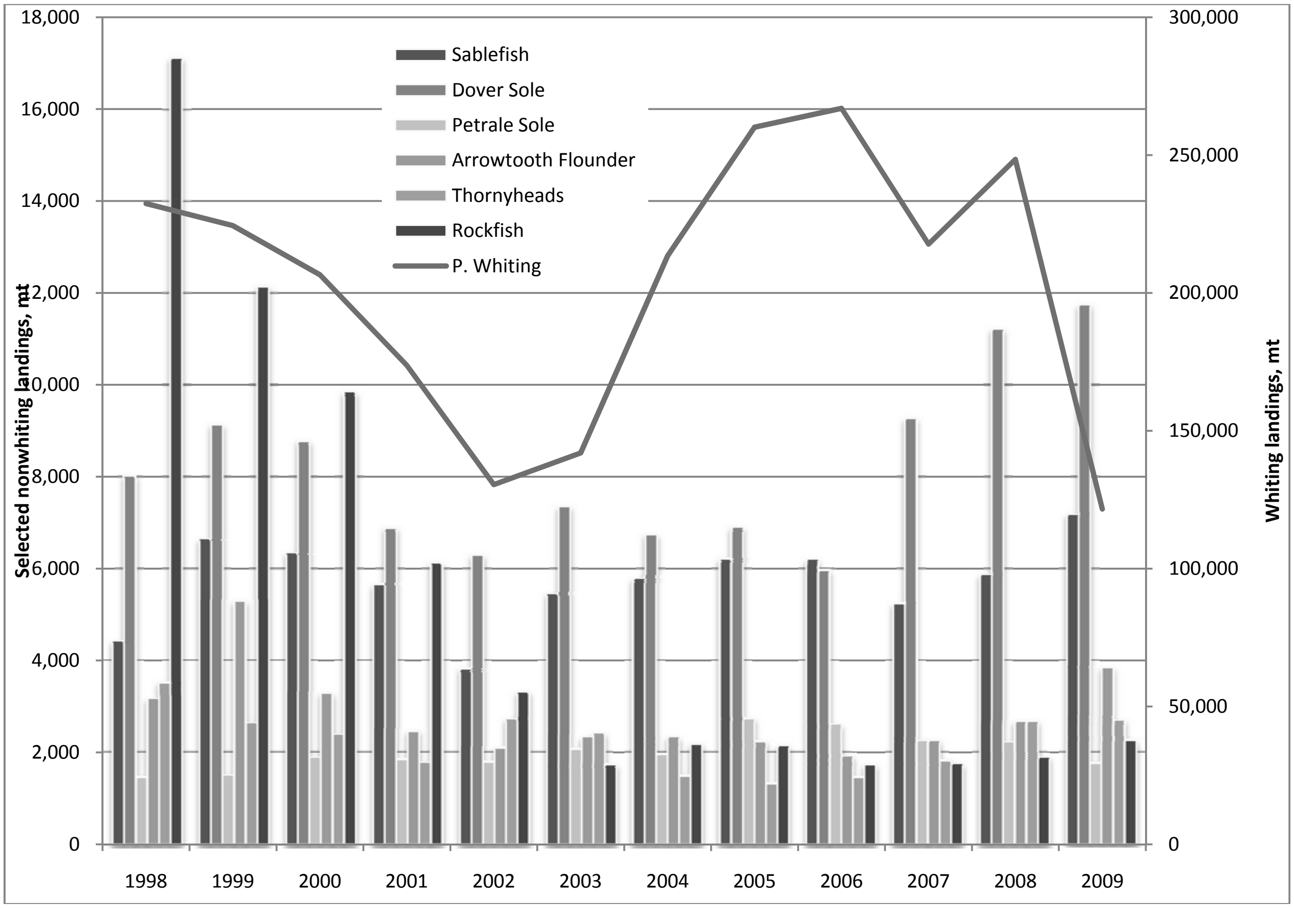


Figure 4-22. Landings (mt) of selected groundfish species, 1998-2009.

In evaluating changes in revenue over the past decade it is also useful to consider longer term variability in ex-vessel revenue. Figure 4-23 shows average annual inflation adjusted revenues from groundfish for three time periods, 1981-1990, 1991-2000, and 2001-2009 (not including revenue from the at-sea whiting sectors). Average annual ex-vessel revenue in the 2000s is a little more than half what it was in the 1980s. Most of this decline occurred between the 1991-2000 period and the 2001-2009 period. Ex-vessel revenue from Pacific whiting has grown, due to the development of the domestic fishery and increases in real prices (note that since at-sea landings are not included, the actual growth is greater than shown in the figure). Sablefish ex-vessel revenue also shows a net increase, although total revenue is down between the 1990s and the current decade. Rockfish average annual ex-vessel revenue in the 2000s is one-fifth what it was in the 1980s. The long-term decline in revenue has contributed to cumulative adverse impacts to fishing communities. Fishery-related economic activity and infrastructure cannot be supported at the same level under the current regime as the higher levels of revenue obtained in previous decades.

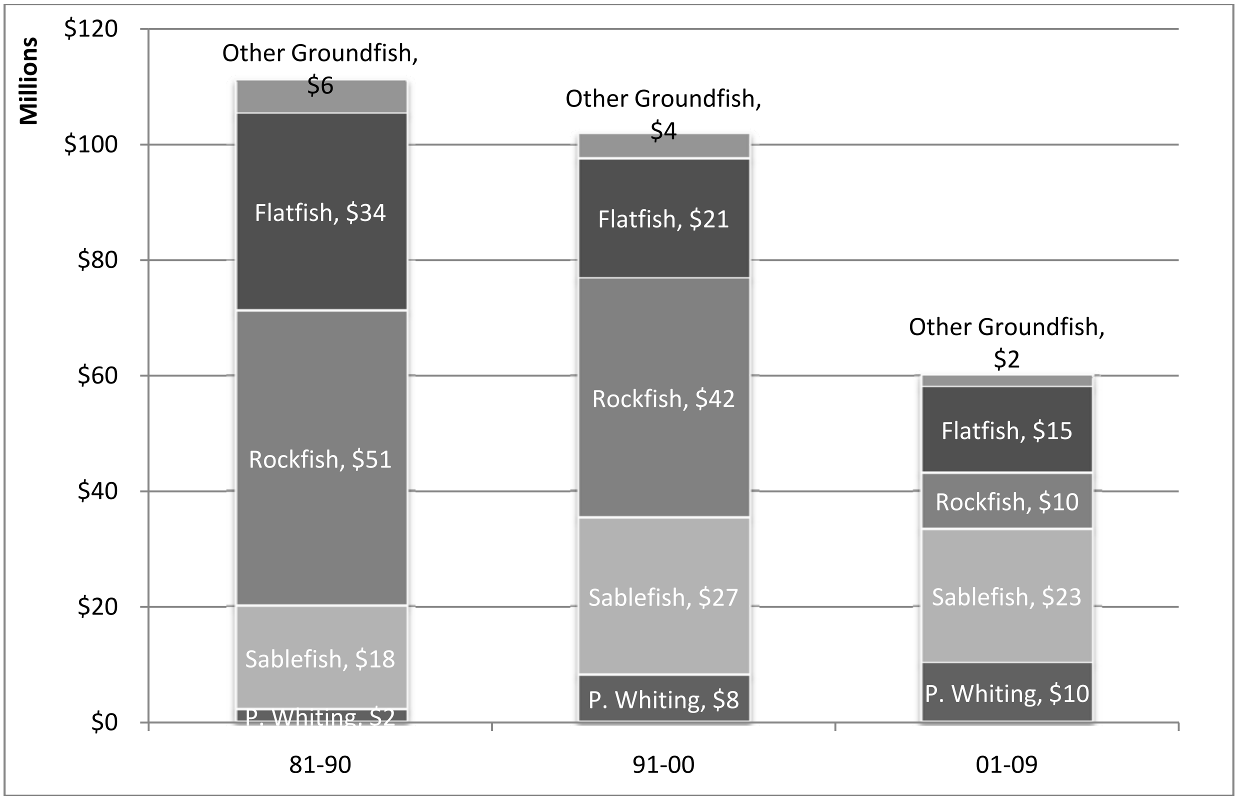


Figure 4-23. Average annual inflation adjusted ex-vessel revenue by species group, $millions, for three time periods.

Input costs are another factor affecting financial profits for harvesters. Costs have increased for many inputs and management requirements also directly and indirectly increase costs. For example, fuel prices have increased substantially during the period in question (see Figure 4-24). Direct costs of management include VMS requirements imposed in recent years (see also discussion in Appendix B). Indirect costs of management result from requirements that restrict operational flexibility. For example, RCAs and other types of closed areas restrict areas open to fishing and can require vessels to travel further to suitable fishing grounds, thereby increasing running costs. The shoreside trawl sector would assume additional costs under the Amendment 20 trawl rationalization program through requirements for harvesters to pay at least part of the cost of at-sea observers and processors to provide personnel to monitor landings. Provisions in the MSA also allow fees to be assessed to at least partially recover costs associated with management, data collection, and enforcement.

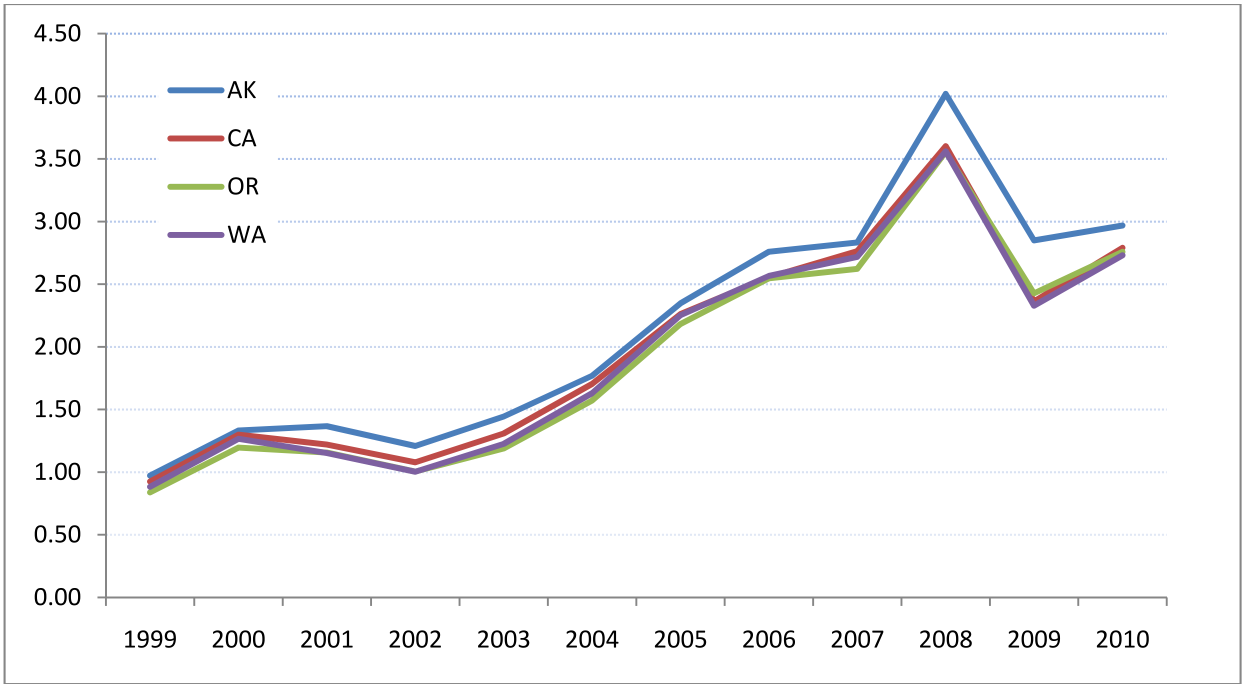


Figure 4-24. State average before-tax cash price based on the purchase of 600 gallons of #2 marine diesel. (Source: PSMFC EFIN http://www.psmfc.org/efin/data/fuel.html#Data.)

As overfished stocks rebuild fishing opportunities should increase, consistent with the Council's stock rebuilding policies. But because scientific understanding of the productivity and dynamics of rockfish stocks has changed since the time when large harvests were last allowed, it is unlikely that stock rebuilding will accommodate the relatively high-volume target fisheries that occurred in the past for rockfish stocks that are currently overfished. However, since under stock rebuilding overfished rockfish have primarily functioned as a constraint on harvest opportunity for other target stocks, it is likely that relaxation of these constraints as stocks rebuild will gradually allow greater access to target stocks, thereby increasing overall revenue. In that environment total revenue should be more affected by market demand for target species than by management constraints.

Even if overfished species ACLs gradually increase, the trend of declining participation may accelerate in the non-whiting groundfish trawl fishery as a result of IFQ management, as discussed at length in the Amendment 20 EIS. The co-op program for the whiting mothership sector implemented by Amendment 20 is also a type of catch share; a co-op receives an allocation based on the catch history of participating catcher vessels. Since catch history is transferrable with the underlying limited access permit there is some opportunity for consolidation, depending on the efficiency gains that may be realized. The trend in other fisheries sectors is harder to predict. If the decline in participation implied from the data presented in Section 3.2 represents a permanent change, with capital and labor permanently deployed to other activities, increased harvest opportunity would tend to increase revenues (and likely profits) for a smaller number of participants than in the past. The limited entry fixed gear sector saw an increase in overall revenue since 1998 with participation declining, possibly in part due to permit stacking, which allows an individual to consolidate additional sablefish quota onto a single vessel. Since permit stacking represents another form of catch share for the primary sablefish fishery, similar mechanisms driving consolidation could be at work. At some point any trend in consolidation is likely to reach an equilibrium based on average harvest opportunity, which will be dictated by measures implemented through future harvest specifications.

Gear switching by vessels fishing under the IFQ program should not affect fishing opportunity for non-trawl groundfish sectors, because gear-switching vessels would still be fishing against the trawl sector allocations established under Amendment 21 and the current harvest specifications. However, as discussed in the Amendment 20 EIS, there could be increased competition for favored fishing areas and in product markets. Information presented in the Amendment 20 EIS indicates that gear switching to catch sablefish, the most valuable fixed gear species, is likely to have only a modest, if any, effect on ex-vessel price of sablefish for the fixed gear sectors.

Future revenue is also a function of price. Over the long term, increased demand for protein driven by increasing population and income could lead to a rise in real ex-vessel prices. However, over the past decade the average ex-vessel price recorded on fish tickets has been variable, as shown in Table 4-43. Flatfish prices have declined, which may be influenced by supply increases (see Figure 4-22). Likewise, prices paid for rockfish increased by 88 percent, likely at least in part due to the decline in supply resulting from management restrictions. However, dockside prices for two other commercially important species, Pacific whiting and sablefish, have increased during the 1998-2009 period, probably largely due to world market conditions influencing supply and demand for those species and their substitutes. These changes suggest how management constraints and market conditions can affect ex-vessel prices over time. The Amendment 20 EIS also identifies the relative bargaining power over price between harvesters and processors as a factor. Control of IFQ is expected to increase bargaining power.[30] This is likely to favor harvesters based on the initial allocation scheme. Sablefish caught with fixed gear commands a price premium over trawl-caught sablefish, so vessels under the IFQ program harvesting their sablefish quotas with fixed gear may be able to increase their revenues compared to status quo (trip limit) management.[31]

[30] Initial allocation of IFQ would distribute the majority to harvesters (with 20 percent of whiting IFQ going to eligible processors), based on ownership of a trawl endorsed groundfish limited access permit. Since there are few restrictions on who may own a permit and IFQ, processors have had the opportunity to acquire permits before initial allocation in order to qualify and may acquire IFQ from willing sellers once the program is implemented.

[31] According to PacFIN fish ticket data, in 2009 on average sablefish caught with hook-and-line and pot gear commanded $2.23 and $2.20 per pound respectively while trawl-caught sablefish averaged $1.13 per pound. In addition, the price increase from 1998 has been greater for fixed gear caught sablefish compared to trawl-caught, at 58 percent (hook-and line), 55 percent (pot), and 33 percent (trawl).

Table 4-43. Change in average price per pound for groundfish species and species groups in inflation adjusted dollars, 1998-2009. (Source: PacFIN ft and ftl tables accessed 7/82010.)

Species / Group	Change in price
Lingcod	58%
P. Cod	-26%
P. Whiting	42%
Sablefish	39%
Rockfish	88%
Thornyheads	-27%
Arrowtooth Flounder	-2%
Dover Sole	-13%
English Sole	-14%
Petrale Sole	-20%
Other Flatfish	9%
Cabezon	63%
Spiny Dogfish	18%

4.3.2.3 West Coast Fishing Communities

Past, current, and future harvest specifications impact fishing communities through mechanisms similar to those operating on fishery sectors described above, because it is the landings into west coast ports that generate local fishery-related income. Effects on fishing communities, however, have a more explicit geographic component. The Amendment 20 FEIS identified a variety of potential impacts to west coast fishing communities from trawl rationalization. Many of these effects relate to consolidation in the trawl fleet and geographic shifts in the distribution of landings due to factors such as the relative efficiency of the groundfish trawl fleet currently located in the port, the level of bycatch of overfished species in adjacent fishing grounds, and the level of agglomeration and infrastructure availability. Another important component affecting fishing communities is the presence of processors and processing infrastructure. Trawl rationalization may lead to further consolidation in the processing as well as harvesting industry. Such consolidation could result in the closure of facilities in less advantaged ports, thereby putting them at an even greater competitive disadvantage.

As discussed in previous harvest specifications EISs (PFMC 2002; PFMC 2004b; PFMC 2006; PFMC 2008a) past management restrictions, and the attendant decline in participation in groundfish sectors, has likely lead to a decline in fishery support infrastructure in some ports and processor presence. Some local economies may adapt to these changes in economic structure, and declines in fishery-related income may be less discernable in ports in major urban areas, such as Seattle, San Francisco, and Los Angeles. However, fisheries and fishery-related infrastructure can be an important part of community identity and a key component in its attractiveness for other economic activities, such as tourism. A good example is Fishermen's Wharf in San Francisco, a working waterfront that plays an important role in the city's tourist economy. Section 4.14 in the Amendment 20 FEIS includes an extensive discussion of socioeconomic trends in west coast fishing communities and their interaction with trawl rationalization.

Information presented in Section 3.2 shows the change in ex-vessel revenue by port group area since 1998. Coastwide ex-vessel revenue from groundfish declined 3.2 percent from 1998 to 2009, although revenue has been generally increasing from a low point in 2001, showing a 25 percent increase from 2004. At the state level California ports had the biggest decline in revenue from groundfish, while Oregon and Washington ports had an overall increase since 1998. Particular California ports also had the largest absolute declines in revenue over the period: Monterey was the largest with a $2.7 million decline since 1998, and also posted a decline in revenues from 2004 while many other ports were showing increases in groundfish revenues from a low point.

Section 3.2 also describes characteristics of port group areas, including the results of the community vulnerability analysis described in Appendix E. (This analysis is intended to identify communities especially vulnerable to adverse socioeconomic impacts due to declines in income from fishing.) The underlying characteristics that caused communities to be rated vulnerable are likely to change slowly, if at all. This is somewhat reflected in the overlap between ports rated vulnerable in the 2006 analysis (based on 2000 Census data) and the updated analysis (which mainly used 2006-2008 3-year American Community Survey estimates). Some of the hardest hit port groups in terms of revenue declines for groundfish and also for all species were also rated as vulnerable. Coos Bay, Crescent City, Eureka, and Fort Bragg are port groups that experienced declines in revenue and also had one or more counties within the port group area rated as vulnerable; Crescent City and Fort Bragg are in counties rated most vulnerable. These areas are likely to be most subject to cumulative adverse socioeconomic impacts from groundfish harvest specifications and management measures.

4.3.2.4 Protected Species

ESA-listed Salmon

As discussed above, since 1998 management restrictions reduced landings of many groundfish species. Past groundfish management measures authorized fishing, indirectly affecting the incidental take of Chinook salmon. The groundfish fishery, even with management measures in place to reduce impacts to Chinook salmon, has a persistent effect on stock productivity; however, given the life cycle of Chinook and coho salmon, fishing mortality in more recent years would have a much greater contributory effect on population status.

As with past harvest specifications, future harvest specifications are likely to have an indirect effect on the incidental take of listed Chinook salmon and coho, which in combination with incidental take during 2011-2012 will have cumulative effects on year classes intercepted by the fisheries during that time; however, it is unlikely that impacts to listed Chinook salmon will exceed the 20,000 fish threshold for multiple years. (No incidental take threshold has been established for Oregon Coast coho). This cumulative effect will only persist as long as the affected year classes. For 2011-2012 harvest specifications and management measures this is of relatively short duration. Projected rebuilding times for overfished species are much longer, and rebuilding alternatives are thus likely to affect groundfish harvest levels, thus indirectly affecting interactions with Chinook salmon for decades. However, it is likely that rebuilding strategies will continue to be modified in the future based on new information, so it is probably unrealistic to expect that any strategy adopted as part of this proposed action will remain unchanged for the duration of a given rebuilding period. Nonetheless, in very general terms groundfish fishing effort is likely to be constrained to mitigate overfished species catch for the foreseeable future.

The Amendment 20 FEIS (PFMC 2010c, Section 4.18) describes impacts of trawl rationalization on ESA-listed salmon. Rationalization of the trawl fishery is not expected to fundamentally change the mixed stock fishery structure where catch of healthy species will be constrained in order to meet rebuilding requirements for overfished groundfish species. It will increase flexibility of fishers to harvest their quotas; however, this increase in flexibility will also increase uncertainty in predicting Chinook and coho salmon interactions due to the changes that are likely to occur in fishing behavior due to changes in management measures that will regulate the trawl fishery under the new quota system.

ESA-listed salmon are also affected by commercial and recreational salmon fisheries that target non-listed salmon but incidentally take listed Chinook and coho salmon. All fisheries have a similar persistent effect, contributing to total fishing mortality and attendant effects on stock productivity. Commercial and recreational salmon fisheries are managed to optimize harvest of hatchery-produced fish while keeping the take of wild, ESA-listed stocks within limits that will ensure their continued existence. Thus, in managing these stocks, all sources of fishing mortality are estimated or accounted for, including incidental take in groundfish fisheries.

Salmon are vulnerable to human-caused degradation of freshwater habitat used for spawning. These effects are generally well-known and diverse. They include physical barriers to migration (dams), changes in water flow and temperature (often a secondary effect of dams or water diversion projects), and degradation of spawning environments due to increased silt in the water due to adjacent land use. A very large proportion of the long-term, and often permanent, declines in salmon stocks are attributable to this class of impacts. For a detailed summary of nonfishing impacts to salmon habitat see Section 3.2.5 of the EFH Appendix in Amendment 14 to the Pacific Coast Salmon FMP (PFMC 2000). Adverse impacts to freshwater salmon habitat are likely to continue for the foreseeable future.

Eulachon

NMFS has reinitiated its Section 7 consultation on the Council's groundfish FMP for the Southern DPS of Eulachon. The Status Review (Eulachon Biological Review Team 2010) describes the most likely threats to eulachon recovery, allowing for a qualitative assessment of the potential significance of impacts to eulachon from the U.S. west coast commercial groundfish fishery.

Green Sturgeon

NMFS has reinitiated its Section 7 consultation on the Council's groundfish FMP for the Southern DPS of green sturgeon. Green sturgeon are caught incidentally in estuaries by the white sturgeon fishery (NMFS 2002).

As discussed above for listed salmon, past and future groundfish harvest specifications indirectly affect the level of fishing effort by regulated fishing vessels, which in turn has a general influence on the likelihood of interaction with protected species, including green sturgeon. As noted, fishing mortality from all sources, including nongroundfish fisheries, will likely continue to affect the status of green sturgeon population.

Marine Mammals

NMFS is in the process of analyzing available data on the interactions of fisheries conducted under the Pacific Coast groundfish FMP with marine mammals and seabirds. Humpback whale interactions have been documented in fisheries using pot and trap gear off the west coast, including the west coast crab fisheries. Additional species specific information on other fisheries is available in Section 4.6.3 of the Groundfish FMP Amendment 19 EFH FEIS (NMFS 2005). Section 4.19 of the Amendment 20 FEIS describes the effects of trawl rationalization on marine mammals. Generally, the impact mechanisms described above for ESA-listed salmon operate for marine mammals and other protected species. Increased flexibility in trawl fleet operations combined with other changes in the overall structure of the trawl sector (such as fleet consolidation) may have variable effects on the likelihood of marine mammal interactions. The trawl sector will be subject to 100 percent observer coverage under the trawl rationalization program, which would improve the reliability of incidental take estimates for marine mammals and other protected species.

Sea Turtles

There is very little information available to estimate total mortalities of sea turtles, with the exception of the drift gillnet fishery, a fishery not directly managed under the Groundfish FMP; therefore the cumulative effects of fisheries conducted under the Groundfish FMP on endangered and threatened sea turtle species are unknown. Sea turtle capture has been documented in purse seines, gillnets, and other types of fishing gear that are not commonly used or are not authorized for use in fisheries conducted under the groundfish FMP.

Seabirds

Besides entanglement in fishing gear, seabirds may be indirectly affected by commercial fisheries in various ways. Change in prey availability may be linked to directed fishing and the discarding of fish and offal. Vessel traffic may affect seabirds when it occurs in and around important foraging and breeding habitat and increases the likelihood of bird strikes. In addition, seabirds may be exposed to at-sea garbage dumping and the diesel and other oil discharged into the water associated with commercial fisheries. As stated in Section 4.6.4 of the EFH FEIS (NMFS 2005), numerous human-induced factors have adversely affected sea turtle populations in the North Pacific. Indirect effects to seabirds by commercial fisheries are likely to continue for the foreseeable future. Section 4.19 of the Amendment 20 FEIS describes the effects of trawl rationalization on seabirds.

4.3.2.5 Essential Fish Habitat and the California Current Ecosystem

Cumulative effects to EFH are a function of ongoing adverse effects of fishing, including fishing regulated by measures implemented through the biennial harvest specifications process combined with other activities, discussed below. Past groundfish harvest specifications EISs (PFMC 2006; PFMC 2008a) evaluated the cumulative impacts of groundfish fisheries on essential fish habitat and trophic structure. The current harvest specifications are expected to have similar cumulative effects, because fishing effort and fishery removals would not be so substantially different so as to result in cumulative effects differing in type and intensity. Cumulative effects are more relevant for these environmental components, because changes in resource status result from the incremental effects of fishing over longer time periods.

Future harvest specifications could induce changes in fishing behavior via time/area closures, gear restrictions, and harvest levels. Fishing behavior is a result of management measures, availability of target species, as well as socioeconomics, and factors such as ex-vessel value can create a situation in which vessels are re-rigged to target a different species than previously being targeted. Additionally, the cost for fuel and the potential for more oversight from observer programs would like decrease fishing effort and associated habitat impacts.

The Amendment 20 FEIS describes potential effects of that action on EFH and the ecosystem. The following factors resulting from the trawl rationalization program could affect EFH and trophic structure:

- Trawl fleet consolidation is likely to result in changes in the level and distribution of fishing effort.
- Changes in fishing strategy, such as shorter tow times of avoid overfished species catch, could have a modest mitigating effect on impacts to EFH.
- Increased catch of target species could have a modest effect on abundance at different trophic levels.

- Gear switching provisions could result in some trawl fishing effort being replaced by fixed gear effort, which could have mixed effects. Fixed gear generally has less adverse impacts to EFH compared to trawl gear. However, groundfish trawl is generally prevented from being used in rocky habitat because of gear restrictions and area closures, including RCAs and EFH closed areas. Rocky habitat is more sensitive to adverse effects from fishing because of the presences of biogenic habitat such as deepwater corals and sponges. Fixed gear is less restricted from fishing in these areas and still result in adverse impacts.

Changes in ocean use for energy development and offshore aquaculture, external factors outlined above, may mitigate adverse impacts to EFH by creating de facto marine reserves, closed to fishing. However, they may have impacts resulting from anchors or other equipment emplaced on the seafloor.

The Amendment 20 FEIS also discusses use of the Atlantis California current ecosystem model (Brand, *et al.* 2007) to explore the effects of fishing on trophic dynamics. More recently, Kaplan and Levin (2009) discussed using the model to evaluate a range of fishery management strategies in terms of changes in relative abundance of different functional groups. Management strategies were presented in terms of harvest as a fraction of initial abundance based on data from approximately 1995-2005. This provides a very general look at the cumulative effects of fishing on the ecosystem. Shifts in community structure occurred as harvest levels increased "such that short-lived productive species replace longer-lived, lower productivity species." The authors note that sustainably fishing productive high value species while allowing overfishing on lower value, less productive species may maximize revenue, but such a strategy is not acceptable from a conservation perspective. Furthermore, the current policy framework, while focusing on single stock management, has preventing overfishing on all stocks as a key objective. Thus, groundfish management is largely driven by the need to rebuild stocks of less productive rockfish. Once rebuilt, harvest limits for these stocks will likely have to be set at relatively low levels compared to historical level of fishing, as noted above.

While a variety of effects on marine ecosystems are forecast due to climate change—including hypoxia, acidification, increased storm activity, and changes in ocean currents—predicting local, specific effects is not yet possible (Pinsky and Wannier 2010). Climate change will have likely effects upon fish stock biomass, which could in turn lead to changes in fishing behavior that impacts trophic structure and EFH.

4.4 Summary of the Impacts of the Alternatives of the Integrated Alternatives

This section summarizes the key effects of the No Action Alternative and the integrated alternatives, including the FPA. As presented in Chapter 2, the integrated alternatives are suites of harvest specifications for all non-overfished species/species complexes and overfished species, along with management measures for all sectors of the fishery. The integrated alternatives are driven by the alternative ACLs for the overfished species, which are in turn driven by the rebuilding alternatives for these stocks. This summary focuses on the effects of rebuilding the eight overfished groundfish species under alternative rebuilding plans, expressed as alternative ACLs, including the time to rebuild the stocks; the corresponding economic implications to groundfish sectors, port groups, and fishing communities; the interaction of overfished species within the marine ecosystem; and the effects on non-groundfish species and the marine ecosystem. Alternative 2011-2012 groundfish management measures are designed to provide fishing opportunities to harvest healthy species within the constraints of alternative overfished species' ACLs. The following tables and figures, which can be found at the end of this section, provide a "snapshot" of the bottom line biological and socioeconomic effects of the action alternatives:

- Table 4-44 – Minimum Time to Rebuild ($T_{F=0}$), Maximum Permissible Rebuilding Time (T_{MAX}) and Median Time to Rebuild under the Alternatives.

- Table 4-45 – Projected Fishing Mortality of Non-overfished Species and Species Complexes.
- Table 4-46 – Overfished Species Fishing Mortality Projections By Alternatives 2011 and Biological Consequence Indicators.
- Table 4-47 – Overfished Species Fishing Mortality Projections By Alternatives 2012 and Biological Consequence Indicators.
- Table 4-48 – Estimated Groundfish Revenue Impacts by Fishery Sector under the 2011-2012 Groundfish Alternatives.
- Figure 4-25 – depicts trends in groundfish exvessel revenues since 1981, with projections through 2008 under each of the action alternatives.
- Table 4-49 – Change in Commercial Fishery Income Relative to No Action and Socioeconomic Indicators.
- Table 4-50 – Change in Recreational Fishing Trips Relative to No Action and Socioeconomic Indicators.
- Table 4-51 – Percent Change in Recreational Bottomfish Angler Trips and Commercial Income from No Action.
- Table 4-52 – Estimated Community Income Impacts from Commercial Fishing and Processing Activities by Port Group Area under No Action ($ million) and Change from No Action (%) under the Action Alternatives.
- Table 4-53 through Table 4-56 – which show changes in trawl and non-trawl RCA structure by fishery, including sub-options.
- Table 4-57 through Table 4-61 – which show changes in recreational seasons and RCA structure by state, including sub-options.

4.4.1 Alternatives and Projected Impacts

4.4.1.1 No Action

If no action were taken by the Council, the 2010 OYs and management measures currently specified in Federal regulations would remain in place for the 2011-2012 fisheries. For the purposes of this analysis, currently specified in regulation refers to the regulations as of July 16, 2010 (75 FR 41383). This alternative does not consider the implementation of the trawl rationalization program under Amendment 20 or the allocations under Amendment 21. The ABC harvest specifications considered under the No Action Alternative (equivalent to the OFLs) for all groundfish species and species groups are the 2010 ABCs. The OY harvest specifications considered under the No Action were specified under the pre-Amendment 23 harvest specification framework and would be analogous to ACLs under the new framework.

4.4.1.2 Alternative 1 (1a and 1b)[32]

Alternative 1 is comprised of the lowest ACLs for overfished species which results in the shortest rebuilding times relative to the other integrated alternatives. Relative to F=0, the changes in rebuilding time are as follows: widow rockfish and petrale sole median rebuilding times are equal to F=0; bocaccio, canary rockfish, and POP median rebuilding times are one year longer than F=0; the darkblotched rockfish median rebuilding are two years longer than F=0; the cowcod median rebuilding time is four years longer than F=0; and the yelloweye rockfish median rebuilding time is 18 years longer than F=0 (Table 4-44). A rebuilding plan would be included for petrale sole in which petrale sole continues to be managed as a target species. The canary rockfish ACL drives the management measures for commercial and recreational fisheries under this alternative. Under Alternative 1, the apportionment of canary rockfish is so low that it severely reduces fishing opportunities coastwide. The ACLs for non-overfished species are the same in Alternatives, 1, 2, 3, and the FPA, with the exception of Pacific whiting and Dover sole. The Dover sole ACL (16,500 mt) is the same as Alternatives 1, 2 and 3, but different under the FPA. For Pacific whiting the low ACL (96,968 mt) is considered.

Alternative 1 reduces overfished species ACLs compared to No Action catch levels (Table 4-46 and Table 4-47). The revenue generated by commercial groundfish fisheries and the number of recreational bottomfish angler trips are lower than No Action. Catch of many of the target species would be significantly below the ACLs (Table 4-45) under this alternative. The amount of open fishing area is decreased for all sectors as the size of RCAs and YRCAs are expanded to reduce the catch of overfished species (Table 4-53 through Table 4-61). Under Alternative 1a and 1b, the commercial exvessel revenues for the major directed groundfish sectors in 2011 are estimated to be approximately $58.6 million for Alternative 1a and $53.2 million for Alternative 1b (Table 4-48). In 2012, the commercial groundfish fishery exvessel revenues are estimated to be $57.9 million under Alternative 1a and $53.8 under Alternative 1b (Table 4-48). The exvessel revenue generated by all commercial groundfish fisheries in 2011 is projected to be 28.3 percent (1a) and 34.9 percent (1b) lower than No Action, and 29.1 percent (1a) and 34.1 percent (1b) lower than No Action in 2012 (Table 4-48). The change in recreational bottomfish angler trips for all three states combined are projected to be 25.9 percent lower under Alternative 1 (28.3 percent for charter fishing and 23.3 percent for private fishing) (Table 4-50).

Both a rationalized and non rationalized trawl fishery were considered under this alternative. Under trawl rationalization, the burden to stay within the harvest specifications is the responsibility of the individual harvesters (IFQ) and harvester cooperatives (at-sea whiting). The canary rockfish ACL limits the catch of target species, such as petrale and Dover sole in the summer months, as well as English sole, arrowtooth flounder, and other flatfish on the continental shelf. The bottom trawl fisheries on the continental slope are restricted more under this alternative than any other with a year round seaward RCA boundary of 250 fm to reduce access to darkblotched rockfish and petrale sole. Alternative 1 has the lowest non-whiting trawl allocation for petrale sole (342 mt) compared to Alternative 2 (643 mt) and Alternative 3 (865 mt). Under a cumulative limit structure, the average bimonthly trip limit of 1,458 lbs/2 months, compared with the average petrale sole trip limits in 2010 of 7,900 lbs/2 months (No Action Alternative) and the FPA trip limits of 4,800 lbs/2 months for 2011 and 6,400 lbs/2 months for 2012. Sablefish is a constraining target species in the DTS fishery. Under Alternative 1, the trip limits for sablefish, which are an average

[32] Different sub-options that explore different management measures for the non-nearshore fishery Alternatives 1a and 1b are included in this alternative. Under Alternative 1, the canary rockfish ACL and associated apportionment to the non-nearshore fisheries is so low that the non-trawl RCAs would have to be restricted to depths that are deeper than implemented since the inception of RCAs (Option 1a) or sablefish allocations would have to be reduced by 42 percent in 2011 and 33 percent in 2012 (Option 1b).

of 11,500 lbs/2 months in Alternative 1, versus 21,389 lbs/2 months in the No Action Alternative, and 13,063 lbs/2 months in the FPA.

Alternative 1 includes the lowest Pacific whiting ACL (96,968 mt). The low ACL was considered because access to higher ACLs would likely by restricted by overfished species catch. For the Pacific whiting, the catcher-processor sector would likely reach their whiting allocation within the overfished species allocations. However, the mothership and shoreside sectors' allocation of widow rockfish is less than the impacts seen in 2009. As such, these fleets would likely need to actively avoid widow rockfish to reach their whiting allocations (Table C-37 in Appendix C).

For the non-trawl sector under Alternative 1, the harvest guideline of canary rockfish is so low that the non-trawl RCAs would restrict fishing to depths that are deeper than those implemented since the inception of RCAs (Table 4-55 and Table 4-56). Changes in allowable harvest of sablefish would have to be reduced by as much as 42 percent to reduce canary rockfish catch. The results of these measures may be significantly reduced annual catches, fewer areas to fish, and longer-distance runs to reach fishing grounds. Option 1a would seek to maintain full harvest of the fixed gear sablefish allocations and would require closing the area north of Point Chehalis (46.888° north latitude) completely to the non-nearshore sectors, or alternatively, pushing the RCA boundaries to 150 fm (Table 4-55). The second option under Alternative 1 (Option 1b) requires a reduction to the available harvest of sablefish and more constraining RCA lines in some areas (Table 4-55 and Table 4-56). Options 1a and 1b would apply to the open access fishery as well.

Under Alternative 1, the Oregon nearshore fishery would be severely constrained by yelloweye rockfish and California is constrained by yelloweye and canary rockfish. Black rockfish and greenling are important target strategies in Oregon. For both species, landings would be most restrictive under Alternative 1 relative to other target species to stay within the overfished species ACLs. In California, black rockfish is an important target strategy in the area between 42° and 40°10' N lat and cabezon is an important target strategy statewide; therefore higher landings were maintained for these species relative to others while staying within overfished species impacts. For the integrated alternative 1 catch projections, the nearshore fishery is modeled assuming a 50:50 (OR:CA) catch sharing of yelloweye rockfish. A 20 fm depth restriction would be in place between 42° north latitude to 43° north latitude with reductions to landed catch of 69 percent for black rockfish and greenling, and 79 percent for the remaining species (Table C-48 in Appendix C). While south of 42° north latitude a statewide 20 fm depth restriction and reduced landings for many species, except cabezon.

For the Washington recreational fishery, Alternative 1 would continue to allow for a year-round groundfish season with lingcod seasons that are the same as the No Action Alternative. The aggregate bottomfish limit would be reduced from 15 to 12 and would include a cabezon sub limit of two per angler per day in addition to the sub limits for rockfish (10) and lingcod (2). To maintain yelloweye harvest levels that don't exceed the Washington harvest share under this alternative would require increasing the time that the 20 fathom depth restriction is in place in Marine Areas 3 and 4 from what is in place under the No Action Alternative. Management measures for Marine Areas 1 and 2 would be the same as the No Action Alternative (Table 4-57). YRCAs in place under No Action would remain in place.

Depth management is the main tool used for controlling yelloweye rockfish catch in the Oregon recreational fishery. A range of season/depth restrictions were considered under this Alternative, ranging from the least restrictive, a year round season with April through September open only shoreward of 20 fathoms to the most restrictive option, a year round season open only shoreward of 20 fathoms (Table 4-58). The catch projection model for the integrated alternative assumes option 5 (Table 4-57) is carried forward. Bag limits for marine fish, lingcod, and flatfish under the No Action alternative would remain in place under Alternative 1, except for cabezon which would have a seasonal sub-bag limit of one fish in the months that the groundfish fishery is restricted to inside of 20, 30, or 40 fathoms. The shore fishery would be a year round fishery as yelloweye rockfish are not impacted. Fishing for sanddabs and "other flatfishes", excluding Pacific halibut would be legal year round without depth restrictions, except that fishing would be restricted to shoreward of 40 fathoms during any period the groundfish fishery has any depth restrictions. Extension of the Stonewall Banks YRCAs would likely be necessary.

As under No Action, under Alternative 1 yelloweye rockfish continues to restrict the California Recreational fishery. Under Alternative 1 the season duration for the rockfish, Cabezon and kelp greenling (RCG complex) would be as follows: in the Northern Management Area to a four month fishing season (restricted to areas <20 fm); in the North-Central North of Point Arena Management Area to a one and a half month season (restricted to areas <20 fm); in the North-Central South of Point Arena Management Area to four (restricted to areas <30 fm); in the South-Central Monterey Management Area to six months (restricted to areas <40 fm) (Table 4-59). Bocaccio would be the most constraining species in the South-Central Morro Bay Management Area and the Southern Management Area. In the South-Central Morro Bay Management Area the RCG complex fishery would have a six month season (restricted to areas <40 fm). In the Southern Management area the RCG complex fishery would be restricted to a five month fishing season (restricted to areas <60 fm) during the least valuable months of the season. The resulting RCG season would not include March through April when Coastal Pelagic and Highly Migratory species are not available to the fishery. Under all of the alternatives the lingcod season and depth restrictions would be modified to be the same as the RCG complex (Table 4-61). Under all of the Alternatives, the California scorpionfish seasons and depth restrictions in the southern area would be increased to 60 fm year round, eliminating the 40 fm restrictions at the beginning and end of the year (Table 4-60). Increase in depth restriction in the CCA from 20 fm to 30 fm (or 40 fm) and retention of shelf and slope rockfish including bocaccio in the CCA would likely not be possible under this Alternative. YRCAs would be available if necessary inseason, but not in effect at the start of the year.

4.4.1.3 Alternative 2

Alternative 2 is comprised of the intermediate overfished species ACLs. Relative to F=0, the change in rebuilding times are as follows: The median time to rebuild POP and petrale is one year later than F=0, the median time to rebuild bocaccio, canary rockfish, and petrale sole is two years later than F=0, the median time to rebuild darkblotched rockfish is six years later than F=0, the median time to rebuild cowcod is eight years later than F=0, and the median time to rebuild yelloweye rockfish is 27 years greater than F=0. Widow rockfish is assumed to be rebuilt in 2010 under all alternatives. A rebuilding plan would be included for petrale sole in which petrale sole continues to be managed as a target species. The associated Pacific whiting ACL is driven by the availability of overfished species. The Dover sole ACL (16,500 mt) is the same as Alternatives 1, 2 and 3. For Pacific whiting the intermediate ACL (193,935 mt) is considered.

Alternative 2 reduces overfished species ACLs compared to No Action, with the exception of yelloweye rockfish for which the ACL is 17 mt as compared to a No Action of 14 mt (Table 4-46 and Table 4-47). Under this alternative, catch of many of the target species would be significantly below the ACLs (Table 4-45). Revenues generated by commercial groundfish fisheries and the number of recreational bottomfish trips are slightly lower than under No Action (Table 4-48 and Table 4-50). Under Alternative 2, the exvessel revenues for the major directed groundfish sectors are estimated to be approximately $73.6 million in 2011 and $73.0 million in 2012 (Table 4-48). The projected revenues from the commercial fishery in 2011 are 9.8 percent lower than No Action, and in 2012 are 10.6 percent lower than No Action (Table 4-48). Decreases in revenue occurring in the non-nearshore limited entry and open access fisheries and the tribal fisheries, result from the reduced sablefish ACL. The change in recreational fishing trips for all three states combined is projected to be 0.58 percent higher under Alternative 2 (0.68 percent increase for charter fishing and 0.38 percent increase for private fishing) (Table 4-50).

Both a rationalized and non rationalized trawl fishery were considered under this alternative. Under trawl rationalization, the burden to stay within the harvest specifications is the responsibility of the individual harvesters (IFQ) and harvester cooperatives (at-sea whiting). With cumulative limits, Alternative 2 has the intermediate petrale sole ACL (643 mt) compared to Alternative 1 (342 mt) and Alternative 3 (865 mt). The non-whiting trawl allocation under the No Action Alternative was 1,140 mt and the FPA was 871 mt in 2011. The Alternative 2 petrale model target resulted in an average bimonthly trip limit of 5,125 lbs/2 months, compared with 7,900 lbs/2 months for the No Action Alternative, 4,800 lbs/2 months for the FPA in 2011. Sablefish is a constraining target species in the DTS fishery. Under Alternative 2, the sablefish trawl allocation is 2,325 mt, the No Action Alternative is 2,955 mt, and the FPA is 2,538 mt. This is reflected in the trip limits for sablefish, which are an average of 11,208 lbs/2 months in Alternative 2, versus 21,389 lbs/2 months in the No Action Alternative, and 13,063 lbs/2 months in the FPA in 2011.

Alternative 2 includes the Pacific whiting ACL of 193,935 mt, which is the same as No Action. While the whiting fishery is very dynamic and conditions (e.g., whiting schooling/availability, bycatch interactions, etc.) vary from year to year, projections indicate that the catcher-processor sector, and mothership sectors will need to operate such that they stay within darkblotched and widow rockfish constrains to successfully harvest their whiting allocation. Under a bycatch limit management structure, the shorebased fishery widow rockfish and POP could be constraining, therefore efforts would need to be made to keep catch below the bycatch limits to harvest the whiting allocation.

The sablefish ACL (and therefore the allocation for non-nearshore fixed gear fisheries) will be lower in 2011 and 2012 than observed in 2010 under all of the alternatives. The seaward RCA boundary configuration under Alternative 2 is the same as the Council's FPA and Alternative 3 in that it liberalizes the 125 fm seaward RCA to 100 fm between 43° and 45.064° north latitude, while reducing impacts to canary and providing only marginal increased impacts to yelloweye rockfish (Table 4-55).

Under Alternative 2, the Oregon nearshore fishery would be severely constrained by yelloweye rockfish and California nearshore fishery is constrained by yelloweye and canary rockfish. Black rockfish and greenling are important target strategies in Oregon, for which landings would be most restricted relative to other target species to stay within the overfished species ACLs. In California, black rockfish is an important target strategy in the area between 42° and 40°10' north latitude and cabezon is an important target strategy statewide; therefore higher landings were maintained for these species relative to others while staying within overfished species ACLs. Under Alternative 2 the nearshore fishery mortality projections were modeled assuming a 50:50 (OR:CA) catch sharing of yelloweye rockfish. North of 42° north latitude, a 20 fm depth restriction would be maintained from 42° north latitude to 43° north latitude. Reductions to landed catch would be as follows: 51 percent for black rockfish and greenling, 62 percent remaining species. South of 42° north latitude, a 20 fm depth restriction would be implemented statewide. No reductions to landed catch would be necessary due to the savings afforded by the 20 fm depth restriction. Landings for black rockfish would be increased between 42° and 40°10' north latitude. Cabezon would be increased statewide to reflect the higher ACL available as a result of the new assessment.

For the Washington recreational fishery, the groundfish fishery management measures under Alternative 2 are the same as the Council's FPA (Table 4-57).

Under Alternative 2, depth management is the main tool used for controlling yelloweye rockfish catch in the Oregon recreational fishery. The range of season/depth restrictions considered under this Alternative, range from the least restrictive, a year round season with April through September open only shoreward of 40 fathoms to the most restrictive option, a year round season open only shoreward of 25 fathoms (Table 4-58). The fishing mortality projections are based on option 3 (see Appendix C for recreational sub-options considered in the development of this alternative). Bag limits for marine fish, lingcod, and flatfish under the No Action alternative would remain in place, except for cabezon which would have a seasonal sub-bag limit of one fish in the months that the groundfish fishery is restricted to inside of 40 fathoms. The shore fishery would be a year round fishery as yelloweye rockfish are not impacted. Fishing for sanddabs and “other flatfishes”, excluding Pacific halibut, would be legal year round without depth restrictions only when the groundfish fishery has depth restrictions. Stonewall Banks YRCAs would be the same as No Action.

Yelloweye rockfish would continue to restrict the California recreational fishery in the northern management areas. Under Alternative 2 the season duration for the RCG complex would be as follows: in the Northern Management Area a four month fishing season (restricted to areas <20 fm); in the North-Central North of Point Arena Management Area a two and a half month season (restricted to areas <20 fm); in the North-Central South of Point Arena Management Area to four (restricted to areas <30 fm); in the South-Central Monterey Management Area eight months (restricted to areas <40 fm); in the South-Central Morro Bay Management Area the fishery would have an eight month season (restricted to areas <40 fm); and in the Southern Management area the fishery would be a 10 month fishing season (restricted to areas <60 fm) (Table 4-59). In the North-Central South of Point Arena Management Area both yelloweye and blue rockfish constrain the season lengths. Yelloweye rockfish is not constraining the season in the Monterey and Morro Bay South-Central Management Areas. The season in the Southern Management area would allow fishing during March and April when coastal pelagic and highly migratory species are not available to the fishery. Under all of the alternatives the lingcod season and depth restrictions would be modified to be the same as the RCG complex (Table 4-61). Under all of the Alternatives, the California scorpionfish seasons and depth restrictions in the southern area would be increased to 60 fm year round, eliminating the 40 fm restrictions at the beginning and end of the year (Table 4-60). Increase in depth restriction in the CCA from 20 fm to 30 fm (or 40 fm) and retention of shelf and slope rockfish including bocaccio in the CCA could be allowed under this Alternative. YRCAs would be available if necessary inseason, but none are in effect at the start of the year.

4.4.1.4 Alternative 3

Alternative 3 represents the Council’s Preliminary Preferred Alternative from April 2010, and to the extent possible follows the FMP rebuilding strategy of maintaining the current SPRs. For management stability, the SSC recommended continuing with a constant SPR harvest rate for most overfished species applied to the latest stock assessment, except for widow rockfish and yelloweye. Relative to F=0, the change in rebuilding time are as follows: for POP and petrale the median time to rebuild is two years longer than F=0; for canary rockfish the median time to rebuild is three years longer than F=0, for bocaccio the median time to rebuild is four years longer than F=0; for both cowcod and darkblotched rockfish the median time to rebuild is eleven years longer than F=0; and the yelloweye rockfish median time to rebuild is 37 years longer than F=0. Widow rockfish is projected to rebuild by 2010 under all of the alternatives. The widow rockfish ACL of 600 mt under Alternative 3 accommodates fisheries while still achieving rebuilding by T_{TARGET}. The yelloweye ACL represents a departure from the current SPR of 71.9 percent by increasing the SPR to 72.8. Maintaining the 71.9 percent harvest rate would not result in rebuilding by the current T_{TARGET} of 2084. As such, the yelloweye rockfish ACL for Alternative 3 is 20 mt for both 2011 and 2012 which is projected to result in rebuilding by 2084. The ACLs for non-overfished species are the same in Alternatives, 1, 2, 3, and the FPA, with the exception of Pacific whiting and Dover sole. The Dover sole ACL (16,500 mt) is the same as Alternatives 1, 2 and 3. For Pacific whiting the high ACL (290,903 mt) is considered.

Alternative 3 increases ACLs for yelloweye, widow, darkblotched and canary (2012 only) rockfish over the No Action OYs (Table 4-46 and Table 4-47). Similar to No Action, catch of many of the target species would be significantly below the ACLs under this alternative (Table 4-45). However, revenues generated by the commercial trawl and nearshore fisheries directed at groundfish, and the number of recreational bottomfish trips are higher than No Action (Table 4-46 and Table 4-50). The exvessel revenues for the major directed groundfish sectors in 2011 are estimated to be approximately $90.4 million and $90.0 million in 2012 (Table 4-48). Under Alternative 3 the projected commercial fishery revenue in 2011 is 10.7 percent higher than No Action and 10.1 higher in 2012. Decreases in revenue in the non-nearshore limited entry and open access fisheries and tribal fisheries compared to No Action, result from the reduced sablefish ACL. The larger Pacific whiting ACL (290,903 mt) results in the highest exvessel revenue projections for the trawl fisheries. The change in recreational fishing trips for all three states combined is projected to be a 2.78 percent increase form No Action is higher under Alternative 2 (4.28 percent increase for charter fishing and 3.48 percent increase for private fishing) (Table 4-50).

Both a rationalized and non rationalized trawl fishery were considered under this alternative. Under trawl rationalization, the burden to stay within the harvest specifications in the responsibility of the individual harvesters (IFQ) and harvester cooperatives (at-sea whiting). Under a cumulative limit fishery structure, Sablefish was a constraining target species in the DTS fishery. Under Alternative 3, the trawl allocation was 2,588 mt, the No Action Alternative was 2,955 mt, and the FPA was 2,538 mt in 2011. This is reflected in the trip limits for sablefish, which were an average of 13,625 lbs/2 months in Alternative 3, versus 21,389 lbs/2 months in the No Action Alternative for 2011. Alternative 3 has the highest petrale sole trawl model target (865 mt) compared to Alternative 2 (643 mt) and Alternative 1 (342 mt). The trawl allocation under the No Action Alternative was 1,140 mt and the FPA was 871 mt. The Alternative 3 petrale model target resulted in an average bimonthly trip limit of 4,900 lbs/2 months, compared with 7,900 lbs/2 months for the No Action Alternative in 2011.

Under Alternative 3 the Pacific whiting ACL would be 290,903 mt, 1.5 times No Action. There has not been a whiting OY as high as that contemplated under Alternative 3. As such, there are no recent bycatch impacts to inform how the allocations compare. It is assumed that all sectors would need to actively avoid overfished species in order to prosecute this high whiting allocation.

The sablefish ACL (and therefore the allocation for non-nearshore fixed gear fisheries) will be lower in 2011 and 2012 than observed in 2010 under all of the alternatives. The seaward RCA boundary configuration is the same as the FPA and Alternative 3 in that it liberalizes the 125 fm seaward RCA to 100 fm between 43^o and 45.064^o north latitude, while reducing impacts to canary and providing only marginal increased impacts to yelloweye rockfish compared to No Action (Table 4-55). Changes in allowable harvest of sablefish would not have to be reduced.

Under Alternative 3, the Oregon nearshore fishery would be severely constrained to stay within the ACL for yelloweye rockfish and California is constrained by yelloweye and canary rockfish. Black rockfish and greenling are important target strategies in Oregon, for which landings would be most restricted relative to other target species to stay within the overfished species ACLs. In California, black rockfish is an important target strategy in the area between 42° and 40°10’ N lat and cabezon is an important target strategy statewide; therefore higher landings were maintained for these species relative to others while staying within overfished species ACLs. Under integrated Alternative 3, the nearshore fishery mortality projections were based on a model assuming a 50:50 (OR:CA) catch sharing of yelloweye rockfish. North of 42° north latitude, a 20 fm depth restriction would be maintained from 42° to 43° north latitude and a 30 fm line would remain north of 43° N. latitude. Reductions to landed catch north of 42° N. latitude would be as follows: 38 percent for black rockfish and greenling, 49 percent remaining species. South of 42° north latitude, a 20 fm depth restriction would be implemented statewide. No reductions to landed catch would be necessary due to the savings afforded by the 20 fm depth restriction. Landings for black rockfish would be increased between 42° and 40°10’ north latitude. Landings for cabezon would be increased to reflect the higher ACL available as a result of the new assessment.

For the Washington recreational fishery, the groundfish fishery management measures under Alternative 3 are the same as the Council's FPA (Table 4-57). Depth management is the main tool used for controlling yelloweye rockfish catch in the Oregon recreational fishery. A range of season/depth restrictions were considered under this Alternative, ranging from the most restrictive, a year round season with April through September open only shoreward of 40 fathoms to the least restrictive option, a year round season with May through August open only shoreward of 40 fathoms (Table 4-58). The catch projections were modeled using option 4 (Table 4-57). Bag limits for marine fish, lingcod, and flatfish under the No Action alternative would remain in place under Alternative 3, except for cabezon which would have a seasonal sub-bag limit of one fish in the months that the groundfish fishery is restricted to inside of 40 fathoms. The shore fishery would be a year round fishery as yelloweye rockfish are not impacted in this fishery. Fishing for sanddabs and "other flatfishes", excluding Pacific halibut would be legal year round without depth restrictions, except that any fishing would be restricted to shoreward of 40 fathoms during any period the groundfish fishery has any depth restrictions. The Stonewall Banks YRCAs would be the same as NO Action.

Under Alternative 3 the California recreational fishery season duration would be as follows for the RCG complex: in the Northern Management Area five and one half months (restricted to areas <20 fm); in the North-Central North of Point Arena Management Area three months (restricted to areas <20 fm); in the North-Central South of Point Arena Management Area six months (restricted to areas <30 fm); the South-Central Monterey Management Area to eight months (restricted to areas <40 fm); in the South-Central Morro Bay area eight months (restricted to 40 fm); and in the Southern Management area 10 months (restricted to areas <60 fm) (Table 4-59). In the Southern Management Area fishing is allowed March and April when Coastal Pelagic and Highly Migratory species are not available to the fishery. Under all of the alternatives the lingcod season and depth restrictions would be modified to be the same as the RCG complex (Table 4-61). Under all of the Alternatives, the California scorpionfish seasons and depth restrictions in the southern area would be increased to 60 fm year round, eliminating the 40 fm restrictions at the beginning and end of the year (Table 4-60). Increase in depth restriction in the CCA from 20 fm to 30 fm (or 40 fm) and retention of shelf and slope rockfish including bocaccio in the CCA would be possible under this Alternative. YRCAs would be available if necessary inseason, but not in effect at the start of the year.

4.4.1.5 Alternative 4 (NMFS preferred Alternative)

This alternative is a modification of the Council's FPA in that it has reduced rebuilding periods for cowcod and yelloweye rockfish. Under Alternative 4, the median time to rebuild cowcod is eight years later than $_{F=0}$, and the median time to rebuild yelloweye rockfish is 27 years greater than $_{F=0}$ all other rebuilding periods are the same as the FPA. The rebuilding periods for all other overfished species would be the same as the FPA. Under Alternatives 4, all harvest specifications are the same as the FPA except that the cowcod ACL is 3 mt and the yelloweye rockfish ACL is 17 mt. The mortality projections for all stocks (including cowcod and yelloweye rockfish) under the FPA were within the specifications of Alternative 4. Therefore, management measures would be the same as the FPA and economic effects would be similar to the FPA, with the exception of management measures affecting the CCAs in the southern California recreational fishery. Unlike the FPA, Alternative 4 does not allow for the CA recreational depth restriction changes to the CCAs nor would it allow the retention of shelf rockfish in the CCAs. The overall commercial fishery revenue and angler trip are expected to be similar to the FPA, with the exception of recreational angler trips in the southern California area. The projected angler trips under Alternative 4 would be similar to the FPA. Table 4-50, shows that there is a zero percent change in recreational angler trips in the Southern management area (Los Angeles and San Diego Counties) under the FPA. Under the FPA even with the CCA changes and retention of shelf rockfish within the CCAs, little increase in angler trips were projected. Therefore, not including the CCA changes and retention of shelf rockfish under Alternative 4 should result in overall angler trips does that are similar to the FPA.

4.4.1.6 Council's Final Preferred Alternative

The Council reviewed the DEIS, analytical documents provided by the Council's advisory bodies and heard testimony from Council advisors, fishing industry representatives, representatives from non-governmental organizations, and the general public before making a recommendation on the FPA. Like Alternative 3, the FPA follows the FMP rebuilding strategy of maintaining the current SPRs as much as possible. For management stability, the SSC recommended continuing with a constant SPR harvest rate for most overfished species applied to the latest stock assessment, except for widow rockfish and yelloweye rockfish. Widow rockfish is projected to rebuild by 2010 under all of the alternatives. An ACL of 600 mt accommodates fisheries while still achieving rebuilding. The yelloweye ACL represents a departure from the harvest rate of 71.9 percent which is also the ramp-down goal harvest rate by increasing to 72.8. Maintaining the 71.9 percent harvest rate would not result in rebuilding by the current T_{TARGET} of 2084. As such, the yelloweye rockfish ACL for the FPA is 20 mt for both 2011 and 2012. An ACT of 17 mt would be included for yelloweye rockfish under the FPA. Relative to F=0, the change in rebuilding time are as follows: for POP and petrale the median time to rebuild is two years longer than F=0; for canary rockfish the median time to rebuild is three years longer than F=0, for bocaccio the median time to rebuild is four years longer than F=0; for both cowcod and darkblotched rockfish the median time to rebuild is eleven years longer than F=0; and the yelloweye rockfish median time to rebuild is 37 years longer than F=0. A petrale sole rebuilding plan would be implemented that would continue to be managed as a target species. The ACLs for non-overfished species are the same in Alternatives, 1, 2, 3, and the FPA, with the exception of Pacific whiting and Dover sole. The Dover sole ACL is 25,000 mt and the Pacific whiting ACL is the same as No Action (193,935 mt).

The FPA increases ACLs for yelloweye, widow, darkblotched and canary (2012 only) rockfish when compared to No Action OYs (Table 4-46 and Table 4-47). Similar to No Action, catch of many of the target species would be significantly below the ACLs under this alternative (Table 4-45). However, revenues generated by the commercial trawl and nearshore fisheries directed at groundfish, and the number of recreational bottomfish trips are higher than No Action (Table 4-48 and Table 4-50). The exvessel revenues for the major directed groundfish sectors in 2011 are estimated to be $78.9 million and $78.2 million in 2012 (Table 4-48). Under the FPA the commercial fishery in 2011 is 3.4 percent less than No Action in 2011 and 4.2 percent less in 2012. Decreases in revenue in the non-nearshore limited entry and open access fisheries and tribal fisheries result from the reduced sablefish ACL. The change in recreational fishing trips for all three states combined is projected to be 6.0 percent higher under the FPA than No Action (+7.3 percent increase for charter fishing and + 4.7 percent increase for private fishing) (Table 4-50).

Both a rationalized and non rationalized trawl fishery were considered under this alternative. Under trawl rationalization, the burden to stay within the harvest specifications is the responsibility of the individual harvesters (IFQ) and harvester cooperatives (at-sea whiting). The FPA trawl RCA for the rationalized fishery is to set the boundaries as they exist on June 17, 2010. Notable features of this RCA include a modified 200 fm line in the north and a modified 150 fm line in the south during periods 1 and 6. These modified lines are designed to provide access to petrale sole during winter spawning. Under a cumulative limit fishery structure, the FPA has markedly lower trip limits for sablefish in the northern areas, in comparison with the No Action Alternative (14,750 lbs/2 months versus an average of 21,389 lbs/2 months, respectively). This reflects the lower sablefish ACL. The FPA also has much lower petrale sole trip limits coast-wide (4,800 lbs/2 months versus an average of 7,900 lbs/2 months) and somewhat lower trip limits for shortspine thornyheads, which is tied to the lower sablefish limits, since they co-occur. The Dover sole trip limits are 33 percent higher (150,000 lbs/2 months vs. 100,000 lbs/2 months in the No Action Alternative), in order to increase utilization of this species and fulfill the much higher ACL. Slope rockfish limits for the FPA Alternative were set at the same levels as the beginning of 2010 (6,000 lbs/2 months), as modeling to these trip limits kept projections of POP and darkblotched rockfish impacts 15 percent to 20 percent below the trawl allocation, while allowing bycatch of other slope species within the trawl allocations. Like Alternative 3, the FPA, the shoreward RCA boundary in period 4 was brought in to 75 fm in order to further restrict access to summer petrale sole, along with lower trip limits.

The FPA includes the Pacific whiting ACL of 193,935 mt, which is the same as No Action. While the whiting fishery is very dynamic and conditions (e.g., whiting schooling/availability, bycatch interactions, etc.) vary from year to year, projections indicate that the catcher-processor sector, and mothership sectors will need to operate such that they stay within their overfished species constraints to harvest their respective Pacific whiting allocations. Under a bycatch limit management structure, the shorebased fishery would have bycatch limits and would need to keep catch below the bycatch limits to harvest the whiting allocation.

The sablefish ACL (and therefore the allocation for non-nearshore fixed gear fisheries) will be lower in 2011 and 2012 than the OY observed in 2010 under all of the alternatives. The seaward RCA boundary configuration is the same Alternative 3 and liberalizes the 125 fm seaward RCA to 100 fm between 43^{o} and 45.064^{o} north latitude, while reducing impacts to canary and providing only marginal increased impacts to yelloweye rockfish (Table 4-55).

Under the FPA, the Oregon nearshore fishery would be constrained by yelloweye rockfish and California is constrained by yelloweye and canary rockfish. Black rockfish and greenling are important target strategies in Oregon, for which landings would be most restricted relative to other target species to stay within the overfished species impacts. In California, black rockfish is an important target strategy in the area between 42° and 40°10’ N lat and cabezon is an important target strategy statewide; therefore higher landings were maintained for these species relative to others while staying within overfished species impacts. Under the FPA, the nearshore fishery mortality projections were based on a model assuming a 50:50 (OR:CA) catch sharing of yelloweye rockfish. The FPA maintains the No Action RCA structure for the nearshore fishery (30 fm north of 43° N; 20 fm between 43° N and 40° 10’ north latitude; 30 fm between 40° 10’ north latitude and 34° 27’ north latitude; 60 fm south 34° 27’ north latitude).

For the Washington recreational fishery, the groundfish fishery management measures under the FPA are the same as Alternative 2 and 3. The Oregon recreational groundfish fishery would be open year-round, except from April 1 to September 30 when fishing is only allowed shoreward of 40 fm (Figure C-8 in Appendix C). Closing the fishery outside of 40 fm from April 1 to September 30, months where yelloweye rockfish harvest is highest, mitigate the impacts to depleted yelloweye rockfish. (Table 4-58). The on shore fishery would be a year round fishery as yelloweye rockfish fishing mortality is not a concern. A marine fish daily-bag-limit of ten fish in aggregate would be in place. Reducing the marine fish daily-bag-limit will also affect black rockfish harvest rates and may prevent the fishery from harvesting its total allocation. Reductions in the marine fish daily bag limit is not expected to reduce yelloweye rockfish fishing mortality, as data showed little difference in trip hours under 10, 8, 6, or 5 fish bag limits. Cabezon would have a seasonal sub-bag limit of one fish in the months that the groundfish fishery is restricted to inside of 40 fathoms and a lingcod would have a three fish daily bag limit which is projected to keep yelloweye and canary rockfish within the state harvest guidelines. Sanddabs and “other flatfishes”, excluding Pacific halibut would be legal year round without depth restrictions, except that fishing would be restricted to shoreward of 40 fathoms during any period the groundfish fishery has any depth restrictions. The Stonewall Banks YRCAs would be the same as No Action.

Under the FPA, the California recreational fishery season duration would be as follows for the RCG complex: in the Northern Management Area five and one half months (restricted to areas <20 fm); in the North-Central North of Point Arena Management Area three months (restricted to areas <20 fm); in the North-Central South of Point Arena Management Area seven months (restricted to areas <30 fm); the

South-Central Monterey Management Area to eight months (restricted to areas <40 fm); in the South-Central Morro Bay area eight months (restricted to 40 fm); and in the Southern Management area 10 months (restricted to areas <60 fm) (Table 4-59). In the Southern Management Area fishing is allowed March and April when coastal pelagic and highly migratory species are not available to the fishery. Under all of the alternatives the lingcod season and depth restrictions would be modified to be the same as the RCG complex (Table 4-61). Under all of the Alternatives, the California scorpionfish seasons and depth restrictions in the southern area would be increased to 60 fm year round, eliminating the 40 fm restrictions at the beginning and end of the year (Table 4-60). Increase in depth restriction in the CCA from 20 fm to 30 fm (or 40 fm) and retention of shelf and slope rockfish including bocaccio in the CCA would be possible under this Alternative. YRCAs would be available if necessary inseason, but would not be in effect at the start of the year.

4.4.2 The Economic Implications of Uncertainty and Management Flexibility

The economic impact estimates are based on management measures that achieve some level of target and non-target species catch or recreational fishing opportunity. Catch projections, revenue estimates, and recreational effort projections are, as with any projection or estimate, subject to varying degrees of accuracy. While the pre-season estimates represent the best available information on catch and socioeconomic impacts, the estimates will inherently differ from what actually occurs in the fishery. These differences can be due to such things as changes in catch per unit effort, unexpected weather patterns, unexpected ocean conditions, changes in the behavior or availability of the fish stocks, or changes in effort on the part of fishermen, amongst other things. Some projections will be less than what occurs and some will be higher than what actually occurs.

Overfished species catch estimates that end up being less than what actually occurs in the fishery have the potential to negatively impact fishing sectors if an inseason management response is necessary to keep the catch of that overfished species within the ACLs. While the catch of overfished species that are higher than expected may provide for some amount of revenue or angler satisfaction, overfished species provide little social and economic benefit because they represent a small portion of the fishery, but constrain abundant target species. This is because of the mixed stock nature of the fishery. When an inseason action is necessary to stay within an overfished species ACL because of unexpectedly high catch, that inseason action will typically result in a loss of social and economic benefits as the fishery becomes constrained to minimize further catch of that overfished species. While it is impossible to know which species are likely to have higher or lower actual catches than projected, it can almost always be expected that it will occur to some degree.

The amount of uncertainty related to the catch projections of overfished species is directly related to the economic impacts of management measures designed to achieve a given catch level. Predictions of overfished species bycatch are developed based catch models described in Appendix A. These models are based on analysis of observer data, fish ticket data, survey data and logbook data and use mean estimates that imply that there is a 50 percent likelihood that the prediction will be under the actual observation and a 50 percent likelihood that it will be over the actual observation.

Given that there are eight overfished species, this means it is highly likely that the catch of at least one will be higher than projected. If ACLs are constructed in a manner that takes into account the reality that catch projections have a certain level of uncertainty (that is, if ACLs are somewhat higher than projected total catch), then the economic impact that is projected prior to the start of the season for a given set of management measures becomes more certain. As the difference between the ACL of overfished species and projected catch increases, the economic impacts resulting from management measures becomes increasingly more certain. Inversely, as the difference, or "buffer "between the ACL of a overfished species and projected catch decreases, the certainty of the economic impacts projected for that particular management scheme is reduced. For example, if the incidental catch of an overfished species is found to be higher than expected during the course of the season, a restrictive management response will be necessary to insure that the cumulative catch of that overfished species does not exceed the ACL. This restrictive management response is likely to be in the form of reduced access to more abundant target species (through area management and decreased catch limits), and the decreased access to target species will outweigh the marginal gains made from increased catch of overfished species, causing an economic loss compared to what would otherwise occur. If the ACL is larger than projected catch, a restrictive management response may not be necessary, or it may not need to be as severe. This means that as the ACL of an overfished species becomes larger than projected catch, the estimated economic impact associated with that ACL is more certain.

If the actual catch of one or more overfished species is higher than pre-season projections, management measures would be refined inseason to reduce the catch. Because the economic impacts (exvessel revenue and angler trips) are projected from the ACLs and preseason catch projections, the actual economic impacts could be much lower than that projected pre-season. A management system designed in a manner where each stock is equally constraining has no flexibility to respond to likely departures from predictions. In addition, a management system designed in a manner where some, or all, ACLs are higher than projected catch does not necessarily mean longer rebuilding times as the entire ACL will not necessarily be caught.

Management of groundfish fisheries relies on some degree of management flexibility to keep overfished species' catch levels within their respective ACLs while maintaining some amount of social and economic benefits. For example, a typical review of inseason catches will reveal that the catch of one or more overfished species is higher than what was anticipated. The response has often been to implement a change in management regulations which shifts major portions of the fishery to areas where overfished species that are experiencing higher than anticipated catch levels may not be as abundant, but other overfished species may be found in greater abundance. This effectively reduces catches of overfished species that may be tracking ahead of projections, but it may increase the catch of other overfished species. The social and economic impact of restricting the fishery in some areas is often mitigated by the ability to move the fishery to other areas. Without a buffer between projected catch of overfished species and overfished species ACLs, this type of management flexibility would not be possible, and the actual social and economic impact (change in exvessel revenue and angler trips) associated with particular catch levels is likely to be lower than what was expected. Therefore, if it is an objective to maintain some certainty that a level of social and economic benefit related to fishing activities will occur over the course of a year, then a buffer between projected catches of overfished species and the ACL of overfished species is necessary.

4.4.3 Effects on West Coast Fishing Communities

Section 4.2 and Appendix E explore the socioeconomic impact of alternative harvest levels and corresponding management measures on West Coast fishing sectors, ports, and communities. This section summarizes these effects at the county level by listing those counties that are considered "vulnerable" and "most vulnerable" to changes in management measures by ranking those counties that are most engaged in fishing or dependent on the groundfish fishery and least resilient to negative socioeconomic impacts (Table E-3 and Table E-4 in Appendix E).

In the Community Vulnerability analysis (Appendix E), communities are placed in high, low, and medium categories based on an overall score for engagement, dependence, and resiliency. (Since some communities show no groundfish landings for the dependence score a fourth category, not dependent, was added.) A county is listed as "vulnerable" if it is commercially engaged and least resilient, commercially dependent and least resilient, or recreationally engaged or dependent and least resilient. A county is listed as “most vulnerable” if they are highly engaged, highly dependent, and have low resiliency.

4.4.4 Vulnerable Communities

4.4.4.1 Alternative 1

For the commercial fisheries the difference between alternatives is measured as the percent change in estimated exvessel revenue from No Action. Under Alternative 1a, vulnerable and most vulnerable port groups with the greatest decrease (>25 percent) in commercial fishery ex-vessel revenue from No Action are Tillamook (-50.9 percent), South and Central Washington Coast (-33.2 percent), Newport (-27.8 percent), Crescent City (-25.8 percent), and Coos Bay (-25.7 percent) (Table 4-49). Under Alternative 1b, twelve communities are projected to have a decrease in commercial fisheries ex-vessel revenue that is greater than 25 percent of the No Action ex-vessel revenue estimates. These twelve communities include all three of the most vulnerable communities (Newport with - 40.8 percent; Crescent City with -34.4 percent, and Fort Bragg with -25.7 percent) and five other port groups with one or more vulnerable communities (Tillamook with -52.8 percent, South and Central Washington Coast with – 47.1 percent, Brookings with -38.3 percent, Coos Bay with -35.3 percent, and Eureka with -29.4 percent).

For the recreational fishery, the difference between the alternatives is measured as the change in bottom fish angler trips (Table 4-50). Under Alternative 1, four port groups were projected to have reductions in trips that were greater than 25 percent. Of these four port groups, only Fort Bragg was also identified as a most vulnerable community with a 61.2 percent reduction (-47.9% charter and -72.2 percent private) in angler trips projected. There were no vulnerable communities identified with reductions greater than 25 percent of the angler trips).

4.4.4.2 Alternative 2

Under Alternative 2, the vulnerable and most vulnerable port groups with the greatest percentage decrease (> 15 percent) in ex-vessel revenue from commercial fisheries when compared to the No Alternative are South and Central Washington Coast (33.7 percent), Tillamook (-31.0 percent), Newport (27.8 percent), Crescent City (25.8 percent), Coos Bay (25.7 percent), Brookings (-16.5 percent), Coos Bay (-16.0 percent), and Eureka (-15.1 percent) (Table 4-49 and Table 4-51). The three most vulnerable communities have less substantial projected decreases in ex-vessel revenue (Crescent City with -14.4 percent, Newport with -11.9 percent, and Fort Bragg with -11.0 percent). Two port groups have projected increases, however, neither are vulnerable communities (Morro Bay and Santa Barbara).

For the recreational fishery, the difference between the alternatives is measured as the change in bottom fish angler trips. Under Alternative 2, Fort Bragg, also identified as a most vulnerable community was projected to have an 18.2 percent reduction (-7 percent for charter trips and -26.7 percent for private trips) in angler trips (Table 4-50 and Table 4-51). Only one vulnerable community (South and Central WA Coast with an increase of 0.8 percent overall (+0.7 percent for charter and +1.0 percent for private) was projected to have an increase in Angler trips when compared to No Action. The remaining vulnerable and most vulnerable communities were not projected to have a change over the No Action Alternative.

4.4.4.3 Alternative 3

Under Alternative 3, the vulnerable and most vulnerable port groups with the greatest percentage decrease (> 10 percent) in ex-vessel revenue from commercial fisheries when compared to the No Alternative are Tillamook (-27.6 percent) and Brookings (-10.4 percent) (Table 4-49 and Table 4-51).

Two of the three most vulnerable communities had minor projected decreases in ex-vessel revenue (Crescent City with -2.2 percent, and Fort Bragg with -1.9 percent). Newport, the third most vulnerable community was projected to have an increase of 4.6 percent as did the South and Central Washington Coast with a 16.0 percent increase. These port groups were likely affected by the substantial increased in the Pacific whiting ACL under this alternative.

For the recreational fishery, the difference between the alternatives is measured as the change in bottom fish angler trips (Table 4-50 and Table 4-51). Under Alternative 3, no port group has a projected reduction in angler trips. Only one port group with a vulnerable community has an increase greater than 10 percent (Eureka with +13.5 percent). Although three California port groups have projected increases greater than 20 percent (Morro Bay, Monterey, and San Francisco), none is listed as vulnerable.

4.4.4.4 Alternative 4 (NMFS Preferred Alternative)

This alternative is a modification of the Council's FPA. The change in commercial fishery revenue and recreational fishing trips under Alternative 4 would be the same as the FPA with the exception of the southern California recreational fishery in which the recreational fishing trips would be unchanged from No Action. Over the period 2002-2007, non-whiting groundfish revenues (including tribal non-whiting groundfish revenues) were fairly steady at levels just below $50,000,000. For the period 2008-2009 they increased to $55 million and $65 million respectively due to increased Dover sole and sablefish revenues. For 2010, revenues appear to be decreasing to the $56 million level as result of these species and petrale sole. However 2010 estimate may be low as the PacFIN Completeness Reports shows that the data for the states is not complete. The Council's preferred alternative and NMFS' preferred alternative are predicted to lead to a level just under $55 million. There are no vulnerable communities in the southern California area (Santa Barbara, Los Angeles, San Diego).

4.4.4.5 The Council's Final Preferred Alternative

Under the FPA, no vulnerable and most vulnerable port groups have a projected percentage decrease > 10 percent in ex-vessel revenue from commercial fisheries when compared to the No Action (Table 4-49 and Table 4-51). All three of the most vulnerable communities had minor projected decreases in ex-vessel revenue (Crescent City with -3.1 percent, Fort Bragg with -2.5 percent, and Newport with -5.5 percent). Newport, the third most vulnerable community was projected to have an increase of 4.6 percent as did the South and Central Washington Coast with a 16.0 percent increase. These port groups were likely affected by the substantial increase in the Pacific whiting ACL under this alternative.

For the recreational fishery, the difference between the alternatives is measured as the change in bottom fish angler trips. Under Alternative 3, no port group has a projected reduction in angler trips (Table 4-50 and Table 4-51). Only on port group with a vulnerable community has an increase greater than 10 percent (Eureka with +13.5 percent). Although three California port groups have projected increases greater than 50 percent (Morro Bay, Monterey, and San Francisco), none is listed as vulnerable.

4.4.5 Impacts to Other Ecosystem Components

4.4.5.1 Protected Species

Protected species covers those organisms for which laws constrain their take (a term covering mortality and other non-lethal harmful effects). The principal laws are the Marine Mammal Protection Act and the Endangered Species Act. Protected species potentially affected by the proposed action include marine mammals, sea turtles, and seabirds that occur in the action occur and especially those for which past interactions have been documented.

It is not possible to determine how direct and direct impacts would differ among the alternatives. Effects are expected to be similar to those described in previous harvest specifications EISs (PFMC 2004b; PFMC 2006; PFMC 2008a). Effects are primarily cumulative due to a variety of external actions and trends discussed previously. In particular, expected implementation of Amendment 20 to the Groundfish FMP is expected to contribute to effects of the proposed action. Under a rationalized fishery, it is difficult to predict fishing behavior and resultant impacts to protected resources. It is likely that any alternative resulting in a decreased overall effort would likewise result in decreased impacts to protected resources. However, there may be exceptions depending on a variety of factors discussed below. Further, it is possible that a rationalized fishery, assuming an increase targeting efficiency, would increase harvest of targeted species but would decrease bycatch. This circumstance would potentially happen with even less effort than currently used.

4.4.5.2 Gear Switching

Transition of effort from trawl gear (small footrope, large footrope) to fixed gear (longline, pots, etc.) under the Amendment 20 gear switching provision may change the nature of interactions with protected species. If quota pounds are harvested with fixed gear, impacts to protected resources (positive and negative) might also occur. Although the shift in trawl effort to fixed gears during 2011 and 2012 is unknown and therefore cannot be projected, it is reasonable to expect that the change in impacts would be to those of the current fixed gear fisheries.

4.4.5.3 Essential Fish Habitat

The Magnuson-Steven Act requires that FMPs identify essential fish habitat for managed species and that Councils consider actions to ensure the conservation and enhancement of such habitat. Amendment 19 to the FMP, implemented in 2006, identifies groundfish EFH and habitat areas of particular concern (these are habitat areas that have special importance for managed species and may be vulnerable to adverse effects). Amendment 19 implemented a variety of mitigation measures including gear restrictions and a series of closed areas where bottom trawl gear or all bottom contacting gear is prohibited.

4.4.5.4 Ecosystem and Trophic Structure

Fisheries selectively remove particular kinds and sizes (or ages) of fish from populations, affecting trophic structure. Groundfish removals in 2011-2012, which may be considered the direct impact of the action, contribute to the cumulative effect of fishery removals over longer time periods. Trophic effects are more evident in this long-term context.

Incidental take of protected species and habitat impacts are a function of the total amount of fishing effort expended, its geographic distribution, the types of fishing gear used. It is not possible to distinguish among the alternatives with respect to these effects.

Table 4-44. Minimum time to rebuild ($T_{F=0}$), maximum permissible rebuilding time (T_{MAX}) and median time to rebuild under the alternatives.

Species	$T_{F=0}$	T_{MAX}	No Action	FPA	Alternative 1 (a & b)	Alternative 2	Alternative 3
Bocaccio	2018	2031	2026	2022	2019	2020	2022
Canary	2024	2046	2021	2027	2025	2026	2027
Cowcod	2060	2097	2072	2071	2064	2068	2071
Darkblotched	2016	2037	2028	2025	2018	2022	2027
POP	2018	2045	2017	2020	2019	2019	2020
Widow	2010	2035	2015	2015	2010	2010	2010
Yelloweye	2047	2089	2084	2084 a/	2065	2074	2084
Petrale	2014	2021	NA	2016	2014	2015	2016

a/ If the harvest rate corresponding to the adopted ACT were continued over the long term the median rebuilding year would be 2074.

Table 4-45. Projected fishing mortality of non-overfished species and species complexes.

Stock	No Action Alternative			Integrated Alternatives				
	2010 OY	Projected Fishing Mortality 2011/2012	ACL	Projected Fishing Mortality (mt)				
				Alt.1a	Alt.1b	Alt.2	Alt. 3	FPA
Lingcod – coastwide	4,829	541.7	NA					
Lingcod N. of 42º N. lat. (OR & WA)	NA	--	2,151	485.7	485.7	542.6	603.1	685.2
Lingcod S. of 42º N. lat. (CA)	NA	--	2,164					
Pacific Cod	1,600	400.0	1,600	400.0	400.0	400.0	400.0	400.0
Pacific Whiting	193,935	192,996	TBA	96,008	96,008	192.996	289,985	192,996
Sablefish (coastwide)	7,729	6,208.9	6,645	5,123.0	4,151.0	5,286.3	5,537.3	5,470.7
Shortbelly	6,950	1.0	50	1.0	1.0	1.0	1.0	1.0
Chilipepper S. of 40°10' N. lat.	2,447	0.0	1,789	0.0	0.0	0.0	0.0	0.0
Splitnose S. of 40°10' N. lat.	461	7.0	1,538	7.0	7.0	7.0	7.0	7.0
Yellowtail N. of 40°10' N. lat.	4,562	499.0	4,371	499.0	499.0	499.0	499.0	499.0
Shortspine Thornyhead (coastwide)	2,001	1,422.0	1,950	1,370.1	1,370.1	1,504.7	1,474.1	1,487.0
Longspine Thornyhead (coastwide)	2,560	1,559.0	2,430	1,373.3	1,373.3	1,384.0	1,387.6	1,387.6
Black Rockfish (WA)	464	900.9	415	778.2	778.2	828.2	840.2	905.1
Black Rockfish (OR-CA)	1,000		1,000					
California scorpionfish	155	65.8	126	21.0	21.0	65.8	65.8	79.0
Cabezon (CA)	79	70.8	168	94.9	94.9	103.8	111.9	128.9
Cabezon (OR)	NA		48					
Dover Sole	16,500	15,418.6	25,000	12,165.2	12,165.2	14,082.0	19,300.4	19,300.4
English Sole	9,745	698.3	10,151	523.7	523.7	539.0	557.9	557.9
Arrowtooth Flounder	10,112	7,259.1	12,049	5,524.6	5,524.6	6,685.0	7,601.7	7,601.7
Starry Flounder	1,077	7.0	1,360	7.0	7.0	7.0	7.0	7.0
Longnose skate	1,349	1,393.9	1,349	995.1	995.1	1,038.0	1,068.0	1,068.0
Minor Rockfish North	2,283	779.6	2,227	809.7	994.7	962.0	836.1	1,049.1
Minor Rockfish South	1,990		2,330					
Other Flatfish	4,884	1,393.9	4,884	995.1	995.1	1,038.0	1,068.0	1,068.0
Other Fish	5,600	--	5,575	--	--	--	--	--

Table 4-46. Overfished Species Fishing Mortality Projections By Alternatives 2011 And Biological Consequence Indicators.

Species	No Action		2011 Alternative 1		Alternative 2		Alternative 3		FPA		Estimated Depletion a/	Proportion of BMSY	PSA Vulnerability to Overfishing	Concern Relative to Catch Accounting Uncertainty
	ACL	Mort. Est.	ACL	Mort. Est.	ACL	Mort. Est.	ACL	Mort. Est.	ACL	Mort. Est.				
Bocaccio	288	75.8	53	44.5	109	71.1	263	75.6	263	70.3	28%	59.3%	Medium Concern (1.93)	>70% non-trawl, significant recreational catch
Canary rockfish	105	63.1	49	43.6	94	58.4	102	61.7	102	59.3	24%	11.3%	High concern (2.01)	~ 40% -trawl, ~ 35 non-trawl (landings prohibited), significant portion is recreational catch
Cowcod	4	0.8	2	0.6	3	0.7	4	0.8	4	11.3	5%	68.8%	High concern (2.13)	Primarily non-trawl and recreational (landings prohibited)
Darkblotched rockfish	330	239.4	222	117.9 (1a) 115.9 (1b)	298	157.5	332	219.6	298	68.8	28%	71.4%	Medium concern (1.92)	>90% trawl, low concern
POP	200	137.7	80	63.3 (1a) 63.4 (1b)	111	85.0	180	133.6	180	71.4	29%	46.4%	Low concern (1.69)	>90% trawl, low concern
Petrale sole	1200	1176.6	459	406.3	776	697.4	976	916.6	976	46.4	12%	96.3%	Medium concern (1.94)	>96% trawl, low concern
Widow rockfish	509	339.7	200	142.4	400	332.8	600	339.7	600	96.3	39%	50.8%	High concern (2.05)	>90% trawl, low concern
Yelloweye rockfish	14	14	13	11.2 (1a) 10.5 (1b)	17	14.4	20	15.9	20	50.8	20.3%	59.3%	Medium concern (2.0)	>90% non-trawl (landings prohibited), significant portion is recreational catch

a/ Estimated depletion (current biomass relative to unfished biomass) is relative to the year in which the stock was last assessed or a stock assessment update prepared. See Chapter 3 for details on recent stock assessment for each species

Table 4-47. Overfished Species Fishing Mortality Projections By Alternatives 2012 And Biological Consequence Indicators.

			2012											
	No Action		Alternative 1		Alternative 2		Alternative 3		FPA					
Species	**ACL**	**Mort. Est.**	**ACL**	**Mort. Est.**	**ACL**	**Mort. Est.**	**ACL**	**Mort. Est.**	**ACL**	**Mort. Est.**	**Estimated Depletion**	**Proportion of BMSY**	**PSA Vulnerability to Overfishing**	**Concern Relative to Catch Accounting Uncertainty**
Bocaccio	288	75.8	56	44.5	115	71.1	274	75.6	274	76.2	28%	59.3%	Medium Concern (1.93)	>70% non-trawl, significant recreational catch
Canary rockfish	105	63.1	51	43.6	99	58.4	107	61.7	107	62.8	24%	11.3%	High concern (2.01)	~ 40% -trawl, ~ 35 non-trawl (landings prohibited), significant portion is recreational catch
Cowcod	4	0.8	2	0.6	3	0.7	4	0.8	4	0.8	5%	68.8%	High concern (2.13)	Primarily non-trawl and recreational (landings prohibited)
Darkblotched rockfish	330	239.4	222	117.9 (1a) 115.9 (1b)	296	157.5	329	219.6	296	219.2	28%	71.4%	Medium concern (1.92)	>90% trawl, low concern
POP	200	137.7	80	63.3 (1a) 63.4 (1b)	113	85.0	183	133.6	183	134.4	29%	46.4%	Low concern (1.69)	>90% trawl, low concern
Petrale sole	1,200	1,176.6	624	406.3	1,160	697.4	1,160	916.6	1,160	904.4	12%	96.3%	Medium concern (1.94)	>96% trawl, low concern
Widow rockfish	509	339.7	200	142.4	400	332.8	600	339.7	600	339.8	39%	50.8%	High concern (2.05)	>90% trawl, low concern
Yelloweye rockfish	14	14	13	11.2 (1a) 10.5 (1b)	17	14.4	20	15.9	20	15.9	20.3%	59.3%	Medium concern (2.0)	>90% non-trawl (landings prohibited), significant portion is recreational catch

Table 4-48. Estimated Groundfish Revenue Impacts by Fishery Sector Under the 2011-2012 Groundfish Alternatives.

Sector Name	No Action	2011 Alt 1a	2011 Alt 1b	2011 Alt 2	2011 Alt 3 (PPA)	2011 FPA	2012 Alt 1a	2012 Alt 1b	2012 Alt 2	2012 Alt 3 (PPA)	2012 FPA
Combined At-Sea Whiting sectors*	13,802	6,814	6,814	13,802	20,789	13,802	6,814	6,814	13,802	20,789	13,802
Shoreside whiting trawl	7,873	3,944	3,944	7,849	11,761	7,860	3,944	3,944	7,849	11,759	7,859
Non-whiting trawl	29,297	21,104	21,104	24,031	29,084	28,816	21,104	21,104	24,031	29,073	28,801
Limited entry fixed gear	15,303	13,708	9,234	13,708	13,708	13,708	13,330	9,938	13,330	13,330	13,330
Open access fixed gear Nearshore	3,541	3,286	3,285	3,757	3,783	4,217	3,286	3,285	3,757	4,012	4,217
Open access fixed gear Non-nearshore	4,681	4,210	3,265	4,212	4,212	4,214	4,039	3,323	4,041	4,041	4,042
Incidental open access	32	32	32	32	32	32	32	32	32	32	32
Tribal groundfish (incl. shoreside whiting)	7,151	5,491	5,491	6,254	7,018	6,254	5,398	5,398	6,162	6,926	6,162
Grand Total	81,680	58,589	53,170	73,644	90,388	78,903	57,948	53,838	73,003	89,963	78,245
Shoreside Only Total	67,878	51,775	46,355	59,843	69,599	65,101	51,133	47,024	59,201	69,174	64,443
Change from No Action ($ thousands)											
Combined At-Sea Whiting sectors[a/]		- 6,988	- 6,988	+ 0	+ 6,988	+ 0	- 6,988	- 6,988	+ 0	+ 6,988	+ 0
Shoreside whiting trawl		- 3,929	- 3,929	- 24	+ 3,888	- 13	- 3,929	- 3,929	- 24	+ 3,886	- 14
Non-whiting trawl		- 8,193	- 8,193	- 5,267	- 214	- 482	- 8,193	- 8,193	- 5,267	- 224	- 497
Limited entry fixed gear		- 1,595	- 6,068	- 1,595	- 1,595	- 1,595	- 1,973	- 5,365	- 1,973	- 1,973	- 1,973
Open access fixed gear Nearshore		- 256	- 256	+ 215	+ 242	+ 675	- 256	- 256	+ 215	+ 471	+ 675
Open access fixed gear Non-nearshore		- 470	- 1,415	- 469	- 469	- 467	- 641	- 1,358	- 640	- 640	- 638
Incidental open access		+ 0	+ 0	+ 0	+ 0	+ 0	+ 0	+ 0	+ 0	+ 0	+ 0
Tribal groundfish (incl. shoreside whiting)		- 1,660	- 1,660	- 896	- 133	- 896	- 1,753	- 1,753	- 989	- 225	- 989
Grand Total		- 23,091	- 28,510	- 8,036	+ 8,708	- 2,777	- 23,733	- 27,842	- 8,677	+ 8,283	- 3,435
Shoreside Only Total		- 16,104	- 21,523	- 8,036	+ 1,720	- 2,777	- 16,745	- 20,854	- 8,677	+ 1,296	- 3,435
Change from No Action (%)											
Combined At-Sea Whiting sectors*		- 50.6%	- 50.6%	+ 0.0%	+ 50.6%	+ 0.0%	- 50.6%	- 50.6%	+ 0.0%	+ 50.6%	+ 0.0%
Shoreside whiting trawl		- 49.9%	- 49.9%	- 0.3%	+ 49.4%	- 0.2%	- 49.9%	- 49.9%	- 0.3%	+ 49.4%	- 0.2%
Non-whiting trawl		- 28.0%	- 28.0%	- 18.0%	- 0.7%	- 1.6%	- 28.0%	- 28.0%	- 18.0%	- 0.8%	- 1.7%
Limited entry fixed gear		- 10.4%	- 39.7%	- 10.4%	- 10.4%	- 10.4%	- 12.9%	- 35.1%	- 12.9%	- 12.9%	- 12.9%
Open access fixed gear Nearshore		- 7.2%	- 7.2%	+ 6.1%	+ 6.8%	+ 19.1%	- 7.2%	- 7.2%	+ 6.1%	+ 13.3%	+ 19.1%
Open access fixed gear Non-nearshore		- 10.0%	- 30.2%	- 10.0%	- 10.0%	- 10.0%	- 13.7%	- 29.0%	- 13.7%	- 13.7%	- 13.6%
Incidental open access		+ 0.0%	+ 0.0%	+ 0.0%	+ 0.0%	+ 0.0%	+ 0.0%	+ 0.0%	+ 0.0%	+ 0.0%	+ 0.0%
Tribal groundfish (incl. shoreside whiting)		- 23.2%	- 23.2%	- 12.5%	- 1.9%	- 12.5%	- 24.5%	- 24.5%	- 13.8%	- 3.1%	- 13.8%
Grand Total		- 28.3%	- 34.9%	- 9.8%	+ 10.7%	- 3.4%	- 29.1%	- 34.1%	- 10.6%	+ 10.1%	- 4.2%
Shoreside Only Total		- 23.7%	- 31.7%	- 11.8%	+ 2.5%	- 4.1%	- 24.7%	- 30.7%	- 12.8%	+ 1.9%	- 5.1%

a/ Includes tribal at-sea whiting fishery.

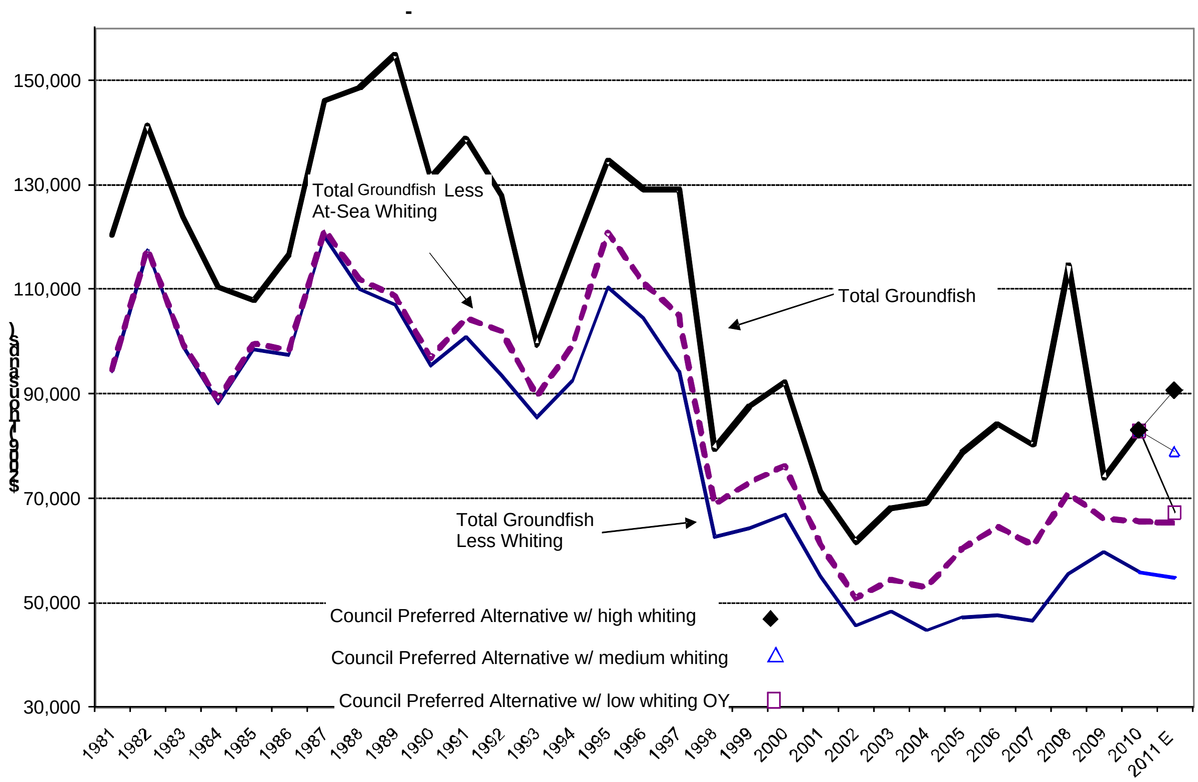


Figure 4-25. Trends in ex-vessel revenues from the West Coast groundfish fishery and projected revenues under the final Council-preferred alternative (and NMFS preferred Alternative 4).

Table 4-49. Change in Commercial Fishery Income Relative to No Action and Socioeconomic Indicators.

Port Group	No Action ($ in millions)	Change in Port Group Commercial Fishing and Processing Income Over No Action					Number of "Vulnerable" and "Most Vulnerable" Counties within Port Group	Poverty Rate 2006-2008	Unemployment Rates 2009 a/	Primary Commercial Groundfish Sector (Revenue by Dominant Sector)	Percentage of Commercial Fishing Revenue From Groundfish, 2005-2009
		Alt 1a	Alt 1b	Alt 2	Alt 3	FPA					
Puget Sound	*5.69*	-18.7%	-42.6%	-14.7%	-7.7%	-7.9%	None out of 8	10.0%	8.0%	Non-whiting Trawl (53.5%)	49.9%
North Washington Coast	*1.31*	-10.4%	-44.9%	-10.0%	-9.9%	-9.8%	None out of 2	14.0%	9.6%	Tribal Non-whiting (59.7%)	49.1%
South and Central WA Coast	*5.62*	-33.2%	-47.1%	-9.2%	+16.0%	-5.4%	2 out of 3	15.6%	12.4%	Shoreside Whiting (41.9%)	12.8% (52% crab)
Astoria	*16.78*	-33.7%	-37.0%	-13.8%	+11.1%	-1.4%	None out of 2	12.2%	8.9%	Non-whiting Trawl (67.0%)	37.5%
Tillamook	*0.24*	-50.9%	-52.8%	-31.0%	-27.6%	-2.4%	1 out of 1	17.6%	9.3%	OA Fixed Gear (58.9%)	6.5% (60% crab)
Newport	*10.54*	-27.8%	-40.8%	-11.9%	+4.6%	-5.5%	1 out of 1 (most vulnerable)	16.8%	10.4%	Non-whiting Trawl (40.9%)	31.1% (38% crab)
Coos Bay	*8.01*	-25.7%	-35.3%	-16.0%	-0.5%	-3.8%	1 out of 3	15.2%	12.0%	Non-whiting Trawl (72.8%)	28.1% (40% crab)
Brookings	*3.98*	-22.3%	-38.3%	-16.5%	-10.4%	-6.0%	1 out of 1	15.3%	13.1%	Non-whiting Trawl (42.7%)	33.7% (54% crab)
Crescent City	*1.66*	-25.8%	-34.4%	-14.3%	-2.2%	-3.1%	1 out of 1 (most vulnerable)	20.3%	12.2%	Non-whiting Trawl (60.7%)	16.7% (72% crab)
Eureka	*6.08*	-23.2%	-29.4%	-15.1%	-1.8%	-2.9%	1 out of 1	18.4%	11.0%	Non-whiting Trawl (79.4%)	32.9% (56% crab)
Fort Bragg	*5.19*	-12.7%	-25.7%	-11.0%	-1.9%	-2.5%	1 out of 1 (most vulnerable)	16.8%	10.5%	Non-whiting Trawl (67.9%)	39.7%
Bodega Bay	*0.36*	-19.8%	-36.7%	-15.5%	-10.9%	-11.5%	None out of 2	9.0%	9.7%	Non-whiting Trawl (58.4%)	8.3% (45% crab)
San Francisco	*1.85*	-18.1%	-28.7%	-12.6%	-5.8%	-6.2%	None out of 2	9.6%	9.2%	Non-whiting Trawl (68.1%)	15.4% (40% crab)
Monterey	*1.42*	-6.8%	-21.6%	-3.5%	-3.1%	-3.1%	None out of 2	11.7%	11.9%	Non-whiting Trawl (47.3%)	22.3% (22% CPS)
Morro Bay	*3.22*	+1.2%	-0.2%	+3.0%	+3.1%	+3.1%	None out of 1	12.9%	9.0%	OA Fixed Gear (60.8%)	50.1%
Santa Barabara	*0.76*	+16.8%	+16.8%	+18.2%	+18.2%	+17.0%	None out of 2	10.3%	9.2%	OA Fixed Gear (51.6%)	2.4% (54% CPS)
Los Angeles	*1.70*	-2.2%	-2.6%	-2.1%	-2.1%	-2.1%	None out of 2	13.8%	10.3%	LE Fixed Gear (79.5%)	3.3% (63% CPS)
San Diego	*0.72*	-1.3%	-1.3%	-1.2%	-1.2%	-1.2%	None out of 1	11.7%	9.7%	LE Fixed Gear (75.0%)	8.5% (50% other)
Source Table	Table 4-42						Appendix E Table E-4	Table 3-26	A-20 RIR	Table 3-22	Table 3-27

a/ Average of 2009 county unemployment rates.
Shaded rows are vulnerable communities.

Table 4-50. Change in Recreational Fishing Trips Relative to No Action and Socioeconomic Indicators.

Port Group	No Action (number of trips)		Change in Bottomfish Recreational Angling Trips Over No Action								Number of "Vulnerable" and "Most Vulnerable" Counties within Port Group	Poverty Rate 2006-2008	Unemployment Rates 2009 a/
			Alternative 1		Alternative 2		Alternative 3		FPA				
	Charter	Private	Charter	Private	Charter	Private	Charter	Private	Charter	Private			
Puget Sound	--	--	--	--	--	--	--	--	--	--	None out of 8	10.0%	8.0%
North Washington Coast * LaPush-Neah Bay	659	3,492	-4.7%	-7.1%	+4.7%	+7.1%	+4.7%	+7.1%	+4.7%	+7.1%	None out of 2	14.0%	9.6%
South - Central WA Coast * Westport * Ilwaco-Chinook	10,882 341	1,637 630	+0.0% +0.0%	+0.0% +0.0%	+0.7% +0.0%	+1.0% +0.0%	+0.7% +0.0%	+1.0% +0.0%	+0.7% +0.0%	+1.0% +0.0%	2 out of 3	15.6%	12.4%
Astoria a/	--	--	--	--	--	--	--	--	--	--	None out of 2	12.2%	8.9%
Tillamook	3,842	4,946	-16.2%	-16.2%	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%	1 out of 1	17.6%	9.3%
Newport	20,636	6,874	-1.3%	-1.3%	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%	1 out of 1 (most vulnerable)	16.8%	10.4%
Coos Bay	3,895	7,729	-10.3%	-10.3%	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%	1 out of 3	15.2%	12.0%
Brookings	3,903	17,809	-6.0%	-6.0%	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%	1 out of 1	15.3%	13.1%
Crescent City	2,718	16,534	+0.0%	+0.0%	+0.0%	+0.0%	+25.7%	+11.5%	+25.7%	+11.5%	1 out of 1 (most vulnerable)	20.3%	12.2%
Eureka											1 out of 1	18.4%	11.0%
Fort Bragg	4,849	5,881	-47.9%	-72.2%	-7.7%	-26.8%	+0.0%	+0.0%	+0.0%	+0.0%	1 out of 1 (most vulnerable)	16.8%	10.5%
Bodega Bay											None out of 2	9.0%	9.7%
San Francisco	25,311	23,841	-4.9%	-4.6%	-4.9%	-4.6%	+16.7%	+29.0%	+73.2%	+34.7%	None out of 2	9.6%	9.2%
Monterey	30,413	34,629	-3.8%	-3.1%	+11.5%	+9.3%	+11.5%	+9.3%	+11.5%	+9.3%	None out of 2	11.7%	11.9%
Morro Bay											None out of 1	12.9%	9.0%
Santa Barbara											None out of 2	10.3%	9.2%
Los Angeles	*208,845*	*168,730*	-39.5%	-35.2%	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%	None out of 2	13.8%	10.3%
San Diego											None out of 1	11.7%	9.7%
Source Tables	Table 4-41										Appendix E Table E-4	Table 3-26	A-20 RIR

a/ Less than 2% of angler trips originating from Astoria Port Group Area in 2009 were bottomfish-target trips.
Shaded rows are vulnerable communities.

Table 4-51. Percent Change in Recreational Bottomfish Angler Trips and Commercial Income from No Action.

Port Group	Number of Counties of total in Group rated vulnerable or most vulnerable	Percent change in Recreational Angler trips for multi-county region				Percent change in Commercial income				
		Alt 1	Alt 2	Alt 3	FPA	Alt 1a	Alt 1b	Alt 2	Alt 3	FPA
Newport	**1 out of 1 (Most Vulnerable)**	-1.3%	0.0%	0.0%	0.0%	-27.80%	-40.80%	-11.90%	4.60%	-5.50%
Crescent City	**1 out of 1 (Most Vulnerable)**	-10.3%	0.0%	0.0%	13.5%	-25.80%	-34.40%	-14.30%	-2.20%	-3.10%
Fort Bragg	**1 out of 1 (Most Vulnerable)**	-61.2%	-18.2%	0.0%	0.0%	-12.70%	-25.70%	-11.00%	-1.90%	-2.50%
Tillamook	1 out of 1	-16.2%	0.0%	0.0%	0.0%	-50.90%	-52.80%	-31.00%	-27.60%	-2.40%
Brookings	1 out of 1	-6.0%	0.0%	0.0%	0.0%	-22.30%	-38.30%	-16.50%	-10.40%	-6.00%
Eureka	1 out of 1	0.0%	0.0%	13.5%	13.5%	-23.20%	-29.40%	-15.10%	-1.80%	-2.90%
South and Central WA Coast	2 out of 3	0.8%	0.8%	0.8%	0.8%	-33.20%	-47.10%	-9.20%	16.00%	-5.40%
Coos Bay	1 out of 3	-10.3%	0.0%	0.0%	0.0%	-25.70%	-35.30%	-16.00%	-0.50%	-3.80%
Puget Sound	None out of 8*	NA	NA	NA	NA	-18.70%	-42.60%	-14.70%	-7.70%	-7.90%
North Washington Coast	None out of 2	-6.7%	6.7%	6.7%	6.7%	-10.40%	-44.90%	-10.00%	-9.90%	-9.80%
Bodega Bay	None out of 2	-61.2%	-18.2%	0.0%	0.0%	-19.80%	-36.70%	-15.50%	-10.90%	-11.50%
San Francisco	None out of 2	-4.8%	-4.8%	22.7%	54.5%	-18.10%	-28.70%	-12.60%	-5.80%	-6.20%
Monterey	None out of 2	-4.8%	-4.8%	22.7%	54.5%	-6.80%	-21.60%	-3.50%	-3.10%	-3.20%
Morro Bay	None out of 1	-4.8%	-4.8%	22.7%	54.5%	1.20%	-0.20%	3.00%	3.10%	3.10%
Santa Barabara	None out of 2	-3.5%	10.4%	10.4%	10.4%	16.80%	16.80%	18.20%	18.20%	17.00%
Los Angeles	None out of 2	-37.0%	0.0%	0.0%	0.0%	-2.20%	-2.60%	-2.10%	-2.10%	-2.10%
San Diego	None out of 2	-37.0%	0.0%	0.0%	0.0%	-1.30%	-1.30%	-1.20%	-1.20%	-1.20%
Astoria	None out of 2				NA	-33.70%	-37.00%	-13.80%	11.10%	-1.40%

Shaded rows are port groups that have no vulnerable communities.

Table 4-52. Estimated Community Income Impacts from Commercial Fishing and Processing Activities by Port Group Area under No Action ($ million) and Change from No Action (%) under the Action Alternatives.

Community (Port Group Area)	No Action	Alt 1a	Alt 1b	Alt 2	Alt 3 PPA	FPA
Puget Sound	*5.69*	-18.7%	-42.6%	-14.7%	-7.7%	-7.9%
North Washington Coast	*1.31*	-10.4%	-44.9%	-10.0%	-9.9%	-9.8%
South and Central WA Coast	*5.62*	-33.2%	-47.1%	-9.2%	+16.0%	-5.4%
Astoria	*16.78*	-33.7%	-37.0%	-13.8%	+11.1%	-1.4%
Tillamook	*0.24*	-50.9%	-52.8%	-31.0%	-27.6%	-2.4%
Newport	*10.54*	-27.8%	-40.8%	-11.9%	+4.6%	-5.5%
Coos Bay	*8.01*	-25.7%	-35.3%	-16.0%	-0.5%	-3.8%
Brookings	*3.98*	-22.3%	-38.3%	-16.5%	-10.4%	-6.0%
Crescent City	*1.66*	-25.8%	-34.4%	-14.3%	-2.2%	-3.1%
Eureka	*6.08*	-23.2%	-29.4%	-15.1%	-1.8%	-2.9%
Fort Bragg	*5.19*	-12.7%	-25.7%	-11.0%	-1.9%	-2.5%
Bodega Bay	*0.36*	-19.8%	-36.7%	-15.5%	-10.9%	-11.5%
San Francisco	*1.85*	-18.1%	-28.7%	-12.6%	-5.8%	-6.2%
Monterey	*1.42*	-6.8%	-21.6%	-3.5%	-3.1%	-3.2%
Morro Bay	*3.22*	+1.2%	-0.2%	+3.0%	+3.1%	+3.1%
Santa Barabara	*0.76*	+16.8%	+16.8%	+18.2%	+18.2%	+17.0%
Los Angeles	*1.70*	-2.2%	-2.6%	-2.1%	-2.1%	-2.1%
San Diego	*0.72*	-1.3%	-1.3%	-1.2%	-1.2%	-1.2%
Total	*75.16*	-23.6%	-33.6%	-12.1%	+2.4%	-3.7%

Table 4-53. Change in Trawl RCA lines North of 40°10 North Latitude by Cumulative Limit Period.

Alternative	**N. of 48º10' N. lat**						**48º10'-45º 46' N. lat**						**45º 46'- 40º10' N. lat.**					
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	**6**
No Action	0-200 modified	0-200	0-150		0-200	0-200 modified	75-200 modified	75-200	75-150		75-200	75-200 modified	75-200 modified	75-200		100-200	75-200	75-200 modified
Alternative 1	75-250			100-250	75-250		75-250			100-250	75-250		75-250			100-250	75-250	
Alternative 2	75-250	75-200		100-200	75-200	75-250	75-250	75-200		100-200	75-200	75-250	75-250	75-200		100-200	75-200	75-250
Alternative 3	75-200		150-200		75-200		75-200		150-200		75-200		75-200		150-200		75-200	
FPA Non-IFQ	75-200		75-150/200		75-200		75-200		75-150/200		75-200		75-200		75-150/200		75-200	
FPA IFQ	0-200 modified	0-200	0-150		0-200	0-200 modified	75-200 modified	75-200	75-150		75-200	75-200 modified	75-200 modified	75-200		100-200	75-200	75-200 modified

Table 4-54. Change in Trawl RCA lines South North of 40°10 North Latitude by Cumulative Limit Period.

Alternative	**40º10' N. lat. 38º N. lat**						**South of 38º N. lat**					
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	**6**
No Action	100-200						100-200					
Alternative 1	100-150						100-150					
Alternative 2	100-150						100-150					
Alternative 3	100-200	100-150				100-200	100-200	100-150				100-200
FPA Non-IFQ	100-200	100-150				100-200	100-200	100-150				100-200
FPA - IFQ	100-200						100-200					

Table 4-55. Change in Non-trawl RCA lines North of 40°10 North Latitude by Cumulative Period (Open Access and Limited Entry).

<table>
<tr><th rowspan="2">Alternative</th><th colspan="6">N. of 46º16' N. lat</th><th colspan="6">46º16'-45º 03.83 N. lat</th><th colspan="6">45º 03.83 - 43º00' N. lat.</th><th colspan="6">43º 00 - 42º00' N. lat.</th><th colspan="6">42º 00 - 40º10' N. lat.</th></tr>
<tr><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th></tr>
<tr><td>**No Action**</td><td colspan="6">0-100</td><td colspan="6">30-100</td><td colspan="6">30-125</td><td colspan="6">20-100</td><td colspan="6">20-100</td></tr>
<tr><td>**Alternative 1a**</td><td colspan="6">0-150</td><td colspan="6">30-100</td><td colspan="6">30-100</td><td colspan="6">20-100</td><td colspan="6">20-100</td></tr>
<tr><td>**Alternative 1b**</td><td colspan="6">0-125</td><td colspan="6">30-125</td><td colspan="6">30-125</td><td colspan="6">20-100</td><td colspan="6">20-100</td></tr>
<tr><td>**Alternative 2-1**</td><td colspan="6">0-100</td><td colspan="6">30-100</td><td colspan="6">30-125</td><td colspan="6">20-100</td><td colspan="6">20-100</td></tr>
<tr><td>**Alternative 2-2**</td><td colspan="6">0-100</td><td colspan="6">30-100</td><td colspan="6">30-100</td><td colspan="6">30-100</td><td colspan="6">20-100</td></tr>
<tr><td>**Alternative 3-1**</td><td colspan="6">0-100</td><td colspan="6">20-100</td><td colspan="6">20-125</td><td colspan="6">20-100</td><td colspan="6">20-100</td></tr>
<tr><td>**Alternative 3-2**</td><td colspan="6">0-100</td><td colspan="6">30-100</td><td colspan="6">30-100</td><td colspan="6">30-100</td><td colspan="6">20-100</td></tr>
<tr><td>**FPA**</td><td colspan="6">0-100</td><td colspan="6">30-100</td><td colspan="6">30-100</td><td colspan="6">20-100</td><td colspan="6">20-100</td></tr>
</table>

Shaded cells represent the options that did not carry forward into the integrated alternatives fishing mortality projections and economic analysis.

Table 4-56. Change in Non-trawl RCA lines South of 40°10 North Latitude by Cumulative Period (Open Access and Limited Entry).

<table>
<tr><th rowspan="2">Alternative</th><th colspan="6">40º10' N. lat. - 36º N. lat</th><th colspan="6">36º - 34º 27 N. lat</th><th colspan="6">South of 34º 27 N. lat</th></tr>
<tr><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th></tr>
<tr><td>**No Action**</td><td colspan="6">30-150</td><td colspan="6">30-150</td><td colspan="6">60-150 (applies around islands)</td></tr>
<tr><td>**Alternative 1a**</td><td colspan="6">20-150</td><td colspan="6">20-150</td><td colspan="6">20-150 (applies around islands)</td></tr>
<tr><td>**Alternative 1b**</td><td colspan="6">20-150</td><td colspan="6">20-150</td><td colspan="6">20-150 (applies around islands)</td></tr>
<tr><td>**Alternative 2-1**</td><td colspan="6">20-150</td><td colspan="6">20-150</td><td colspan="6">20-150 (applies around islands)</td></tr>
<tr><td>**Alternative 2-2**</td><td colspan="6">30-150</td><td colspan="6">30-150</td><td colspan="6">60-150 (applies around islands)</td></tr>
<tr><td>**Alternative 3-1**</td><td colspan="6">20-150</td><td colspan="6">20-150</td><td colspan="6">20-150 (applies around islands)</td></tr>
<tr><td>**Alternative 3-2**</td><td colspan="6">30-150</td><td colspan="6">30-150</td><td colspan="6">60-150 (applies around islands)</td></tr>
<tr><td>**FPA**</td><td colspan="6">30-150</td><td colspan="6">30-150</td><td colspan="6">60-150 (applies around islands)</td></tr>
</table>

Shaded cells represent the options that did not carry forward into the integrated alternatives fishing mortality projections and economic analysis.

Table 4-57. Change in Washington Recreational Fishing Seasons and RCAs by Month.

Alternatives	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
No Action- Washington												
Area 1	Open all depths				Open all depths a/					Open all depths		
Area 2	Open all depths			Open <30 fm b/ c/ d/			Open all depths, except lingcod on Friday and Saturday>30 fm e/		Open all depths			
Area 3 & 4	Open all depths				Open < 20 fm f/					Open all depths		
Alternative 1 - Washington												
Area 1	Open all depths				Open all depths a/					Open all depths		
Area 2	Open all depths			Open <30 fm b/ d/ g/			Open all depths, except lingcod on Friday and Saturday>30 fm e/		Open all depths			
Area 3 & 4	Open all depths				Open < 20 fm f/					Open all depths		
Alternative 2 - Washington												
Area 1	Open all depths				Open all depths a/					Open all depths		
Area 2	Open all depths			Open <30 fm b/ d/ g/			Open all depths, except lingcod on Friday and Saturday>30 fm e/		Open all depths			
Area 3 & 4	Open all depths					Open < 20 fm f/				Open all depths		
Alternative 3 - Washington												
Area 1	Open all depths				Open all depths a/					Open all depths		
Area 2	Open all depths			Open <30 fm b/ d/ g/			Open all depths, except lingcod on Friday and Saturday>30 fm e/		Open all depths			
Area 3 & 4	Open all depths					Open < 20 fm f/				Open all depths		
FPA - Washington												
Area 1	Open all depths				Open all depths a/					Open all depths		
Area 2	Open all depths			Open <30 fm b/ d/ g/			Open all depths, except lingcod on Friday and Saturday>30 fm e/		Open all depths			
Area 3 & 4	Open all depths					Open < 20 fm f/				Open all depths		

a/ Retention of groundfish, except sablefish and Pacific cod, prohibited with Pacific halibut on board.
b/ Retention of sablefish and Pacific cod allowed seaward of 30 fm from May 1- June 15.
c/ Retention of lingcod allowed on days that the primary halibut season is open.
d/ Retention of rockfish allowed seaward of 30 fm.
e/ Retention of lingcod prohibited >30 fm, south of 46°58 on Fri. and Sat. from July 1 – August 31.
f/ Groundfish retention allowed >20 fm on days when Pacific halibut is open.
g/ Retention of lingcod allowed seaward of 30 fm on days that the primary halibut season is open.

Table 4-58. Change in Oregon Recreational Fishing Seasons and RCAs by Month.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
No Action - Oregon												
	Open all Depths			Open <40 fm						Open all Depths		
Alternative 1- Oregon												
Option 1	Open all depths			Open <20 fm						Open all Depths		
Option 2	Open <40 fm			Open <20 fm						Open <40 fm		
Option 3	Open <30 fm			Open <20 fm						Open <30 fm		
Option 4	Open <25 fm			Open <20 fm						Open <25 fm		
Option 5	Open <20 fm											
Alternative 2 - Oregon												
Option 1	Open all Depths			Open <25 fm						Open all Depths		
Option 2	Open all Depths			Open <30 fm						Open all Depths		
Option 3	Open all Depths			Open <40 fm						Open all Depths		
Alternative 3 - Oregon												
Option 1	Open all Depths			Open <40 fm						Open all Depths		
Option 2	Open all Depths				Open <40 fm					Open all Depths		
Option 3	Open all Depths			Open <40 fm					Open all Depths			
Option 4	Open all Depths				Open <40 fm				Open all Depths			
FPA - Oregon												
	Open all depths			Open <40 fm						Open all depths		

Shaded cells represent the options that did not carry forward into the integrated alternatives fishing mortality projections and economic analysis.

Table 4-59. Change in California Recreational Fishing Seasons and RCAs by Month for Rockfish, Cabezon and Kelp Greenling (RCG Complex).a/

<table>
<tr><th></th><th colspan="2">Jan</th><th colspan="2">Feb</th><th colspan="2">Mar</th><th colspan="2">Apr</th><th colspan="2">May</th><th colspan="2">Jun</th><th colspan="2">Jul</th><th colspan="2">Aug</th><th colspan="2">Sept</th><th colspan="2">Oct</th><th colspan="2">Nov</th><th colspan="2">Dec</th></tr>
<tr><td colspan="25">No Action b/ - California RCG Complex</td></tr>
<tr><td>Northern</td><td colspan="9">CLOSED</td><td colspan="8">Open <20 fm</td><td colspan="7">CLOSED</td></tr>
<tr><td>North-central North</td><td colspan="9">CLOSED</td><td colspan="6">Open <20 fm</td><td colspan="9">CLOSED</td></tr>
<tr><td>North-central South</td><td colspan="11">CLOSED</td><td colspan="9">Open <30 fm</td><td colspan="4">CLOSED</td></tr>
<tr><td>South-central Monterey</td><td colspan="8">CLOSED</td><td colspan="13">Open <40 fm</td><td colspan="3">CLOSED</td></tr>
<tr><td>South-central Morro Bay</td><td colspan="8">CLOSED</td><td colspan="13">Open <20 fm</td><td colspan="3">CLOSED</td></tr>
<tr><td>Southern</td><td colspan="8">CLOSED</td><td colspan="16">Open <60 fm</td></tr>
<tr><td colspan="25">Alternative 1 – California RCG Complex</td></tr>
<tr><td>Northern</td><td colspan="9">CLOSED</td><td colspan="8">Open <20 fm</td><td colspan="7">CLOSED</td></tr>
<tr><td>North-central North</td><td colspan="9">CLOSED</td><td colspan="3">Open <20 fm</td><td colspan="12">CLOSED</td></tr>
<tr><td>North-central South</td><td colspan="10">CLOSED</td><td colspan="8">Open <30 fm</td><td colspan="6">CLOSED</td></tr>
<tr><td>South-central Monterey</td><td colspan="8">CLOSED</td><td colspan="12">Open <40 fm</td><td colspan="4">CLOSED</td></tr>
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<tr><td colspan="25">Alternative 2 - California RCG Complex</td></tr>
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<tr><td>North-central South</td><td colspan="10">CLOSED</td><td colspan="8">Open <30 fm</td><td colspan="6">CLOSED</td></tr>
<tr><td>South-central Monterey</td><td colspan="8">CLOSED</td><td colspan="16">Open <40 fm</td></tr>
<tr><td>South-central Morro Bay</td><td colspan="8">CLOSED</td><td colspan="16">Open <40 fm</td></tr>
<tr><td>Southern</td><td colspan="4">CLOSED</td><td colspan="20">Open <60 fm</td></tr>
<tr><td colspan="25">Alternative 3 - California RCG Complex</td></tr>
<tr><td>Northern</td><td colspan="9">CLOSED</td><td colspan="11">Open <20 fm</td><td colspan="4">CLOSED</td></tr>
<tr><td>North-central North</td><td colspan="9">CLOSED</td><td colspan="6">Open <20 fm</td><td colspan="9">CLOSED</td></tr>
<tr><td>North-central South</td><td colspan="10">CLOSED</td><td colspan="12">Open <30 fm</td><td colspan="2">CLOSED</td></tr>
<tr><td>South-central Monterey</td><td colspan="8">CLOSED</td><td colspan="16">Open <40 fm</td></tr>
<tr><td>South-central Morro Bay</td><td colspan="8">CLOSED</td><td colspan="16">Open <40 fm</td></tr>
<tr><td>Southern</td><td colspan="4">CLOSED</td><td colspan="20">Open <60 fm</td></tr>
<tr><td colspan="25">FPA - California RCG Complex</td></tr>
<tr><td>Northern</td><td colspan="9">CLOSED</td><td colspan="11">Open <20 fm</td><td colspan="4">CLOSED</td></tr>
<tr><td>North-central North</td><td colspan="9">CLOSED</td><td colspan="6">Open <20 fm</td><td colspan="9">CLOSED</td></tr>
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<tr><td>Southern</td><td colspan="4">CLOSED</td><td colspan="20">Open <60 fm</td></tr>
</table>

a/ All spearfishing divers (boats permitted while diving for rockfish or other closed species during closed periods provided no hook-and-line gear on board or in possession while diving to catch rockfish) and shore-based anglers were exempt from the seasonal closures and depth restrictions for rockfish, greenlings, California scorpionfish, California sheephead, and ocean whitefish.

b/ Area names are changes from No Action in which CA/OR boarder =Northern; North-Central North of Point Arena Region= North-central north; North-Central South of Point Arena Region= North-central south; Montery-South Central= South-central Monterey; Morro Bay South Central = South Central Morro Bay; and South Region=Southern..

Table 4-60. Change in California Recreational Groundfish RCAs and Seasons by Month (Same as California Scorpionfish). a/

<table>
<tr><th></th><th colspan="2">Jan</th><th colspan="2">Feb</th><th colspan="2">Mar</th><th colspan="2">Apr</th><th colspan="2">May</th><th colspan="2">Jun</th><th colspan="2">Jul</th><th colspan="2">Aug</th><th colspan="2">Sept</th><th colspan="2">Oct</th><th colspan="2">Nov</th><th colspan="2">Dec</th></tr>
<tr><td colspan="25">No Action b/ - California Scorpionfish</td></tr>
<tr><td>Northern</td><td colspan="9">CLOSED</td><td colspan="8">Open <20 fm</td><td colspan="7">CLOSED</td></tr>
<tr><td>North-central North</td><td colspan="9">CLOSED</td><td colspan="4">Open <20 fm</td><td colspan="11">CLOSED</td></tr>
<tr><td>North-central South</td><td colspan="8">CLOSED</td><td colspan="13">Open <30 fm</td><td colspan="3">CLOSED</td></tr>
<tr><td>South-central Monterey</td><td colspan="8">CLOSED</td><td colspan="13">Open <40 fm</td><td colspan="3">CLOSED</td></tr>
<tr><td>South-central Morro Bay</td><td colspan="8">CLOSED</td><td colspan="13">Open <40 fm</td><td colspan="3">CLOSED</td></tr>
<tr><td>Southern</td><td colspan="4"><40 fm</td><td colspan="18">Open <60 fm</td><td colspan="2"><40 fm</td></tr>
<tr><td colspan="25">Alternative 1, 2, 3, FPA – California Scorpionfish</td></tr>
<tr><td>Northern</td><td colspan="9">CLOSED</td><td colspan="8">Open <20 fm</td><td colspan="7">CLOSED</td></tr>
<tr><td>North-central North</td><td colspan="9">CLOSED</td><td colspan="4">Open <20 fm</td><td colspan="11">CLOSED</td></tr>
<tr><td>North-central South</td><td colspan="8">CLOSED</td><td colspan="12">Open <30 fm</td><td colspan="4">CLOSED</td></tr>
<tr><td>South-central Monterey</td><td colspan="8">CLOSED</td><td colspan="12">Open <40 fm</td><td colspan="4">CLOSED</td></tr>
<tr><td>South-central Morro Bay</td><td colspan="8">CLOSED</td><td colspan="12">Open<40 fm</td><td colspan="4">CLOSED</td></tr>
<tr><td>Southern</td><td colspan="24">Open <60 fm</td></tr>
</table>

a/ All spearfishing divers (boats permitted while diving for rockfish or other closed species during closed periods provided no hook-and-line gear on board or in possession while diving to catch rockfish) and shore-based anglers were exempt from the seasonal closures and depth restrictions for rockfish, greenlings, California scorpionfish, California sheephead, and ocean whitefish.

b/ Area names are changes from No Action in which CA/OR boarder =Northern; North-Central North of Point Arena Region= North-central north; North-Central South of Point Arena Region= North-central south; Montery-South Central= South-central Monterey; Morro Bay South Central = South Central Morro Bay; and South Region=Southern.

Table 4-61. Change in California Recreational Fishing Seasons and RCAs by Month for Lingcod. a/

<table>
<tr><td colspan="25">No Action b/ – California Lingcod</td></tr>
<tr><td>Northern</td><td colspan="9">CLOSED</td><td colspan="8">Open <20 fm</td><td colspan="7">CLOSED</td></tr>
<tr><td>North-central North</td><td colspan="9">CLOSED</td><td colspan="4">Open <20 fm</td><td colspan="11">CLOSED</td></tr>
<tr><td>North-central South</td><td colspan="11">CLOSED</td><td colspan="9">Open <30 fm</td><td colspan="4">CLOSED</td></tr>
<tr><td>South-central Monterey</td><td colspan="8">CLOSED</td><td colspan="13">Open <40 fm</td><td colspan="3">CLOSED</td></tr>
<tr><td>South-central Morro Bay</td><td colspan="8">CLOSED</td><td colspan="13">Open <40 fm</td><td colspan="3">CLOSED</td></tr>
<tr><td>Southern</td><td colspan="6">CLOSED</td><td colspan="16">Open <60 fm</td><td colspan="2"></td></tr>
<tr><td colspan="25">Alternative 1, 2, 3, FPA – California Lingcod</td></tr>
<tr><td>Northern</td><td colspan="9">CLOSED</td><td colspan="11">Open <20 fm</td><td colspan="4">CLOSED</td></tr>
<tr><td>North-central North</td><td colspan="9">CLOSED</td><td colspan="4">Open <20 fm</td><td colspan="11">CLOSED</td></tr>
<tr><td>North-central South</td><td colspan="10">CLOSED</td><td colspan="14">Open <30 fm</td></tr>
<tr><td>South-central Monterey</td><td colspan="8">CLOSED</td><td colspan="16">Open <40 fm</td></tr>
<tr><td>South-central Morro Bay</td><td colspan="8">CLOSED</td><td colspan="16">Open <40 fm</td></tr>
<tr><td>Southern</td><td colspan="4">CLOSED</td><td colspan="20">Open >60 fm</td></tr>
</table>

a/ All spearfishing divers (boats permitted while diving for rockfish or other closed species during closed periods provided no hook-and-line gear on board or in possession while diving to catch rockfish) and shore-based anglers were exempt from the seasonal closures and depth restrictions for rockfish, greenlings, California scorpionfish, California sheephead, and ocean whitefish.

b/ Area names are changes from No Action in which CA/OR boarder =Northern; North-Central North of Point Arena Region= North-central north; North-Central South of Point Arena Region= North-central south; Montery-South Central= South-central Monterey; Morro Bay South Central = South Central Morro Bay; and South Region=Southern.

CHAPTER 5 CONSISTENCY WITH THE GROUNDFISH FMP AND MSA NATIONAL STANDARDS

5.1 FMP Goals and Objectives

The Groundfish FMP contains three broad goals and 17 objectives intended to achieve those goals. Past EISs for rebuilding plans and harvest specifications describe how the actions address each objective. The proposed actions evaluated in the current EIS address the goals and objectives in a similar fashion as described in the previous groundfish harvest specifications EISs.

5.2 National Standards

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

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

The harvest specification action alternatives are consistent with Amendment 23 to the Groundfish FMP, which addresses revised National Standard 1 Guidelines. Section 2.1 describes how the proposed harvest specifications were developed in relation to the OFL, ABC, and ACL reference points. The OFL is the estimate of catch level above which overfishing is occurring, or the estimate of MFMT applied to a stock's abundance. The ABC is a level of annual catch that accounts for the scientific uncertainty in the estimate of OFL and any other scientific uncertainty. Amendment 23 includes an ABC control rule, ABC values described in this document were determined following that control rule. The ACL is the level of annual catch that serves as the basis for invoking Accountability Measures. The ACL may equal but may not exceed the ABC. The ACL may be set lower than the ABC to account for a wide range of factors. The application of the Amendment 23 framework to the specifications described in this document should result in ACLs that reduce the likelihood of overfishing.

The revised National Standard 1 guidelines set forth principles on which stock complexes should be organized, including that stocks within a complex should be similar in terms of geographic distribution, life history, and vulnerability to the fishery. The existing stock complexes in the groundfish fishery are not reorganized as part of this action due to limited time and staff resources. However, it is anticipated that stock complexes will be reexamined, and if necessary, reorganized, in the next biennial cycle.

Because of past overfishing eight groundfish stocks have been declared overfished. Seven of these stocks have been managed under rebuilding plans over several previous harvest specification cycles (these *stocks were declared overfished between 1999 and 2002). As discussed in Section 2.1.4.8, the most recent stock assessment for petrale sole (representing the best available science) produced a new estimate of stock biomass in relation to unfished biomass (the stock depletion level). In combination with the adoption of a new value for B_{MSY} ($B_{25\%}$) and MSST ($B_{12.5\%}$) for flatfish, the petrale stock was declared overfished. In addition, stock assessments for canary rockfish, Pacific ocean perch, and yelloweye rockfish resulted in new estimates of the time to rebuild in the absence of fishing ($T_{F=0}$) greater than the target rebuilding year (T_{Target}) in the current rebuilding plan. Since these changes to the scientific understanding of stock dynamics make it impossible to rebuild by the current target year, a new target year has to be adopted. All of these actions are intended to address National Standard 1 and related provisions in Section 304(e) about rebuilding overfished stocks.*

Section 304(e) introduces a tradeoff formulated as specifying a time to rebuild "as short as possible, taking into account the status and biology of any overfished stocks, the needs of fishing communities, … and the interaction of the overfished stock of fish within the marine ecosystem…" The proposed action is evaluated based on these considerations in Chapter 4 of this EIS.

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

The best available science standard applies to the following areas in relation to this proposed action: stock assessments, rebuilding analyses and methods for determining management reference points (OFL, ABC, ACL, etc.), which forms the basis for determining harvest levels, and the evaluation of socioeconomic impacts. The supporting science is discussed below.

The harvest specifications (specifically, ACLs) considered under the proposed action (the action alternatives, including the Final Preferred Alternative), are based on the most recent stock assessments, developed through the peer-review STAR process. As part of the management cycle the Council recommends which stocks should be assessed in advance of current decision-making. Only a small proportion of the 80+ managed groundfish species are regularly assessed, because of a combination of factors. For many stocks there may not be enough data to support a full assessment (the FMP describes a classification system based on the availability of data). For unassessed stocks proxy methods must be used to determine reference points. Stocks may be subjected to little or no fishing pressure, or determined to have low vulnerability, and thus less in need of regular assessment. Finally, there is a limit on the institutional resources needed to carry out the assessments (i.e., fishery scientists). In some cases a previous assessment may be updated; this means that the underlying model is not reevaluated but the model is re-run with the addition of more recent data from the period since the last full assessment. Section 2.1 reviews the basis for alternative harvest specifications and references the stock assessments that were used. In this biennial cycle, information developed through the assessment process also supports the proposed new proxies for determining reference points for flatfish.

The No Action Alternative specifications do not benefit from the new assessments and updates conducted as part of the current management cycle. For those stocks No Action does not represent the best available science.

Section 4.1 describes the methods that were used to determine reference points for harvest specifications (OFL, ABC, ACL, etc.) for stocks and stock complexes.

The NWFSC has developed a model application, called IO-Pac, for estimating personal income impacts of commercial fishing on the west coast. This model is documented in Appendix D.

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

Groundfish ACLs are set for management units, which include stocks, stock complexes, or geographic subdivisions thereof. Stock complexes group co-occurring species, many of which have not been formally assessed. Section 2.1.6 describes how ACLs for stock complexes are developed based on ABC estimates of component stocks. Stocks within these complexes are not managed individually for a variety of reasons including the lack of assessments, lack of reliable catch data at the species level, or they constitute a small portion of catches. If a stock within a complex is individually assessed it may be managed under a separate harvest limit, when practicable. For example, longnose skate was assessed and removed from the other fish category as part of the 2009-2010 biennial cycle. For this biennial cycle, chilipepper rockfish is proposed to be removed from the northern minor shelf rockfish complex and managed on a coastwide basis with its own ACL.

Stocks with their own ACLs are managed throughout the range of that stock (as opposed to the species), although issues do arise in the case of stocks straddling international borders. For this reason, allocation of the harvestable surplus of Pacific whiting between the U.S. and Canada is subject to a negotiated agreement by the U.S.-Canada Pacific Hake/Whiting Commission.

Separate ACLs may be set for geographic subcomponents of a stock for management purposes. However, the development of subcomponent ACLs is based on managing these stocks throughout their range within U.S. waters.

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

Amendments 20 and 21 to the Groundfish FMP establish a catch share system for the groundfish trawl fishery and underlying allocations of harvest opportunity. The development of these allocations at fishery sector, co-op, and permit level took into account the requirements of National Standard 4. Chapter 6 in the Amendment 20 FEIS and Chapter 6 in the Amendment 21 EIS address compliance of these actions with National Standards, including National Standard 4. Both EISs proposed actions have multiple objectives that include promoting conservation, as explained in those EIS. Both EISs evaluate the distribution of harvest opportunity resulting from the respective actions in light of requirement for fair and equitable distribution. The IFQ and co-op programs implemented under Amendment 20 include accumulation limits to prevent entities from accumulating excess shares.

Allocation decisions are also made as part of the biennial harvest specifications process for those stocks for which formal allocations have not been established under the FMP. Section 2.3.1 describes these allocation decisions. Emphasis is placed on equitable division while ensuring conservation goals. Decision-making on these allocations occurs through the Council process, which facilitates substantial participation by state representatives. Generally, state proposals are brought forward when alternatives are crafted and integrated to the degree practicable.

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

Measures have been taken to reduce fishing capacity in the limited entry trawl fleet and non-trawl fleets, including: fixed gear permit stacking program under Amendment 14 to the FMP; the trawl vessel buyback program; and through trawl rationalization under Amendment 20 to the groundfish FMP. Reducing excess capacity is expected to improve the efficiency in the utilization of fishery resources as well as reduce the levels of incidental catch.

Biennial harvest specifications support the implementation of the trawl rationalization program under Amendment 20 (trawl sector IFQs and co-ops). As noted above, the trawl rationalization program has multiple objectives including, conservation, in addition to increasing efficiency. The conservation objective is addressed through the individual accountability incentive, which is expected to reduce bycatch and may also foster a stronger stewardship ethic among resource users. The program will also require 100 percent observer coverage on all vessels participating in the program under a trawl endorsed limited access permit. This will improve catch accounting.

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

Management measures reflect differences in catch, and in particular bycatch, of overfished species, among different fisheries. For example, different RCA configurations are established for different gear types (trawl versus fixed gear) and the catch control tools also differ. As noted elsewhere, under Amendment 20 different catch control tools would be introduced for the trawl fishery while fixed gear fisheries are managed with trip limits established and adjusted to reflect these fisheries' projected catches. Recreational fisheries are managed with area closures and bag limits proposed by the states and appropriate to the catches and characteristics of each state's recreational fishery.

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

Generally, by coordinating management, monitoring, and enforcement activities between the three west coast states, duplication, and thus cost, is minimized. Appendix C evaluates proposed management measures in detail, including consideration of associated costs and duplication.

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

This document evaluates the effects of the alternatives on fishing communities (see Section 4.3). These effects were taken into account in choosing the preferred harvest specification and management measure alternative. The alternatives are structured to allow a comparison of the tradeoff between the requirements of the MSA, which include in Section 304(e)(4)(A) rebuilding overfished stocks in as short a time possible, and in that section and under the National Standard, taking into account the needs of fishing communities and minimizing adverse economic impacts to fishing communities. Each alternative contains a suite of ACLs for overfished species associated with a particular rebuilding strategy (target year and harvest rate) and management measures needed to constrain catches to these harvest levels. Target species catch for each alternative is projected based on these management measures, which allows an estimate of resulting ex-vessel revenue and personal income impacts at the community level (with the port group area the unit of analysis for community impacts). In this way the 'rebuild in as short a time as possible' standard can be contrasted with the 'needs of fishing communities' standard to *demonstrate what level of catch or bycatch of overfished species is necessary to address adverse impacts to fishing communities.*

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

Minimizing bycatch, of overfished species in particular, is an important component of the alternatives. Through the use of GCAs fishing effort is reduced in areas where overfished species are most abundant, thereby reducing potential bycatch. Implementation of IFQs for the shoreside trawl sector under Amendment 20 is also expected to reduce bycatch by eliminating regulatory discards (harvesters may retain all species for which they have sufficient quota pounds to cover their catch). Non-trawl sectors (and the trawl sector if status quo management measures are continued because Amendment 20 is not implemented) use cumulative trip limits as the principal catch control tool. Because trip limits are based on landings, when they are set at a low level to discourage directed and incidental catch of overfished species, this can result in regulatory discards.

Petrale sole, declared overfished in 2010 and to be managed under the rebuilding plan proposed under Amendment 16-5, is managed differently than the overfished rockfish species. The rebuilding plan will allow a limited target fishery to continue, so discarding should be minimized.

The at-sea whiting sectors are managed under bycatch limits for selected overfished species. Mandatory co-ops in the mothership sector are allocated a portion of these sector bycatch limits and are accountable for keeping catch of these species within their allocation. The catcher-processor operates as a single, voluntary co-op responsible for the bycatch limit assigned to the sector.

As noted above, under Amendment 20 all groundfish trawl fisheries will be subject to 100 percent observer coverage, which is necessary for catch accounting under IFQ/co-op management. But it will also allow complete monitoring of total catch (including bycatch). The limited entry fixed gear sector and directed open access fisheries are subject to partial observer coverage. This observer data is used to develop bycatch rate estimates, which can be used to forecast and account for total catch of all managed species.

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

RCAs could affect safety if more vessels elect to fish seaward of the closed areas and are more exposed to bad weather conditions. Individual accountability under the Amendment 20 IFQ program could result in vessels fishing more often seaward of the RCA in order to avoid catch of species such as canary and yelloweye rockfish, which have very low ACLs, and thus permits will be allocated very small amounts of quota for these species. On the other hand, expected capacity reduction and increased profits in the trawl sector could allow greater investment in vessels and equipment that would enhance safety. Less efficient vessels are expected to leave the trawl fishery as part of this consolidation, which may eliminate older, less safe vessels.

For vessels electing to increase the amount of time fishing seaward of RCAs, implementing a VMS capable of sending distress calls could provide some mitigation. Although units with this capability have been approved for use, vessel owners are not required to purchase a unit with this capability. Also, by providing near real-time vessel position data, VMS could aid in search and rescue operations.

The Amendment 20 FEIS includes information on and evaluation of safety issues. Available data suggest that vessel condition and weather have been the two main contributory factors to vessel loss.

5.3 Other Applicable MSA Provisions

Harvest specifications are set based on targets established in overfished species rebuilding plans, which conform to Section 304(e) Rebuild Overfished Fisheries. Rebuilding plans contain the elements required by Section 304(e)(4) and discussed in the National Standard 1 Guidelines (NSGs) (50 CFR 600.310).

NMFS prepared an EIS evaluating programmatic measures designed to identify and describe west coast groundfish EFH (NMFS 2005), and minimize potential fishing impacts on west coast groundfish EFH. The Council took final action amending the groundfish FMP to incorporate new EFH provisions in November 2005. NMFS partially approved the amendment in March 2006. Implementing regulations became effective in June 2006. The effects of the proposed actions on groundfish EFH are within the scope of effects evaluated in the programmatic groundfish EFH EIS. The Council is planning to commence a 5-year review of its groundfish EFH designation in 2011. Section 4.1.4 in this EIS describes impacts of the proposed action on EFH, consistent with the EFH assessment requirements of 50 CFR 600.920 (e)(3).

CHAPTER 6 **OTHER APPLICABLE LAW**

6.1 Other Federal Laws

6.1.1 Coastal Zone Management Act

Section 307(c)(1) of the Federal Coastal Zone Management Act (CZMA) of 1972 requires all Federal activities that directly affect the coastal zone be consistent with approved state coastal zone management programs to the maximum extent practicable. Either the *Council-preferred Alternative* and the *NMFS-preferred Alternative* 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. This determination has been 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. The recommended action is consistent and within the scope of the actions contemplated under the framework FMP.

Under the CZMA, each state develops its own coastal zone management program which is then submitted for Federal approval. This has resulted in programs which vary widely from one state to the next. Harvest specifications and management measures for 2011-2012 are not expected to affect any state's coastal management program.

6.1.2 Endangered Species Act

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 Pacific Coast groundfish FMP 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 have concluded that implementation of the FMP for the Pacific Coast groundfish fishery was not expected to jeopardize the continued existence of any endangered or threatened species under the jurisdiction of NMFS, or result in the destruction or adverse modification of critical habitat.

NMFS reinitiated a formal section 7 consultation under the ESA in 2005 for both the Pacific whiting midwater trawl fishery and the groundfish bottom trawl fishery. The December 19, 1999, Biological Opinion had defined an 11,000 Chinook incidental take threshold for the Pacific whiting fishery. During the 2005 Pacific whiting season, the 11,000 fish Chinook incidental take threshold was exceeded, triggering reinitiation. Also in 2005, new data from the West Coast Groundfish Observer Program became available, allowing NMFS to complete an analysis of salmon take in the bottom trawl fishery.

NMFS prepared a Supplemental Biological Opinion dated March 11, 2006, which addressed salmon take in both the Pacific whiting midwater trawl and groundfish bottom trawl fisheries. In its 2006 Supplemental Biological Opinion, NMFS concluded that catch rates of salmon in the 2005 whiting fishery were consistent with expectations considered during prior consultations. Chinook bycatch has averaged about 7,300 fish over the last 15 years and has only occasionally exceeded the reinitiation trigger of 11,000 fish.

Since 1999, annual Chinook bycatch has averaged about 8,450 fish. The Chinook ESUs most likely affected by the whiting fishery has generally improved in status since the 1999 section 7 consultation. Although these species remain at risk, as indicated by their ESA listing, NMFS concluded that the higher observed bycatch in 2005 does not require a reconsideration of its prior ‘‘no jeopardy’’ conclusion with respect to the fishery. For the groundfish bottom trawl fishery, NMFS concluded that incidental take in the groundfish fisheries is within the overall limits articulated in the Incidental Take Statement of the 1999 Biological Opinion. The groundfish bottom trawl limit from that opinion was 9,000 fish annually. NMFS will continue to monitor and collect data to analyze take levels. NMFS also reaffirmed its prior determination that implementation of the Groundfish FMP is not likely to jeopardize the continued existence of any of the affected ESUs.

Lower Columbia River coho (70 FR 37160, June 28, 2005) were recently listed 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. The Southern Distinct Population Segment (DPS) of green sturgeon was listed as threatened under the ESA (71 FR 17757, April 7, 2006). The southern DPS of Pacific eulachon was listed as threatened on March 18, 2010, under the ESA (75 FR 13012). NMFS has reinitiated consultation on the fishery, including impacts on green sturgeon, eulachon, marine mammals, and turtles.

6.1.3 Marine Mammal Protection Act

The MMPA of 1972 is the principle Federal legislation that guides marine mammal species protection and conservation policy in the United States. Under the MMPA, NMFS is responsible for the management and conservation of 153 stocks of whales, dolphins, porpoise, as well as seals, sea lions, and fur seals; while the U.S. Fish and Wildlife Service 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.

The WA/OR/CA sablefish pot fishery is proposed for listing as a category II fishery due to interactions with gray and humpback whales (75 FR 36318). In category II fisheries annual mortality and serious injury of a stock in a given fishery is greater than 1 percent and less than 50 percent of the potential biological removal (PBR) level (i.e., occasional incidental mortality and serious injuries of marine mammals). All other west coast groundfish fisheries are proposed as category III fisheries indicating a remote likelihood of or no known serious injuries or mortalities to marine mammals. The proposed action will affect the intensity, duration, and location of groundfish fisheries through implemented management measures. But these changes would not change the effects of the groundfish fisheries on marine mammals.

6.1.4 Migratory Bird Treaty Act

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

6.1.5 Paperwork Reduction Act

The proposed action, as implemented by any of the alternatives considered in this EIS, does not require collection-of-information subject to the Paperwork Reduction Act.

6.1.6 Regulatory Flexibility Act

The purpose of the Regulatory Flexibility Analysis (RFA) is to relieve small businesses, small organizations, and small governmental entities of burdensome regulations and record-keeping requirements. Major goals of the RFA are; (1) to increase agency awareness and understanding of the impact of their regulations on small business, (2) to require agencies to communicate and explain their findings to the public, and (3) to encourage agencies to use flexibility and to provide regulatory relief to small entities. The RFA emphasizes predicting impacts on small entities as a group distinct from other entities and the consideration of alternatives that may minimize the impacts while still achieving the stated objective of the action. An initial regulatory flexibility analysis (IRFA) is conducted unless it is determined that an action will not have a “significant economic impact on a substantial number of small entities.” The RFA requires that an IRFA include elements that are similar to those required by EO 12866 and NEPA. Therefore, the IRFA has been combined with the regulatory impact review (RIR) and NEPA analyses.

6.2 Executive Orders

6.2.1 EO 12866 (Regulatory Impact Review)

EO 12866, Regulatory Planning and Review, was signed on September 30, 1993, and established guidelines for promulgating new regulations and reviewing existing regulations. The EO covers a variety of regulatory policy considerations and establishes procedural requirements for analysis of the benefits and costs of regulatory actions. Section 1 of the EO deals with the regulatory philosophy and principles that are to guide agency development of regulations. It stresses that in deciding whether and how to regulate, agencies should assess all of the costs and benefits across all regulatory alternatives. Based on this analysis, NMFS should choose those approaches that maximize net benefits to society, unless a statute requires another regulatory approach.

The RIR and IRFA determinations are part of the combined summary analysis in Section 6.3 of this document.

6.2.2 EO 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 environmental justice analysis must first identify minority and low-income groups that live in the project area and may be affected by the action. Typically, census data are used to document the occurrence and distribution of these groups. Agencies should be cognizant of distinct cultural, social, economic, or occupational factors that could amplify the adverse effects of the proposed action. (For example, if a particular kind of fish is an important dietary component, fishery management actions affecting the availability, or price of that fish, could have a disproportionate effect.) In the case of Indian tribes, pertinent treaty or other special rights should be considered. Once communities have been identified and characterized, and potential adverse impacts of the alternatives are identified, the analysis must determine whether these impacts are disproportionate. Because of the context in which environmental justice is developed, health effects are usually considered, and three factors may be used in an evaluation: whether the effects are deemed significant, as the term is employed by NEPA; whether the rate or risk of exposure to the effect appreciably exceeds the rate for the general population or some other comparison group; and whether the group in question may be affected by cumulative or multiple sources of exposure. If disproportionately high adverse effects are identified, mitigation measures should be proposed. Community input into appropriate mitigation is encouraged.

Section 3.2 describes the demographic characteristics of coastal communities and Section 4.3 describes the potential effects of the proposed action. This information is illustrative of the effects on minority and low income populations. It should be noted that fishery participants make up a small proportion of the total population in these communities, and their demographic characteristics may be different from the community as a whole. However, information specific to fishery participants is not available. Furthermore, different segments of the fishery-involved population may differ demographically. For example, workers in fish processing plants may be more often from a minority population while deckhands may be more frequently low income in comparison to vessel owners.

Participation in decisions about the proposed action by communities that could experience disproportionately high and adverse impacts is another important principle of the EO. The Council offers a range of opportunities for participation by those affected by its actions and disseminates information to affected communities about its proposals and their effects through several channels. In addition to Council membership, which includes representatives from the fishing industries affected by Council action, the GAP, a Council advisory body, draws membership from fishing communities affected by the proposed action. While no special provisions are made for membership to include representatives from low income and minority populations, concerns about disproportionate effects to minority and low income populations could be voiced through this body or to the Council directly. Although Council meetings are not held in isolated coastal communities for logistical reasons, they are held in different places up and down the west coast to increase accessibility. In addition, fishery management agencies in Oregon and California sponsored public hearings in coastal communities to gain input on the proposed action. The comments were made available to the Council in advance of their decision to choose a preferred alternative.

The Council disseminates information about issues and actions through several media. Although not specifically targeted at low income and minority populations, these materials are intended for consumption by affected populations. Materials include a newsletter, describing business conducted at Council meetings, notices for meetings of all Council bodies, and fact sheets intended for the general reader. The Council maintains a postal and electronic mailing list to disseminate this information. The Council also maintains a website (www.pcouncil.org) providing information about the Council, its meetings, and decisions taken. Most of the documents produced by the Council, including NEPA documents, can be downloaded from the website.

6.2.3 EO 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 Council process offers many opportunities for states (through their agencies, Council appointees, consultations, and meetings) to participate in the formulation of management measures. This process encourages states to institute complementary measures to manage fisheries under their jurisdiction that may affect federally-managed stocks.

The proposed action does not have federalism implications subject to EO 13132.

6.2.4 EO 13175 (Consultation and Coordination with Indian Tribal Government)

EO 13175 is intended to ensure regular and meaningful consultation and collaboration with tribal officials in the development of Federal policies that have tribal implications, to strengthen the United States government-to-government relationships with Indian tribes, and to reduce the imposition of unfunded mandates upon Indian tribes.

The Secretary recognizes the sovereign status and co-manager role of Indian tribes over shared Federal and tribal fishery resources. In Section 302(b)(5), the MSA reserves a seat on the Council for a representative of an Indian tribe with Federally-recognized fishing rights from California, Oregon, Washington, or Idaho.

The U.S. government formally recognizes the four Washington coastal tribes (Makah, Quileute, Hoh, and Quinault) have treaty rights to fish for groundfish. In general terms, the quantification of those rights is 50 percent of the harvestable surplus of groundfish available in the tribes' U and A fishing areas (described at 50 CFR 660.324). Each of the treaty tribes has the discretion to administer their fisheries and to establish their own policies to achieve program objectives.

Accordingly, harvest specifications and management measures for 2011-2012 have been developed in consultation with the affected tribe(s) and, insofar as possible, with tribal consensus.

6.2.5 EO 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds)

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

Past EISs evaluating the impact of groundfish harvest specifications (PFMC 2004b; PFMC 2006; PFMC 2008a) evaluated impacts to seabirds and concluded that the proposed action will not significantly impact seabirds. There is no new information to indicate that the current proposed action would result in greater impacts to seabirds, and the previous evaluations are incorporated by reference.

CHAPTER 7 LIST OF PREPARERS

Council Staff

Name	Participation
Kelly Ames	Management measures
Christopher Dahl	Project management
John DeVore	Harvest specifications
Kerry Griffin	Fishery Ecosystem

Groundfish Management Team

Name	Affiliation	Participation
John Budrick	California Department of Fish and Game	California recreational management measures analysis and write-up; CCA depth restriction analysis
Jason Cope	NMFS Northwest Fishery Science Center	PSA analysis and write-up (Section 4.1.1.2); cabezon and splitnose rockfish STAT
E.J. Dick	NMFS Southwest Fisheries Science Center	DCAC and DB-SRA analyses; cowcod, bocaccio, and widow rockfish STAT
Dan Erickson	Oregon Department of Fish and Wildlife	Commercial management measures analysis; sablefish fishery analysis
Joanna Grebel	California Department of Fish and Game	Nearshore fishery analysis
Gretchen Hanshew	NMFS Northwest Region	Analysis of management measures
Rob Jones	Northwest Indian Fisheries Commission	GMT chair; tribal management measures analysis
Sean Matson	NMFS Northwest Region	Trawl bycatch analysis
Lynn Mattes	Oregon Department of Fish and Wildlife	Oregon recreational management measures analysis
Corey Niles	Washington Department of Fish and Wildlife	Analysis of management measures
Sarah Williams	NMFS Northwest Region	Analysis of management measures

Scientific and Statistical Committee

Name	Affiliation	Participation
Louis Botsford	University of California, Davis	SSC Groundfish Subcommittee

Name	Affiliation	Participation
Robert Conrad	Northwest Indian Fisheries Commission	
Ray Conser	NMFS Southwest Fisheries Science Center	SSC Groundfish Subcommittee
Martin Dorn	NMFS Alaska Fisheries Science Center	Current SSC chair; STAR panel chair for bocaccio and widow rockfish reviews; meta-analysis of flatfish biomass reference points
Carlos Garza	NMFS Southwest Fisheries Science Center	
Vladlena Gertseva	NMFS Northwest Fisheries Science Center	SSC Groundfish Subcommittee; splitnose rockfish STAT; bocaccio and widow rockfish STAR panel
Owen Hamel	NMFS Northwest Fisheries Science Center	SSC Groundfish Subcommittee; Pacific whiting, lingcod, POP, and darkblotched rockfish STAT
Selina Heppell	Oregon State University	
Tom Jagielo	Oregon Department of Fish and Wildlife	SSC Groundfish Subcommittee
Meisha Key	California Department of Fish and Game	Cabezon STAT
Peter Lawson	NMFS Northwest Fisheries Science Center	
Todd Lee	NMFS Northwest Fisheries Science Center	IOPAC income impact model development
Charlie Petrosky	Idaho Department of Fish and Game	
Andre Punt	University of Washington	SSC Groundfish Subcommittee; developer of rebuilding analysis program (aka “The Puntalyzer”); meta-analysis of flatfish biomass reference points
Cindy Thomson	NMFS Southwest Fisheries Science Center	
Theresa Tsou	Washington Department of Fish and Wildlife	SSC Groundfish Subcommittee; STAR panel chair for petrale sole and splitnose rockfish reviews
Steve Ralston	NMFS Southwest Fisheries Science Center	Past SSC chair; SSC Groundfish Subcommittee; methods for quantifying scientific uncertainty; cowcod and widow rockfish STAT;

Name	Affiliation	Participation
		STAR panel chair for yelloweye and greenstriped rockfish reviews
Vidar Wespestad	Research Analysts International	SSC Groundfish Subcommittee; STAR panel chair for cabezon, lingcod, and Pacific whiting reviews

NMFS Northwest Fishery Science Center Staff

Name	Participation
Marlene Bellman	WCGOP data and analysis; total mortality reports
Melissa Haltuch	Petrale sole and greenstriped rockfish STAT
Jim Hastie	Trawl bycatch modeling
Elizabeth Heery	WCGOP data and analysis; total mortality reports
Allan Hicks	Greenstriped rockfish and petrale sole STAT
Jerry Leonard	IOPAC income impact model development
Janell Majewski	WCGOP data and analysis; total mortality reports
Richard Methot	Yelloweye and greenstriped rockfish STAR panel; developer of Stock Synthesis assessment model
Stacey Miller	NMFS Stock Assessment Coordinator
Ian Stewart	Pacific whiting, canary rockfish, and yelloweye rockfish STAT
John Wallace	Darkblotched and yelloweye rockfish STAT

NMFS Southwest Fishery Science Center Staff

Name	Participation
John Field	Bocaccio and widow rockfish STAT; ecosystem write-up (Section 3.3.3)
Xi He	Widow rockfish and bocaccio STAT; petrale sole STAR panel
Alec MacCall	Bocaccio and widow rockfish STAT; DCAC and DB-SRA analyses
Don Pearson	Splitnose rockfish, cowcod, bocaccio, and widow rockfish STAT

NMFS Northwest Region Staff

Name	Participation
Becky Renko	Project management

Other Contributors

Name	Affiliation	Participation

Name	Affiliation	Participation
Troy Buell	Oregon Department of Fish and Wildlife	Analysis of management measures
Tom Carruthers	University of British Columbia	Pacific whiting STAR panel
Robin Cook	Center for Independent Experts	Petrale sole and splitnose rockfish STAR panel
Patrick Cordue	Center for Independent Experts	Pacific whiting STAR panel
Chris Francis	Center for Independent Experts	Bocaccio and widow rockfish STAR panel
Jim Ianelli	NMFS Alaska Fisheries Science Center	Cabezon and lingcod STAR panel
Traci Larinto	California Department of Fish and Game	Analysis of management measures
Robert Leos	California Department of Fish and Game	Analysis of management measures
Jean-Jacques Maguire	Center for Independent Experts	All 2009 STAR panels
Steve Martell	University of British Columbia	Pacific whiting STAT (TINSS model)
Carey McGilliard	University of Washington	Yelloweye rockfish STAT
Caroline McKnight	California Department of Fish and Game	Analysis of management measures
Matthew Michie	California Department of Fish and Game	Analysis of management measures
Jean Olsen	Pacific States Marine Fisheries Commission	Data queries
Melanie Parker	California Department of Fish and Game	Analysis of management measures
Heather Reed	Washington Department of Fish and Wildlife	Analysis of Washington recreational management measures
Jayna Schaaf-DaSilva	California Department of Fish and Game	Analysis of management measures
Suresh Sethi	University of Washington	Lingcod STAT
Stephen Smith	Center for Independent Experts	Cabezon and lingcod STAR panel
Brad Stenberg	Pacific States Marine Fisheries Commission	Data queries
Geoff Tingley	Center for Independent Experts	Pacific whiting STAR panel
Thomas Wadsworth	Moss Landing Marine Laboratories	Lingcod STAT
Edward Waters	Contracted by the Council	Socioeconomics

Name	Affiliation	Participation
Chantel Wetzel	University of Washington	Greenstriped rockfish STAT
John Wiedenmann	University of California, Santa Cruz	Cowcod STAT
Deb Wilson-Vandenberg	California Department of Fish and Game	Analysis of management measures

CHAPTER 8 AGENCIES, ORGANIZATIONS, AND PERSONS TO WHOM COPIES OF THIS STATEMENT WERE SENT

The Council makes both the DEIS and FEIS available on its website, so anyone with computer access may download an electronic copy. Electronic copies on CD-ROM and paper copies are made available upon request. The Council distributes a notice of availability for the DEIS and FEIS through its electronic mailing list, which include state and Federal agencies, tribes, and individuals. Copies of the FEIS are sent to anyone who comments on the DEIS. In addition, NMFS distributes copies of the DEIS to the following agencies:

Department of Interior
Department of State
U.S. Coast Guard, Commander Pacific Area
Marine Mammal Commission
Pacific States Marine Fisheries Commission
Washington Coastal Zone Management Program, Shoreline Environmental Assistance, Department of Ecology, Washington State
Ocean-Coastal Management Program, Department of Land Conservation and Development, State of Oregon
California Coastal Commission

CHAPTER 9 ACRONYMS AND GLOSSARY

Acronym	Definition
ABC	Acceptable biological catch. The ABC is a harvest threshold below the overfishing limit that is specified to accommodate the scientific uncertainty in estimating the overfishing limit.
ACL	Annual catch limit
ACT	Annual catch target
ADMB	AD Model Builder
AM	Accountability measure
ANOVA	Analysis of variance
B	Biomass
B_{MSY}	The biomass that allows maximum sustainable yield to be taken
BO	Biological opinion
CCA	Cowcod Conservation Area
CDFG	California Department of Fish and Game
CEQ	Council on Environmental Quality
CFGC	California Fish and Game Commission
CFR	Code of Federal Regulations
CO-OPS	Cooperatives
Council	Pacific Fishery Management Council
CPFV	Commercial passenger fishing vessel (charter boat)
CPS	Coastal pelagic species
CPUE	Catch per unit of effort
CRFS	California Recreational Fisheries Survey
CV	Coefficient of variation
CZMA	Coastal Zone Management Act
DB-SRA	Depletion-based stock reduction analysis
DCAC	Depletion-corrected average catch

Acronym	Definition
DEIS	Draft Environmental Impact Statement
DPS	Distinct population segment
DTL	Daily-trip-limit
DTS	Dover sole, thornyhead, and trawl-caught sablefish complex
EA	Environmental Assessment
EEZ	Exclusive Economic Zone
EFH	Essential fish habitat
EFP	Exempted fishing permit
EIS	Environmental Impact Statement
ENSO	*El Niño* Southern Oscillation
EO	Executive Order
ESA	Endangered Species Act
F	The instantaneous rate of fishing mortality. The term "fishing mortality rate" is a technical fishery science term that is often misunderstood. It refers to the rate at which animals are removed from the stock by fishing. The fishing mortality rate can be confusing because it is an "instantaneous" rate that is useful in mathematical calculations, but is not easily translated into the more easily understood concept of "percent annual removal."
F=0	Fishing mortality equals zero (no fishing)
FEIS	Final Environmental Impact Statement
FMP	Fishery management plan
F_{MSY}	The fishing mortality rate that maximizes catch biomass in the long term
FPA	Final preferred alternative
FR	Federal Register
GAP	Groundfish Advisory Subpanel.
GIS	Geographic Information System
GMT	Groundfish Management Team
HAPC	Habitat areas of particular concern
HG	Harvest guideline
HMS	Highly migratory species
IBQ	Individual bycatch quotas
IFQ	Individual fishing quota
INPFC	International North Pacific Fishery Commission
IPHC	International Pacific Halibut Commission
IRFA	Initial Regulatory Flexibility Analysis

Acronym	Definition
LE	Limited entry
M	Instantaneous rate of natural mortality (as opposed to F, fishing mortality)
MBTA	Migratory Bird Treaty Act
MCMC	Monte Carlo Markov Chain
MFMT	Maximum fishing mortality threshold
MMPA	Marine Mammal Protection Act
MPA	Marine protected area
MRFSS	Marine Recreational Fisheries Statistical Survey
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MSRA	The Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006
MSST	Minimum stock size threshold
MSY	Maximum sustainable yield
NCS	Northern California substock
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NMNU	Non-market or Non-use
NOAA	National Oceanic and Atmospheric Administration. The parent agency of the National Marine Fisheries Service.
NOI	Notice of intent
NRDC	Natural Resource Defense Council
NS1	National Standard 1
NSG	National Standards Guidelines
NWFSC	Northwest Fisheries Science Center
NWR	National Marine Fisheries Service, Northwest Region
ODFW	Oregon Department of Fish and Wildlife
OFL	Overfishing Limit
ORBS	Oregon Recreational Boat Survey
OY	Optimum Yield
PacFIN	Pacific Coast Fisheries Information Network. Provides commercial fishery information for Washington, Oregon, and California. Maintained by the Pacific States Marine Fisheries Commission.
PBR	Potential Biological Removal
PDO	Pacific decadal oscillation

Acronym	Definition
PFMC	Pacific Fishery Management Council
P_{MAX}	The estimated probability of reaching $T_{MAX.}$ May not be less than 50%.
POP	Pacific ocean perch. A rockfish species that was declared overfished in 1999.
PPA	Preliminary preferred alternative
PSA	Productivity and Susceptibility Assessment
PSMFC	Pacific States Marine Fisheries Commission
PV	Present value
QPs	Quota pounds
RCA	Rockfish Conservation Area
RecFIN	Recreational Fishery Information Network. A database managed by the Pacific States Marine Fisheries Commission that provides recreational fishery information for Washington, Oregon, and California.
RFA	Regulatory Flexibility Analysis, or Regulatory Flexibility Act
RFFA	Reasonably foreseeable future actions
RIR	Regulatory Impact Review
SAC	Sport Advisory Committee
SAFE	Stock Assessment and Fishery Evaluation
SBA	Small Business Administration
SCB	Southern California Bight
SCS	Southern California substock
SDC	Status Determination Criteria
SFA	Sustainable Fisheries Act of 1996. Amended the MSFCMA.
SO	Spawning output
SPR	Spawning potential ratio.
SS1	Stock synthesis version 1
SS3	Stock synthesis version 3
SSC	Scientific and Statistical Committee
SST	Sea surface temperatures
STAR Panel	Stock Assessment Review Panel. A panel set up to review stock assessments for particular fisheries.
STAT	Stock Assessment Team
SWFSC	Southwest Fisheries Science Center
TAC	Total Allowable Catch
TINSS	A stock assessment model. Stands for “This Is Not Stock Synthesis”

Acronym	Definition
TIQ	Trawl Individual Quota
$T_{F=0}$	The median time to rebuild a stock if all fishery-related mortality were eliminated beginning in 2011.
T_{MAX}	The maximum time period to rebuild an overfished stock, according to National Standard Guidelines (T_{MAX} = 10 years, if possible, or T_{MIN} + 1 mean generation time). Depends on biological, environmental, and legal/policy factors.
T_{MIN}	The minimum time period to rebuild an overfished stock, according to National Standard Guidelines. Technically, this is the minimum amount of time in which a fish stock will have a 50% chance of rebuilding if no fishing occurs (depends on biological and environmental factors) from the inception of the rebuilding plan.
TOCAS	Treaty Online Catch Accounting System
TOR	Terms of Reference
T_{TARGET}	The target year, set by policy, for a fish stock to be completely rebuilt.
U/A	Usual and accustomed (usually used when referring to tribal fishing, hunting or gathering areas)
USFWS	U.S. Fish and Wildlife Service. A representative of USFWS is a non-voting member of the Council.
VMS	Vessel Monitoring System
WCGOP	West Coast Groundfish Observer Program
WDFW	Washington Department of Fish and Wildlife. A representative of WDFW sits on the Council.
WOC	Washington, Oregon and California
YRCA	Yelloweye Rockfish Conservation Area

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CHAPTER 11 **RESPONSES TO DEIS COMMENTS**

11.1 Introduction

When preparing a Final EIS, an agency must address comments received on the draft, either by modifying the alternatives in the DEIS, supplementing the DEIS alternatives, revising the analyses, making factual corrections, or explaining why the comments do no warrant further agency response (40 CFR 1503.4). A 45-day public comment period on the DEIS for this action began on August 27, 2010, and ended on October 12, 2010 (75 FR 52736; August 27, 2010). Comments to the DEIS were provided by the U.S. Environmental Protection Agency; the Natural Resources Defense Council, Oceana, and The Ocean Conservancy. In addition a letter was received from the United States Department of the Interior indicating that the Department had no comments. This chapter summarizes the public comments received on the DEIS and provides the responses from the National Marine Fisheries Service to those comments. The comments (in italics) are summarized by subject followed by detailed responses from the National Marine Fisheries Service.

11.2 Responses to Comments on the NEPA Analysis in the DEIS

Two nongovernmental organizations submitted a joint set of comments on the DEIS. Their comments address issues specific to the DEIS, and issues regarding the substance of the Council's Final Preferred Alternative (FPA) and NMFS's ultimate decision regarding the 2011-12 groundfish specifications and management measures. The comments that relate to the NEPA analysis are addressed below. Comments pertaining to Amendment 23 to the Groundfish FMP, and the substance of NMFS's ultimate decision regarding the 2011-12 groundfish specifications and management measures, will be addressed in the Final Rule. Where it was not clear whether a comment was intended to address the NEPA analysis, or the final decision, or both, we have exercised judgment with respect to including it in this document. All comments not addressed here will be addressed in the final rule.

Comment 1: The EIS should consider additional alternatives for ABCs, based on P* values that reflect lower levels of risk tolerance.

> **Response:** NMFS agrees with the commenter that the EIS should consider alternative P* values than those ultimately selected by the Council, and has added discussion of such alternatives to Chapter 2 of the FEIS. Specifically, the FEIS discusses alternative P* values considered in the Council process that would result in 25% and 50% reductions from OFL for category 2 and 3 stocks. It describes the ABC values for Category 1 stocks, which comprise the majority of the individually-managed stocks, that would result from P* values ranging from.45 to.15. The environmental effects of these lower ABC values are discussed generally in Chapter 4. For most

stocks, lower ABC values based on lower P* values would not have identifiable environmental effects. For overfished stocks, catch levels are set according to rebuilding plans, which result in reductions from OFL far below what would result from lower P* values. For non-overfished stocks, the choice of P* would not likely have any environmental effects given that the projected actual impacts on these stocks is expected to be below the range of possible ABCs given low P* values. The management measures applied in order to keep impacts on the overfished stocks below their rebuilding ACLs significantly limit the impacts on the non-overfished stocks, thus the projected impacts on most of the non-overfished stocks is significantly lower than the ABC values that would result from a P* of.15. Thus, the risk of overfishing these stocks given the limitations on the groundfish fishery necessary to ensure rebuilding overfished species is extremely low.

Comment 2: The EIS should analyze alternative sigma values that address additional sources of scientific uncertainty.

Response: The sigma value is scientifically determined and recommended by the SSC, therefore alternatives to the SSC-recommended value are not appropriate. Because the Council is bound by the SSC recommendation on this scientific determination of the SSC, the Council cannot and should not consider a range of alternative sigma values. The SSC's recommendation is based on the best available scientific information. The SSC has not recommended any alternative approaches to determining the value of sigma for the three categories of stocks in the groundfish fishery.

Comment 3: The EIS should analyze alternative ACLs in addition to the No Action and preferred alternative for all of the stocks.

Response: The EIS does not analyze multiple ACL alternative s for non-overfished stocks for which there were no new stock assessments or stock assessment updates for this biennial cycle. This approach is consistent with the 9th Circuit's decision in NRDC v. NMFS, 421 F.3d 872 (9th Cir. 2005), where the court agreed with NMFS that the agency's decision to maintain harvest levels at the previous year's levels where new assessments had not been conducted was not arbitrary or capricious.

Comment 4: The EIS should analyze significant short and long-term impacts of the FPA including stock collapses and crashes, and the environmental and socioeconomic effects of such events.

Response: NEPA requires only that agencies analyze reasonably foreseeable impacts. NMFS has no scientific basis on which to expect that the implementation of the FPA during the two-year specification and management measure cycle will result in stock collapses or crashes, thus such events are not reasonably foreseeable and not properly subject to NEPA analysis. While recognizing the scientific uncertainty in the estimation of the OFL, and the possibility that in some very limited circumstances the "true OFL" could be exceeded, NMFS believes that the possibility of this occurring during the implementation of the FPA and resulting in stock collapses or crashes is extremely unlikely. The affected non-overfished stocks are mostly expected to be impacted at levels far below their ACLs because catch of these stocks is limited by the management measures necessary to keep catch of overfished stocks within their ACLs. The rebuilding analyses for the overfished stocks indicate that the stock status for these stocks is improving. There is no basis on which to conclude that implementation of the FPA has any likelihood of resulting in stock collapses or crashes.

Comment 5: The EIS should not use T_{MAX} as a key component to constructing and evaluating the soundness of rebuilding plans; rebuilding plans must be "oriented' around Tmin, and Tmax must not be used as a criterion for choosing T_{TARGET}.

Response: The FMP, as amended by Amendment 16-4, is clear that the time to rebuild may be adjusted upward from T_{MIN} (the minimum time in which an overfished stock can rebuild to its target biomass) under certain circumstances, and as such, T_{MIN} is the starting point for considering appropriate time periods for rebuilding. See FMP section 4.5.2. Procedures for Calculating Rebuilding Parameters. As used in the FMP, T_{MAX} is the maximum permissible time to rebuild and is identified as one of the three rebuilding parameters, with T_{TARGET} somewhere between Tmin at the lower end and T_{MAX} at the maximum permissible end of the time to rebuild.

The use of T_{MAX} as one rebuilding reference point is consistent with the National Standard 1 Guidelines (NS1 Guidelines). The preamble to the final rule revising the National Standard 1 Guidelines, 74 FR 3178, states that "Just as T_{MIN} is a helpful reference point of the absolute shortest time to rebuild, T_{MAX} provides a reference point of the absolute longest rebuilding period that could be consistent with the MSA." T_{TARGET} is established based on the factors specified in MSA section 304(e)(4) with T_{MIN} and T_{MAX} serving as upper and lower bounds on the time period to rebuild. Therefore, T_{MAX} is relevant to evaluating the appropriateness of T_{TARGET}.

Comment 6: The MSA requires that overfished species be rebuilt as quickly as possible so T_{TARGET} must be set as close to T_{MIN} as possible. Any T_{TARGET} that is longer than T_{MIN} must be specifically demonstrated as necessary to prevent "severe short -term hardship" to fishing communities.

Response: NMFS notes that the MSA requires that overfished stocks be rebuilt as quickly as possible, taking into account the status and biology of the overfished stock, the needs of fishing communities . . . and the interaction of the overfished stock of fish within the marine ecosystem. NMFS agrees with commenters that T_{MIN} is the starting point, and that it is important to assess the impacts on fishing communities of T_{MIN} (or in this case, $T_{F=0}$), and alternative levels above that amount in order to determine the appropriate rebuilding time period. The Council considered a wide range of overfished species ACLs at its November 2009 Council meeting, including a zero-harvest alternative for overfished species. However, the Council rejected the zero-harvest alternative from more detailed analysis because of the devastating impacts it would have on fishing communities. Similarly, the Council also rejected alternative ACLs that had a median time to rebuild equal to Tmax because it would not meet the requirement to rebuild overfished species in a time frame that is "as short as possible" within the meaning of the MSA. As described in Chapter 2, this FEIS utilizes a reasonable range of alternatives for detailed analysis of the impacts of various overfished species ACLs and corresponding Ttargets. The socioeconomic impacts of the alternatives are addressed in Chapter 4.

Comment 7: The conclusion in the DEIS that rebuilding progress on yelloweye rockfish has been "moderate" is overly optimistic.

Response: The DEIS noted that spawning stock biomass for yelloweye rockfish is estimated to have increased to 128.7 percent of the minimum biomass in 2000. In addition, the DEIS noted that the stock depletion has increased from a low of 15.8 percent in 2000 to 20.3 percent in 2009.Regardless of whether one prefers to call the rebuilding progress moderate or otherwise, the stock assessment and rebuilding analyses indicate improvement. NMFS' modifications to the DEIS included changes to Chapter 4 to reflect the addition of NFMS' preferred alternative and to make the analyses and presentation of the impacts of alternatives more transparent. Although the background discussion of yelloweye rockfish rebuilding progress, where progress was described as "moderate," is no longer presented in this FEIS due to some reorganization, the improvements in the status of yelloweye rockfish remain unchanged.

Comment 8: It is not clear what data the economic analysis in the DEIS relies on.

Response: As specified in the DEIS and this FEIS, the economic analyses untilize a variety of information, including the PacFin Fish Ticket data base, the RecFin data, catch data presented in Appendix F (Historical Landings and Revenues), a variety of metrics described in Appendix E (Update of the 2006 Community Vulnerability Analysis), and numerous data in the IO PAC regional impact model described in Appendix D (Description of the Input-Output Model for the Pacific Coast Fisheries (IOPAC)). Key types of socio-economic data utilized included historical commercial and recreational catch statistics and trends in commercial ex-vessel revenues and recreational trips. The chief socio-economic modeling done mainly relied on the catch projection models described in Appendix A: Description of Catch Projection Models. In addition to the commercial and recreational catch and effort data, these models use additional data sources such as logbook data and observer data in a series of sector specific models to predict, by species, the amount of target catch and bycatch by alternative. For assessing the impacts on particular communities, the data used includes: total number of vessels making at least one landing by port in 2008; total commercial ex-vessel revenue by port in 2008; total buyers that received at least one landing by port in 2008; number of charter vessels in each port; total of private/rental plus charter angler trips by port, community population density, unemployment rate, and percentage of population under the poverty rate. See Appendix E for addition information on the updated community vulnerability analysis. The FEIS also makes limited use of regional impact modeling for commercial fisheries. As described in Appendix D, the IOPAC model is designed to estimate the gross changes in economic contributions and net economic impacts resulting from policy, environmental, or other changes that affect fishery harvest. Compared to use of ex-vessel values by year, port, sector, and community as indicators of the commercial impacts of the alternatives, projected changes in personal income are used infrequently as economic indicators. However, projected changes in personal income show a similar distribution amoung port group areas as ex-vessel revenue because the distribution of projected ex-vessel revenue is the input to the IOPAC model. Tables 1 through 16 in Appendix F provide a snapshot of the important indicators available for use in comparing alternatives.

Comment 9: The EIS should analyze the threshold level of economic activity necessary to avert a fishery-wide disaster.

Response: The statutory standard requires that NMFS take into accound the needs of fishing communities. It does not require that there be a disaster, however defined, prior to make decisions on rebuilding time periods. The 9th Circuits' use of the term "disastrous" was not meant to redefine the provisions of 304(e) or import "disaster" language from other ports of the the MSA or other statutes. In addition, NMFS does not believe that it is possible or practical to establish a bright line below which a disaster would occur in the context of establishing rebuilding plans and time periods. Each situation needs to be addressed based on thespecific facts and in considerations of the factors required by 304(e).

Comment 10: The rebuilding alternatives are not and should be constructed in a manner that would allow a determination of the lowest level of ACLs possible without triggering an economic disaster. In its current form, the DEIS does not answer the fundamental question of what minimum ACL level of each species is necessary to avoid disastrous short-term consequences to fishing communities.

Response: As noted in the response to comment 9, the statute does not require a disaster determination. This FEIS describes the socioeconomic impacts of the alternatives in Chapter 4. The information presented includes, but is not limited to, the following: change in groundfish ex-vessel revenue from previous year by sector, 1999-2009; estimated groundfish revenue impacts by fishery sector under the alternatives; estimated bottomfish recreational angling trips by management region under the alternatives; estimated community income impacts from commercial fishing and processing activities by port group area under the alternatives; average annual inflation adjusted ex-vessel revenue by species group; and change in average price per pound for groundfish species and species groups in inflation adjusted dollars, 1998-2009. In addition, Chapter 3 presents a detailed description of the socioeconomic environment. NMFS has reorganized some of the information contained in the DEIS in order to reflect the addition of NMFS' preferred alternative and to make the document more transparent with respect to impacts on communities of the alternatives.

Appendix A
DESCRIPTION OF PROJECTION MODELS

2011-2012 GROUNDFISH HARVEST SPECIFICATIONS
DRAFT ENVIRONMENTAL IMPACT STATEMENT

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This Appendix describes the projection models used for each fishery to estimate the total catch of selected non-overfished species (generally target species) and overfished species. Additionally, a description of trip limit models is provided for sablefish in the limited entry daily trip limit fisheries and open access.

A.1 Limited Entry Non-Whiting Trawl

This section was adapted from the Proposed Acceptable Biological Catch and Optimum Yield Specifications and Management Measures for the 2009-2010 Pacific Coast Groundfish Fishery Final Environmental Impact Statement Including Regulatory Impact Review and Initial Regulatory Flexibility Analysis (PFMC 2008).

The limited entry non-whiting trawl fishery is modeled using several different data sources that are compiled into a framework often described as the “trawl bycatch model”. The WCGOP provides discard estimates for target and rebuilding species by several different depth and latitudinal strata and these data are used to estimate discards of select species, depending on where fishing is estimated to be taking place.

In addition to discard rate estimates, staff at the WCGOP develop bycatch rates for rebuilding species that estimate the total catch of rebuilding species (landings and discard) based on a rate of rebuilding species catch to retained target species catch. These rates are used to estimate the catch of rebuilding species based on an estimated retained catch amount of target species in various locations. The location of fishing effort and catch is informed by logbook information. Logbooks record several pieces of information including the latitude, longitude, depth, month, species, and pounds of retained catch on a vessel by vessel basis. This information is used to indicate the productive potential of each vessel at various locations on a species by species basis. Logbooks do not, however, capture 100 percent of the landed catch that the limited entry trawl fleet generates. In order to develop spatial target species catch estimates that are reflective of all trawl landings, the weight of catch in logbook records are expanded up to the amount recorded on fish tickets from the three west coast states. In this exercise, the spatial distribution of catch recorded in logbooks is maintained, but the total amount is increased. Discard, bycatch rate, and logbook information is compiled into matrices stratified by bi-monthly period, 3 latitudinal strata, and 7 different depth strata.

The interface of the model selects for particular depth and latitudinal strata by imposing a distinct set of RCA boundaries within each of 3 latitudinal areas. For example, if RCA boundaries are set at 75 fm to 200 fm north of 40°10' N. latitude, the model selects records that are both deeper and shallower than the area between 75 fm and 200 fm. The model then estimates a depth preference for each active vessel based on logbook information and the established set of RCA boundaries. Logbook data indicates clear depth preferences and fishing success for individual vessels. Based on the set of RCAs imposed on the fishery, the model estimates whether a vessel will tend to fish deeper or shallower than the trawl RCA based on the preference of each vessel to fish in areas that remain open, and then selects the retained catch associated with that vessel from the depth strata where the vessel is estimated to be fishing.

In addition to RCA boundaries, the model interfaces controls for retained catch quantities by species and bi-monthly period. Historic records of vessel catch are matched up with historic catch limits. It is assumed that those vessels that have attained their trip limits in the past would catch their trip limits if those limits are increased. An increase in a trip limit therefore results in an increase in predicted catch only in cases where particular vessels have historically attained their trip limit. It is assumed that those vessels that have not attained their trip limit will not do so if the limit is raised. Inversely, as trip limits are reduced, the catch of each vessel is constrained, but only if the limit is less than their historic catch of a particular species. If a limit is reduced, some vessels may not be constrained by that limit because their historic catch levels have been relatively small.

After calculating retained catch on a vessel-by-vessel basis, and the location of that catch, the model estimates the catch of rebuilding species. This is done by aggregating the amount of target species predicted to be caught by various depth and latitudinal strata and multiplying those retained target species tonnages by the bycatch rates of rebuilding species that have been observed in the WCGOP. The result is then aggregated for each rebuilding species to derive an estimated annual catch of rebuilding species in the limited entry non-whiting trawl fishery.

Beginning in 2007, bycatch rates from the WCGOP were stratified in a more refined manner to accommodate more spatially refined management. This was done to more precisely manage the impacts of rebuilding species in the non-whiting trawl fishery. Data provided by the WCGOP included bycatch rates of rebuilding species in 8 sub-areas north of 40°10' N. latitude. This stratification allowed for analysis of more refined/focused spatial restrictions. This more refined bycatch data allows analysts to estimate an aggregate bycatch rate in areas north of 40°10' N. latitude that is based on a series of various depth restrictions in one or more of the eight subareas. For example, if an area off northern Washington is closed, analysts can re-estimate an aggregate bycatch rate for the areas remaining open and incorporate this new bycatch rate into the trawl model. The trawl model then uses this new bycatch rate to estimate the catch of rebuilding species that would be associated with a fishery that is closed off northern Washington. Bycatch rates used to project depleted species impacts in the fishery north of 40°10' N latitude and shoreward of the RCA (using selective flatfish trawls) are average annual rates from the last two years of WCGOP observations weighted equally by depth, area, and season (Table A-1). Bycatch rates used to project depleted species impacts in the fishery north of 40°10' N. latitude and seaward of the RCA are weighted average annual rates from that last four years of WCGOP observations and are modeled by depth and bi-monthly period (Table A-2).

Table A-1 Bycatch rates for rebuilding species used in projection modeling for 2010-12 trawl fisheries, expressed as a percentage of target species landings, by area, depth zone and bi-monthly period, based on data collected by the West Coast Groundfish Observer Program between May 2005 and April 2009.

Area	2-month period	< 50 fm	< 60 fm	< 75 fm	< 100 fm	> 150 fm	> 180 fm	> 200 fm	> 250 fm
Bocaccio									
S of 40°10'									
	1	0.000%	0.000%	0.973%	0.906%	0.056%	0.002%	0.003%	0.000%
	2	0.000%	0.000%	0.973%	0.906%	0.168%	0.027%	0.001%	0.001%
	3	0.920%	0.514%	0.806%	1.531%	0.026%	0.024%	0.026%	0.028%
	4	0.920%	0.514%	0.806%	1.531%	0.026%	0.024%	0.026%	0.028%
	5	0.920%	0.514%	0.806%	1.531%	0.168%	0.027%	0.001%	0.001%
	6	0.000%	0.000%	0.973%	0.906%	0.056%	0.002%	0.003%	0.000%
Canary rockfish									
N of 40°10'									
	1	0.085%	0.198%	0.216%	2.613%	0.001%	0.001%	0.001%	0.001%
	2	0.085%	0.198%	0.216%	2.613%	0.005%	0.005%	0.008%	0.004%
	3	0.100%	0.120%	0.180%	0.269%	0.003%	0.002%	0.001%	0.001%
	4	0.100%	0.120%	0.180%	0.269%	0.003%	0.002%	0.001%	0.001%
	5	0.100%	0.120%	0.180%	0.269%	0.005%	0.005%	0.008%	0.004%
	6	0.085%	0.198%	0.216%	2.613%	0.001%	0.001%	0.001%	0.001%
S of 40°10'									
	1	0.000%	0.000%	1.384%	0.696%	0.000%	0.000%	0.000%	0.000%
	2	0.000%	0.000%	1.384%	0.696%	0.012%	0.012%	0.021%	0.023%
	3	0.140%	0.116%	0.678%	0.407%	0.011%	0.010%	0.011%	0.014%
	4	0.140%	0.116%	0.678%	0.407%	0.011%	0.010%	0.011%	0.014%
	5	0.140%	0.116%	0.678%	0.407%	0.012%	0.012%	0.021%	0.023%
	6	0.000%	0.000%	1.384%	0.696%	0.000%	0.000%	0.000%	0.000%
Widow rockfish									
N of 40°10'									
	1	0.000%	0.003%	0.111%	0.110%	0.056%	0.038%	0.014%	0.007%
	2	0.000%	0.003%	0.111%	0.110%	0.008%	0.007%	0.004%	0.004%
	3	0.005%	0.006%	0.007%	0.011%	0.084%	0.007%	0.007%	0.006%
	4	0.005%	0.006%	0.007%	0.011%	0.084%	0.007%	0.007%	0.006%
	5	0.005%	0.006%	0.007%	0.011%	0.008%	0.007%	0.004%	0.004%
	6	0.000%	0.003%	0.111%	0.110%	0.056%	0.038%	0.014%	0.007%
S of 40°10'									
	1	0.000%	0.154%	0.361%	0.359%	0.038%	0.000%	0.000%	0.000%
	2	0.000%	0.154%	0.361%	0.359%	0.047%	0.000%	0.000%	0.000%
	3	0.000%	0.000%	0.072%	0.071%	0.843%	0.829%	0.843%	0.391%
	4	0.000%	0.000%	0.072%	0.071%	0.843%	0.829%	0.843%	0.391%
	5	0.000%	0.000%	0.072%	0.071%	0.047%	0.000%	0.000%	0.000%
	6	0.000%	0.154%	0.361%	0.359%	0.038%	0.000%	0.000%	0.000%
Cowcod									
S of 40°10'									
	1	0.000%	0.000%	0.000%	0.000%	0.017%	0.000%	0.000%	0.000%
	2	0.000%	0.000%	0.000%	0.000%	0.017%	0.000%	0.000%	0.000%
	3	0.002%	0.004%	0.060%	0.069%	0.000%	0.000%	0.000%	0.000%
	4	0.002%	0.004%	0.060%	0.069%	0.000%	0.000%	0.000%	0.000%
	5	0.002%	0.004%	0.060%	0.069%	0.017%	0.000%	0.000%	0.000%
	6	0.000%	0.000%	0.000%	0.000%	0.017%	0.000%	0.000%	0.000%

Table A-1. Bycatch rates for rebuilding species used in projection modeling for 2010-12 trawl fisheries (continued).

Area	2-month period	< 50 fm	< 60 fm	< 75 fm	< 100 fm	> 150 fm	> 180 fm	> 200 fm	> 250 fm
Yelloweye rockfish									
N of 40°10'									
	1	0.000%	0.000%	0.011%	0.006%	0.000%	0.000%	0.000%	0.000%
	2	0.000%	0.000%	0.011%	0.006%	0.000%	0.000%	0.000%	0.000%
	3	0.008%	0.005%	0.004%	0.005%	0.001%	0.000%	0.000%	0.000%
	4	0.008%	0.005%	0.004%	0.005%	0.001%	0.000%	0.000%	0.000%
	5	0.008%	0.005%	0.004%	0.005%	0.000%	0.000%	0.000%	0.000%
	6	0.000%	0.000%	0.011%	0.006%	0.000%	0.000%	0.000%	0.000%
S of 40°10'									
	1	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
	2	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
	3	0.000%	0.008%	0.006%	0.003%	0.000%	0.000%	0.000%	0.000%
	4	0.000%	0.008%	0.006%	0.003%	0.000%	0.000%	0.000%	0.000%
	5	0.000%	0.008%	0.006%	0.003%	0.000%	0.000%	0.000%	0.000%
	6	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Darkblotched rockfish									
N of 38°									
	1	0.000%	0.001%	0.023%	0.044%	1.883%	1.765%	0.858%	0.497%
	2	0.000%	0.001%	0.023%	0.044%	0.753%	0.694%	0.532%	0.297%
	3	0.031%	0.026%	0.053%	0.080%	1.005%	0.907%	0.821%	0.356%
	4	0.031%	0.026%	0.053%	0.080%	1.005%	0.907%	0.821%	0.356%
	5	0.031%	0.026%	0.053%	0.080%	0.753%	0.694%	0.532%	0.297%
	6	0.000%	0.001%	0.023%	0.044%	1.883%	1.765%	0.858%	0.497%
S of 38°									
	1	0.000%	0.000%	0.000%	0.006%	0.400%	0.377%	0.340%	0.148%
	2	0.000%	0.000%	0.000%	0.006%	0.321%	0.283%	0.280%	0.174%
	3	0.002%	0.021%	0.015%	0.044%	1.299%	1.330%	1.299%	1.041%
	4	0.002%	0.021%	0.015%	0.044%	1.299%	1.330%	1.299%	1.041%
	5	0.002%	0.021%	0.015%	0.044%	0.321%	0.283%	0.280%	0.174%
	6	0.000%	0.000%	0.000%	0.006%	0.400%	0.377%	0.340%	0.148%
Pacific ocean perch									
N of 40°10'									
	1	0.000%	0.000%	0.001%	0.001%	0.670%	0.619%	0.341%	0.120%
	2	0.000%	0.000%	0.001%	0.001%	0.603%	0.469%	0.341%	0.164%
	3	0.001%	0.005%	0.010%	0.095%	0.804%	0.502%	0.357%	0.183%
	4	0.001%	0.005%	0.010%	0.095%	0.804%	0.502%	0.357%	0.183%
	5	0.001%	0.005%	0.010%	0.095%	0.603%	0.469%	0.341%	0.164%
	6	0.000%	0.000%	0.001%	0.001%	0.670%	0.619%	0.341%	0.120%
S of 40°10'									
	1	0.000%	0.000%	0.000%	0.000%	0.013%	0.014%	0.017%	0.000%
	2	0.000%	0.000%	0.000%	0.000%	0.001%	0.000%	0.000%	0.000%
	3	0.000%	0.000%	0.000%	0.012%	0.010%	0.010%	0.010%	0.000%
	4	0.000%	0.000%	0.000%	0.012%	0.010%	0.010%	0.010%	0.000%
	5	0.000%	0.000%	0.000%	0.012%	0.001%	0.000%	0.000%	0.000%
	6	0.000%	0.000%	0.000%	0.000%	0.013%	0.014%	0.017%	0.000%

Notes: Northern-area rates for depths less than 100 fm reflect the status quo closure of these depths north of 48.167° N. latitude. Northern-area rates for Periods 3 and 4 in the column '> 150 fm' do not include data shallower than 200 fm for the sub-area south of 45.767° N. latitude.

Table A-2 Discard rates used in projection modeling for the 2010-12 trawl fisheries, expressed as a percentage of total stratum catch of each species, by area, depth zone, and bi-monthly period, based on data collected by the West Coast Groundfish Observer Program between May 2005 and April 2009.

	< 50 fm		< 60 fm		< 75 fm		< 100 fm		> 150 fm			> 180 fm			> 200 fm			> 250 fm		
	Periods		Periods		Periods		Periods		Periods			Periods			Periods			Periods		
	1,2,6	3,4,5	1,2,6	3,4,5	1,2,6	3,4,5	1,2,6	3,4,5	1,6	2,5	3,4	1,6	2,5	3,4	1,6	2,5	3,4	1,6	2,5	3,4
N of 40°10'																				
Canary	99%	81%	93%	82%	48%	85%	71%	87%	100%	91%	94%	100%	100%	93%	100%	100%	91%	100%	100%	80%
Widow	0%	71%	100%	81%	81%	81%	87%	82%	61%	25%	59%	65%	28%	37%	19%	22%	35%	11%	19%	35%
Yelloweye	0%	72%	0%	72%	0%	69%	0%	67%	14%	11%	45%	14%	14%	20%	14%	14%	0%	14%	0%	0%
Darkblotched	0%	17%	100%	72%	100%	85%	100%	78%	63%	39%	47%	65%	36%	44%	45%	25%	42%	18%	11%	11%
POP	0%	0%	0%	57%	0%	51%	0%	34%	23%	36%	22%	24%	33%	14%	22%	34%	9%	11%	37%	9%
Lingcod	29%	74%	20%	77%	44%	76%	44%	76%	26%	10%	14%	19%	12%	12%	20%	14%	8%	7%	11%	1%
Sablefish	76%	67%	79%	54%	70%	44%	80%	41%	7%	7%	8%	7%	7%	8%	6%	7%	7%	6%	7%	7%
Shortspine	0%	0%	0%	31%	0%	2%	0%	6%	7%	7%	11%	7%	7%	10%	5%	7%	10%	5%	5%	7%
Longspine	0%	0%	0%	0%	0%	0%	0%	0%	21%	18%	15%	21%	18%	15%	21%	18%	15%	21%	18%	14%
Dover sole	32%	22%	24%	14%	16%	11%	16%	10%	5%	6%	8%	5%	6%	8%	5%	6%	8%	5%	8%	11%
Petrale	11%	10%	10%	8%	9%	8%	9%	8%	2%	1%	4%	2%	1%	2%	3%	1%	2%	10%	2%	5%
Arrowtooth	46%	73%	80%	77%	86%	72%	88%	66%	16%	11%	15%	16%	11%	15%	12%	10%	21%	13%	9%	20%
English	53%	28%	36%	26%	32%	27%	32%	26%	4%	4%	4%	4%	4%	4%	2%	1%	2%	3%	1%	2%
Other flatfish	44%	37%	32%	41%	38%	42%	39%	42%	17%	11%	14%	18%	10%	14%	15%	10%	14%	13%	14%	19%
Chilipepper	0%	89%	0%	70%	100%	76%	100%	77%	58%	74%	91%	51%	54%	91%	10%	54%	80%	18%	40%	0%
Slope rockfish	0%	6%	0%	3%	55%	6%	46%	16%	30%	27%	34%	29%	27%	31%	31%	27%	26%	29%	21%	19%
Shelf rockfish	0%	31%	0%	49%	10%	68%	15%	57%	64%	65%	70%	67%	71%	59%	57%	62%	54%	44%	54%	55%
S of 40°10'																				
Bocaccio	0%	100%	0%	73%	100%	85%	100%	95%	17%	53%	43%	100%	97%	43%	100%	0%	43%	0%	0%	0%
Canary	0%	19%	0%	14%	90%	44%	93%	42%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Cowcod	0%	100%	0%	100%	0%	100%	0%	100%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Widow	0%	0%	100%	0%	100%	72%	100%	80%	100%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Yelloweye	0%	0%	0%	100%	0%	100%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Darkblotched	0%	100%	0%	25%	0%	22%	36%	37%	20%	1%	0%	18%	1%	0%	15%	0%	0%	0%	0%	0%
POP	0%	0%	0%	0%	0%	0%	0%	100%	100%	25%	50%	100%	25%	50%	100%	0%	50%	0%	0%	0%
Lingcod	37%	30%	67%	52%	24%	52%	22%	47%	0%	2%	32%	1%	14%	50%	0%	17%	32%	0%	0%	0%
Sablefish	0%	25%	0%	17%	0%	11%	69%	12%	4%	4%	5%	4%	3%	10%	4%	4%	5%	4%	4%	7%
Shortspine	0%	0%	0%	100%	0%	100%	0%	26%	5%	4%	3%	5%	4%	3%	4%	4%	3%	3%	4%	2%
Longspine	0%	0%	0%	72%	0%	43%	0%	6%	9%	14%	7%	9%	14%	8%	9%	14%	7%	9%	14%	7%
Dover sole	0%	72%	100%	74%	100%	75%	97%	33%	12%	16%	12%	12%	14%	11%	11%	14%	12%	15%	16%	18%
Petrale	24%	5%	10%	9%	6%	8%	5%	5%	1%	10%	8%	0%	8%	17%	0%	8%	8%	1%	19%	4%
Arrowtooth	0%	100%	0%	53%	0%	56%	100%	93%	94%	90%	51%	93%	87%	63%	93%	84%	51%	83%	80%	49%
English	71%	55%	55%	54%	52%	48%	48%	47%	8%	31%	6%	11%	34%	13%	0%	29%	6%	0%	0%	8%
Other flatfish	16%	31%	19%	35%	37%	37%	40%	39%	19%	44%	35%	17%	41%	35%	12%	35%	35%	17%	38%	46%
Chilipepper	0%	7%	98%	49%	73%	64%	85%	80%	4%	15%	26%	7%	12%	32%	0%	8%	26%	0%	0%	0%
Slope rockfish	0%	0%	0%	0%	0%	8%	0%	16%	13%	19%	5%	12%	16%	4%	8%	18%	5%	18%	25%	2%
Shelf rockfish	0%	86%	100%	66%	100%	93%	100%	87%	62%	80%	30%	91%	75%	66%	97%	48%	30%	0%	12%	17%

A.2 Limited Entry Trawl Whiting

Under No Action, the Council's Groundfish Management Team utilizes a model for assessing bycatch impacts in the Pacific whiting fishery. This model estimates the catch of depleted species based on a rate of depleted species catch per unit of Pacific whiting catch in each sector. This model is used to help inform appropriate bycatch limits for the Pacific whiting fishery given a particular Pacific whiting OY. Under Amendments 20 and 21, the whiting bycatch model is no longer necessary since allocations of overfished species (i.e., widow, darkblotched, and POP) are done through formal amendments. The model can be used to inform potential impacts to canary rockfish, which are allocated through the harvest specifications and management measures process.

Bycatch rates in the Pacific whiting fishery model are calculated for each year and non-tribal whiting sector. The rates are estimated as the metric tons of each depleted species per metric ton of whiting. The model uses the four years immediately prior to the existing year and combines those years through the use of a weighted average formula indicated below:

$$\text{Weighted Bycatch Rate} = 0.4{*}\text{BCrate}_{\text{Year-1}} + 0.3{*}\ \text{BCrate}_{\text{Year-2}} + 0.2{*}\ \text{BCrate}_{\text{Year-3}} + 0.1{*}\ \text{BCrate}_{\text{Year-4}}$$

This weighted average approach is taken because it is believed that the prior year is more reflective of potential bycatch patterns in the current year. This is believed to be the case in the Pacific whiting fishery because the relative abundance of species caught in the Pacific whiting fishery can vary substantially from year to year. This is particularly the case because Pacific whiting is a highly variable stock, and variations in Pacific whiting stock abundance should have an impact on the bycatch rate of non-target stocks as those stocks become more or less relatively abundant to Pacific whiting. The bycatch rates used for estimating depleted species catch in the 2009 fishery (except for widow rockfish) are illustrated in Table A-3.

Table A-3. Bycatch rates of depleted species used to model impacts in the 2011-2012 Pacific whiting trawl fishery.

Sector	Canary	Darkblotched	POP	Yelloweye
Mothership	0.0000222	0.0000597	0.0000450	0.0000000
CP	0.0000105	0.0000309	0.0000453	0.0000001
Shoreside	0.0000400	0.0000192	0.0001105	0.0000002

One exception to the weighted average approach described above is widow rockfish. The bycatch rate of widow rockfish has been increasing year over year in all non-tribal sectors of the Pacific whiting fishery. Due to this clear trend of increasing bycatch rates, widow rockfish bycatch rates are estimated with a linear regression analysis that uses the prior four years to estimate bycatch rates in the future. This is done on a sector by sector basis.

A.3 Non-nearshore Fixed Gear Model

The non-nearshore model projects impacts for limited entry and open access fixed gear vessels that are fishing seaward of the non-trawl RCA. Generally, these vessels target sablefish. The sablefish ACL north of 36° N. latitude is apportioned according to the formal intersector allocations shown in Figure A-1. It is assumed in the analysis that the annual sablefish allocation will be fully attained by the fixed gear fleets seaward of the RCA. WCGOP observations on discards and landed catch 2002-2008 provide the primary data input for estimating bycatch with PacFIN fish ticket data also providing information on the distribution of catch among gear types.

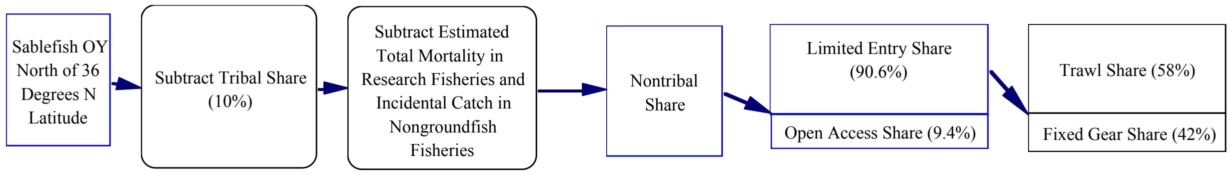


Figure A-1. The formal intersector allocations of sablefish north of 36° N. latitude.

Observations from the fixed gear sablefish fishery north and south of 40°10' N. latitude were pooled for all years of data (2002-2008), with no differential weighting applied to catch from different years. This level of data aggregation enables reporting of retained and discarded catch of groundfish species by gear type at a finer latitudinal and depth scale than has been done in previous specifications and management measure analyses. Data summarizing observed retained and discarded catch from fishing efforts north of 40°10' N. latitude were stratified by gear type (longline and pot/trap) and three alternative depth ranges that are used to evaluate different seaward boundaries of the non-trawl RCA. Although the range of depths recorded for an individual fixed gear set by observers is commonly much smaller than for observed trawl tows, it may not be possible to accurately assign the catch and discard of many sets to a specific 25 fm interval. For this exercise, the average of the beginning and ending depths of each set was used to represent the depth at which all fish on the set were caught.

The area stratification used in this model was developed first for use in the 2009-10 biennial management cycle. This stratification was arrived at through consideration of canary and yelloweye bycatch north of 40°10' N. latitude by depth and area and provides the Council with the option of employing differential seaward RCA boundaries. Four subareas were identified bounded by: Cape Mendocino at 40°10' N. latitude, the boundary of the Columbia and Eureka INPFC areas (43°10' N. latitude), Cascade Head (45.064°10' N. latitude), Point Chehalis (46.888°10' N. latitude), and the U.S.-Canada border. Several alternative boundaries were evaluated, but those listed above provided the greatest contrast between areas of high and low yelloweye bycatch. Since rockfish bycatch in the pot gear fleet is very small and there are very limited numbers of pot gear observations in some areas, results for this group are summarized with respect to depth only (without subareas). The seaward boundary of the non-trawl RCA south of 40°10' N. latitude has always been 150 fm and so no data is available shallower than that depth.

The spreadsheet model projects the distribution of sablefish catch between the areas north and south of 40°10' N. latitude and between longline and pot gear types for both the open access and limited entry sectors based on fish ticket landings for the years 2002-2008 (Table A-4). The 2002-2008 average of WCGOP observed landings are then used to project the distribution of the longline catch north of 40°10' N. latitude among the four management subareas (Table A-5). The model then applies WCGOP observed discard rates to these projected catch distributions using the appropriate area, depth, and gear stratification to produce annual estimates of discard for the rebuilding rockfish encountered by the non-nearshore fixed gear sectors. Discard rates were calculated by dividing the total observed discard weight for each species by the weight of retained sablefish and are reported in Table A-6 through Table A-9. The analysis of impact associated with alternative RCA specifications based on this methodology is discussed in Appendix C.

Table A-4. Distribution of fish ticket landings among longline (hkl) and pot gear types in the limited entry and open access non-nearshore fixed gear sectors, 2002-2008.

	LIMITED ENTRY						OPEN ACCESS				
	36° - 40°10' N lat		North of 40°10' N		TOTAL (LE)		36° - 40°10' N lat		North of 40°10' N		TOTAL (OA)
	hkl	pot	hkl	pot			hkl	pot	hkl	pot	
2002	154	16	783	345	1,298	2002	125	82	138	16	361
2003	201	24	1,013	587	1,825	2003	126	148	246	29	549
2004	214	58	1,264	575	2,111	2004	90	156	191	10	447
2005	212	-	1,319	623	2,154	2005	111	262	419	101	893
2006	186	50	1,389	564	2,189	2006	78	247	280	182	787
2007	190	45	1,117	391	1,742	2007	31	209	185	32	458
2008	226	39	1,146	398	1,809	2008	66	206	273	24	570
Total	1,381	231	8,031	3,483	13,127	Total	627	1,310	1,733	395	4,065
% of LE total	11%	2%	61%	27%	100%	% of OA total	15%	32%	43%	10%	100%

Table A-5. Distribution of observed longline sablefish landings among the four management subareas north of 40°10' N. latitude, 2002-2008.

	Longline				
	North of 40°10' N	**40°10' - Col./Eur. line 43°**	**Col./Eur. line 43° - Cascade Head 45.064°**	**Cascade Head 45.064° - Pt. Chehalis 46.888°**	**North of Pt. Chehalis 46.888°**
Observed sablefish landings (mt)	1,962	278	510	318	856
% of total		**14%**	**26%**	**16%**	**44%**
min (02-08)		6%	17%	4%	24%
max (02-08)		24%	37%	45%	55%
mean (02-08)		12%	26%	18%	43%
stdev (02-08)		6%	8%	14%	13%

Table A-6. Rates of species discard (2002-2008 average) for rebuilding species and select non-rebuilding species, relative to retained sablefish, used to project bycatch impacts for longline gear south of 40°10' N. latitude and for pot gear types north and south of north of 40°10' N. latitude.

	36° - 40°10' N. lat.		North of 40°10' N. Lat Pot		
	Longline	Pot	100 fm	125 fm	150fm
Bycatch ratios (total catch lbs / retained sablefish lbs)					
Rebuilding species					
Bocaccio	0.0000	0.0000	0.0000	0.0000	0.0000
Canary rockfish	0.0000	0.0000	0.0000	0.0026	0.0000
Darkblotched rockfish	0.0016	0.0011	0.0006	0.0006	0.0007
Pacific ocean perch	0.0000	0.0000	0.0000	0.0002	0.0000
Widow rockfish	0.0002	0.0000	0.0000	0.0000	0.0000
Yelloweye rockfish	0.0000	0.0000	0.0000	0.0004	0.0000
Non-rebuilding species					
Sablefish	1.3639	1.4768	1.2265	1.2227	1.2060
Unspecified grenadiers	0.2656	0.0000	0.0021	0.0023	0.0025
Other slope rockfish	0.0498	0.0124	0.0102	0.0102	0.0104
Blackgill (South of 40°10' N. lat.)	0.0417	0.0108	0.0000	0.0000	0.0000
Longnose skate	0.0499	0.0000	0.0000	0.0000	0.0000
Spiny dogfish	0.0419	0.0002	0.0012	0.0011	0.0012
Shortspine thornyhead	0.0381	0.0004	0.0005	0.0005	0.0005
Lingcod	0.0041	0.0185	0.0109	0.0103	0.0094
Unspecified skate	0.0109	0.0007	0.0000	0.0000	0.0000
Mixed thornyheads	0.0113	0.0000	0.0000	0.0000	0.0000
Dover sole	0.0062	0.0009	0.0024	0.0025	0.0027
Longspine thornyhead	0.0094	0.0000	0.0000	0.0000	0.0000
Arrowtooth flounder	0.0001	0.0002	0.0050	0.0052	0.0052
Other groundfish	0.0032	0.0000	0.0000	0.0000	0.0000
Pacific hake	0.0006	0.0000	0.0000	0.0000	0.0000
Other shelf rockfish	0.0005	0.0000	0.0001	0.0001	0.0001
Splitnose rockfish	0.0004	0.0002	0.0000	0.0000	0.0000
Bank rockfish (South of 40°10' N. lat.)	0.0004	0.0000	0.0000	0.0000	0.0000
Big skate	0.0002	0.0000	0.0000	0.0000	0.0000
Petrale sole	0.0000	0.0001	0.0000	0.0000	0.0000
Chilipepper	0.0002	0.0000	0.0000	0.0000	0.0000
Yellowtail rockfish	0.0000	0.0000	0.0000	0.0000	0.0000

Table A-7. Rates of species discard (2002-2008 average) observed on fixed gear sablefish sets deeper than 100 fm for rebuilding species and select non-rebuilding species, relative to retained sablefish, used to project bycatch impacts for longline gear north of 40°10' N. latitude by management subareas.

	North of 40°10' N	40°10' - Col./Eur. line 43°	Col./Eur. line 43° - Cascade Head 45.064°	Cascade Head 45.064° - Pt. Chehalis 46.888°	North of Pt. Chehalis 46.888°
Bycatch ratios (total catch lbs / retained sablefish lbs)					
Rebuilding species					
Bocaccio	0.0001	0.0004	0.0000	0.0000	0.0002
Canary rockfish	0.0016	0.0001	0.0002	0.0022	0.0029
Darkblotched rockfish	0.0025	0.0095	0.0030	0.0010	0.0005
Pacific ocean perch	0.0003	0.0006	0.0001	0.0002	0.0003
Widow rockfish	0.0000	0.0000	0.0000	0.0001	0.0000
Yelloweye rockfish	0.0007	0.0005	0.0008	0.0003	0.0007
Non-rebuilding species					
Sablefish	1.1379	1.1577	1.2162	1.1924	1.0628
Spiny dogfish	0.1645	0.0468	0.0238	0.1137	0.3098
Other slope rockfish	0.0775	0.0902	0.0218	0.0532	0.1165
Longnose skate	0.0458	0.0278	0.0344	0.0387	0.0616
Arrowtooth flounder	0.0477	0.0018	0.0137	0.0259	0.0923
Unspecified skate	0.0201	0.0093	0.0182	0.0186	0.0256
Lingcod	0.0109	0.0058	0.0059	0.0123	0.0150
Big skate	0.0077	0.0066	0.0011	0.0010	0.0146
Shortspine thornyhead	0.0071	0.0030	0.0007	0.0033	0.0139
Other shelf rockfish	0.0055	0.0012	0.0016	0.0059	0.0093
Dover sole	0.0021	0.0008	0.0005	0.0044	0.0026
Other groundfish	0.0016	0.0027	0.0015	0.0013	0.0015
Unspecified grenadiers	0.0016	0.0021	0.0000	0.0001	0.0029
Pacific cod	0.0016	0.0000	0.0001	0.0022	0.0028
Yellowtail rockfish	0.0014	0.0000	0.0000	0.0003	0.0032

Table A-8. Rates of species discard (2002-2008 average) observed on fixed gear sablefish sets deeper than 125 fm for rebuilding species and select non-rebuilding species, relative to retained sablefish, used to project bycatch impacts for longline gear north of 40°10' N. latitude by management subareas.

	North of 40°10' N	40°10' - Col./Eur. line 43°	Col./Eur. line 43° - Cascade Head 45.064°	Cascade Head 45.064° - Pt. Chehalis 46.888°	North of Pt. Chehalis 46.888°
Bycatch ratios (total catch lbs / retained sablefish lbs)					
Rebuilding species					
Bocaccio	0.0001	0.0004	0.0000	0.0000	0.0000
Canary rockfish	0.0012	0.0000	0.0001	0.0001	0.0026
Darkblotched rockfish	0.0031	0.0100	0.0037	0.0020	0.0006
Pacific ocean perch	0.0002	0.0005	0.0001	0.0003	0.0002
Widow rockfish	0.0000	0.0000	0.0000	0.0001	0.0000
Yelloweye rockfish	0.0004	0.0004	0.0005	0.0003	0.0004
Non-rebuilding species					
Sablefish	1.1331	1.1607	1.2202	1.1792	1.0617
Spiny dogfish	0.1440	0.0497	0.0208	0.1403	0.2518
Other slope rockfish	0.0931	0.0957	0.0250	0.1018	0.1308
Longnose skate	0.0436	0.0274	0.0376	0.0350	0.0547
Arrowtooth flounder	0.0506	0.0018	0.0148	0.0388	0.0918
Unspecified skate	0.0168	0.0075	0.0170	0.0153	0.0202
Shortspine thornyhead	0.0089	0.0034	0.0008	0.0061	0.0163
Lingcod	0.0073	0.0058	0.0058	0.0031	0.0096
Big skate	0.0055	0.0049	0.0009	0.0013	0.0094
Other shelf rockfish	0.0035	0.0012	0.0013	0.0015	0.0060
Unspecified grenadiers	0.0020	0.0024	0.0000	0.0002	0.0035
Other groundfish	0.0015	0.0029	0.0015	0.0008	0.0012
Dover sole	0.0017	0.0009	0.0005	0.0014	0.0028
Yellowtail rockfish	0.0016	0.0001	0.0000	0.0003	0.0033
Pacific cod	0.0007	0.0000	0.0000	0.0009	0.0013

Table A-9. Rates of species discard (2002-2008 average) observed on fixed gear sablefish sets deeper than 150 fm for rebuilding species and select non-rebuilding species, relative to retained sablefish, used to project bycatch impacts for longline gear north of 40°10' N. latitude by management subareas.

	North of 40°10' N	40°10' - Col./Eur. line 43°	Col./Eur. line 43° - Cascade Head 45.064°	Cascade Head 45.064° - Pt. Chehalis 46.888°	North of Pt. Chehalis 46.888°
Bycatch ratios (total catch lbs / retained sablefish lbs)					
Rebuilding species					
Bocaccio	0.0000	0.0001	0.0000	0.0000	0.0000
Canary rockfish	0.0013	0.0000	0.0001	0.0000	0.0027
Darkblotched rockfish	0.0040	0.0112	0.0061	0.0026	0.0006
Pacific ocean perch	0.0002	0.0005	0.0000	0.0004	0.0001
Widow rockfish	0.0000	0.0000	0.0000	0.0000	0.0000
Yelloweye rockfish	0.0002	0.0001	0.0003	0.0004	0.0002
Non-rebuilding species					
Sablefish	1.1306	1.1769	1.2340	1.1677	1.0581
Spiny dogfish	0.1456	0.0507	0.0190	0.1118	0.2465
Other slope rockfish	0.1133	0.0939	0.0374	0.1288	0.1529
Longnose skate	0.0420	0.0288	0.0363	0.0398	0.0501
Arrowtooth flounder	0.0479	0.0016	0.0128	0.0319	0.0846
Unspecified skate	0.0156	0.0058	0.0188	0.0120	0.0185
Shortspine thornyhead	0.0113	0.0041	0.0012	0.0070	0.0195
Lingcod	0.0043	0.0043	0.0034	0.0021	0.0052
Big skate	0.0033	0.0042	0.0001	0.0019	0.0047
Unspecified grenadiers	0.0029	0.0031	0.0001	0.0003	0.0046
Other shelf rockfish	0.0026	0.0010	0.0008	0.0015	0.0042
Dover sole	0.0018	0.0010	0.0005	0.0016	0.0028
Other groundfish	0.0013	0.0034	0.0014	0.0005	0.0006
Yellowtail rockfish	0.0019	0.0001	0.0000	0.0004	0.0038
Pacific cod	0.0004	0.0000	0.0000	0.0003	0.0008

A.4 Limited Entry Fixed Gear Sablefish Daily Trip Limit Model north of 36° N. latitude

Available information indicates that catches in the Limited Entry Fixed Gear Daily Trip Limit (LEFG-DTL) sablefish fishery north of 36° N. latitude have been substantially less than the allocations during the past six years (Table A-10). Even though catches and the percentage of the allocation caught have generally increased over that period, this fishery has typically under-harvested its allocation.

Table A-10. Limited Entry Fixed Gear Sablefish DTL allocation, landings, and percentage of allocation landed for 2004 – 2009 north of 36° N. latitude.

Year	Allocation (mt)	Landings (mt)	Proportion of Allocation
2004	367	79	0.22
2005	367	146	0.40
2006	356	104	0.29
2007	276	116	0.42
2008	276	150	0.54
2009	351	205	0.58

Measures to remedy this problem of under-harvesting the allocation by this fishery were initiated in November 2009, when the GMT first presented a new model to predict landings by the LEFG-DTL sablefish fishery (Agenda Item G.4.b, Supplemental GMT Report, November 2009). This model was subsequently improved and used to predict the impacts of inseason trip-limit adjustments during the June 2010 PFMC meeting (Agenda Item B.5.b, Supplemental GMT Report 2, June 2010), and to develop trip limits for the 2011-2012 seasons (Agenda Item B.7.b, Supplemental GMT Report, June 2010). This section provides detail on the development and application of this new LEFG-DTL sablefish trip limit model.

Data Sources

Landings and catch data were acquired from PacFIN using the PacFIN query "slct_ves_sabl_arid_DTL.sql". Currently, only PacFIN staff can run this query because it selects data from an internal table that cannot be accessed by general users. The output from this query contains monthly summaries by vessel for fleet (limited entry and open access) and INPFC area (Conception and Vancouver-Columbia-Eureka-Monterey areas). Data used to create this model were LEFG-DTL sablefish landings north of 36° N. latitude for years 2004-2009 (periods 1-6) and 2010 (periods 1-2). It was recently learned that this data set may include landings under research or exempted fishing permits. These potential additional landings, which if present, should be excluded from this analysis and not be attributed to LEFG-DTL fisheries. This potential inclusion of inappropriate data was not an issue for this fishery north of 36° N. latitude.

Daily-, weekly-, and bimonthly-landing limits were obtained from the Federal Pacific Coast Groundfish Regulations (50 CFR 660). There have been significant contrasts among landing limits throughout the six-year period included in this analysis; landing limits have been altered frequently and at many different levels. For example, bimonthly landing limits have been set at the following levels for this LEFG-DTL sablefish: 3600, 5000, 5500, 6000, 7000, and 9000 lbs/2 months. Landing limits within bimonthly periods were consistent across months for all years except 2005 (period 5) for which the lowest limit within that period was used.

Analysis

The present analysis was conducted using SAS software. The significance of potential explanatory variables was evaluated using the REG procedure (stepwise selection). Potential explanatory variables included in the full model were daily, weekly, and bimonthly landing limits (continuous variables, lbs). This analysis eliminated daily and weekly trip limits from the model, leaving a model containing cumulative bimonthly landing limit as the only significant explanatory variable. However, potential impacts of seasonal variation (calendar period) were not included in the REG procedure because period is a class variable (rather than continuous). Hence, the significance of including calendar period in the predictive model was tested using the GLM procedure; both calendar period and cumulative bimonthly landing limit significantly contributed to variation ($p < 0.0001$). The correlation coefficient (R^2) for this GLM model containing both bimonthly landing limit and calendar period was 0.81. The R^2 with calendar period removed (i.e., with only bimonthly landing limit) was 0.52, indicating calendar period explains much of the variation. Hence, parameters were estimated using the REG procedure by calendar period (ι) as:

Equation 1 $\ln(\text{landings}_\iota) = \ln(\alpha_\iota) + \beta_\iota(\ln(\text{bml}_\iota))$

where landings = bimonthly landed catch (mt), bml = cumulative bimonthly landing limit (lbs), and *i* = bimonthly calendar period (1 – 6). Parameter estimates for each calendar period are shown in (Table A-11). The model R^2 for each period ranged from a low of 0.45 (period 5) to a high of 0.93 (period 4).

Table A-11. Parameter estimates obtained by fitting Equation 1 to 2004-April 2010 landings data for the LEFG-DTL sablefish fishery north of 36° N. latitude. Associated correlation coefficients (R^2) are also shown.

Period (*i*)	$\ln(\alpha_\iota)$	β_ι	R^2
1	-8.35	1.35	0.46
2	-8.95	1.42	0.47
3	-24.63	3.19	0.74
4	-22.03	2.91	0.93
5	-6.74	1.12	0.45
6	-10.50	1.65	0.89

Annual-sablefish landings can be predicted for the LEFG-DTL sablefish fishery using the parameter estimates shown in Table A-11 and any level of cumulative bimonthly landing limit. Table A-12 provides an example for estimating annual landings using a constant 8,000 lb/2 month cumulative limit. Under this scenario, the model predicted a total of 321 mt of sablefish would be landed. Note that ln(landings) must be back transformed, and should be adjusted for bias. Both unadjusted and bias-adjusted landings are provided in (Table A-12). The back-transformed landings estimates were adjusted using:

Equation 2 $\text{Adjusted Landings} = \exp((\ln(\text{landings})+(0.5 \times \sigma^2)))$,

where σ = root mean square error. Sigma (σ) values were 0.26, 0.38, 0.39, 0.19, 0.35, and 0.21 for periods 1-6, respectively.

Table A-12. Example of predicted annual landings for the LEFG-DTL sablefish fishery north of 36° N. latitude for cumulative bimonthly landing limits of 8,000 lbs/2 months using the model ln(landings)=ln(α_ι) + β_ι(ln(bml)).

Period (i)	Bimonthly landing limit (bml), lbs	ln(bml)	ln(α_ι)	(β_ι)	Predicted landings: ln(landings, mt)	Unadjusted landings (mt)	Adjusted landings (mt)
1	8,000	8.99	-8.35	1.35	3.82	45.8	47.4
2	8,000	8.99	-8.95	1.42	3.84	46.6	50.1
3	8,000	8.99	-24.63	3.19	4.00	54.6	58.1
4	8,000	8.99	-22.03	2.91	4.08	59.3	60.4
5	8,000	8.99	-6.74	1.12	3.32	27.8	29.5
6	8,000	8.99	-10.50	1.65	4.30	73.7	75.4
TOTAL							320.9

Model Performance (Predicted vs. Actual Landings)

In general, patterns were similar between actual landings and landings predicted by this new LEFG-DTL sablefish model throughout the six-year period (Figure A-2). This figure demonstrates that much of the variability in landings can be explained by cumulative bimonthly trip limits and calendar period. This model tracks catches close enough that it may be useful to help this fishery fully prosecute its allocation. However, careful inseason monitoring will be necessary to prevent this fishery from exceeding its annual allocation, especially leading up to the final period of each year where catches are typically highest (Figure A-2). Highest landings and effort (number of vessels) were consistently observed during period 6 (November and December).

This model should be updated at the end of each year to re-estimate parameters with the additional data to improve the predictive performance. Additional variables may also be included in future models to increase precision of predictions if deemed important (i.e., statistically significant). Finally, all PacFIN data requests in the future should be made for the query "slct_ves_sabl_arid_DTL_no_EFP.sql". This query excludes all landings made under research or exempted fishing permits. Although the potential of additional research or EFP landings has not affected this analysis to date, it is possible that significant research or EFP landings could occur in the future.

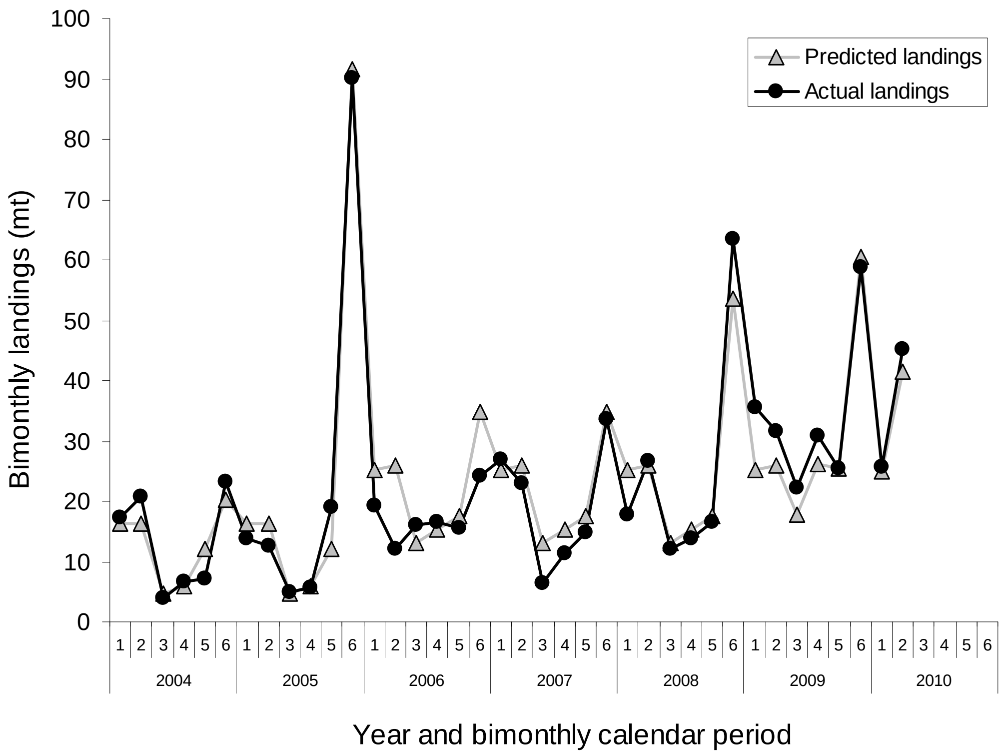


Figure A-2. Predicted and actual landings (mt) by the LEFG-DTL sablefish fishery north of 36° N. latitude for each bimonthly period from 2004 (periods 1-6) through 2010 (periods 1-2).

A.5 Open Access DTL Sablefish north and south of 36° N. latitude

The GMT prepared regional models (north and south of 36° N. latitude) to predict landings of sablefish by the open access (OA) sectors of the fishery. In each region, the effects of trip limits are examined with respect to the number of participating vessels and the average bimonthly catch per vessel. The analysis also evaluates the influence of price per pound, fuel costs, and seasonal effects on vessel participation and average catch.

Data requirements

- Open-access sablefish landings by date, vessel and region
- Historical trip limits (daily, weekly, and bimonthly) for each region
- Catch-weighted average ex-vessel price by region
- Median fuel cost by region

Bimonthly landings and ex-vessel prices were obtained from the PacFIN database (www.pacfin.org). Marine fuel prices are available from the website of the Pacific States Marine Fisheries Commission's Fisheries Economics Data Program (http://www.psmfc.org/efin/data/fuel.html). Historical trip limits are available online from the NMFS Northwest Region website (http://www.nwr.noaa.gov). Although rare, changes to historical trip limits sometimes occurred within a bimonthly period. Trip limits in the models were set equal to the largest limit within a bimonthly period.

Model Structure, Assumptions, and Results

The proposed model estimates bimonthly sablefish landings by the OA sector as the product of predictions from two linear statistical models. This approach assumes that the number of vessels entering the fishery is independent from the average bimonthly catch per vessel. Similarly, vessel participation and average bimonthly catch are assumed to be independent among regions. Standard model diagnostics and variable selection routines (residual plots, analysis of variance, and Akaike's Information Criterion) were used to reduce model dimensions and maintain reasonable predictive ability.

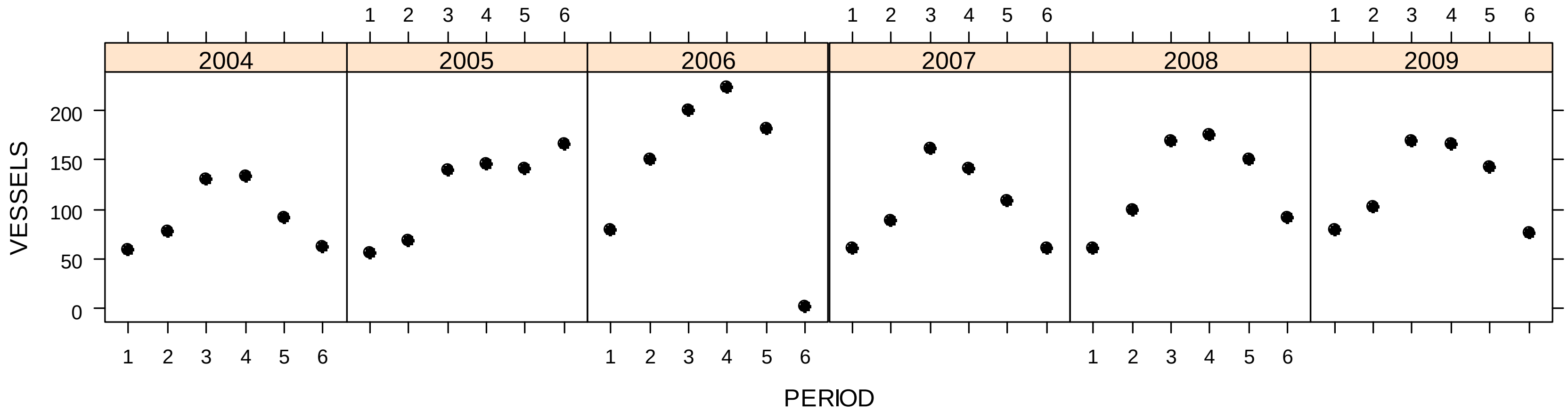
Within the northern region, bimonthly landings averaged among participating vessels are modeled as a simple linear function of the bimonthly trip limit. In this region, no other covariates were found to have a statistically significant relationship with average bimonthly landings after bimonthly trip limit was included in the model. The number of vessels participating in each bimonthly period varies seasonally in the northern region (Figure A-3, upper panel) with peak participation usually occurring near July or August (period 4). This seasonal pattern is approximately linearized (Figure A-4) in the model using a transformation of bimonthly calendar period ($-|x-4|$). Weekly trip limits and catch-weighted average price per pound were also found to influence vessel participation north of the Conception area (Table A-13, Figure A-5). All data in the final northern model are provided in Table A-14.

In the southern region, average bimonthly landings vary with changes to both daily and weekly trip limits, and in response to ex-vessel price per pound (Table A-13, Figure A-5). Bimonthly (and monthly) trip limits have not been implemented often enough in the Conception area to provide information about their effect on landings or vessel participation. The number of vessels participating in the southern OA sector does not have the same seasonal pattern as the northern region (Figure A-3, lower panel).

The catch-weighted price per pound for sablefish varies seasonally, but shows an overall increasing trend since 2004. Using these models, predictions for future bimonthly periods will require an estimate of price per pound. Prices from the most recent year are likely to be a reasonable first approximation for practical applications of the models, and any unforeseen changes in price leading to deviations from model predictions could be accounted for through inseason management.

In both regions, the use of average vessel catch as a response (regression of averages), rather than catch by individual vessel, results in artificially high R^2 values and underestimates variability in bimonthly catch. Analysis of vessel-specific data is recommended for future analysis. However, retrospective estimates of landings in the northern region closely match the actual landings (Figure A-6, upper panel). Landings estimates in the south are less accurate (Figure A-6, lower panel), in part due to a lack of contrast in historical trip limits (Table A-15).

Figure A-3. Number of vessels by period and year; upper panels = north of Conception area; lower panels = Conception area



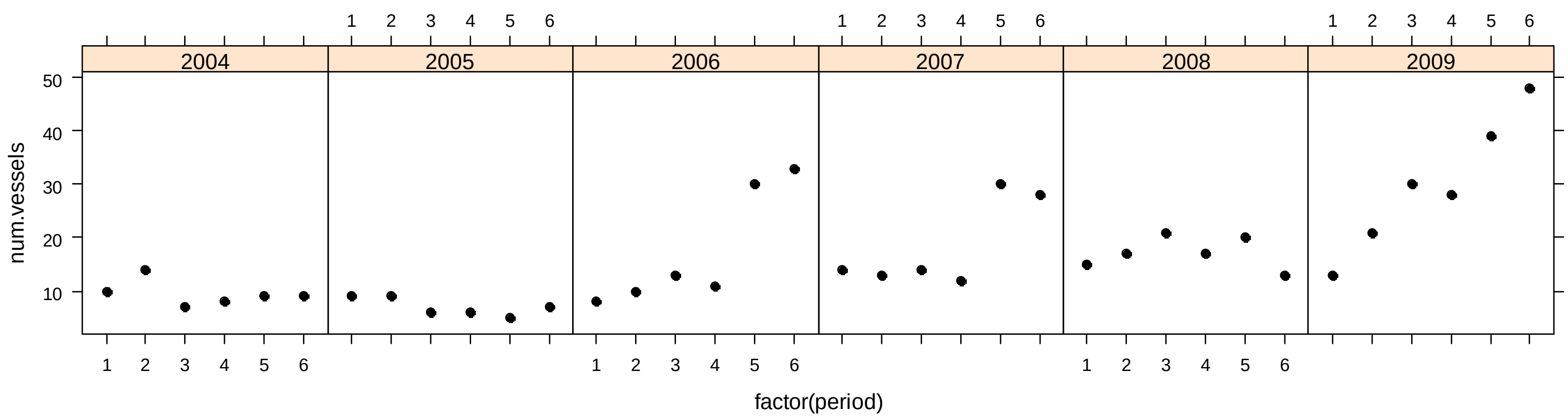


Figure A-4. Number of vessels versus transformed 2-month period (-abs(period-4)). This transformation assumes the number of participating vessels peaks in period 4, with a linear decline in surrounding periods. North of Conception area only.

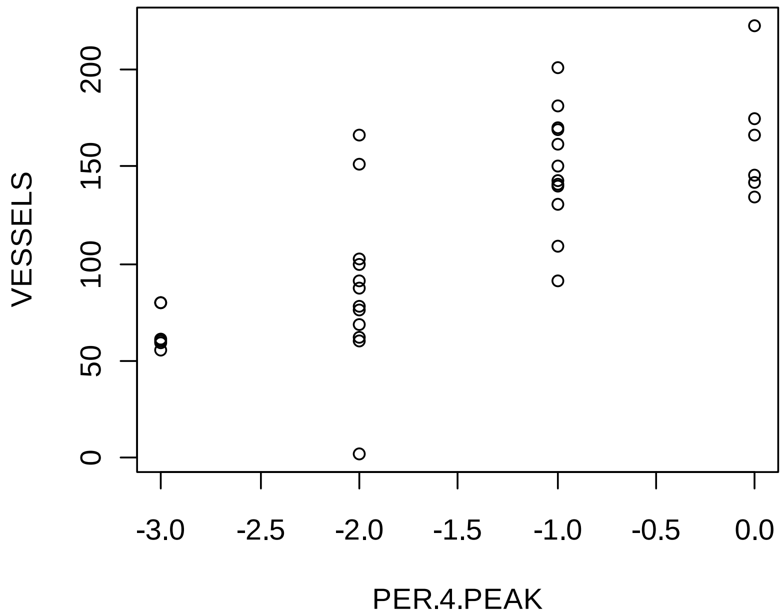
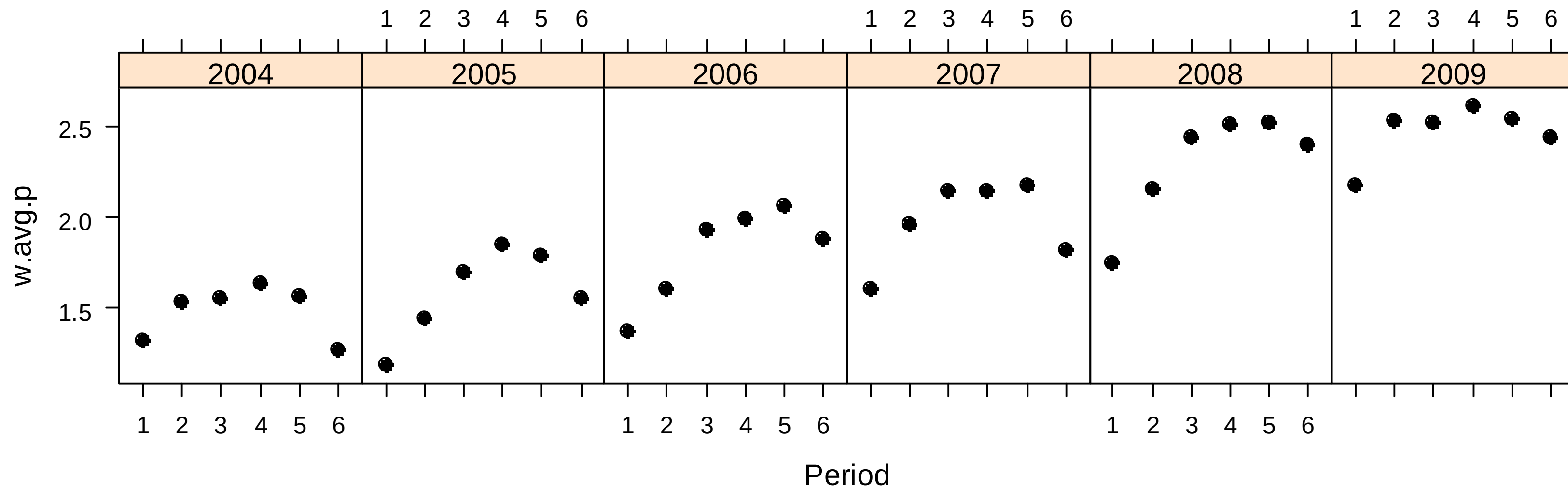


Figure A-5. Weighted average price-per-pound by period and year. Prices weighted by pounds landed. upper panels = north of Conception INPFC; lower panels = Conception area



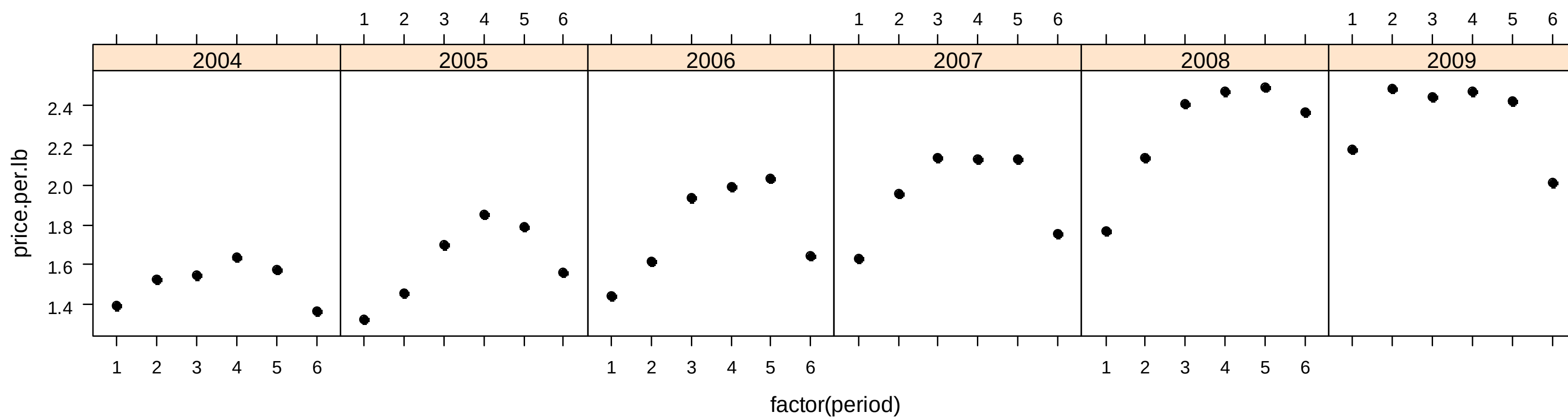
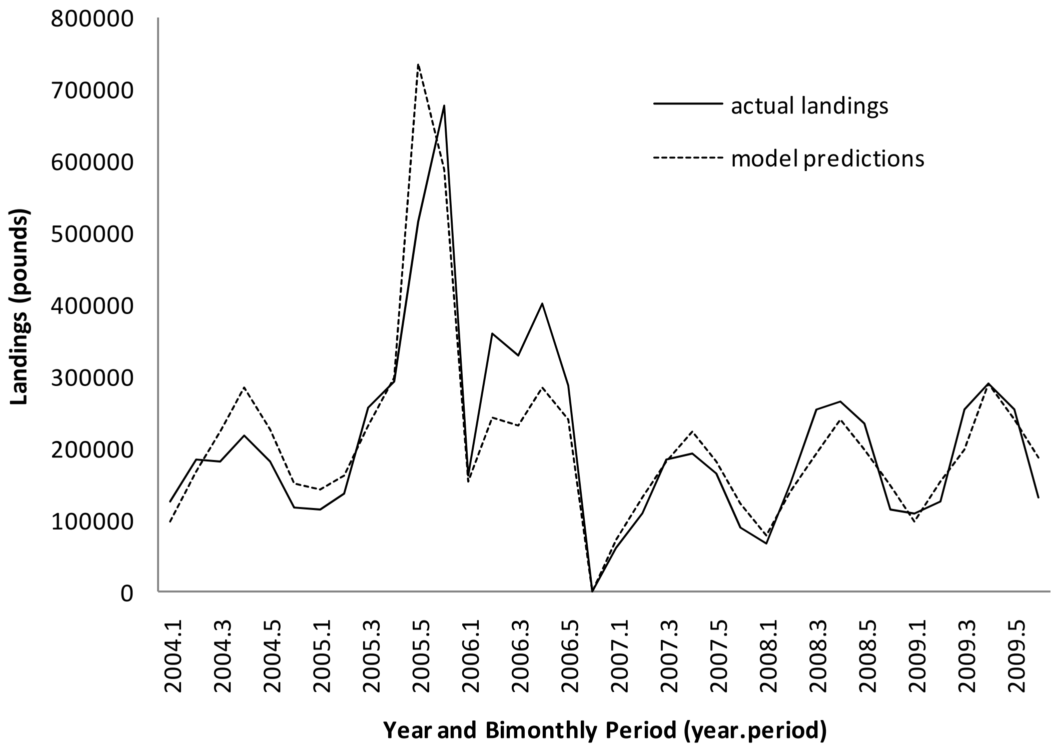


Figure A-6. Time series of actual and predicted catch [lbs]; upper panel = north of Conception area, lower panel = Conception area



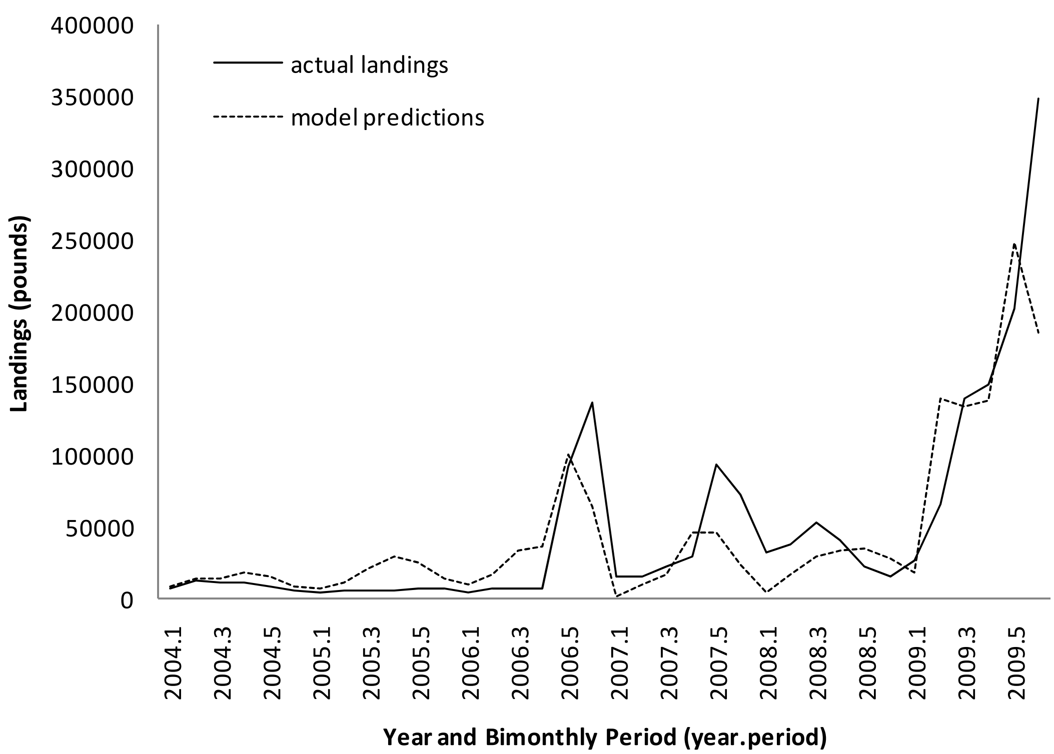


Table A-13. Regression results for sablefish open-access trip limit models

Region	Response Variable	Explanatory Variable	Coefficient	Standard Error	t-value	Pr(>|t|)
North	Average Bimonthly Landings	(Intercept)	487.585	83.667	5.83	1.44E-06
		Bimonthly Trip Limit	0.37613	0.02268	16.581	2.00E-16
North	Number of Vessels	(Intercept)	13.454	38.556	0.35	0.7294
		-|period - 4|	30.513	5.255	5.807	1.90E-06
		Weekly Trip Limit	0.101	0.021	4.78	3.76E-05
		Price per Pound	30.932	12.394	2.496	1.79E-02
South	Average Bimonthly Landings	(Intercept)	-6936.7	1388.1	-4.997	0.00002
		Daily Trip Limit	8.6759	3.6209	2.396	0.022592
		Weekly Trip Limit	1.8647	0.4278	4.359	0.000126
		Price per Pound	2052.6	398.36	5.153	1.27E-05
South	Number of Vessels	(Intercept)	-42.822	10.447	-4.099	0.000265
		Daily Trip Limit	0.070185	0.027251	2.576	0.014833
		Weekly Trip Limit	0.009473	0.003219	2.943	0.006009
		Price per Pound	12.866	2.9980	4.291	0.000153

Table A-14. Data and Predictions for OA Trip Limit Model for areas north of the Conception INPFC area. Catch is in pounds.

Year	Period	Vessels	Daily TL	Weekly TL	Bimonthly TL	Sum.Catch	Avg.Catch	Fuel Cost	Price/lb	Predicted Avg. Catch	Predicted Vessels	Predicted Landings
2004	1	59	300	900	3600	124945	2117.7	1.25	1.32	1841.6	53.6	98754.3
2004	2	78	300	900	3600	185123	2373.4	1.41	1.53	1841.6	90.6	166911.2
2004	3	131	300	900	3600	180198	1375.6	1.72	1.55	1841.6	121.8	224244.5
2004	4	134	300	900	3600	217406	1622.4	1.68	1.63	1841.6	154.8	284995.7
2004	5	91	300	900	3600	182538	2005.9	1.81	1.57	1841.6	122.4	225383.8
2004	6	62	300	900	3600	118707	1914.6	1.87	1.27	1841.6	82.6	152100.0
2005	1	56	300	1000	5000	115526	2063	1.7	1.19	2368.2	59.7	141380.9
2005	2	69	300	900	3600	136336	1975.9	2.1	1.44	1841.6	87.8	161784.2
2005	3	140	300	900	3600	256672	1833.4	2.05	1.69	1841.6	126.1	232219.8
2005	4	146	300	900	3600	291849	1999	2.13	1.85	1841.6	161.6	297528.3
2005	5	141	500	1500	9000	514841	3651.4	2.7	1.79	3872.7	189.8	734934.4
2005	6	166	500	1500	9000	677533	4081.5	2.4	1.55	3872.7	151.8	588015.9
2006	1	80	300	1000	5000	160807	2010.1	2.23	1.36	2368.2	65.0	153834.2
2006	2	151	300	1000	5000	360253	2385.8	2.32	1.6	2368.2	102.9	243676.7
2006	3	201	300	1000	3000	328243	1633	2.74	1.93	1616.0	143.6	232077.1
2006	4	223	300	1000	3000	401673	1801.2	2.7	1.99	1616.0	176.0	284384.2
2006	5	181	300	1000	3000	286996	1585.6	2.6	2.06	1616.0	147.6	238575.3
2006	6	2	0	0	0	--	--	2.38	1.88	--	--	--
2007	1	61	300	800	2400	62679	1027.5	2.43	1.6	1390.3	52.2	72554.5
2007	2	88	300	800	2400	110115	1251.3	2.48	1.96	1390.3	93.8	130458.1
2007	3	162	300	800	2400	184827	1140.9	2.56	2.14	1390.3	129.9	180620.9
2007	4	142	300	800	2400	192389	1354.9	2.63	2.14	1390.3	160.4	223042.8
2007	5	109	300	800	2400	165442	1517.8	2.67	2.17	1390.3	130.8	181911.1
2007	6	60	300	800	2400	88398	1473.3	3.16	1.81	1390.3	89.2	124007.4
2008	1	60	300	800	2400	66487	1108.1	3.04	1.75	1390.3	56.8	79005.2
2008	2	100	300	800	2400	151224	1512.2	3.42	2.15	1390.3	99.7	138629.1
2008	3	170	300	800	2400	252663	1486.3	4.04	2.44	1390.3	139.2	193522.4
2008	4	175	300	800	2400	263642	1506.5	4.27	2.51	1390.3	171.9	238954.6
2008	5	150	300	800	2400	233897	1559.3	3.7	2.52	1390.3	141.7	196962.8
2008	6	91	300	800	2400	113574	1248.1	2.54	2.4	1390.3	107.4	149380.3
2009	1	80	300	800	2400	107969	1349.6	2	2.18	1390.3	70.1	97497.4
2009	2	103	300	800	2400	126824	1231.3	1.97	2.53	1390.3	111.5	154971.0
2009	3	169	300	800	2400	253457	1499.7	2.05	2.52	1390.3	141.7	196962.8
2009	4	166	300	950	2750	290951	1752.7	2.3	2.61	1521.9	190.1	289340.1
2009	5	143	300	950	2750	253759	1774.5	2.42	2.54	1521.9	157.4	239605.9
2009	6	76	300	950	2750	131999	1736.8	2.49	2.44	1521.9	123.8	188459.5

Table A-15. Data and Predictions for OA Trip Limit Model for the Conception INPFC area. Catch is in pounds.

Year	Period	Vessels	Daily TL	Weekly TL	Sum.Catch	Avg.Catch	Fuel Cost	Price/lb	Predicted Avg. Catch	Predicted Vessels	Predicted Landings
2004	1	10	350	1050	6703.8	670.4	1.54	1.39	917.6	9.6	8822.8
2004	2	14	350	1050	13078	934.1	1.56	1.53	1198.6	11.4	13635.5
2004	3	7	350	1050	11134.4	1590.6	1.63	1.55	1239.7	11.6	14422.1
2004	4	8	350	1050	11478	1434.8	1.6	1.64	1420.5	12.8	18136.7
2004	5	9	350	1050	8415	935.0	2.025	1.57	1284.7	11.9	15309.1
2004	6	9	350	1050	6180	686.7	1.74	1.37	868.8	9.3	8087.1
2005	1	9	350	1050	4951	550.1	1.85	1.32	777.2	8.7	6788.7
2005	2	9	350	1050	5905	656.1	2.47	1.46	1051.6	10.5	10994.6
2005	3	6	350	1050	5687	947.8	2.23	1.70	1551.6	13.6	21085.4
2005	4	6	350	1050	6354	1059.0	2.55	1.86	1866.8	15.6	29054.8
2005	5	5	350	1050	7115	1423.0	2.92	1.79	1738.3	14.8	25655.5
2005	6	7	350	1050	7172	1024.6	2.44	1.56	1265.4	11.8	14925.2
2006	1	8	350	1050	4803	600.4	2.37	1.44	1020.3	10.3	10467.4
2006	2	10	350	1050	7343	734.3	2.47	1.62	1377.2	12.5	17209.7
2006	3	13	350	1050	7940	610.8	2.95	1.94	2031.6	16.6	33720.3
2006	4	11	350	1050	7589	689.9	2.725	1.99	2145.0	17.3	37126.8
2006	5	30	500	1050	92361.8	3078.7	2.595	2.03	3532.0	28.4	100214.4
2006	6	33	500	1050	137160	4156.4	2.495	1.65	2738.9	23.4	64096.1
2007	1	14	300	700	16031	1145.1	2.54	1.63	317.2	5.8	1851.0
2007	2	13	300	700	15857	1219.8	2.59	1.96	991.3	10.1	9975.0
2007	3	14	300	700	23222	1658.7	2.64	2.14	1358.1	12.4	16787.3
2007	4	12	350	1050	29443	2453.6	2.725	2.13	2437.2	19.1	46649.4
2007	5	30	350	1050	93185	3106.2	2.7	2.13	2426.9	19.1	46295.4
2007	6	28	350	1050	73201	2614.3	3.075	1.75	1656.7	14.2	23603.5
2008	1	15	300	700	32051	2136.7	3.11	1.77	603.7	7.6	4608.1
2008	2	17	300	700	37364.8	2197.9	3.48	2.14	1367.2	12.4	16977.8
2008	3	21	300	700	52710	2510.0	4.38	2.41	1910.2	15.8	30222.2
2008	4	17	300	700	41271	2427.7	4.32	2.47	2046.6	16.7	34129.7
2008	5	20	300	700	22475	1123.8	3.745	2.49	2086.2	16.9	35310.1
2008	6	13	300	700	15382	1183.2	2.555	2.37	1828.2	15.3	27986.0
2009	1	13	300	700	27214	2093.4	2.06	2.18	1446.3	12.9	18678.0
2009	2	21	400	1500	65336	3111.2	1.95	2.49	4434.8	31.5	139496.4
2009	3	30	400	1500	139734	4657.8	2.2	2.45	4350.0	30.9	134516.6
2009	4	28	400	1500	149739	5347.8	2.475	2.47	4410.6	31.3	138062.4
2009	5	39	400	2500	201976.4	5178.9	2.4	2.42	6167.2	40.1	247297.5
2009	6	48	400	2500	347805.8	7246.0	2.615	2.01	5330	35	185766.0

A.6 Limited Entry Fixed Gear Sablefish Daily Trip Limit Model South of 36° N. Latitude

There has never been a model available for predicting sablefish landings for the limited entry fixed gear daily trip limit (LEFG-DTL) sablefish fishery south of 36° N. latitude (Conception INPFC area). In addition, there has never been a formal allocation between open access and limited entry fixed gear DTL fisheries in this area. Hence, trip limits (= landing limits) in the Conception INPFC area have been set annually with little basis. As a result, sablefish have been largely underutilized by this DTL fishery.

Landings by the LEFG-DTL sablefish fishery south of 36° N. latitude increased dramatically in 2009 relative previous years (Table A-16). Although fishing effort (number of LEFG_DTL boats fishing per year) increased from 31 to 42 from 2004 to 2009 (36% increase), landings increased 143% over the same period, suggesting something other than (or in addition to) an effort increase caused the recent spike in sablefish landings for this fishery. Landing limits were higher in 2009 than during any of the previous years (Table A-17), and is likely the primary reason for recent increase in landings by this fishery. These observed increases in effort and landings illustrate that a predictive model is not only needed to more fully utilize the sablefish allocation for this fishery, but also to reduce the chance of exceeding the allocation.

Table A-16. Limited Entry Fixed Gear DTL sablefish landings and effort for 2004 – 2009 south of 36° N. latitude. Sablefish landings and effort by research and exempted fishing permit fisheries were excluded.

Year	LEFG-DTL landings (mt)	Effort (number of boats per year)
2004	77	31
2005	73	32
2006	63	37
2007	70	37
2008	80	36
2009	187	40

Data Sources

Landings and effort data were acquired from PacFIN using the PacFIN query "slct_ves_sabl_arid_DTL_no_EFP.sql". Currently, only PacFIN staff can run this query because it selects data from an internal table that cannot be accessed by general users. The output from this query contains monthly summaries by vessel for fleet (limited entry and open access) and INPFC area (Conception and Vancouver-Columbia-Eureka-Monterey areas). This query eliminated fixed gear landings made under research and exempted fishing permits. Data used to create this model were LEFG-DTL sablefish landings south of 36^{o} N. latitude for years 2006-2009 (Jan-Dec) and 2010 (Jan-Apr). The number of vessels fishing in the LEFG-DTL sablefish fishery was 31-32 boats per year during 2004-2005 and 37-42 boats per year during 2006-2009 (Table A-16). This relative difference in effort between the two periods (2004-2005 and 2006-2010) provided the basis to only use landings data beginning 2006; the latter years are most representative of the current fishery.

Daily-, weekly-, and monthly-landing limits were obtained from the Federal Pacific Coast Groundfish Regulations (50 CFR 660) and are summarized in Table A-17. Landing limits during 2004-2005 were constant (350 lb/day or 1 landing per week of up to 1,050 lb) and did not provide additional contrast relative to landing limits shown in Table A-17, providing further justification for using only 2006-2010 data for model development.

Table A-17. Daily, weekly, and monthly landing limits for the LEFG-DTL sablefish fishery south of 36° N. latitude.

Year	Month	Period	Daily limit (lbs)	Weekly limit (lbs)	Monthly limit (lbs)
2006	Jan - Sep	1 - 5	350	1,050	.
	Oct - Nov	5 - 6	500[a]	1,050	.
	Dec	6	300[b]	1,050	3000[b]
2007	Jan - Dec	1 - 6	350	1,050	.
2008	Jan - Dec	1 - 6	350	1,050	
2009	Jan - Feb	1	350[c]	1,050[c]	.
	Mar - Oct	2 - 5	400[d]	1,500[d]	.
	Nov - Dec	6	.	3,000[e]	.
2010	Jan -Apr	1 - 2	400	1,500	.

[a]Public Notice from September 28, 2006 changed daily trip limit from 350 lb/day to 500 lb/day effective Oct 1.

[b]Public Notice from November 29, 2006 changed daily trip limit from 500 lb/day to 300 lb/day and implemented monthly total effective Dec 1.

[c]Trip limits for Jan-Feb 2009 are the same as those from the same time period in 2008 since 2009-2010 specifications were not publish until Mar 2009.

[d]Public Notice from February 27, 2009 provided trip limits for 2009-2010 effective Mar 1.

[e]Public Notice from October 27, 2009 eliminated daily trip limit and increased weekly trip limit from 1,500 lb to 3,000 lb effective Oct 28.

Analysis

This analysis was conducted using SAS software. The significance of potential explanatory variables was evaluated using the GLMSELECT procedure (stepwise selection). Potential explanatory variables included in the full model were natural-log transformed daily and weekly landing limits (continuous variables, lbs) and 2-month calendar period (class variable; 1 = Jan and Feb, 2 = Mar and Apr, 3 = May and Jun, 4 = Jul and Aug, 5 = Sep and Oct, 6 = Nov and Dec). The response variable was natural-log transformed landings (monthly, mt). This analysis eliminated daily limits from the model, leaving a model containing weekly landing limits and calendar period as significant explanatory variables. The final GLM model showed that both calendar period ($p < 0.0003$) and weekly trip limit ($p < 0.0001$) significantly contributed to variation in landings. The correlation coefficient (R^2) for this GLM model containing both weekly landing limit and calendar period was 0.74. The R^2 with calendar period removed (i.e., with only weekly landing limit) was 0.57, indicating calendar period explains much of the variation. Parameters were subsequently estimated using the REG procedure by calendar period (ι) as:

Equation 3 $$\ln(\text{landings}) = \ln(\alpha_\iota) + \beta_\iota(\ln(\text{wkl})),$$

where landings = monthly landings (mt) and wkl = weekly landing limit (lbs). Parameter estimates for each bimonthly calendar period (*i*) are shown in (Table A-18). The model R^2 for each period ranged from a low of 0.56 (period 3) to a high of 0.84 (period 3).

Table A-18. Parameter estimates obtained by fitting Equation 1 with 2006-April 2010 landings (monthly landings, mt) and weekly landing limit data for the LEFG-DTL sablefish fishery south of 36° N. latitude. Associated correlation coefficients (R2) are also shown.

Month	Period (*i*)	$\ln(\alpha_\iota)$	β_ι	R^2
1	1	-14.94	2.32	0.74
2	1	-14.94	2.32	0.74
3	2	-23.91	3.64	0.84
4	2	-23.91	3.64	0.84
5	3	-13.33	2.18	0.56
6	3	-13.33	2.18	0.56
7	4	-12.92	2.13	0.80
8	4	-12.92	2.13	0.80
9	5	-15.41	2.50	0.72
10	5	-15.41	2.50	0.72
11	6	-8.19	1.45	0.75
12	6	-8.19	1.45	0.75

Annual-sablefish landings can be predicted for the LEFG-DTL sablefish fishery using the parameter estimates shown in Table A-18 and any level of weekly landing limit. Table A-19 provides an example for estimating annual harvest using a constant 2,000 lb/week limit. Under this scenario, the model predicted a total of 341 mt of sablefish would be landed. Note that ln(monthly landings) must be back transformed, and should be adjusted for bias. Both unadjusted and bias-adjusted landings are provided in (Table A-19). The back-transformed landings estimates were adjusted using:

Equation 4 Adjusted monthly landings = $\exp((\ln(\text{monthly landings})+(0.5 \times \sigma^2)))$,

where σ = root mean square error. Sigma (σ) values were 0.22, 0.31, 0.35, 0.19, 0.28, and 0.44 for bimonthly calendar periods 1-6, respectively.

Table A-19. Example of predicted annual landings for the LEFG-DTL sablefish fishery south of 36° N. latitude for weekly landing limits of 2,000 lbs/week using the model ln(monthly landings)=ln(α_i) + β_i(ln(wkl)), where *i* = bimonthly period.

Month	Period (i)	Weekly landing limit (wkl, lbs)	ln(wkl)	ln(α_i)	(β_i)	Predicted landings		
						ln(landings, mt)	Unadjusted landings (mt)	Adjusted landings (mt)
1	1	2,000	7.60	-14.94	2.32	2.69	14.8	15.2
2	1	2,000	7.60	-14.94	2.32	2.69	14.8	15.2
3	2	2,000	7.60	-23.91	3.64	3.76	42.8	44.9
4	2	2,000	7.60	-23.91	3.64	3.76	42.8	44.9
5	3	2,000	7.60	-13.33	2.18	3.24	25.5	27.2
6	3	2,000	7.60	-13.33	2.18	3.24	25.5	27.2
7	4	2,000	7.60	-12.92	2.13	3.27	26.3	26.8
8	4	2,000	7.60	-12.92	2.13	3.27	26.3	26.8
9	5	2,000	7.60	-15.41	2.50	3.59	36.3	37.8
10	5	2,000	7.60	-15.41	2.50	3.59	36.3	37.8
11	6	2,000	7.60	-8.19	1.45	2.83	17.0	18.7
12	6	2,000	7.60	-8.19	1.45	2.83	17.0	18.7
TOTAL								341.2

Model Performance (Predicted vs. Actual Landings)

In general, monthly patterns were similar between actual landings and landings predicted by this new LEFG-DTL sablefish model throughout the four-year period (Figure A-7). This figure demonstrates that much of the variability in landings can be explained by weekly landing limits and bimonthly-calendar period. This model tracks catches close enough that it may be useful for setting landing limits that will help this fishery fully prosecute its allocation while preventing this fishery from exceeding its allocation. However, for some months, predicted catches were much different than actual catches. This is not surprising because there has been little variation in weekly limits (Table A-17). A scatter plot of predicted versus actual landings (Figure A-8) provides an indicator of precision for this predictive model. This clearly demonstrates that although monthly predictions were typically within $\pm$ 2 mt (43 of 52 observations), some monthly predictions would have been incorrect by as much as 8 mt. Hence, careful inseason monitoring will be necessary to prevent this fishery from exceeding its annual allocation.

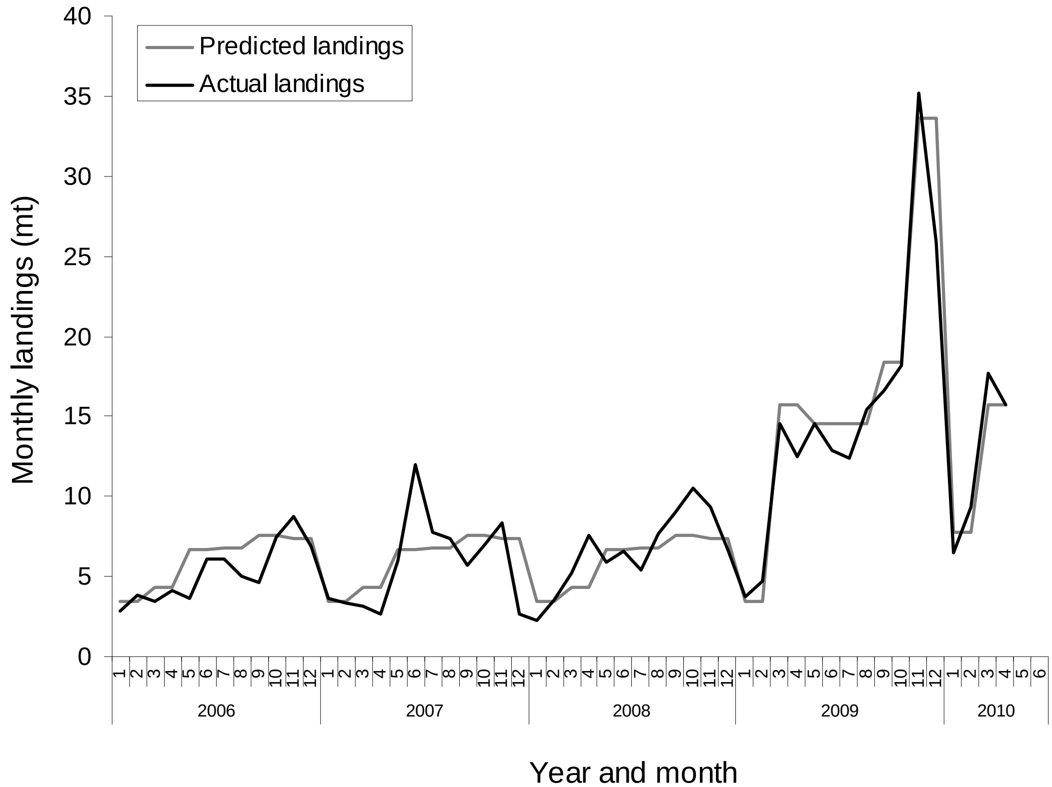


Figure A-7. Predicted and actual monthly landings (mt) by the LEFG-DTL sablefish fishery south of 36° N. latitude for each month (1 = Jan through 12 = Dec) from 2004 through April 2010.

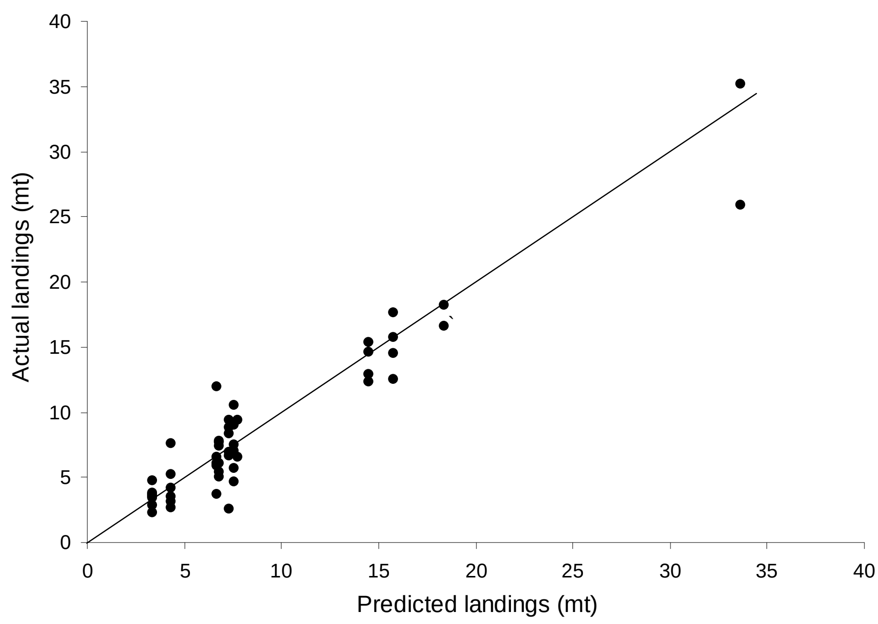


Figure A-8. Predicted versus actual landings (mt) for the LEFG-DTL sablefish fishery south of 36° N. latitude for 2004 – April 2006. A 1:1 line is included.

Options for Landing Limits

This model suggests an exponential increase in landings relative to increases in weekly trip limits, predicting an increase from 341 mt (at 2,000 lb/wk landing limits) to 611 and 1,005 mt at 2,500 and 3,000 lb/week landing limits, respectively (Figure A-9). This exponential relationship may be largely due to the lack of contrast in the independent variable; only three weekly landing limits were available for fitting this model (Table A-17). Additional data may reduce this predicted rate of increase. On the other hand, if weekly landing limits become too high, then it is possible that effort may shift from the north into the Conception area, making this exponential increase in landings plausible. For example, a 3,000 lb/week landing limit equates to potential landings of up to 24,000 lbs/2 months per vessel. The bimonthly limit planned for 2011 north of 36° N. latitude ranges from 6,500 to 7,500 lb/2 months (Agenda Item B.7.b, Supplemental GMT Report, June 2010), substantially lower than these potential scenarios in the south. Shifting of effort from north to south should be considered before increasing this weekly landing limit beyond 2,000 lb/week in the absence of monthly or bimonthly caps. Indeed, effort may shift to the south under the current preliminary preferred landing limit of 2,000 lb/week, which provides the opportunity of landing up to 16,000 lbs/2months per vessel.

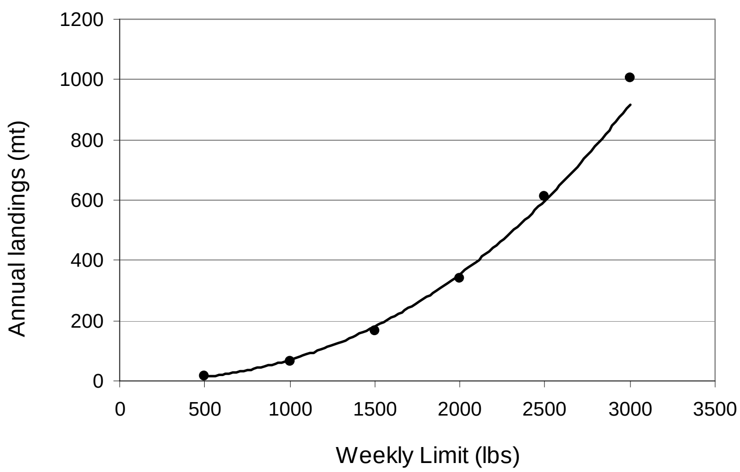


Figure A-9. Predicted annual landings (mt) relative to weekly landing limits (lbs) for the LEFG-DTL sablefish fishery south of 36° N. latitude.

General comments: This model should and will be improved in the future. Parameter estimates should be re-estimated annually, which will provide more data with different landing limits. This additional contrast in landing limits may provide better predictive capabilities. Also, additional parameters may be included in later models which could result in a better fit to the data and enhance the predictive capability (i.e., fishing effort).

A.7 Commercial Nearshore Fixed Gear Model

Impacts associated with the directed open access daily-trip-limit fishery targeting sablefish are modeled using the primary sablefish model described above. Nearshore commercial fisheries in waters off Oregon and California are modeled separately from offshore efforts targeting sablefish.

The nearshore commercial model incorporates fleet-wide discard estimates by depth from West Coast Groundfish Observer Program (WCGOP) data, landings data from PacFIN, and depth-specific discard mortality rates derived by the Groundfish Management Team (GMT) (refer to 2009/2010 Harvest

Specifications and Management Measures FEIS for full description of model). The WCGOP began pilot coverage of vessels targeting nearshore rockfish and associated species, such as cabezon and kelp greenling, in January 2003 for the California nearshore fishery and in May 2004 for the Oregon nearshore/rockfish fisheries. Data from these vessels from January 2003 – December 2008 were averaged for analyses. Although the number of observed trips has increased since the WCGOP began monitoring the fleet, coverage levels are still lower than for other fleets and thus greater uncertainty in estimating discard relationships exists (Table A-20).

Table A-20. Summary of WCGOP observer coverage (2003-2008)

Area/Depth	# Trips	# Sets	# Vessels
North of 42° N. lat.			
0-10 fm	397	524	76
10-20 fm	457	607	74
20-60 fm	43	48	23
42° to 40° 10' N. lat.			
0-10 fm	149	204	23
10-20 fm	187	223	20
20-60 fm	37	41	10
South of 40°10' N. lat.			
0-10 fm	310	510	76
10-20 fm	218	277	63
20-60 fm	34	56	19

In 2009-10, projected overfished species impacts were estimated based on the previous year's landings data in two areas (north and south of 40°10 N. latitude). Unlike other fisheries, nearshore overfished species impacts are not modeled based on full attainment of the target species harvest guidelines. Low target landings in a previous year (due to weather or management action) decrease the estimate of overfished species impacts and opportunity for target species for the following year, creating a use-it or lose-it fishery.

In 2009-10, any management action taken to stay within projected overfished species impacts was applied to an entire area (north or south of 40°10' N. lat) regardless of the location of impact within that area. As such, fine scale management actions (i.e., closing just part of an area) were not incorporated and areas with lower overfished species impacts were affected because they fell within the larger management area.

For 2011-12, the nearshore model structure was modified to include finer area stratifications and used modified landings data to project overfished species impacts. These modifications would facilitate management, provide greater protection to stocks while minimizing adverse impacts to communities, and provide the best estimate of fishery needs.

The nearshore model was stratified into three areas based on available WCGOP data: (1) north of 42° N. latitude; (2) between 42° and 40°10' N. latitude; and (3) south of 40°10' N. latitude. These finer area stratifications facilitated overfished species impact projections on a smaller scale, reduced adverse actions to lower bycatch areas, and allowed incorporation of state specific management measures. In 2009-10, a 20 fm depth restriction was applied to the area between 43° N. latitude and 40°10' N. latitude to reduce yelloweye impacts. Under the new model structure, these types of management actions could be accommodated on a higher scale.

Instead of using a single previous year landings data to project overfished species impacts, average landings were used as the best estimate of fishery needs. As a starting point, average landings from 2007-2009 were used for Oregon and 2006-2008 for California (California landings in 2009 were anomalously low and not likely representative of future landings). Landings data were adjusted from this starting point based on new information (i.e., higher black rockfish and cabezon ACLs) or based on increased availability in overfished species (i.e., higher nearshore allocation of yelloweye). Opportunities were maximized for this fishery where available while staying within available overfished species impacts.

Table A-21, Table A-22, and Table A-23 summarizes the ratios of observed discarded and retained catch for each of the three depth intervals (0-10 fm, 11-20 fm, and 21-50 fm) used to model impacts in nearshore commercial fisheries.

Allocation of Overfished Species (Canary and Yelloweye Rockfish) between States

Currently, WCGOP provides aggregated data for the entire area north of 40°10' N. lat and as such, the GMT was unable to attribute overfished species impacts to an individual state. Therefore, California and Oregon "co-manage" this area to ensure that the fishery stays within the allowable overfished species impacts.

The finer area stratification of the proposed nearshore model would provide an opportunity for California and Oregon to independently manage their nearshore fisheries since overfished species impacts could be estimated for each state. To facilitate modeling, it would be beneficial to provide an informal or formal split of the allowable overfished species (canary and yelloweye) between California and Oregon for the nearshore fishery.

To inform any formal or informal catch sharing agreements of canary and yelloweye rockfish between the two states, the GMT examined WCGOP Total Mortality Reports, WCGOP Data Report of the Nearshore Fixed Gear Groundfish Fishery, and individual stock assessments. Since data are not reported in the WCGOP reports on the same scale as the proposed new model, the GMT was unable to use this information to inform potential catch sharing.

Yelloweye Rockfish

Although the yelloweye stock assessment (Stewart, *et al.* 2009) did provide data to inform catch sharing, the SSC cautioned against making use of these trends as the sole basis for the spatial allocation of harvest guidelines because the trend in abundance at the coastwide level was much more robust than those at the regional level (Agenda Item E.2.c, Supplemental SSC Report, September 2009). Data provided by Stewart, *et al.* (2009) suggest a 53% - 61% allocation for Oregon and 39% - 47% allocation for California (Table A-24). This range is supported by Wallace et al (2006) which estimated that the 2005 yelloweye rockfish biomass was 581 mt (Oregon) and 484 mt (California).

In addition to any potential catch sharing informed by the stock assessment, the Council could also consider an equal sharing (50:50) between the states for 2011-12 only. The GMT could continue to work with the SSC to examine data which may be used for future catch sharing arrangements.

Canary Rockfish

Canary rockfish has typically been modeled on a coastwide basis; hence, information on distribution of biomass and catch is not available by state. Similar to yelloweye rockfish, the Council could consider an equal sharing (50:50) between the states for 2011-12 and the GMT could continue to work with the SSC to examine data to inform future catch sharing arrangements.

Table A-21 Bycatch and discard rates from the commercial nearshore projection model north of 42° N. latitude.

NORTH of 42° N. lat.	Observed discard ratio			Observed retained ratio			% of observed landings by depth			Discard mortality rate		
	0-10 fm	11-20 fm	21-60 fm	0-10 fm	11-20 fm	21-60 fm	0-10 fm	11-20 fm	21-60 fm	0-10 fm	11-20 fm	21-60 fm
Rebuilding species												
Bocaccio	0.000	0.000	0.000	0.000	0.000	0.000				30%	54%	100%
Canary rockfish	0.004	0.010	0.022	0.000	0.000	0.000				32%	54%	100%
Widow rockfish	0.000	0.000	0.000	0.000	0.000	0.002				32%	54%	100%
Yelloweye rockfish	0.002	0.011	0.030	0.000	0.000	0.000				32%	56%	100%
Other species												
Black rockfish	0.032	0.025	0.020	0.684	0.516	0.351	49.4%	48.8%	1.8%	23%	42%	90%
Blue rockfish	0.018	0.029	0.036	0.028	0.030	0.057	39.7%	54.8%	5.5%	29%	49%	100%
Cabezon	0.010	0.015	0.001	0.082	0.182	0.164	24.8%	71.8%	3.5%	7%	7%	7%
Kelp greenling	0.011	0.014	0.010	0.100	0.082	0.069	47.1%	50.6%	2.3%	7%	7%	7%
Lingcod	0.100	0.118	0.189	0.101	0.163	0.286	30.1%	63.9%	6.0%	7%	7%	7%
Other minor nearshore rockfish	0.003	0.004	0.006	0.049	0.092	0.163	27.0%	66.7%	6.3%	24%	48%	100%

Table A-22. Bycatch and discard rates from the commercial nearshore projection model from 42° N. latitude to 40°10 N. latitude.

42° to 40°10' N. lat.	Observed discard ratio			Observed retained ratio			% of observed landings by depth			Discard mortality rate		
	0-10 fm	11-20 fm	21-60 fm	0-10 fm	11-20 fm	21-60 fm	0-10 fm	11-20 fm	21-60 fm	0-10 fm	11-20 fm	21-60 fm
Rebuilding species												
Bocaccio	0.000	0.000	0.000	0.000	0.000	0.000				30%	54%	100%
Canary rockfish	0.004	0.018	0.035	0.000	0.000	0.000				32%	54%	100%
Widow rockfish	0.000	0.001	0.001	0.000	0.002	0.001				32%	54%	100%
Yelloweye rockfish	0.001	0.005	0.055	0.000	0.000	0.000				32%	56%	100%
Other species												
Black rockfish	0.007	0.004	0.001	0.831	0.703	0.303	46.7%	49.6%	3.7%	23%	42%	90%
Blue rockfish	0.010	0.019	0.011	0.073	0.218	0.220	18.5%	69.4%	12.1%	29%	49%	100%
Cabezon	0.010	0.008	0.010	0.031	0.020	0.043	48.2%	37.6%	14.2%	7%	7%	7%
Kelp greenling	0.011	0.008	0.004	0.007	0.009	0.001	38.9%	60.1%	1.0%	7%	7%	7%
Lingcod	0.033	0.049	0.030	0.065	0.079	0.218	30.6%	47.0%	22.4%	7%	7%	7%
Other minor nearshore rockfish	0.000	0.000	0.002	0.027	0.045	0.263	19.0%	40.3%	40.7%	24%	48%	100%

Table A-23. Bycatch and discard rates from the commercial nearshore projection model south of 40°10 N. latitude.

SOUTH of 40°10' N. lat.	Observed discard ratio			Observed retained ratio			% of observed landings by depth			Discard mortality rate		
	0-10 fm	11-20 fm	21-60 fm	0-10 fm	11-20 fm	21-60 fm	0-10 fm	11-20 fm	21-60 fm	0-10 fm	11-20 fm	21-60 fm
Rebuilding species												
Bocaccio	0.000	0.000	0.001	0.000	0.000	0.052				30%	54%	100%
Canary rockfish	0.001	0.031	0.116	0.000	0.000	0.000				32%	54%	100%
Widow rockfish	0.000	0.000	0.000	0.000	0.000	0.000				32%	54%	100%
Yelloweye rockfish	0.000	0.001	0.008	0.000	0.000	0.000				32%	56%	100%
Other species												
Black rockfish	0.005	0.013	0.010	0.020	0.047	0.060	44.9%	49.2%	5.9%	23%	42%	90%
Blue rockfish	0.013	0.046	0.231	0.023	0.038	0.073	53.6%	39.3%	7.2%	29%	49%	100%
Cabezon	0.123	0.034	0.052	0.267	0.023	0.081	95.1%	3.7%	1.2%	7%	7%	7%
Deeper nearshore rockfish	0.009	0.024	0.048	0.082	0.384	0.619	29.1%	61.6%	9.4%	23%	48%	100%
Kelp greenling	0.034	0.011	0.084	0.020	0.003	0.000	93.0%	7.0%	0.0%	7%	7%	7%
Lingcod	0.086	0.151	0.160	0.098	0.147	0.171	56.8%	38.9%	4.3%	7%	7%	7%
Shallow nearshore rockfish	0.025	0.008	0.055	0.099	0.028	0.053	86.7%	11.3%	2.0%	25%	49%	100%

Table A-24. State-specific contributions of spawning output, commercial and recreational catch, and biomass for yelloweye rockfish. The Oregon:California contribution (percentage) is shown in the right-hand column.

		State		Percent Contribution
Source	Description	OR	CA	(OR:CA)
Stewart et al. (2009	Yelloweye Spawning Output (million eggs)	93	75	55:45
	Total Commercial Catch (mt) 2000 – 2008	22.1	17.5	56:46
	Total Commercial Catch (mt) 1990 – 1998	1,048	667	61:39
	Total Recreational Catch (mt) 2000 – 2008	38.6	34.0	53:47
	Total Recreational Catch (mt) 1990 – 1998	174	147	54:46
Wallace et al. (2006)	Yelloweye Rockfish biomass (mt) of Age 3+	581	484	55:45

A.8 Evaluation of Uncertainty in the Non-Nearshore and Nearshore Models

Two overfished species (OFS)-impact models (non-nearshore and nearshore models) may have misapplied landings of two species: sablefish shoreward of the RCA and lingcod seaward of the RCA. Although these potential misapplications and the extent of the potential implications are uncertain, it is important to illuminate these sources of error by both models.

Sablefish shoreward of the fixed gear RCA

The non-nearshore model estimates OFS impacts by sablefish tier fisheries and sablefish daily trip limit (open access and limited entry) fisheries. These impacts are based on estimates of annual sablefish landings (full utilization is assumed) and associated bycatch rates by depth strata. In the past, bycatch rates have only been requested for depths > 100 fm (i.e., seaward of the RCA), because it was assumed that this fishery operates only in deeper waters. However, it is possible that sablefish catches may also occur shoreward of the RCA in some areas north of 36^{o} N. latitude. If sablefish catches do occur shoreward of the RCA, then those landings receive the non-nearshore (i.e., >100 fm) bycatch rates and not the shoreward of the RCA bycatch rates.

The nearshore model does not estimate OFS impacts by sablefish landings, even if sablefish are caught shoreward of the RCA. This model estimates OFS impacts based on bycatch rates of OFS relative to landings of “nearshore species”, and the nearshore model does not include sablefish as one of the “nearshore species” encountered.

The impacts of these sablefish catches shoreward of the RCA may not be accounted for by any model. The magnitude of sablefish catches shoreward of the RCA by fixed gear fisheries will be examined and impacts will be attributed to one of the impact models as soon as possible.

Lingcod seaward of the fixed gear RCA:

It is known that some "nearshore" vessels target lingcod on the seaward side of the RCA. It is uncertain how the impacts of these sets are assessed, or whether they are modeled at all. It is possible that these seaward-sets are erroneously included in the nearshore model. Under this scenario, unrealistically high bycatch rates calculated for depths < 30 fm may be applied to these sets that were actually made at much deeper depths (i.e., > 100 fm). The result would be an overestimation of yelloweye rockfish impacts by the nearshore fishery. On the other hand, these catches may not be included in any model, which would result in an underestimation of overfished species impacts. The magnitude of these targeted-lingcod catches seaward of the fixed gear RCA will be examined and impacts will be attributed to one of the impact models as soon as possible.

Uncertainty Explorations

The current formulation of the both the non-nearshore and nearshore model assumes several inputs are known without error. These include total landing estimates, allocation of landing by depth strata, bycatch ratios, and discard mortality. Treating these quantities as known decreases the amount of uncertainty admitted in the model and ultimately influences the realization of model outputs (i.e. projected catches). Improvements to these models would address characterizing the uncertainty in each of the input quantities. One suggested approach to incorporate uncertainty in these inputs is Monte Carlo sampling of probability distributions. This approach assigns a probability distribution to each input, draws a sample for each input, and calculates the final projected catch based on those draws. This is performed many times, resulting in a distribution of projected catches. The projected catch distribution could then be evaluated against catch targets and limits. This approach will require defining the uncertainty distribution of each input. Given the large number of inputs that potential need this treatment, it is advisable to prioritize which inputs are considered most essentially in characterizing uncertainty. Such prioritization could be achieved via identifying which inputs have measurable uncertainty and which cause the greatest sensitivity in projected catches. This exploration is anticipated for the 2013-2014 harvest specifications and management measure process.

A.9 Washington Recreational Model

The Washington Ocean Sampling Program (OSP) generates catch and effort estimates for the recreational boat-based groundfish fishery, which are provided to Pacific States Marine Fisheries Commission (PSMFC) and incorporated directly into RecFIN. The OSP provides catch in total numbers of fish, and also collects biological information on average fish size, which is provided to RecFIN to enable conversion of numbers of fish to total weight of catch. Boat egress from the Washington coast is essentially limited to four major ports, which enables a sampling approach to strategically address fishing effort from these ports. Effort estimates are generated from exit-entrance counts of boats leaving coastal ports while catch per effort is generated from angler intercepts at the conclusion of their fishing trip. The goal of the program is to provide information to RecFIN on a monthly basis with a one-month delay to allow for inseason estimates. For example, estimates for the month of May would be provided at the end of June. Some specifics of the program are:

Exit/entrance count - boats are counted either leaving the port (4:30 AM - end of the day) or entering the port (approximately 8:00 AM through end of the day) to give a total count of sport boats for the day.

Interview - boats are encountered systematically as they return to port; anglers are interviewed for target species, number of anglers, area fished, released catch data and depth of fishing (non-fishing trips are recorded as such and included in the effort expansion). The OSP collects information on released catch but does not collect information on the condition of the released fish. Therefore, released catches must be post-stratified as live or dead based upon an assumed discard mortality rated. Onboard observers are deployed on charter vessels throughout the salmon season primarily to observe hatchery salmon mark rates but also to collect rockfish discard information on these trips.

Examination of catch - catch is counted and speciated by the sampler. Salmon are electronically checked for coded wire tags and biodata is collected from other species.

Sampling Rates - vary by port and boat type. Generally, at boat counts less than 30, the goal is 100% coverage. The sampling rate goal decreases as boat counts increase (e.g., at an exit count of 100, sample rate goal is 30%; over 300, sample rate goal is 20%). Overall sampling rates average approximately 50% coastwide through March-October season.

Sampling Schedules - due to differences in effort patterns, weekdays/weekend days are stratified. Usually, both weekend days and a random 3 of 5 weekdays are sampled.

Personnel - OSP sampling staff include two permanent biologists coordinating data collection, approximately twenty-two port samplers, three on-board observers and one data keypuncher.

Volume of data - Between 20,000 and 30,000 boat interviews completed per season coastwide.

Data Expansion

Algorithm for expanding sampled days:

$$\frac{\text{Exit Count}}{\text{Total boats sampled}} * P_s \text{ sampled} = P_t$$

where P_s = any parameter (anglers, fish retained, fish released) within a stratum,
and P_t = total of any parameter with stratum for the sample day

Algorithm for expanding for non-sampled days:

$$\text{Total Weekday Catch} = \frac{\Sigma(P_t) \text{ on sampled weekdays}}{\text{number weekdays sampled}} * \text{no. of weekdays in stratum}$$

$$\text{Total Weekend Catch} = \frac{\Sigma(P_t) \text{ on sampled weekend days}}{\text{number weekend days sampled}} * \text{no. weekend days in stratum}$$

Total weekend catch + total weekday catch = total catch in stratum

Notes on Data Expansion:
Salmon and halibut catches are stratified by week; all other species are stratified by month. All expansions are stratified by boat type (charter or private), port, area and target species trip type (e.g., salmon, halibut, groundfish, and albacore)

Pre-Season Catch Projections

Projected impacts for Washington's recreational fishery are essentially based upon the previous season's harvest estimated by the Ocean Sampling Program (OSP) and incorporated in RecFIN. This is especially true if recreational regulations remain consistent.

In 2005 the Washington Department of Fish and Wildlife implemented a depth restriction of 30 fathoms for a portion of the Washington coast. Since 2002, the OSP program began collecting fishing depths as well as discard information. This information is keypunched and analyzed on an annual basis with respect to depth of catch for species of concern. Beginning in 2006, and carrying through 2007 and 2008, we modified our pre-season catch projections, based on the use of depth restrictions, by sub-area and fishery. This depth analysis was used to determine the pre-season catch projections of catch and mortality of discarded fish for 2009-2010 relative to these depths as follows:

Canary Rockfish

- Apply 100% mortality rate to canary rockfish caught on all recreational fishing trips targeting Pacific halibut, when there is no depth restriction in place
- Apply 66% mortality rate to canary rockfish on recreational fishing trips targeting species other than Pacific halibut, when there is no depth restriction in place (based upon average depth distribution of catch from intercept surveys).
- When a 20-fm depth restriction is in place, apply a 50% mortality rate to canary rockfish caught on all recreational fishing trips (based on research by Albin and Karpov 1995).

Yelloweye Rockfish

- Apply 100% mortality rate to yelloweye rockfish caught on all recreational fishing trips, when there is no depth restriction in place
- When a 20-fathom depth restriction is in place, apply a 50% mortality rate to yelloweye rockfish caught on all recreational fishing trips (based on research by Albin and Karpov 1995).
- When a 20-fathom depth restriction is in place, apply an encounter rate reduction of 25% (based on 2005 OSP catch-by-depth data) as yelloweye tend to inhabit deeper depths.

Washington's management measures maintain the use of depth closures in waters deeper than 20 or 30 fathoms and therefore historical catch estimates will be representative of projected mortalities. To address the transition from the method of estimating discard mortalities (described above) for canary and yelloweye rockfish to the use of coastwide discard mortality rates for all species the average of the 2008 and 2009 final estimates were used to produce projected impacts for 2011-2012. Catch by depth data from 2004 was also analyzed to determine the mortality rate by depth prior to the implementation of depth restrictions.

Inseason Catch Projections for 2011-2012

Inseason catch projections are based upon the most recent OSP estimates (with a one-month time lag) with subsequent months extrapolated from the pre-season catch projections. Starting in 2009, depth dependant mortalities were applied uniformly to all discarded fish coast wide through RecFIN. The implementation of depth based discard mortalities replaced the mortality estimates for canary and yelloweye that Washington used from 2006-2008. It should be noted that the precision of recreational groundfish catch estimates based upon previous seasons will continue to be influenced by factors such as the length and success of salmon and halibut seasons, weather and unforeseen factors.

A.10 Oregon Recreational Model

Data Source for Base Model

Modeling of expected 2011-12 Oregon recreational fishery impacts of selected groundfish species was based on recent year estimates of landings and discards. For the ocean boat fishery, the data source was the Oregon Department of Fish and Wildlife Ocean Recreational Boat Survey (ORBS). For the shore and estuary fishery, the data source was the Marine Recreational Fisheries Statistics Survey (MRFSS) and the Shore and Estuary Boat Survey (SEBS). Analyzed species included black, blue, brown, canary, china, copper, grass, quillback, and yelloweye rockfishes; as well as kelp and rock greenling, cabezon and lingcod. Base level landings and discards for the ocean boat fishery (in numbers of fish) were based on normalized 2007, 2008 and 2009 landings and discards because these data reflect fishery years with regulations most similar to those expected in 2011-12 (i.e., bag limits, offshore closures, behavioral activities to avoid depleted species, etc.). Base level landings and discards for the shore and estuary fishery (in weight), largely not affected by management of depleted species, reflect the most recent 5-year average, 1998-2002. Annual weights of greenling and cabezon were adjusted to reflect changes in minimum length.

Normalizing 2007, 2008, and 2009 Ocean Boat Catch and Angler Trip Data

A base year period of 2007-09 was chosen for modeling catch and angler effort. Equal weighting was given to each year as it is not possible to forecast the opportunity for other targeted fisheries (i.e., salmon, halibut, tuna, etc.) in 2011-12. The fisheries in 2007-09 vary in both angler opportunity and success for other target species such as salmon, tuna and halibut. All three base years include groundfish fishery restrictions (e.g., offshore closures and restrictions on groundfish retention in the directed Pacific halibut fishery).

To facilitate providing maximum flexibility in modeling 2011-12 fishery options, landings in 2007, 2008 and 2009 were normalized to a 10-fish marine bag limit and a year round season with no offshore closures (essentially the basic regulations from 2000 through 2003). Starting in 2004 the sport fishery was managed with offshore closures to reduce impacts on depleted species (i.e., lingcod, canary rockfish, and yelloweye rockfish); the marine fish bag limit of 10 was carried over from 2003. In response to an early closure in 2004 due to attainment of the black rockfish harvest guideline, the marine bag limit in 2005 started at 8 fish on January 1 and was reduced to 5 fish on July 16. During 2006-08 the marine fish bag limit imposed under state regulations was 6 fish to provide for a year round nearshore fishery and not exceed the black rockfish harvest guideline. During 2009, the marine bag limit imposed under state regulations was increased to 7 fish to allow for more access to the increased black rockfish harvest guideline. The marine fish bag limit includes rockfish, greenling, cabezon and other species excluding lingcod, flatfish, Pacific halibut, salmon, trout, steelhead, perch, sturgeon, striped bass, offshore pelagic species, and bait fish (herring, smelt anchovies and sardines).

Normalizing to a 10-fish marine bag limit was accomplished in the previous model (2009-2010) and carried forward for 2011-12, through comparing the average catch per angler trip (CPUE) under 8, 6 and 5 fish regulations in 2005-07 with comparable periods in 2003-04 under a 10 fish marine bag limit. The average CPUE change from 10 to 8 fish was a 13.5 percent reduction, which compared to a 34.3 and 37.8 percent reduction when reducing the bag limit from 10 to 6 and 5 fish, respectfully. The same exercise was also applied to discards per angler as the number discarded for many species for which retention was allowed generally increased as the retention bag limit was reduced. The average duration of groundfish trips did not change, but anglers sorted through more fish. The number of yelloweye rockfish and canary rockfish encountered, both species for which all retention was prohibited in the model base years, was not adjusted due to the reduced marine bag limit as the average duration of groundfish angler trips were nearly the same regardless of the marine bag limit. These adjustments were not made for lingcod, which has a separate bag limit.

Landings and discards were normalized to an all-depth season. In 2007-09, from April through September the groundfish fishery was closed seaward of the 40-fm line. The expected increase in encounter rates for offshore residing species (i.e., yelloweye rockfish and canary rockfish) in normalizing to an all-depth scenario was based on data from 2001 and 2003-07 at-sea observations on Oregon charter vessels (over 500 trips were observed). The observer study was not conducted in 2002. The following increased encounter rate (numbers of fish) were applied to appropriate months (those that were closed seaward of 40-fm) when normalizing to an all-depth fishery: canary rockfish = 1.20 and yelloweye rockfish = 1.47.

The expected weight of landed fish was based on the 2007-09 average by species and month for the ocean boat fishery. The expected average weight of discarded fish in the ocean boat fishery was based on combined at-sea observations in 2003-2009 with attention paid to matching samples with depth closure regulations (releases were not measured on 2001 at-sea trips). Observations indicate that yelloweye rockfish and canary rockfish caught inside of the 40-fm line were considerably smaller compared to the average size of those caught offshore as it appears more juveniles of these species reside nearshore. An exception in the method to estimate the size of discards was made for nearshore rockfish species, other than black rockfish and blue rockfish, due to small sample sizes (most are retained), where a 50 percent reduction in average landed weight was assumed for discards. The fifty percent reduction in average weight was based on the observed average size of discarded black rockfish and blue rockfish which were on the order of a 50 percent reduction from average landed weight. A 50 percent reduction was also used for greenling species since they are also rarely released.

Angler effort in shore and estuary areas was assumed to be similar to the base period of 1998-2002. Groundfish angler trips in the shore and estuary fishery are not available, only total angler trips of all trips types combined, thus all projections of angler trips by trip type exclude shore and estuary.

Model Inputs

Bag limits, offshore closures, season structure, and halibut quotas were the basic input factors applied to the standardized model.

Bag limits were modeled to range from 6 to 10 marine fish and sub-bag limits of 1, 2, and 7 for cabezon. Fish species included in the marine bag limit were defined earlier in this report. The expected reduction in CPUE from reducing the marine bag limit from 10 fish was based on the same comparison between a 10 and 8, 6 or 5 bag limit discussed earlier in this report. In estimating expected reductions in CPUE for marine bag limits a linear relationship was developed using the observations between 10, 8, 6 and 5 fish bag limits (Figure A-10). The number of released fish of species for which retention is not prohibited was estimated to increase as the bag limit was reduced (Figure A-11). As assumed in normalizing the model no effect on CPUE was expected for the non-retention species yelloweye rockfish and canary rockfish for changes in the marine fish bag limit (refer to earlier discussion in this report).

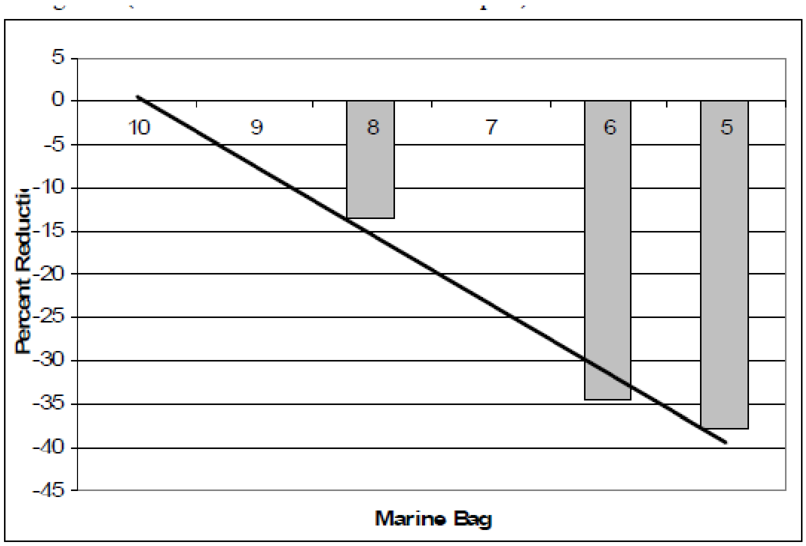


Figure A-10. Percent reduction of catch per angler under decreasing marine bag limits for nearshore groundfish.

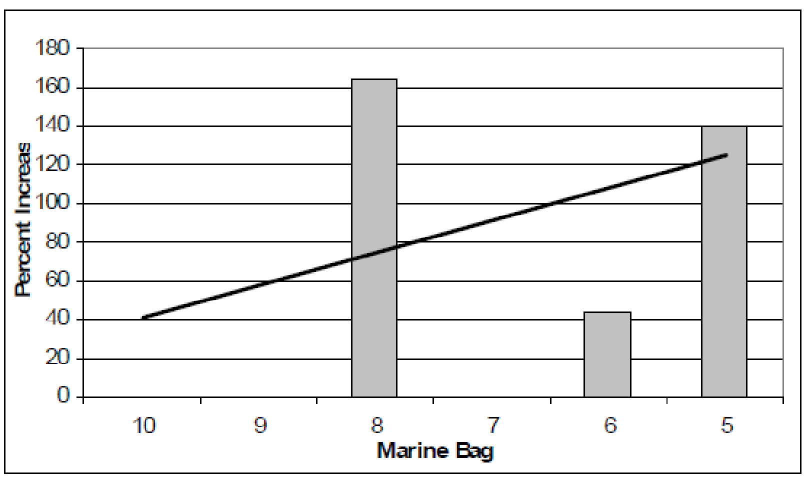


Figure A-11 Percent increase of release per angler with decreasing marine bag limits for nearshore groundfish.

Expected encounter rate reductions for yelloweye rockfish and canary rockfish normally encountered in offshore waters were developed for offshore closures outside of 40, 30, 25, and 20 fm (Table A-25). They were based on the at-sea observations mentioned earlier in the report. Modeling assumptions included a shift in offshore effort (7 percent of total groundfish directed effort) to open areas nearshore during offshore closure periods affecting the catch rates of fish encountered.

Table A-25. Percent total encounter reductions in yelloweye rockfish and canary rockfish due to depth closures.

2001, 2003-2007 Distribution of encounters by depth bin (fm) from at-sea observations (fishery open all depths)						
Species	**<20 fm**	**21-25 fm**	**26-30 fm**	**31-40 fm**	**> 40 fm**	**(n)**
Canary rockfish	59%	15%	5%	7%	16%	518
Yelloweye rockfish	32%	24%	7%	5%	31%	74

Percent reduction in total encounters from open all depths to the following depth closures				
Species	**Closed > 20 fm**	**Closed > 25 fm**	**Closed > 30 fm**	**Closed > 40 fm**
Canary rockfish	43%	28%	23%	16%
Yelloweye rockfish	67%	43%	36%	31%

Monthly groundfish directed angler effort was assumed to remain equal to the 2007-09 normalized average unless the fishery season was reduced to less than a May through September season (the five core months). If the season duration was less than May 1 through September 30 the assumption would be that a third of the normal effort during the closed season would be shifted into the open period (the same assumption used in the 2007-08 and 2009-10 EIS). Thus, for the May 1 through September 30 option it was assumed that the angler effort from the closed period (January 1 through April 30 and October 1 through December 31) would not transfer to the open period as the five core months would be open.

Angler effort in the directed Pacific halibut fishery was assumed to decrease slightly in 2011-12 due to the anticipated continued reduction in halibut allocation. The halibut allocation in 2011-12 was assumed to be equal to the 2010 allocation, which is fifteen percent lower than the allocation in 2009. The decision on the 2011 halibut catch allocation will occur after the 2011-12 groundfish regulations will be set. Estimates were made for the effect of allowing groundfish retention during the all-depth Pacific halibut openings and were made external to the impact model. Adjustment factors to encounter rates of yelloweye and canary rockfish during all-depth halibut openings were determined to be 150% and 230% of status quo encounter rates.

Model Description

The model design was similar to that used in setting the 2009-10 regulations. The model is housed as an Excel spreadsheet. The model has both landed and discarded fish sections. Each section has similar components although the discarded section also has components to apply both differential mortality rates and average size changes due to various potential offshore closures (i.e., seaward of 20, 25, 30 or 40 fm). Groundfish impacts on yelloweye rockfish and canary rockfish in the Pacific halibut fishery were modeled as a separate fishery. Cabezon landings under the sub-bag limit options were addressed separately from the remaining marine species.

The model normalized to a 12 month all-depth fishery was used to address impacts from all ocean boat fishery sources, excluding the targeted Pacific halibut fishery. It includes the following components for each species by month: (1) catch; (2) bag limit affects; (3) offshore fishery effects on encounter rates and average size; (4) a 7 percent effort shift to the nearshore fishery due to offshore closures; (5) average size and (6) mortality rates for discarded fish. For landed and discarded fish the methodology to address the affects of various marine bag limits, and offshore closure effects on (a) encounter rates and (b) effort shifts nearshore, were discussed earlier in the report under the Normalization section. Average weight was based on the 2007-09 average landed weight and at-sea observations since 2001 for discarded fish as discussed earlier in this report also under the Normalization section. Discarded fish mortality rates by rockfish species and depth were developed from at-sea observer data for catch distribution using mortality rates by species and depth adopted by the PFMC (Table A-26). Discard mortality rates of 7 percent were applied to lingcod, cabezon and greenling as they do not suffer from barotrauma.

Expected impacts on yelloweye rockfish and canary rockfish in the Pacific halibut fishery were addressed separately. The encounter rate per halibut pound landed in 2007, 2008 and 2009, using the 2002-2003 average weight of fish caught outside of 30-fm, was applied to the 2010 Oregon central coast all-depth halibut sport allocation. The estimated impacts were averaged between the three years to address expected impacts on both species. This assumes similar Pacific halibut allocations in 2011-12. A second set of encounter rates and impacts were estimated for the option of groundfish retention during the all-depth Pacific halibut openings.

Landings and discard impacts for shore and estuary caught species were modeled on a season total basis using the 1998-2002 average metric tons. This fishery will be managed for a year round season as it does not impact yelloweye rockfish and canary rockfish. The metric tons were adjusted for length limits applied to cabezon and greenling since that period (refer to the 2004-05 EIS). Sub-legal cabezon and greenling that were landed in the 1998-2002 period were now considered discards. A mortality rate of 7 percent was applied to all species discarded in the shore and estuary fishery to represent hooking mortality as the waters are not deep enough to cause mortality from barotrauma.

Table A-26. Discard mortality rate calculations for select rockfish species based on sport observer data from 2001 and 2003-07. Mortality rates are predicted for all-depth fisheries and various depth closure scenarios.

2001, 2003-2007 count of released fish by depth bin (fm)							
Species	**≤ 10 fm**	**11-20 fm**	**21-25 fm**	**26-30 fm**	**31-40 fm**	**> 40 fm**	**Total**
Black	506	522	29	2	0	0	1,059
Blue	308	846	87	7	0	0	1,248
Brown	0	1	0	0	0	0	1
China	1	7	3	0	0	0	11
Copper	0	12	1	1	0	0	14
Quillback	0	3	1	0	0	0	4
Canary	15	295	78	26	21	83	518
Yelloweye	1	24	18	5	4	23	75

Distribution of released fish by depth bin (fm) when open all depths							
Species	**≤ 10 fm**	**11-20 fm**	**21-25 fm**	**26-30 fm**	**31-40 fm**	**> 40 fm**	**Total**
Black	48%	49%	3%	0%	0%	0%	1,059
Blue	25%	68%	7%	1%	0%	0%	1,248
Brown	0%	100%	0%	0%	0%	0%	1
China	9%	64%	27%	0%	0%	0%	11
Copper	0%	86%	7%	7%	0%	0%	14
Quillback	0%	75%	25%	0%	0%	0%	4
Canary	3%	57%	15%	5%	4%	16%	518
Yelloweye	1%	32%	24%	7%	5%	31%	74

Table A-26. Discard mortality rate calculations for select rockfish species based on sport observer data from 2001 and 2003-07. Mortality rates are predicted for all-depth fisheries and various depth closure scenarios (continued).

Predicted distribution of released fish when closed outside of 40 fm						
Species	**≤ 10 fm**	**11-20 fm**	**21-25 fm**	**26-30 fm**	**31-40 fm**	**Total**
Black	48%	49%	3%	0%	0%	1059
Blue	25%	68%	7%	1%	0%	1248
Brown	0%	100%	0%	0%	0%	1
China	9%	64%	27%	0%	0%	11
Copper	0%	86%	7%	7%	0%	14
Quillback	0%	75%	25%	0%	0%	4
Canary	3%	68%	18%	6%	5%	435
Yelloweye	1%	46%	35%	10%	7%	51

Predicted distribution of released fish when closed outside of 30 fm

Species	**≤ 10 fm**	**11-20 fm**	**21-25 fm**	**26-30 fm**	**Total**
Black	48%	49%	3%	0%	1,059
Blue	25%	68%	7%	1%	1,248
Brown	0%	100%	0%	0%	1
China	9%	64%	27%	0%	11
Copper	0%	86%	7%	7%	14
Quillback	0%	75%	25%	0%	4
Canary	4%	71%	19%	6%	414
Yelloweye	2%	50%	37%	11%	47

Predicted distribution of released fish when closed outside of 25 fm

Species	**≤ 10 fm**	**11-20 fm**	**21-25 fm**	**Total**
Black	48%	49%	3%	1,057
Blue	25%	68%	7%	1,241
Brown	0%	100%	0%	1
China	9%	64%	27%	11
Copper	0%	86%	7%	13
Quillback	0%	75%	25%	4
Canary	4%	76%	20%	388
Yelloweye	2%	56%	42%	42

Predicted distribution of released fish when closed outside of 20 fm

Species	≤ 10 fm	11-20 fm	Total
Black	48%	49%	1,028
Blue	25%	68%	1,154
Brown	0%	100%	1
China	9%	64%	8
Copper	0%	86%	12
Quillback	0%	75%	3
Canary	4%	76%	310
Yelloweye	2%	56%	24

Table A-26**. Discard mortality rate calculations for select rockfish species based on sport observer data from 2001 and 2003-07. Mortality rates are predicted for all-depth fisheries and various depth closure scenarios. (continued)**

Mortality Rate

Species	≤ 10 fm	11-20 fm	21-25 fm	26-30 fm	31-40 fm	> 40 fm
Black	11%	20%	29%	29%	63%	63%
Blue	18%	30%	43%	43%	100%	100%
Brown	12%	22%	33%	33%	100%	100%
China	13%	24%	37%	37%	100%	100%
Copper	19%	33%	48%	48%	100%	100%
Quillback	21%	35%	52%	52%	100%	100%
Canary	21%	37%	53%	43%	100%	100%
Yelloweye	22%	39%	56%	56%	100%	100%

Total Mortality rate for discarded fish by proposed depth closure

Species	≤ 10 fm	≤ 20 fm	≤ 25 fm	≤ 30 fm	≤ 40 fm	All Depth
Black	11%	16%	16%	16%	16%	16%
Blue	18%	27%	28%	28%	28%	28%
Brown	12%	22%	22%	22%	22%	22%
China	13%	23%	27%	27%	27%	27%
Copper	19%	33%	34%	35%	35%	35%
Quillback	21%	35%	39%	39%	39%	39%
Canary	21%	36%	40%	40%	43%	52%
Yelloweye	22%	38%	46%	47%	51%	66%

A.11 California Recreational Model

The CDFG revised their impact projection model (“RecFISH”) that was reviewed by the GMT at their January 2010 meeting and revisions were discussed in a conference call in May of 2010. The GMT recommends this updated model for use in projecting impacts of groundfish species in 2011-2012 California recreational fisheries. This model is described below and is used in impact analyses in this EIS.

Recreational fisheries management for multi-species assemblages in California presents many challenges. In recent years, declining stocks of several rockfish species have dictated recreational groundfish management seasons and depths in California. Increasingly complex restrictions have been necessary to keep total catch of depleted species within the reduced limits that are necessary to rebuild the stocks while providing fishing opportunity.

Prior to 2000, the recreational daily bag limit for rockfish was 15 fish per angler with no closed months or depths. Beginning in 2000, the daily bag limit was reduced to 10 fish. Regulations have changed each year since 2000, making analyses of the effects of particular regulations difficult. In addition, regulations have become more region-specific, adding to the difficulty of modeling projected catches.

Methodology Used to Project Recreational Catches for 2011–12

The recreational catch model incorporates a number of parameters and assumptions, all of which are either risk-neutral or risk-adverse. The basic analytical approach is the same as that used for 2009–10. The 2005-2009 data from the California Recreational Fishery Survey (CRFS) program serves as a baseline. The model output predicts expected catch under any combination of season and depth fishing restrictions for each of the regions

Key differences between 2009-10 and 2011-12 RecFISH model changes

- Includes 2008 & 2009 CRFS catch estimates
- Discard mortalities for 2009 used new GMT methodology
- Revised proportion of catch by depth for management areas north of Point Arena
- Revised proportion of catch by time for management areas north of Point Arena

CDFG/California Recreational Groundfish (RecFISH) Model Assumptions

The following assumptions are made in the application of the RecFISH model in projecting fishing impacts in the California recreational fishery.

- Effort Shift Inshore: The model includes a 27.6 percent increase in expected landings when fishing is restricted to less than 30 fm and a 39.3 percent increase in expected landings when fishing is restricted to less than 20 fm. The increase, or effort shift, is to account for increased effort in a smaller fishing area.
- Discard Mortality: The GMT developed depth-dependent mortality rates for discarded rockfish of the genus Sebastes in 10-fm increments, the derivation of which is described in section 4.1.5.6. The species specific depth-dependent mortality rates agreed upon by the GMT and approved by the PFMC in 2008 are applied to the discarded fish (B2 & B3) in the CRFS base data from 2005-09 used in the RecFISH model. When projecting the 2011-12 season catch, discard catch estimates are multiplied by the proportion of catch in a given 10-fm depth increment times the depth-dependent mortality rate for the corresponding depth for each species.

Inputs and Key Parameters for the Model

Weighting of Base Years: Base year data 2005-2009 were given nearly equal weighting by applying a 0.99 decay function. The previous biennial cycle made use of a 0.67 decay function to weight 2005 more heavily than 2004. With the exclusion of the 2004 data in the current model due to issues with the comparability of trip types between years, there are five years of data available for the model and these are weighted equally to represent the base catch in the model.

Base Year Catch: Initially, CRFS catch estimates in weight of fish were summed for caught and retained (CRFS "A" catch), filleted/caught otherwise unavailable ("B1" catch), and for species of concern, a proportion of CRFS reported discarded fish derived using depth-based mortality estimates. Base year catch estimates are assumed to be for an unrestricted fishing year with no months closed and no depths closed. Therefore, for each year, a back calculation method was used to obtain an estimate for what the catch would have been if all months and all depths had been open. This back calculation uses month and depth catch proportions derived from historical catch estimates from seasons unregulated by month and depth.

Historical Catch By Month: Estimates of historical percent catch by two-month period were calculated for each region based on Marine Recreational Fisheries Statistics Survey (MRFSS) data (weight of A+B1) from 1993-99, which was a time period when seasons and depths were unconstrained. Proxies were considered on a species by species basis for regions where there was a lack of catch data for that area. Monthly estimates of percent catch then were divided equally (50:50) for each pair of months.

Historical Catch by Depth: Estimates of percent catch by depth were calculated for each region based on MRFSS depth sample data (numbers caught A+B1 for CPFV and A+B1+B2 for PR) from 1999-2000, which was a time period when depths were unconstrained. Proxies were considered on a species by species basis for regions where there was a lack of catch data for that area.

Description of the Catch Projection Model for the California Recreational Fishery (RecFISH)

To improve the accuracy of catch estimates for yelloweye rockfish, two methods were employed when modeling the effect of depth restrictions on the catch of this species:

- For expanding baseline input catch data from regulated seasons to all depths, unregulated depth distribution of catch data from other areas can be used to supplement the existing historical data; these data must be from unregulated years to be able to expand to all depths. In the Northern Management Area, data from 1999-2003 were used (years unregulated by depth in the North), recent unregulated Oregon catch by depth (1999-2003), and 1999-2000 data from the North-Central area that is north of Point Arena (for bathymetric and fishing effort similarities to the North). For the North-Central area, additional data from dockside party charter catch by depth data from 1999-2000 were used.
- More recent catch data from CRFS were used to produce region–specific proportions of catch by depth with a higher sample size than historical data to provide improved projections that represent the current depth distribution of catch. Although this data is from regulated years, recent years have seen a consistent regulatory scheme by depth that would allow for use in apportioning catch by depth within the open depth strata. For example, for the Northern Management Area, the years 2004-2007 saw a consistent 0-30 fm depth restriction in place. The catch by depth for those years was used to project the depth distribution within the upper 30 fm for upcoming years (assuming catch will be restricted to within this zone), providing a more current framework than using the historical 1999-2000 data. Similarly, this applies to 2006-2009 catch by depth data for the North-Central Management Areas (same 0-30 fm depth restrictions). These depth distributions are applied as a post-model run adjustment, reapportioning the projections with the new depth distributions.

Determining the Proportion of Angler Reported Unavailable Dead Catch for Yelloweye and Canary Rockfish that was Composed of Discarded Dead Fish:

The California Recreational Fisheries Survey program (CRFS) uses several different catch types in generating catch estimates: sampler examined catch (“A”), angler-reported dead fish (“B1”), and angler reported discarded live catch (“B2”). The B1 category includes disposition such as retained (filleted fish, fish given away, used for bait or otherwise unavailable) and fish discarded dead. Unfortunately, since CRFS began in 2004, no disposition of the B1 catch has been recorded for the majority of private and rental trips which are sampled in the PR1 mode. Therefore, it is not possible to separate the discarded dead fish from the retained unavailable fish in the B1 catch type without use of a proxy for the proportion of fish discarded dead. Attempts have been made to use sparse available data and apply these to the B1 catch data, but little data exists for depleted non-retention species, such as yelloweye and canary rockfish.

To estimate the proportion of B1 catch of yelloweye and canary rockfish that is discarded dead, a "compliance factor" (CF) was determined from recent (2005-2009) CRFS data. The CF is calculated by dividing the B2 catch by the total catch (A+B1+B2); this represents the proportion of fish reported discarded live by anglers (reported live only) while complying with regulations. It is conservative, as a portion of the B1 catch (the discarded dead) in the denominator should be in the numerator. The CF is used as a proxy for the proportion of B1 that is discarded dead, and so it is multiplied by the B1 catch to estimate the total fish discarded dead. This amount is added to the known B2 catch to arrive at total discards. This value is then multiplied by discard mortality factors by depth to obtain the discard mortality. Total mortality is then the retained catch (A+B1, less the proportion of B1 designated discarded dead) + discard mortality. Because the CFs are conservative, the proportions of B1 that are considered otherwise unavailable dead (filleted, used for bait, given away) will be biased high, thereby leading to an estimate of total mortality that is biased high. CFs were determined for each management area for both yelloweye and canary rockfish and applied to the B1 (aggregate unavailable dead catch) catch for these species to provide a conservative proxy estimate of fish discarded dead to which depth dependent mortality rates would be applied in estimating total mortality.

Methodology Used to Calculate Annual Unrestricted Catch

- Pull (A+B1+B2+B3) Catch for each year from the RecFIN CRFS data web site: http://www.psmfc.org/recfin/forms/est2004.html. Specify species, and select the parameters: month and district under Define Table Layout.
- Pull historical catch by depth (1999-2000, most recent years unregulated by depth) from the RecFIN boatdepth3 CDFG private access website. Add PC and PR fish caught together for each separate region and species, maintaining combined depth totals for each depth strata. Calculate average percentage of total fish caught within each 10 fm depth stratum (= "Depth Profile") by dividing 10 fm depth strata totals by combined total sum of all strata for the region. Assign proxies as needed for data-poor areas, using adjacent regions, similar species, etc.
- Pull historical catch through time (1993-1999, the most recent years unregulated by monthly closure) from RecFIN website: http://www.psmfc.org/recfin/forms/est.html. Calculate average wave percents over combined years 1993-1999 by dividing individual wave totals by sum of all waves for each region. Assign proxies as needed for data-poor areas using the other region (North or South) as the proxy.
- For each management region and species, calculate total regulated catch based on months each set of regulations was in effect. For example, if fishing was only open from 0-60 fm for March-December, sum total catch for those months only. Each management region should now have catch data for all species grouped by the different sets of management regulations (MR sets) in effect for the year so that the identical calculations can easily be performed on identically restricted species.
- Expanding to All Depths. For each MR set: If there was no depth restriction, use the unmodified total regulated catch as the expected catch for all depths for that period of the year. If a depth restriction was in place, use total regulated catch to expand out each species in each MR set to all depths: from the Depth Profile, divide total regulated catch by sum of proportion of catch represented by the depths where fishing was open. This is the total expected catch for all depths. For example, if fishing for a MR set was open < 20

fm, divide the total catch by the percentage of the catch < 20 fm using the appropriate Depth Profile (historical unregulated catch data) for each species and region.

- Effort Shift. If the depth restriction is confined to a 20 or 30 fm band, we assume increased effort occurred for these months. To remove this effect, apply an Effort Shift factor to remove the increased fishing (and increased catch) for the constrained depth zone. For example, if a 0-20 fm restriction was in effect, divide the total expected catch for all depths by 1.393 to get final total expected catch for those months. Similarly, use a factor of 1.276 if fishing was restricted within a 30 fm range. No Effort Shift is applied for depth restrictions > 30 fm.
- Accounting for Closed Months. After expanding to all depths and removing Effort Shift (if needed), sum all the final expected catch values across all the MR sets for the year for each management region and species. Divide this sum b by the percent catch for the year that these regulated months represent (from the wave percents for the year). In other words, divide the calculated catch for all open months by the percentage of the catch for the year these months historically represent. This results in the expected annual unregulated catch, expanded out from the regulated catch, for each region and species.
- Input expected annual unregulated catch for each region-species into the Catch by Year Table in the RecFISH Model database. The weighting of the different years' data to be used by the model in projecting catch can be selected at the model-user interface.

Changes to the RecFISH Model for 2011-2012

The CRFS estimates from 2008 and 2009 were added to the estimates from 2005-2007 used in the previous iteration of the model. A fixed 42% discard mortality rate was applied to the B2 and B3 discarded rockfish catch for the input data for 2008. The proportion of catch by depth applied to the depth dependent mortality rates to derive Management Area Specific discard mortality rates were updated and applied to the 2009 input data. In addition, the proportion of catch by time and proportion of catch by depth in the historical catch were revised as described below, to better reflect the seasonality of effort North of Point Arena and the proportion of catch by depth North of 40 deg 10 min N. Latitude respectively.

1. Elimination of the Division between the Monterey and Morro Bay South-Central Management Areas. These areas are combined to reflect the consolidation of these two management areas into a single South-Central Management Area in 2011 and 2012. The CRFS district 3 shares the boundaries for this Management Area, extending from Pt. Conception to Pigeon Pt, allowing the same geographic scale of projections and inseason catch estimates for this region. A further analysis of this management measure is provided under Appendix B.
2. Revision to the Historical Catch by Month in North of Point Arena. The proportion of catch by wave was refined to a finer spatial resolution. Historically the fishery South of Point Conception, the area between Point Conception and Point Arena and the area between Point Arena and the CA/OR border have different proportions of catch by time due to weather, but previously only the differences North and South of Point Conception were accounted for in the model. In the area North of Point Conception, a far greater proportion of the total catch is derived from areas South of Point Arena biasing the proportion of catch by time. Oregon catch by time data were used as a proxy for North of Point Arena since catch data are available from Oregon during the unregulated fishing season, and the North Coast is similar to Oregon in terms of weather, opportunity and effort.

Historical Oregon data (1993–1999) replaced historic California data (1993–1999) for the North and North-Central North of Point Arena Management Areas for the following species: bocaccio, cabezon, canary rockfish, black rockfish, blue rockfish, brown rockfish, copper rockfish, quillback rockfish, greenling genus, kelp greenling, rock greenling, lingcod, China rockfish, grass rockfish, widow rockfish, and yelloweye rockfish. Oregon RecFIN catch data were extracted by wave for the years 1993–1999 because this is a time when Oregon had open seasons and no depth restrictions similar to California. “Catch” is defined as sampler-examined dead and angler-reported dead fish (A+B1). Estimated total catch in metric tons were compiled in MS Excel by species and wave. Catch-by-wave was converted into catch-by-month by dividing wave data in half. Areas between Point Arena and Point Conception (the North-Central South of Point Arena and the South-Central Management Areas) and Southern California, were not affected by this revision.

3. Revision to the Historical Catch by Depth in the Northern Management Area.
The proportion of catch by depth for the Northern Management Area (40°10’ N. latitude to the OR/CA border) was previously calculated using data from 1999 and 2000. The RecFISH model now includes data from 2001 and 2002 as well, since depth restrictions did not go into effect until 2003. This increased the sample size and improved the accuracy of the projections. The additional data reduced the reliance on proxy data for the Northern Management Area.

Historical California data (2001–2002) from RecFIN was added the existing data for the Northern North Management Areas for all species within the RecFISH model. The “Boat Depth 3” RecFIN website was used to query the catch by depth data. The data were downloaded into MS Access and aggregated into 60ft (10 fm) depth bins to match the layout found within the RecFISH model. The RecFIN survey data used consist of angler-retained fish (A+B1) as well as angler discarded fish (B2). Proxies were used for some species where data was limited or non-existent. Similar proxy processes were used in the model before but the number of proxies was greatly reduced, resulting in a more robust RecFISH model. Recreational Groundfish Management Areas between Cape Mendocino and the California/ Mexico border were not affected by this revision.

The names of the Management Areas will be changed in 2011 to make them shorter and the south-central management areas will be combined to form a single management area, reducing the number of management areas from six to five, reducing regulatory complexity.

A.12 References

Albin, D. and Karpov, K. 1995. Northern California sport fish project lingcod hooking mortality study. CDFG Cruise Report 95-M-10.

PFMC (Pacific Fishery Management Council). 2008. Final environmental impact statement for the proposed acceptable biological catch and optimum yield specifications and management measures for the 2009-2010 Pacific Coast groundfish fishery. Portland, OR: Pacific Fishery Management Council.

Stewart, I. J., Wallace, J. R., and McGilliard, C. 2009. Status of the U.S. yelloweye rockfish resource in 2009. Portland, OR: Pacific Fishery Management Council.

Appendix B
DETAILED MANAGEMENT MEASURES ANALYSIS

2011-2012 GROUNDFISH HARVEST SPECIFICATIONS
DRAFT ENVIRONMENTAL IMPACT STATEMENT

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Tables

Figures

This appendix provides detailed information surrounding the new management measures (i.e., management measures that have not previously been analyzed or implemented). Sections B.1 through B.3 detail management measures included under the Council's Final Preferred Alternative. Section B.4 details the analysis completed to date on those management measures that were considered but rejected for further analysis or for use in 2011-2012.

B.1 Deductions from the ACL

Deductions from the ACL, or off-the-top deductions, are used to account for groundfish mortality in tribal fisheries, incidental open access fisheries (e.g. non-groundfish fisheries), scientific research, and under exempted fishing permits (EFPs). Chapter 2 describes the Council's final preferred deductions from the ACLs for 2001-2012. Details behind the calculations of each portion of the off-the-top deductions are described in this section.

B.1.1 Tribal

The methods used to estimate the impacts in the tribal fisheries represent the best judgment of tribal fishery managers based on both past performance and anticipated potential impacts in the coming season(s). Though the impact estimates are divided by fishery for the sake of precision in estimating overfished species impacts, tribal managers typically manage to stay within overall projected impacts (i.e., across fisheries).

B.1.1.1 Tribal Non-overfished Species Impacts

For Dover sole, arrowtooth flounder, and longspine thornyhead the Makah Tribe has managed their fisheries with annual fleet limits for the past several years (i.e. bimonthly limits are multiplied by the number of vessels in the fleet and summed across periods to create an annual harvest target). Using cumulative limits similar to those in place in 2010 and an estimated 5 non-whiting trawl vessels, the set asides for Dover sole and arrowtooth flounder are 1,497 mt and 2,041 mt respectively. For longspine thornyhead the cumulative fleet limit would represent a significant departure from anything seen in recent years or anticipated in the next biennium. As such the fleet limit that would result from status quo bimonthly limits is reduced to 30 mt (~ 10 percent of the fleet limit). The yellowtail estimate is also based on the sum of total fleet limits for the Makah midwater fishery (Agenda Item I.4.b, Supplemental Tribal Report, April 2010).

Table B-1. Tribal set asides for 2011-2012 Fisheries.

Species	Amount (mt)
Dover sole	1,497
English sole	91
Arrowtooth flounder	2,041
Starry flounder	2
Other flatfish	60
Shortspine Thornyhead N. 34°27' N.	38
Longspine Thornyhead N. 34°27' N.	30
Minor slope north 40°10 N. lat.	36
Minor shelf north 40°10 N. lat.	9
Longnose skate	56

B.1.1.2 Tribal Overfished Species Impacts

Whiting Fishery

The GMT updated the 2010 set asides for the tribal whiting fishery at the March 2010 Council meeting. This was based on the whiting set aside amounts described in the proposed rule for 2010 Tribal Fishery for Pacific Whiting (75 FR 11829). Using the methodology described in the 2009-2010 harvest specifications and management measures EIS, the GMT calculated 4.3 mt for canary, 0 mt for darkblotched, 7.2 mt for POP, 5 mt for widow, and 0 mt for yelloweye rockfish (Table B-2). This methodology used a weighted average approach for calculating Makah's bycatch rate assuming recent years are more representative of bycatch. Those rates are tripled to provide a conservative estimate of potential bycatch for the Quileute Tribe's developing fishery.

Table B-2. Estimated bycatch (mt) in the tribal whiting fisheries for 2010.

Sector	Canary	Darkblotched	POP	Widow	Yelloweye
Makah	1.78	0.02	2.99	2.06	0.00
Quileute	2.52	0.03	4.22	2.92	0.00
Total Tribal	**4.30**	**0.05**	**7.21**	**4.99**	**0.00**

Non-Whiting Midwater Trawl Fishery

The Makah Tribe is the only tribe that conducts a midwater trawl fishery. The fishery targets yellowtail rockfish and the combined fleet is subject to a limit of 180,000 lbs/2 months. Overfished species bycatch in this fishery consists of widow and canary rockfish. Widow rockfish are subject to an annual limit of 10 percent of the weight of yellowtail landed and may be changed inseason to stay within projected impacts. This was changed from a per-landing limit in 2010 in response to increasing encounters of widow rockfish on some trips. The widow rockfish set aside of 40 mt is based on the maximum expected catch of yellowtail (490 mt) as well as recent bycatch in the fishery (Table B-3). Canary rockfish is subject to a limit of 300 lbs/trip. As reflected in Agenda Item F.9.c, Supplemental GMT Report, June 2008 the canary set aside was changed beginning in 2009:

> The GMT notes that one change in the set asides for overfished species from these fisheries compared to status quo is the increased estimate of canary rockfish in the Makah midwater trawl fishery targeting yellowtail rockfish. Due to higher encounters of canary bycatch in recent years, particularly 2007 and 2008, the Tribe has been unable to successfully prosecute the fishery while remaining within the canary estimate provided in the scorecard. The Makah Tribe is proposing a doubling of those estimated impacts (from 1.8 mt to 3.6 mt) to allow for resumption of the fishery given increased availability of canary rockfish yield in 2009-2010.

Table B-3. Catch in mt of canary, widow, and yellowtail rockfish in the Makah midwater trawl fishery for 2005-2009.

Species	2005	2006	2007	2008	2009
Canary	1.9	0.9	0.0	0.6	1.3
Widow	25.6	9.2	0.5	13.0	35.1
Yellowtail	480.0	111.2	7.3	155.5	429.1

Bottom Trawl Fishery

The Makah Tribe is also the only tribe conducting a bottom trawl fishery. Overfished species bycatch is primarily canary rockfish and POP. The Makah Tribe also targets petrale sole, which has been declared as overfished. The Makah indicated that their expected catch of petrale in 2011-2012 is 45.4 mt based on effort projections and recent catch (Table B-4). The canary set aside of 0.8 mt is based on recent average catch which has remained fairly consistent (Table B-4). The high catch in 2009 was the result of increased encounters associated with Pacific cod availability (as well as commensurate lower impacts from other Makah fisheries). POP bycatch is more variable in recent years. The set aside for POP is 3.7 mt based on the highest year of landings (2006).

Table B-4. Catch in mt of canary rockfish, Pacific ocean perch, and petrale in the Makah bottom trawl fishery for 2005-2009.

Species	2005	2006	2007	2008	2009
Canary	0.8	0.5	0.8	0.6	1.5
POP	3.2	3.7	1.8	0.6	0.2
Petrale	30	26	45	44	69

Salmon Troll Fishery

These estimates include catch from all tribes participating in the treaty troll fishery. The canary set aside of 0.5 mt is based on the highest recent landings from 2004-2005 (Table B-5). Using a similar approach for yelloweye would lead to a set aside of 0.2 mt while using the average of recent years would result in 0.1 mt. The tribes are not recommending a set aside specific to the treaty troll fishery as the scorecard currently contains a conservative estimate of yelloweye impacts (see below) for the longline fisheries for Pacific halibut and sablefish and tribes will manage all fisheries to stay within that estimate.

Table B-5. Catch in mt of canary and yelloweye rockfish in the treaty troll fishery for 2005-2009.

Species	2005	2006	2007	2008	2009
Canary	0.5	0.2	0.1	0.1	0.0
Yelloweye	0.2	0.1	0.1	0.1	0.0

Fixed Gear Fishery

The coastal tribes participate in longline fisheries for Pacific halibut and sablefish. Set asides for these fisheries are based on combined past performance of these closely related fisheries (Table B-6). The set aside for canary is 0.3 mt and is based on average historical catch from 2001-2009. An average is used for canary given they are not predictably associated with target species and the trend across this time period is generally decreasing. For yelloweye, bycatch is more strongly associated with target species, especially when they are located on the shelf. Another factor in estimating bycatch is the lack of a trip limit during open competition halibut fisheries. The set aside for yelloweye is 2.3 mt, representing the highest amount of bycatch from a year when yelloweye were classified as overfished and when the status quo halibut plan under a recent court ruling in *U.S. v. Washington* was in place (i.e., 2002). The status quo halibut plan that was in place for 2001-2003, and includes an open competition fishery, is the same plan that is in effect for the 2010 fishery and likely to be in place for 2011-2012.

Table B-6. Catch in mt of canary and yelloweye rockfish in treaty longline fisheries for 2001-2009.

Species	2001	2002	2003	2004	2005	2006	2007	2008	2009
Canary	1.1	0.3	0.5	0.5	0.2	0.2	0.0	0.1	0.1
Yelloweye	2.9	2.3	0.2	0.7	0.6	0.4	0.3	0.1	0.1

Set asides for treaty tribal fisheries were estimated based on catches of all non-overfished species and complexes in recent years (i.e., since 2004). This represents a period of time with effort levels that are expected to be similar to the next two years (i.e. 2011-2012). Recommended set asides are based on the maximum catch for this time period for all stocks except for those with specific allocations, harvest guidelines, or existing set asides (Table B-1).

B.1.2 Incidental Open Access

B.1.2.1 Incidental Open Access Non-Overfished Species Impacts

Estimates of the amount of groundfish taken in the incidental open access fisheries for establishing off-the-top deductions from 2011-2012 ACLs were taken from the highest amounts published in the 2007-2008 WCGOP Total Mortality reports (sum of California halibut, pink shrimp, remaining incidental fishery landings) (Table B-7). Prior to 2007, mortality estimates from incidental open access fisheries were not broken out by sector in the WCGOP Total Mortality Reports.

The "remaining incidental fishery landings" in the WCGOP Total Mortality Reports also include landings that occur under the non-whiting EFPs. Since the Council considers EFPs separately by specifying EFP set asides, the known EFP catches (e.g., for sablefish, chilipepper, etc.) were subtracted from the "remaining incidental fishery landings" and are presented separately (see Section B.1.4).

Table B-7. Total mortality estimates in fisheries that catch groundfish incidentally from 2007 and 2008.

Year		2008				2007			
Sector		CA Halibut	Pink shrimp	Remaining incidental fisheries landings	TOTAL:	CA Halibut	Pink shrimp	Remaining incidental fisheries landings	TOTAL:
	Pacific hake	0.0	683.7	0.1	683.9	--	2,807.8	0.1	2,807.8
	Lingcod (North of 42° N. lat.)	NA	0.1	15.7	15.7	NA	1.2	25.7	26.9
	Lingcod (South of 42° N. lat.)	0.0	0.0	6.9	7.0	0.1			0.1
	Sablefish	--	2.1	4.5	32.4	--	0.3	16.9	17.2
	Shortbelly rockfish	--	0.4	--	0.4	--	0.1	--	0.1
	Pacific cod (North of 43° N. lat.)	NA	--	0.0	0.0	NA	0.0	0.0	0.0
	Chilipepper rockfish (South of 40°10' N. lat.)	0.0	NA	4.9	4.9	--	NA	1.9	1.9
	Splitnose rockfish (South of 40°10' N. lat.)	--	NA	0.0	0.0	--	NA	0.2	0.2
	Yellowtail rockfish (North of 40°10' N. lat.)	--	0.1	0.3	0.3	NA	0.1	2.9	3.0
	Shortspine thornyhead (North of 34° 27' N. lat.)	--	0.5	0.5	1.0	--	0.5	1.3	1.8
	Shortspine thornyhead (South of 34° 27' N. lat.)	--	NA	41.3	41.6				0.0
	Longspine thornyhead (North of 34° 27' N. lat.)	--	--	0.3	0.3	--	0.0	1.0	1.0
	Longspine thornyhead (South of 34° 27' N. lat.)	--	NA	2.5	2.5				0.0
	Black rockfish (North of 46°16' N. lat.)	NA	--	--	0.0	NA	--	--	0.0
	Black rockfish (South of 46°16' N. lat.)	--	0.0	0.0	0.0	--	--	0.3	0.3
Minor rockfish (North of 40°10' N. lat.)	Minor rockfish (North of 40°10' N. lat.)	NA	25.7	1.0	26.7	NA	43.6	1.3	44.9
	Nearshore	NA	0.0	--	0.0	NA	0.2	0.1	0.3
	Shelf	NA	12.4	0.5	13.0	NA	25.4	0.7	26.0
	Chilipepper rockfish	NA	0.0	0.0	0.1	NA	0.0	--	0.0
	Bocaccio	NA	--	0.0	0.0	NA	0.0	--	0.0
	Redstripe rockfish	NA	0.0	--	0.0	NA	--	--	0.0
	Silvergray rockfish	NA	--	--	0.0	NA	--	--	0.0
	Remaining shelf rockfish	NA	12.4	0.5	12.9	NA	25.3	0.7	26.0
	Slope	NA	13.3	0.5	13.7	NA	18.0	0.5	18.5
	Sharpchin rockfish	NA	0.1	--	0.1	NA	1.3	--	1.3
	Splitnose rockfish	NA	12.8	0.0	12.8	NA	14.1	0.0	14.1
	Yellowmouth rockfish	NA	--	--	0.0	NA	--	--	0.0
	Remaining slope rockfish	NA	0.4	0.5	0.9	NA	2.7	0.5	3.2

Table B-7. Total mortality estimates in fisheries that catch groundfish incidentally from 2007 and 2008. (cont'd)

Year		2008				2007			
Sector		CA Halibut	Pink shrimp	Remaining incidental fisheries landings	TOTAL:	CA Halibut	Pink shrimp	Remaining incidental fisheries landings	TOTAL:
Minor rockfish (South of 40°10' N. la	Minor rockfish (South of 40°10' N. lat.)	0.2	NA	25.5	25.7	0.2	NA	21.0	21.2
	Nearshore	0.2	NA	0.3	0.5	0.2	NA	1.2	1.4
	Gopher rockfish	--	NA	0.1	0.1	0.0	NA	0.2	0.2
	Remaining nearshore rockfish	0.2	NA	0.2	0.4	0.2	NA	1.0	1.3
	Shelf	0.0	NA	8.0	8.0	0.0	NA	8.6	8.6
	Yellowtail rockfish	--	NA	0.9	0.9	--	NA	1.2	1.2
	Remaining shelf rockfish	0.0	NA	7.0	7.1	0.0	NA	7.3	7.3
	Slope	--	NA	17.2	17.2	0.0	NA	11.2	11.2
	Bank rockfish	--	NA	1.3	1.3	--	NA	7.6	7.6
	Blackgill rockfish	--	NA	12.6	14.8	--	NA	3.2	3.2
	Sharpchin rockfish	--	NA	--	0.0	--	NA	--	0.0
	Remaining slope rockfish	--	NA	1.1	1.1	0.0	NA	0.4	0.4
	California scorpionfish (South of 36° N. lat.)	0.8	NA	1.0	1.8	0.5	NA	1.5	2.0
	Cabezon (South of 42° N. lat.)	--	--	0.1	0.1	0.0	--	0.2	0.2
	Dover sole	0.1	12.9	0.1	13.1	0.1	31.9	22.8	54.8
	English sole	1.8	1.3	0.1	3.2	2.3	0.5	0.9	3.7
	Petrale sole	0.2	1.4	0.1	1.7	0.4	2.3	0.1	2.8
	Arrowtooth flounder	--	30.2	0.0	30.3	--	11.1	4.4	15.5
	Starry flounder	2.6	--	0.0	2.6	4.9	--	0.1	5.0
	Other flatfish	4.7	32.8	13.4	50.9	7.2	103.0	14.6	124.8
Other groundfish	Other groundfish	56.4	5.6	105.8	167.8	54.9	4.5	43.2	102.6
	Kelp greenling	--	--	0.0	0.0	--	--	0.0	0.0
	Skates*	49.6	1.4	12.0	62.9	49.6	2.5	12.5	64.6
	Spiny dogfish	3.3	3.7	82.2	89.2	3.0	0.7	1.3	5.1
	Unspecified grenadiers	--	--	--	0.0	--	--	2.1	2.1
	Other	3.6	0.5	11.6	15.7	2.3	1.3	27.2	30.8

B.1.2.2 Incidental Open Access Overfished Species Impacts

California Halibut trawl fishery

The California halibut trawl fishery is a state-permitted fishery that operates in southern California. Commercial trawling is prohibited in all state waters except for the California halibut trawl grounds located south of Point Conception. Conservation measures such as minimum mesh sizes, minimum poundage limits, closed seasons, and Federal observer coverage have been implemented to reduce bycatch of species other than California halibut.

The GMT reviewed the Estimated Discard and Total Catch of Selected Groundfish Species in the 2008 U.S. West Coast Fisheries (hereinafter 2008 WCGOP Total Mortality report) and examined state landing receipts to determine the best estimate of overfished rockfish species impacts from this fishery. Observer data from the limited entry and open access fisheries indicate no discards of any overfished species in this fishery except canary rockfish, which was less than 0.1 mt. State landing receipts from 2004-2008 indicate trace landings of bocaccio rockfish. Impacts to overfished species are not expected in this fishery because it occurs in an area with low overfished species encounters because it takes place and over sandy bottom habitat. The best estimates of impacts to this fishery have been updated in Table B-8.

Estimates of petrale sole catch in the California halibut trawl fishery are less than 1 mt from 2004-2006.

California Gillnet Fishery

The California gillnet fishery is a state-permitted fishery that occurs in California. This fishery is not observed under the Federal groundfish observer program. State landing receipts from 2004-2008 indicate small landings of bocaccio (0.3 mt) and widow rockfish (2.9 mt) in this fishery. Minimal impacts to overfished species are expected in this fishery because this gear is not allowed inside the Rockfish Conservation Areas (RCAs) and is subject to depth restrictions which preclude them from fishing in nearshore waters. The best estimates of impacts to this fishery based on state landing receipts have been updated in Table B-8.

Estimates of petrale sole impacts in the California gillnet fishery are 0.1 mt.

California Sheephead Fishery

The California sheephead fishery is a state-permitted fishery that is primarily taken by trap gear in southern California. This fishery is not observed under the Federal groundfish observer program. State landing receipts from 2004-2008 indicate trace amounts of bocaccio rockfish in this fishery. Impacts to overfished species are not expected in this fishery because it occurs in an area of low overall bycatch of overfished species.

Coastal Pelagic Species (CPS) – Wetfish Fishery

The CPS fishery for wetfish is a limited entry fishery that occurs coastwide. In California, this fishery primarily occurs in Monterey and southern California. CPS (sardine, anchovy, jack mackerel, Pacific mackerel) are targeted with "round-haul" gear including purse and drum seines.

In the sardine fishery, 2009 landings data indicate no catch of overfished species (however, groundfish species are not required to be landed). In California, state landing receipts from 2004 -2008 indicate trace landings of bocaccio rockfish in this fishery. In Oregon, reported logbook and observed catches of non-target species caught in the Oregon sardine fishery showed no catch of rockfish (Table 13 in PFMC 2008). Washington at-sea observer data also indicates less than 0.1 mt of bycatch. Impacts to overfished species are not expected in this fishery because it occurs in an area of low overall bycatch of overfished species.

Coastal Pelagic Species – Squid Fishery

The CPS fishery for squid is a limited entry fishery that is focused around two major fishery areas in California: northern California (Monterey Bay) and southern California (ports of Ventura, Port Hueneme, San Pedro, and Terminal Island). Targeting occurs on shallow-water spawning aggregations with "round-haul" gear similar to the CPS wetfish fishery. This fishery is not observed under the Federal groundfish observer program. State landing receipts from 2004-2008 indicate trace amounts of bocaccio rockfish in this fishery. Impacts to overfished species are not expected in this fishery, because targeting occurs over sandy bottom habitat. Rocky reef areas (where many overfished groundfish species occur) are avoided due to gear conflicts. The Council's SAFE reports also have bycatch information for some of the other CPS fisheries (based on observer or logbook information). For example, the report showed that the frequency of bycatch in observed loads of California market squid (2003-2007) was less than 1 percent for bocaccio rockfish (the highest annual incidence rate was 0.8 percent).

Dungeness Crab Fishery

The Dungeness crab fishery is a restricted access fishery that occurs on the west coast. This fishery targets Dungeness crab using trap gear in shallow waters. Conservation measures such as gear modifications have been implemented to reduce bycatch, specifically crab pots are constructed with escape rings designed to let small fish and small crab escape and pots are made with a release mechanism to allow escapement of all animals that are caught by lost pots. These measures have been implemented to reduce bycatch of species other than crab. Fishermen in this fishery are not permitted to land incidental species except for octopus, so information on groundfish species is limited.

This fishery is not observed under the Federal groundfish observer program. California state landing receipts from 2004-2008 indicate trace landings of bocaccio and darkblotched rockfish in this fishery. Impacts to overfished species are not expected in this fishery due to the selectivity of the gear.

Highly Migratory Species (HMS) Fishery

The fishery for HMS is an open access fishery on the west coast, with the exception of the swordfish drift gillnet fishery off California. Targeting of tunas, sharks, billfish/swordfish, and other pelagic species occurs with a variety of gears (troll gear, drift gillnets, pelagic longline, purse seines) and in waters ranging from the nearshore to outside the 200-mile zone. This fishery is not observed under the Federal groundfish observer program. State landing receipts from 2004 -2008 indicate small landings of bocaccio rockfish and trace landings of darkblotched rockfish in this fishery. Impacts to overfished species are not expected in this fishery, because most of the targeting occurs in the offshore, in the open ocean where few overfished rockfish species are expected to occur.

Ridgeback prawn Fishery

The ridgeback prawn trawl fishery is a state-permitted fishery that primarily occurs in southern California within the California halibut trawl grounds. This fishery is not observed under the Federal groundfish observer program. State landing receipts from 2004-2008 indicate no landings of overfished species in this fishery. Impacts to overfished species are not expected in this fishery because it occurs in an area of low overall bycatch of overfished species and over sandy bottom habitat. The best estimates of impacts to this fishery have been updated in Table B-8.

Sea Cucumber Trawl Fishery

The sea cucumber trawl fishery is a state-permitted fishery that primarily occurs in southern California within the California halibut trawl grounds. This fishery is not observed under the Federal groundfish observer program. State landing receipts from 2004-2008 indicate trace landings of bocaccio rockfish in this fishery. Impacts to overfished species are not expected in this fishery because it occurs in an area of low overall bycatch of overfished species and over sandy bottom habitat.

Estimates of petrale sole impacts in the sea cucumber trawl fishery are 0.1 mt.

Spot Prawn Fishery

The spot prawn fishery is a state-permitted fishery that is taken by trap gear in California. The fishery occurs from just north of Monterey Bay to southern California. This fishery is not observed under the Federal groundfish observer program. State landing receipts from 2004-2008 indicate no landings of overfished species in this fishery. Impacts to overfished species are not expected in this fishery because it occurs in an area of low overall bycatch of overfished species.

Pink Shrimp Trawl Fishery

The pink shrimp trawl fishery is not restricted by an RCA, but approved bycatch reduction devices or fish excluders in shrimp trawls are mandated to minimize incidental groundfish bycatch. 2007 was the first year that observer discard ratios from the pink shrimp fishery were used to estimate fleet-wide amounts of groundfish discards. The Total Mortality reports for darkblotched rockfish showed catches of 18 mt (2007) and 11 mt (2008), therefore for 2011-2012 the GMT recommends using a yearly set aside amount of 15 mt for darkblotched rockfish which is the mean of the 2007 and 2008 observed catch rounded to the nearest whole metric ton. Given the results of the 2007 and 2008 Total Mortality reports, the GMT recommends yearly set asides for POP of 0.1 mt because this is the amount caught in both 2007 and 2008 and 0.4 for canary rockfish, for which there was 0.4 mt caught in 2007 and 0.3 mt in 2008 (0.4 is the average rounded up accordingly). The best estimates of impacts to this fishery have been updated in Table B-8.

Salmon Troll Fishery

The salmon troll fishery operates all along the west coast, however, in recent years the fishery has been severely restricted because of salmon abundance and the set asides recommended by the GMT have been reduced accordingly. Currently the salmon troll fishery is exempted from RCA restrictions and groundfish species, including lingcod, are allowed to be retained while fishing in the non-trawl RCA. Salmon trollers are required to have VMS on their vessels and there are two mandatory yelloweye rockfish conservation areas (YRCAs) and two voluntary YRCAs that apply to salmon trollers. Currently there are set aside amounts in the salmon troll fishery for canary, bocaccio, widow and yelloweye rockfish. The canary impacts that the GMT accounts for in the salmon troll fishery changed after 2005 because the salmon fishery was shifting from one with higher Chinook quotas to higher coho quotas, and canary bycatch in that fishery was most associated with Chinook targeting. The yield set asides were 1.6 mt (2005), 2 mt (2007/2008) and 0.8 mt (2009/2010). Because of the possible higher Chinook opportunities in the north for 2011-2012, the GMT recommends using 1.6 mt as the canary yield set aside in the salmon troll fishery. The other overfished species set aside amounts should remain the same as 2009/2010 because the GMT does not have any new information which would indicate a change in impacts. The best estimates of impacts to this fishery have been updated in Table B-8.

Table B-8. Final Preferred. Estimates of incidental open access projected impacts for overfished species.

Category	Bocaccio South 40'10	Canary	Cowcod	Dkbl	Petrale	POP	Widow	YE
Open Access Incidental								
--CA Halibut								
--CA Gillnet	0.3						2.9	
--CA Sheephead								
--CPS- wetfish	0.1							
--CPS- squid								
--Dungeness crab								
--HMS b/	0.1							
--Pacific Halibut								
--Pink shrimp		0.4		15		0.1	0.1	
--Ridgeback prawn								
--Salmon troll	0.2	1.6					0.3	0.2
--Sea Cucumber					0.1			
--Spot Prawn (trap)								
TOTAL	**0.7**	**2**	**0**	**15**	**1**	**0**	**3.3**	**0.2**

B.1.3 Scientific Research

Scientific research may be conducted on species during times, and within areas, that may be otherwise restricted by Federal groundfish fishing regulations (50 CFR Part 660 Subpart G). Scientific research would assess the status of groundfish stocks, both overfished and non-overfished, and provide important biological information, the results of which would be used to establish fishing and conservation management measures. The research activities would be typical of the groundfish research conducted for decades along the Pacific coast. All of the scientific research activities are designed to conserve the affected species and would include a variety of research and monitoring activities such as determining the abundance, distribution, and condition of adult and juvenile groundfish, and conducting investigations on groundfish behavior and survivability after interacting with fishing gear. The activities would be conducted by qualified researchers. Activities would include: (1) capturing fish with traps, nets, and hook-and-line gears; (2) anesthetizing fish to minimize stress due to handling; (3) handling to count fish, obtain length or weight measurements, assess general condition, and to check fish for external signs of disease, and sex; (4) rescuing or salvaging fish; (5) fish marking or tagging; (6) non-lethal tissue sampling for genetic and diet studies; (7) lethal take for pathogen analysis, diet analysis, life history studies or contaminant accumulation analysis; and (8) testing fishing gear configurations to improve the information collected for stock assessments or to improve selectivity. Not all scientific research projects include all of these types of activities but generally would contain at least one of them. The vast majority of scientific research activities are of short duration and occur either once, biennially, or annually.

The Federal regulations, §600.310 (e)(3)(v)(C) require that fishing mortality be counted against the OY [ACL], including that resulting from bycatch, scientific research, and other fishing activities. In past years, prior to establishing harvest guidelines for fishing activities, the Council has set aside a portion of the overfished species OYs for projected impacts by vessels conducting scientific research. Consistent with the MSA and FMP Amendment 23, these types of mortality will now be deducted from the ACL as an off-the-top deduction. Best estimates of scientific take are provided by the NWFSC and NWR and reported in the WCGOP Total Mortality.

B.1.3.1 Scientific Research Non-Overfished Species Impacts

Based on the relative inability to manage scientific research catch, as well as the potential for some unreported research mortality, the Council adopted the historical maximum catch during scientific research activities, as estimated in 2005-2008, for the off-the-top deductions to the ACLs for 2011-2012.

The NMFS NWR compiled the best estimates of catch of groundfish in scientific research projects that were federally permitted from 2005-2008. For most species, mortality estimates for scientific research are those reported in the WCGOP Total Mortality reports from 2005-2008 (Table B-9). Further discussion on the research mortality estimates for sablefish (north of 36°N. latitude and south of 36° N. latitude) and the minor rockfish complex (north of 40°10' N. latitude and south of 40°10' N. latitude) are provided below. The best estimates do not include scientific research impacts to groundfish species that go unpermitted and unreported. It is most likely that these catches only occur in small amounts; however there is no way to quantify them. Most 2009 research catches have been reported to NMFS, however the data have not yet been compiled and synthesized nor have they been quality assured. No 2009 catches reported so far have caused concern that using 2005-2008 would be unrepresentative.

<u>Sablefish</u>: The WCGOP Total Mortality reports do not separate total mortality estimates for sablefish north and south of 36° N. latitude. For use in calculating set asides for the sablefish ACLs, which are stratified north and south of 36° N. latitude, NMFS provided the area-specific mortality estimates for sablefish taken in scientific research activities for 2005-2008.

<u>Minor Rockfish</u>: The scientific research catch estimates for the minor rockfish complex were accounted for differently between years in the WCGOP Total Mortality reports. Therefore, to provide the best estimates to use for determining the appropriate off-the-top amounts for the 2011-2012 harvest specifications and management measures, the scientific research catch data were reviewed to ensure that research catches of species within the minor rockfish complex were not being double counted, or not counted at all at the complex and sub-complex levels.

In 2005 minor rockfish (shelf, slope and nearshore) research catch were all made on a coastwide basis. Due to difficulties in accurately apportioning this catch north and south, the few research estimates available for 2005 were not used. Therefore, for estimating appropriate scientific research set asides for the minor rockfish complexes, data from only 2006-2008 were used.

Review of 2006-2008 research catch data revealed some inconsistencies in the reporting on research catch for the complex and sub-complexes between the Total Mortality reports and the best estimates of research catch, as depicted in Table B-10.

Table B-9. Scientific research catches in 2005-2008, as reported in the WCGOP Total Mortality Reports (except for sablefish and some of the minor rockfish complex numbers), and in the best estimates of scientific research catch as reported to NMFS.

Species		Year			
		2008	2007	2006	2005
	Pacific hake	11.8	48.7	16.0	42.2
	Lingcod (North of 42° N. lat.)	2.5	4.0	5.3	
	Lingcod (South of 42° N. lat.)	0.4			
	Sablefish				
	Sablefish (North of 36° N. lat.)	11.8	16.4	13.6	15.6
	Sablefish (South of 36° N. lat.)	1.4	2.4	1.7	2.2
	Shortbelly rockfish	1.2	0.3		
	Pacific cod (North of 43° N. lat.)	0.1	0.1	0.2	0.2
	Chilipepper rockfish (South of 40°10' N. lat.)	4.5	6.0	8.3	
	Splitnose rockfish (South of 40°10' N. lat.)	3.2	3.0		6.6
	Yellowtail rockfish (North of 40°10' N. lat.)	3.2	4.2		
	Shortspine thornyhead (North of 34° 27' N. lat.)	3.7	4.8	4.2	3.8
	Shortspine thornyhead (South of 34° 27' N. lat.)	0.6			
	Longspine thornyhead (North of 34° 27' N. lat.)	13.4	12.1	11.6	10.3
	Longspine thornyhead (South of 34° 27' N. lat.)	1.0			
	Black rockfish (North of 46°16' N. lat.)	0.0	0.1		
	Black rockfish (South of 46°16' N. lat.)	--	0.0		
Minor rockfish (North of 40°10' N. lat.)	Minor rockfish (North of 40°10' N. lat.)	12.8	11.5	7.5	NA
	Nearshore	0.0	0.0	0.0	NA
	Shelf	0.7	2.5	2.3	NA
	Greenstriped rockfish	0.0			NA
	Chilipepper rockfish	0.1	2.0		NA
	Bocaccio	0.1	0.0		NA
	Redstripe rockfish	0.5	0.3		NA
	Silvergray rockfish	0.1	0.0		NA
	Remaining shelf rockfish	0.0	3.5		NA
	Slope	3.9	5.4	2.3	NA
	Sharpchin rockfish	2.2	0.4		NA
	Splitnose rockfish	1.6	4.8	1.4	NA
	Yellowmouth rockfish	--	0.0		NA
	Remaining slope rockfish	0.1	0.3		NA
Minor rockfish (South of 40°10' N. lat.	Minor rockfish (South of 40°10' N. lat.)	7.8	3.8	6.0	NA
	Nearshore	0.0	0.0	0.0	NA
	Gopher rockfish	0.0			NA
	Remaining nearshore rockfish	--	0.0		NA
	Shelf	0.1	3.1	0.1	NA
	Greenstriped rockfish	not speciated			NA
	Yellowtail rockfish	0.1	0.1	0.1	NA
	Remaining shelf rockfish	--	2.9		NA
	Slope	0.3	0.7	1.3	NA
	Bank rockfish	0.0	0.0		NA
	Blackgill rockfish	0.3	0.2		NA
	Sharpchin rockfish	0.0	0.0		NA
	Remaining slope rockfish	--	0.4		NA
	California scorpionfish (South of 36° N. lat.)	--	0.1		
	Cabezon (South of 42° N. lat.)	0.0			
	Dover sole	33.0	37.6	28.8	28.1
	English sole	2.0	4.6	2.5	4.4
	Petrale sole	1.6	4.6	2.3	3.5
	Arrowtooth flounder	5.1	6.7	6.1	5.5
	Starry flounder	0.0	0.0		
	Other flatfish	11.7	11.5	11.8	13.2
Other groundfish	Other groundfish	29.8	60.7	2.6	7.9
	Kelp greenling	0.0	0.0	0.0	0.0
	Skates*	--	5.9	7.3	7.8
	Spiny dogfish	14.2	13.3	5.8	8.7
	Unspecified grenadiers	--	5.2		
	Other	15.6	36.2		

Table B-10. Considerations for the scientific research off-the-top deductions for the minor rockfish complex. Bold numbers indicate the highest catch in the 2006-2008 period.

	2008		2007		2006	
	Total Mortality Report (mt)	Best Estimate for set aside (mt)	Total Mortality Report (mt)	Best Estimate for set aside (mt)	Total Mortality Report (mt)	Best Estimate for set aside (mt)
Minor rockfish North[1]	12.8	12.8	11.5	11.8	Not reported	7.5
Nearshore	0	**0**	0	0	0	0
Shelf	13.6	1.9	6.0	3.7	4.6	**3.8**
Slope	3.9	**10.9**	5.5	8.1	2.5	3.8
Minor rockfish South[1]	7.8	7.8	3.8	5.7	Not reported	6.0
Nearshore	0	0	0	0	0	0
Shelf	0	**2.0**	3.0	1.4	3.1	0.4
Slope	0	**5.9**	0.7	4.3	1.3	5.6

The discrepancies between the Total Mortality reports and NMFS's best estimates of research catch are mostly due to how catches were incorporated into the WCGOP Total Mortality reports. The NWR has thoroughly reviewed the scientific catch information for the minor rockfish complex from 2006-2008 and presents the values in Table B-10 as the best estimates of documented catch. The maximum values recommended by the NWR for off-the-top deductions for each sub-complex are bolded.

Note that a portion of the research catch was reported as "remaining rockfish" or "other rockfish" rather than the management units (i.e. sub-complex) that they belong to. For purposes of estimating appropriate off-the-top deductions those were attributed to the minor shelf and minor slope sub-complexes pro-rata. Those conducting research in the future will be encouraged to report to these categories in the future.

B.1.3.2 Scientific Research Overfished Species Impacts

For the biennial specifications and management measures, the amounts projected to be taken in scientific research are based on the most recent years' research catch summaries and are then adjusted to account for any known changes in research activities for future years. Because the research catch amounts are projections, the catch levels have on occasion been modified during the year when the catch of a constraining overfished species was higher or lower than originally projected. In the past, modifications to these off-the-top deductions for scientific research may impact all sectors of the groundfish fishery. For example, in 2006, higher than anticipated canary rockfish catch in a scientific research survey resulted in a need for restrictions in the limited entry non-tribal whiting trawl fishery (71 FR 58289, October 3, 2006).

Through FMP Amendment 21, the ACL for many groundfish species is formally allocated between the trawl and the non-trawl sectors of the groundfish fishery after the set-asides are

[1] Rockfish reported as remaining or other rockfish were attributed to the sub-complexes on a pro-rata basis.

deducted. The trawl allocation is then divided into quota pounds. Because of the formal allocation to the trawl fishery and the conversion of that allocation to quota pounds, it is impracticable to make inseason adjustments to trawl quota pounds if the scientific research set-aside needs to be adjusted inseason. Therefore, any revision of set asides will impact non-trawl sectors disproportionately under a rationalized trawl fishery since the trawl allocation cannot be changed without recalculating quota pounds.

The Council and NMFS do not have direct management control over scientific research activities, nevertheless, the catch must be considered in the accounting of total mortality. Because of the inability to restrict scientific research impacts to overfished species, the Council's Final Preferred Alternative chose to take the maximum scientific research catch from 2005-2008, except for yelloweye rockfish, as the off-the-top deduction for scientific research in order to provide the largest buffer to prevent exceeding the ACLs for rebuilding species. For yelloweye rockfish, the Council chose to take 3.3 mt of yelloweye rockfish as an off-the-top deduction for scientific research. The Council anticipates that up to 3.3 mt of yelloweye rockfish may be taken in scientific research, annually, in 2011-2012 based on the need for improved biological information to inform the yelloweye rockfish stock assessment. Some of this anticipated research catch (1.1 mt) comes from the enhanced rockfish survey that coincides with the IPHC annual survey. These amounts of overfished species anticipated to be taken in scientific research contribute to the total off-the-top deductions that are described in this Appendix and in Chapter 2.

Table B-11 summarizes overfished rockfish groundfish species and petrale sole mortality in scientific research from 2005-2008. The Council's final preferred decision was to use the maximum annual catch as the best estimate of overfished species research impacts in 2011-2012 and 3.3 mt for yelloweye rockfish.

Table B-11. Research catches of overfished rockfish species and petrale sole (mt) from 2005-2008 and the median, average, maximum and minimum by species. Bolded values indicate the Council's final preferred off-the-top deductions for scientific research catch in 2011-2012.

Year	Bocaccio	Canary	Cowcod	Dkbl	POP	Widow	YE	Petrale
2008	1.2	1.8	0	1	1	1	1	2.0
2007	1	3	0	1	1	0	2	17.0
2006	0.2	7.2	0	0.9	1.2	0.2	0.1	2.3
2005	1.7	2.3	0.1	2.1	1.8	1.6	0.6	1.7
Median	1.1	2.7	0.0	1.0	1.1	0.6	0.8	2.2
Average	1.0	3.6	0.0	1.3	1.3	0.7	0.9	5.8
Max (FPA)	**1.7**	**7.2**	**0.1**	**2.1**	**1.8**	**1.6**	2.0 a/	**17.0**
Min	0.2	1.8	0.0	0.9	1.0	0.0	0.1	1.7

a/ The Council's final preferred decision was to use 3.3 mt for yelloweye rockfish.

B.1.4 Exempted Fishing Permits (EFPs)

For 2011-2012 it will also be necessary to estimate EFP set asides as part of the harvest specifications process. Given the need to allocate a set amount for the trawl fishery for rationalization, the Council considered potential needs of EFP applicants as well as effects on existing fisheries in establishing these set asides. As described in Chapter 2 Section 2.3.1, the Council will be taking the EFP set asides off-the-top of the ACL.

B.1.4.1 Exempted Fishing Permit Impacts to Non-Overfished Species

Table B-12 represents the Council-adopted EFP set asides for 2011-12 which is based on recent year EFP removals. Of interest is the 26 mt of sablefish from the Morro Bay/Port San Luis Regional Fishing Association EFP. It is unclear at this point whether this EFP, should it be continued in the future would require a set aside of sablefish or whether such impacts would be accommodated within the permit holder's existing quota pounds.

Table B-12. Council adopted EFP set asides for non-overfished species.

Species/Species Group/Area	Amount (mt)
Sablefish S of 36º N. lat.	26
Yellowtail N. of 40°10' N. lat.	2
Minor Slope Rockfish North 40°10' N. lat.	2
Minor Slope Rockfish South 40°10' N. lat.	2
Minor Shelf Rockfish North 40°10' N. lat.	4
Minor Shelf Rockfish North 40°10' N. lat.	2

B.1.4.2 Exempted Fishing Permit Impacts to Overfished Species

Table B-13 represents the Council adopted EFP set asides for 2011-12 which is based on recent year EFP overfished species bycatch caps. Under the Final Preferred Alternative, the Council stated that the first priority was to accommodate scientific research, tribal fisheries, incidental open access, and directed groundfish fisheries prior to determining the EFP set aside amounts. Since yelloweye rockfish greatly limit access to commercial and recreational fisheries, the Council approved a lower EFP amount, compared to recent removals.

Table B-13. Council adopted set-asides for EFP impacts to overfished species.

Category	Bocaccio South 40'10 (mt)	Canary (mt)	Cowcod (mt)	Dkbl (mt)	Petrale (mt)	POP (mt)	Widow (mt)	YE (mt)
EFP	11	1.3	0.2	1.5	2	0.1	11	0.1

B.2 Sector Allocations

B.2.1 Minor Shelf Rockfish

In its Final Preferred Alternative under proposed Amendment 21 to the FMP, the Council chose long term allocations for trawl dominant species based on the years 2003-2005. This was used as a starting place relative to informing the Council's decision on two-year allocations for minor shelf rockfish north and south of 40°10' N. latitude. Table B-14 shows the range of allocations that the Council considered.

Table B-14. Summary of shelf rockfish catches in 2003-2007.

Shelf rockfish north of 40°10 N. lat.							
	2003	**2004**	**2005**	**2006**	**2007**	**03-05 avg**	**05-07 avg**
trawl	9.2%	27.7%	31.5%	66.1%	88.1%	22.8%	61.9%
non-trawl	90.8%	72.3%	68.5%	33.9%	11.9%	77.2%	68.5%

Shelf rockfish north of 40°10 N. lat.							
	2003	**2004**	**2005**	**2006**	**2007**	**03-05 avg**	**05-07 avg**
trawl	1.3%	4.1%	3.7%	0.0%	80.1%	3.0%	27.9%
non-trawl	98.7%	95.9%	96.3%	100.0%	19.9%	97.0%	72.1%

In addition, a one-time allocation between the non-whiting and whiting trawl sectors for initial issuance of trawl individual quotas was necessary. Table B-15 shows the history of sector catches of shelf rockfish that the Council considered in making this allocation.

Table B-15. Percent of total shoreside trawl catches caught by the whiting and non-whiting sectors, 1995-2005 (PFMC 2010).

Stocks and Stock Complexes	**Shoreside Trawl Sectors**			
	1995-05 %		**2003-05 %**	
	Non-whiting	**Whiting**	**Non-whiting**	**Whiting**
Minor Shelf RF north of 40°10 N. lat.	96.5%	3.5%	81.7%	18.3%
Minor Shelf RF South 40°10 N. lat.	100.0%	0.0%	100.0%	0.0%

The Council also considered total catch estimates from the WCGOP Total Mortality reports as another way to inform 2-year allocations for those species not formally allocated under Amendment-21. Table B-16 shows these results as well as possible percentages to inform non-whiting and whiting trawl sectors allocations for initial issuance of IQ.

Table B-16. Summary of total mortality of shelf rockfish based on Total Mortality reports.

	2005	**2006**	**2007**	**2008**	**Average**
Shelf rockfish north of 40°10 N. lat					
trawl	59.8%	66.1%	70.5%	44.4%	60.2%
non-whiting	74.0%	*96.8%*	*89.5%*	*70.0%*	*82.6%*
whiting	*26.0%*	*3.2%*	*10.5%*	*30.0%*	*17.4%*
non-trawl	40.2%	33.9%	29.5%	55.6%	39.8%
Shelf rockfish south of 40°10 N. lat					
trawl	20.6%	6.6%	9.9%	11.8%	12.2%
non-trawl	79.4%	93.4%	90.1%	88.2%	87.8%

In its Final Preferred Alternative, the Council chose the average total mortality of shelf rockfish north and south of 40°10’ N. latitude from 2005-2008 as the basis for the 2011-2012 allocations and the one time within trawl allocation (Table B-16).

B.3 Detailed Analysis of New Management Measures

B.3.1 Management Measures Not Specific to a Sector

B.3.1.1 Improvements to Catch Accounting

NMFS currently relies on the individual states’ catch accounting systems in order to document groundfish landings from off the coasts of Washington, Oregon and California, except the mothership and catcher/processor sectors of the Pacific whiting fishery. Because state landing regulations are not in effect until a landing occurs, the individual states are unable to gather landing data from vessels that land catch in Mexico or Canada. At the Council’s April 2010 meeting the Enforcement Consultants (Agenda Item I.4.b., Supplemental EC Report, April 2010) expressed its concern to the Council regarding the transport of groundfish into Canada and Mexico without adequate catch accounting. The primary catch accounting concern expressed by the Enforcement Consultants was the risk of vessels circumventing the catch accounting requirements and impairing the Council’s ability to track landings of groundfish relative to the ACLs, particularly overfished species. Following consideration of the Enforcement Consultants recommendations, the Council recommended that an analysis be conducted on the development of Federal regulations to prohibit the landing of groundfish directly managed under the groundfish FMP to be landed into Canada or Mexico without catch accounting. The transfer of catch at-sea to a transport vessel is currently prohibited under the groundfish regulations at 50 CFR 660.306 (a)(12)[2].

These types of groundfish mortality are currently going unreported; there is very little information to determine the magnitude of the number of vessels that may be doing these types of activities, and there is no information to determine the magnitude of groundfish catch that may be going unreported because the fish or fish product is leaving the EEZ unreported.

Alternative Actions

The Enforcement Consultants recommended that all federally managed groundfish be accounted for before they are removed from the Exclusive Economic Zone (EEZ) (Agenda Item B.3.b, Supplemental EC Report, June 2010) and analyzed the following alternatives to accomplish this objective.

No Action – No Amendment 20
If no action is taken, NMFS will continue to rely on the individual states’ catch accounting systems in order to document groundfish landings from off the coasts of Washington, Oregon and California, except the mothership and catcher-processor sectors of the Pacific whiting fishery. This means that both the individual states and NMFS will continue to be unable to gather catch data from vessels that land groundfish catch from off the coasts of Washington, Oregon and California into Mexico or Canada.

No Action – With Amendment 20

[2] Transfer fish to another vessel at sea unless a vessel is participating in the primary whiting fishery as part of the mothership or catcher-processor sectors, as described at §660.373(a)

FMP Amendment 20 requires that vessels in the trawl fishery land their IFQ in the states of Washington, Oregon, or California. If no additional action is taken through the biennial specifications and management measures, NMFS will continue to rely on the individual states catch accounting systems in order to document groundfish landings in the non-trawl fishery from off the coasts of Washington, Oregon and California. This means that both the individual states and NMFS will continue to be unable to gather catch data from non-trawl vessels that land groundfish catch from off the coasts of Washington, Oregon and California into Mexico or Canada.

Alternative 1 – Vessel Activity Report (VAR)
Prohibiting species managed under the PCFMP from being exported without adequate catch accounting could be addressed by developing regulations to require a Federal vessel activity report similar to those used by NMFS Alaska Region[3]. Similar reporting and recordkeeping requirements could be implemented for the Pacific Coast groundfish fisheries. This reporting mechanism could be implemented to ensure that the catch data (on fish that will not be landed in Washington, Oregon, or California) is captured in PacFIN.

The following recommendations is in the form of draft regulatory language from the Council and its advisory bodies pertain directly to revisions to the recordkeeping and reporting requirements, currently found at 660.303 of the Federal regulations.

(x) U.S. vessel activity reporting requirements

> (1) Submit a Vessel Activity Report (VAR). The owner and operator of a catcher vessel, a catcher/processor, or a mothership engaged in fishing for or carrying on board Pacific Coast groundfish managed by the Council and carrying must complete and submit a vessel activity report (VAR), unless that vessel meets the exception requirements in paragraph (3) of this section
>
> > (i) Submit the VAR by facsimile or electronic file to Office of Law Enforcement, Seattle, WA (Fax # 206-526-6528) before the vessel crosses the seaward boundary of the EEZ off the West Coast or crosses the international boundaries between Washington and Canada or California and Mexico.
>
> (2) Revised VAR. If groundfish or fish products are landed at a port other than the one specified on the VAR, the operator must submit a revised VAR showing the actual port of landing before any fish are offloaded.
>
> (3) Exemption: A VAR is not required if a vessel is carrying groundfish or fish product that has been landed or reported in compliance with any other applicable Federal requirements, or state requirements in Washington, Oregon or California, or with applicable U.S. treaties.
>
> (4) Information required
>
> > (i) Whether original or revised VAR.
> >
> > (ii) Name and Limited Entry permit number of vessel or state permit number.
> >
> > (iii) Type of vessel (whether catcher vessel, catcher/processor, or mothership).
> >
> > (iv) Name, daytime telephone number (including area code), and facsimile number and COMSAT number (if available) of representative.
> >
> > (v) Depart report. "Depart" means leaving the EEZ or territorial sea off West Coast States. If the vessel is crossing the seaward boundary of the EEZ and moving out of the EEZ or crossing the international boundary between Washington and Canada or California and Mexico into foreign waters, indicate a "depart" report and enter:

[3] 50 CFR Subpart A, Section 679.5 (k)

(A) The intended port of landing and country if outside the United States;
(B) Estimated date and time (hour and minute, local time) the vessel will cross the boundary; and
(C) The estimated position coordinates in latitude and longitude where the vessel will cross.

(vi) Groundfish or fish products. For all groundfish or fish products on board the vessel, enter:

(A) Harvest zone code; (as described in the table below in Part 660, Subpart G)
(B) Species;
(C) Product codes (if applicable); and
(D) Estimated fish product weight in lbs or mt

(vii) Cancel report. Each operator wanting to cancel a previous report may do so by sending a revised report, and inserting the word "CANCEL" in front of the previous report's vessel name, date, and time. The message must be transmitted and delivered prior to the date and time of the event in the original message.

Prohibition(s) at 660.306(b)

Fail to submit a Vessel Activity Report (VAR) as required.

Harvest zone	Description
A1	U.S. EEZ off Washington
A2	U.S. EEZ off Oregon
A3	U.S. EEZ off California
W	State waters of Washington
O	State waters of Oregon
C	State waters of California

Alternative 2 – Adjustments for catch accounting uncertainty

Groundfish catch that may be going unreported is an important consideration when incorporating catch accounting uncertainty into setting harvest specifications and developing fishery management measures. The Enforcement Consultants considered that estimates for fish that are caught and removed from the EEZ could be accounted for in the setting of ACLs or accountability measures.

Alternative 3 - Additional state fish ticket reporting

The Enforcement Consultants considered developing a state fish receiving ticket system that could potentially address these issues. However, the State jurisdiction for fish tickets is imparted when the fish are landed in the state. In this case, the fish would not be landed in the states of Washington, Oregon, or California, and so this alternative method of catch reporting does not meet the purpose and need. Therefore, the Enforcement Consultants eliminated this alternative from further consideration.

Alternative 4 - Prohibit landing outside of Washington, Oregon, California

In April 2010 the Washington Department of Fish and Wildlife (WDFW) requested that the Council consider changes to the Federal groundfish regulations that would "require groundfish caught in the west coast EEZ to be landed in one of the three west coast states unless specifically exempted" (Agenda Item I.4.b, Supplemental GMT Report 2, April 2010). During initial scoping of this issue, the Enforcement Consultants was discovered that it would not be within the state or Federal government purview to require that groundfish fished within the EEZ be landed to either

Washington, Oregon, or California (unless the vessel is exempted). Therefore, Enforcement Consultants eliminated this alternative from further consideration.

Analysis

FMP Amendment 20 requires that vessels in the trawl fishery land their IFQ in the states of Washington, Oregon, or California. Therefore, the concern for unreported catches lies in the non-trawl fisheries. It is likely that the risk of this unreported catch exceeding an ACL will be higher for some species than for others. The incentive for fishing on groundfish to occur when a vessel is leaving the EEZ is highest for those species that are of highest value in the non-trawl fishery, in particular those species which could be sold outside Washington, Oregon, or California. Relative to overfished species, the greatest concern would be for those species that co-occur with sablefish.

Based on anecdotal information, very few vessels are suspected of these types of activities (Deputy Chief Cenci, WDFW, Personal Communication, July 4, 2010). However, there is a concern that, with no explicit regulations that prohibit these activities, it may become more common. Even if the number of vessels is low, a single vessel operating in this manner could catch a large amount of some of the most constraining groundfish species, though it may go unreported.

Alternative 1 – Vessel Activity Report (VAR)
Adding new VAR reporting requirements into Federal regulations means that additional measures will need to be taken to ensure compliance with the Paperwork Reduction Act and other applicable laws. Estimates of the number of vessels for which this new reporting requirement will affect will be necessary, as well as the average number of hours, annually, that will be spent by a vessel to ensure compliance with these new reporting regulations. Estimates of the anticipated effect to state tax revenues will be necessary. Also, NMFS is affected by the cost to develop and administer the new reporting requirements.

Alternative 2 – Adjustments for catch accounting uncertainty
Estimates for fish that are caught and removed from the EEZ could be accounted for in the setting of ACLs or accountability measures. However, there is no information with which to estimate the magnitude of catch that is going unreported during these types of activities. Therefore, there is a huge level of uncertainty if deductions of unreported catch are to be made to harvest specifications, and no management measures would be implemented to inform the magnitude of the unreported catches. If the deductions are too high, fish that are important to local economies will go unharvested, and we will fail to meet the FMP objective of attaining but not exceeding the ACL. If the deductions are too low, non-trawl fisheries will have to be restricted in an effort to keep total mortality below the ACLs, or the ACLs may be exceeded.

B.3.1.2 Evaluate Gear Stowage for Non-trawl Vessels Transiting the RCA

Current Federal groundfish regulations at 50 CFR 660.306 (h) relative to fishing in conservation areas, prohibit the operation of a vessel with longline and/or trap gear onboard in an applicable GCA (50 CFR 660.382(c)), except for purposes of continuous transiting, with all groundfish longline and/or trap gear stowed. In addition Regulations at 50 CFR §§660.382(c)(11)(ii) and 660.383(c)(12)(ii) prohibit vessels using non-trawl gears from transiting through the non-trawl RCAs unless "all groundfish non-trawl gear is stowed either: below deck; or if the gear cannot readily be moved, in a secured and covered manner, detached from all lines, so that it is rendered unusable for fishing." Stowage requirements for non-trawl (limited entry fixed gear and open access) vessel were implemented in 2008 through a rulemaking required the use of vessel monitoring system (VMS) transmissions of vessel locations relative to groundfish conservation area restrictions (Final Rule 72 FR 69162, December 7, 2007). Groundfish conservation areas are defined at 50 CFR 660.302. Similar gear stowage requirements have been in place for trawl vessels since 1997 (62 FR 27519, May 20, 1997).

Deep-water fisheries on the slope and nearshore fisheries have been permitted in areas seaward or shoreward of the RCAs. Vessels intending to fish in the deep-water slope fisheries seaward of the westernmost boundary of an RCA are allowed to transit through the closed areas, providing their gear is properly stowed. Various state-managed fisheries, including those using gear that would be considered legal groundfish non- trawl gear, targeting species other than groundfish where groundfish are incidentally have continued to occur in the RCA.

In 2009, the VMS Committee (VMSC) met to discuss potential changes to VMS regulations. The VMSC report (Agenda Item G.9.b, VMSC Report, November 2009) identified VMS issues that the Council could consider for further evaluation. Within the list of issues was consideration for analysis-specific vessel activities that would be allowed while transiting a closed area and could be allowed within the gear stowage requirements. Examples specifically discussed by the VMSC and by the Council during the 2011-2012 Harvest Specifications and Management Measures process included baiting or untangling fixed gear.

Changes to gear stowage requirements in the limited entry trawl fishery were not considered because of the differences in gear type and method of preparation for deployment. Fishers using baited gears must take time to bait their gear, whereas trawl gear may take much less time to prepare for deployment so the gear stowage requirements are not causing similar in-efficiency problems due. Therefore, no changes to trawl gear stowage requirements are recommended.

Alternative Actions

The Enforcement Consultants considered and analyzed the following alternatives.

Alternative 1: non-trawl vessels that retain groundfish and have VMS would have more liberal gear stowage requirements when transiting the non-trawl RCA.

The change would allow the following specific non-fishing activities to occur while the vessel was transiting through the non-trawl RCA in route to fishing grounds or while returning to port: untangling and cleaning gear; baiting gear.

The Enforcement Consultants recommended and the Council approved the following language to allow Option 1:

“Buoy line and anchors must be visible and stowed on the deck, and transit through RCA’s must remain continuous. With these two provisions, baiting and un-baiting of fixed gear could be authorized.”

These changes to gear stowage requirements are intended to only apply to vessels fishing with non-trawl gears that have active VMS units. The actual regulatory language may vary slightly from that described above in order to carry this intent into the regulations in a consistent manner.

This measure would liberalize the gear stowage requirements for all non-trawl groundfish vessels required by regulations at 50 CFR 660.306(j) to a VMS unit.

Alternative 2: Allow more liberal gear stowage requirements only when a vessel has observer coverage.

The Enforcement Consultants considered proposing an exempted fishing permit to some vessels that would allow those vessels to bait, un-bait, or untangle their non-trawl gears while transiting in the RCA with the requirement that the vessels that are doing these activities must have an observer on board.

Analysis

Because the pool of non-trawl vessels that are subject to the transiting and gear stowage restrictions may not be identical to the pool of non-trawl vessels that are required to have VMS, the regulations that liberalize the gear stowage requirements should only apply to vessels that have active VMS units. This will ensure that the vessels with more liberal gear stowage still have a deterrent from fishing within the non-trawl RCA of a VMS.

Biological Impacts:
The RCAs are closed to groundfish fishing to promote the rebuilding of overfished species. To maintain the intent of the RCAs, fishing must not occur within the RCAs. If fishing were to occur within the RCA, where there is a higher risk of increased bycatch rates of overfished species. If illegal fishing were to occur within the RCA, it is likely that overfished species that are caught incidentally would be underestimated by fishery impact models, because those models assume that fishing effort occurs in the open areas outside of the RCAs. Therefore, if fishing were to occur in the RCA it would likely lead to higher mortality rates of overfished species and increase the risk of exceeding the ACLs for rebuilding species. Therefore, there is a very important need to ensure the integrity of these closed areas, given the Council's risk-averse policies on rebuilding overfished groundfish species.

Currently, VMS tracks vessels relative to their location, speed and trajectory. VMS does not directly measure whether or not a vessel is "fishing." Primarily, VMS provides Enforcement with information regarding the relative location of a fishing vessel in relation to the closed areas that apply to that vessel, including the RCA. Therefore, regulations that allow vessels to cross the RCA must be explicit relative to the pertinent factors that current VMS requirements are informative to Enforcement.

The Enforcement Consultants believe that allowing some specific gear stowage flexibility would not be a major setback to enforcement of the RCA transiting regulations (Agenda Item B.3.b, Supplemental EC Report, June 2010), as vessels with active VMS units will still be tracked on their speed and trajectory. The gear stowage requirements for non-trawl gears may be less deterring for fishing in closed areas when compared to the deterrent of VMS units that are tracking vessel speed and trajectory relative to the closed areas.

Socio-economic Impacts:
Some non-trawl vessels subject to the transiting and gear stowage requirements may have lower operational efficiency because they are not allowed to bait gear or do other gear maintenance (that is not fishing) while transiting. Allowing non-trawl vessels that have VMS to bait their gear while transiting to the fishing grounds would likely save them some of the additional time that they take upon reaching the fishing grounds to bait their gear. This would improve efficiency.

B.3.1.3 Define Sablefish Dressed Weight in the Groundfish Regulations

Federal groundfish regulations at 50 CFR 660, Subpart G generally require all catch to be accounted for in “round weights” (as defined in 50 CFR 600.10 as “the weight of the whole fish before processing or removal of any part”), unless otherwise specified. Therefore, most Federal groundfish regulations (trip limits, tier limits, allocations, etc.) are given in round weights and are enforced as such. However, Federal and state regulations do not necessarily require that all groundfish be landed in a condition that is considered “round weight.” For most fisheries and species, the Federal regulations defer to state requirements on what condition the fish must be in for landing and then a weight conversion is applied to calculate round weight equivalents. It is a common misconception that Federal groundfish regulations prohibit heading and gutting (not considered processing) and processing of groundfish prior to landing. Based on a review of Federal regulations, heading and gutting is not prohibited for any species, and processing (as defined at 50 CFR 660.10) is prohibited only in the limited entry primary sablefish fishery and in the Pacific whiting fishery (see 660.306). The definition of processing also explicitly says that “heading and gutting” is not considered processing unless additional preparations are done.

Section 660.370 describes how weight limits and conversions are generally established by the state where the fish is or will be landed and how the weight conversions provided in Federal regulations are those conversions currently in use by the States of Washington, Oregon and California and may be subject to change by those states.

Federal groundfish regulations allow for heading and gutting to occur in fisheries even if processing is prohibited, as these activities do not meet the definition of “processing” in 50 CFR 660.10. Therefore, heading and gutting is allowed in the sablefish tier fishery prior to landing, as long as a conversion rate is applied to those “dressed” fish prior to applying the round weight tier limit.

Current regulations at 660.370(h)(5)(iii) describe the weight conversion factor for commercially caught sablefish as “…[for] headed and gutted (eviscerated) sablefish the weight conversion factor is 1.6 (multiply the headed and gutted weight by 1.6 to determine the round weight).”

Under the current regulations described above, the methods used for heading and gutting sablefish may not be consistent among all landings, though they may meet the legal definition. While this allows for some flexibility to fishermen and fish buyers, it is problematic because there is ambiguity in regulations, and there have been differing interpretations on whether or not “headed and gutted” allows for the collar to be removed before it constitutes “processing” as defined in 660.10. Since Federal regulations prohibit processing at-sea in the limited entry sablefish tier fishery, there is a need to clarify the regulations regarding exactly what “headed and gutted” means.

NMFS Northwest Region requested that the Enforcement Consultants and the GMT work to establish and explicit definition of “dressed” sablefish, such that the method of “heading and gutting” is explicitly defined.

Alternative Actions

Alternative 1: Define sablefish heading and gutting practices with the collar removed as “dressed weight.”

Most sablefish delivered on the West Coast are landed with the head removed just behind the collar bone, or "collar off" and eviscerated or "gutted." This fashion of heading and gutting is commonly referred to as the "Eastern J-cut."

The Enforcement Consultants proposed, and the Council recommended, a definition for dressed sablefish to clarify that sablefish landed with the collar removed still met the definition of headed and gutted, and did not cross over into the realm of "processing." The definition would not require a change in the fashion of heading and gutting that is used for most of the landed sablefish in recent years.

Therefore, a new definition would be needed at 50 CFR 660.10:
Dressed sablefish means sablefish that have been eviscerated, and the head removed just behind the collar bone. Dressing by this definition does not constitute processing (see "processing" or "to process").

For consistency, regulations at 660.370(h)(5)(iii) that describe the weight conversion factor for commercially caught sablefish, would also need to be revised:
Sablefish. The following conversion applies to both the limited entry and open access fisheries when trip limits or sablefish primary seasons tier limits are in effect for those fisheries. For dressed sablefish the weight conversion factor is 1.6 (multiply the dressed (headed and gutted) weight by 1.6 to determine the round weight).

This is the preferred alternative, as it would not require a change in the fashion of heading and gutting that is used for most of the sablefish landed in recent years.

Alternative 2: Define sablefish heading and gutting practices with the collar on as "dressed weight."

There is some variation among the methods used to "dress" sablefish off the west coast. The Enforcement Consultants considered whether or not a collar is part of the head, or if it is part of the fish. The collar could be considered part of the fish, and therefore should not be removed during "heading and gutting" when dressing sablefish at sea. Regardless of the number of dressing variations, acceptable practice should only be that which can be concisely defined. While defining sablefish "dressed weight" as "eviscerated, and the head removed in front of the collar bone, or collar on" would be explicit, it may require a change in the most predominant dressing method that has been used for sablefish in recent years; the Eastern J-cut (that is considered under Alternative 1).

Analysis

Federal groundfish regulations (trip limits, tier limits, allocations, etc.) are given in round weights and are enforced as such. However, Federal and state regulations do not necessarily require that all groundfish be landed in a condition that is considered "round weight." The current state and Federal weight conversion from "headed and gutted" sablefish to calculate the round weight is 1.6. How the new regulations define "headed and gutted" may affect the accuracy of the 1.6 conversion factor. Keeping the sablefish conversion factor the same means that the condition the fish must be in for landing when the weight conversion is applied should be as similar to current dressing practices as possible. If the definition of "headed and gutted" requires a change in method of dressing sablefish, then the conversion factor of 1.6 should be reconsidered and perhaps revised to the most appropriate conversion factor for the new method of dressing, as defined.

No changes to Federal regulations regarding processing prohibitions are intended through this regulatory change.

B.3.1.4 Review Federal Definition Regarding Ice and Slime

Federal groundfish regulations at 660.10 specify that round weight does not include the contributing weight of any ice, water, or slime. Since all groundfish trip limits are specified in round weight, ice, water and slime should not count towards a trip limit. Therefore, deductions for these types of substances must be made to groundfish landings so that the catch is accurately counted toward the trip limit. However, ice and slime deductions are not standardized for federally managed groundfish species. Therefore, there have been differential payments occurring by buyer because of the way ice and slime deductions were treated.

Alternative Actions

No Action – No Amendment 20
The International Pacific Halibut Commission (IPHC) regulations establish deductions for ice and slime for recording landed halibut weights. If no action is taken, there will be no standard ice and slime deductions for federally managed groundfish species.

No Action – With Amendment 20
Under FMP Amendment 20, the catch monitoring program that is in development for the rationalized trawl fishery that will accurately account for ice, water and slime deductions in a consistent manner between fish buyers.

The Council recommends postponing analysis of standard deductions for ice, water and slime for the non-trawl sectors, pending information that will be gained from the new trawl catch accounting in 2011-2012.

Alternative 1 – Standardize ice and slime deductions in Federal regulations
The groundfish regulations do not include standard deductions for ice, water, and slime for groundfish. Therefore, fish buyers may differ in how they treat ice and slime on fish tickets. The Enforcement Consultants recommended that a consistent approach to ice and slime reductions for non-trawl fisheries be considered for Federal regulations (Agenda Item I.4.b, Supplemental EC Report, April 2010).

Analysis

Where quotas or other catch limit constraints exist, variations in how ice and slime weight is accounted for is an important consideration in catch estimation and the enforcement of trip limits. Variations in how ice and slime are accounted for can also affect ex-vessel transactions.

B.3.1.5 Revise Coordinates to RCAs as Necessary for Trawl and Non-Trawl Gears

Staff from Oregon and California reviewed selected RCA coordinates and proposed changes that more closely approximate the RCA boundaries with depth contours, which should result in better estimates of overfished species bycatch and provide improved and more efficient access to target species while protecting overfished species.

OREGON

Modification of the 125 fm RCA at the southwest corner of Heceta Bank

Oregon proposes a modification of the 125 fm RCA near the southwest corner of Heceta Bank (Table B-17; Figure B-1). This adjustment would primarily impact Oregon fixed gear fishermen (limited entry and open access) who fish the seaward side of the 125 fm RCA. This proposed change would enable this RCA to better approximate the 125 fm contour. In addition, even though the projected impacts to yelloweye rockfish are not quantifiable with current information, commercial fishermen have reported catches of yelloweye rockfish seaward of the current "125 fm RCA" in this area where depths may be shallower than 75 fm (Figure B-1). This modification would reduce harvest opportunities for target species and may also offer additional protection for yelloweye rockfish off Oregon. The Council adopted these modifications under the Final Preferred Alternative.

Table B-17. ODFW- changes to 125 fm RCA lines off the southwest corner of Heceta Bank.

Fathom Line	Proposed Coordinates					Action	Long Change	Original Coordinates Published in the Federal Register			
	Point	Lat		Long				Lat		Long	
		Deg	Min	Deg	Min			Deg	Min	Deg	Min
125-fm	133	44	1.14	124	56.07	Retain	None	44	1.14	124	56.07
125-fm	134					**Delete**		43	57.49	124	56.78
125-fm	A	43	59.431	124	57.217	Add	Seaward				
125-fm	B	43	57.491	124	57.313	Add	Seaward				
125-fm	C	43	55.728	124	55.407	Add	Seaward				
125-fm	D	43	54.74	124	53.145	Add	Seaward				
125 fm	135	43	54.58	124	52.18	Retain		43	55.74	124	55.34

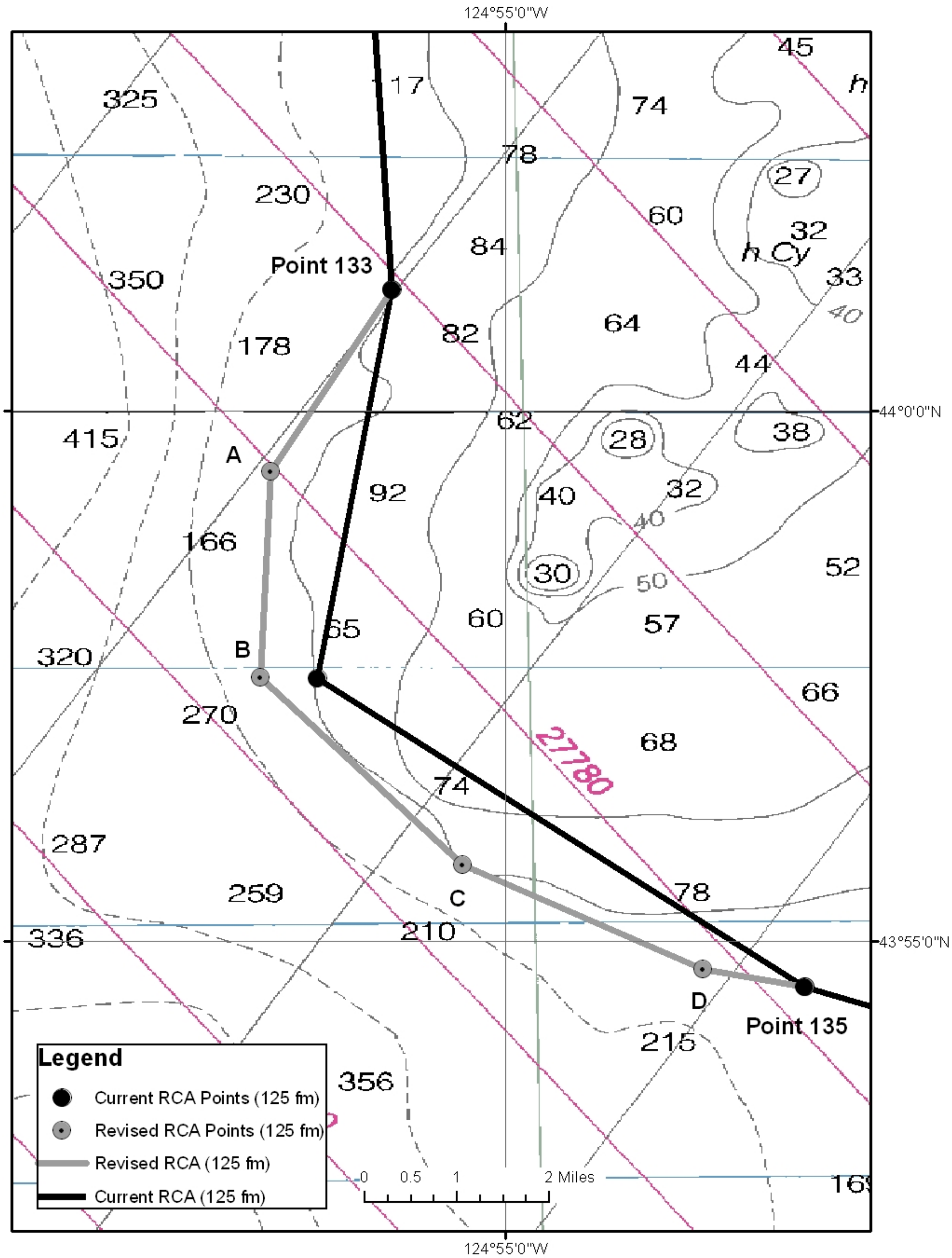


Figure B-1. ODFW changes to the 125-fm RCA line off the southwest corner of Heceta Bank. Black solid line = original 125-fm RCA; Gray solid line = revised 125-fm RCA and points. Units are in fathoms.

Modification of the 100 fm RCA at the southwest corner of Heceta Bank

Oregon proposes modifications to the 100 fm RCA near the southwest corner of Heceta Bank (Table B-18 and Figure B-2). This adjustment would primarily impact Oregon fixed gear fishermen (limited entry and open access) who may fish the seaward side of the 100 fm RCA. This proposed change would enable the RCA to better approximate the 100 fm contour to reduce the risk of impacts to overfished species (i.e., yelloweye rockfish). The “100 fm RCA” is the preferred alternative seaward RCA boundary for fixed gear in this area beginning 2011. Note that the original “100 fm RCA” in this area is shallower than 70 fm in many areas (Figure B-2). The southwest corner of Heceta Banks is known for yelloweye rockfish concentrations. Hence, in the event that a 100 fm RCA is utilized in this area, this modification may offer additional protection for yelloweye rockfish relative to the current (= original) “100 fm RCA.” The Council adopted these modifications under the Final Preferred Alternative.

Table B-18. ODFW changes to 100 fm RCA line off the southwest corner of Heceta Bank.

Fathom Line	Proposed Coordinates					Action	Long Change	Original Coordinates Published in the Federal Register			
	Point	Lat		Long				Lat		Long	
		Deg	Min	Deg	Min			Deg	Min	Deg	Min
100-fm	117	44	12.92	124	56.28	Retain	None	44	12.92	124	56.28
100-fm	118					**Delete**		44	0.14	124	55.25
100-fm	119					**Delete**		43	57.68	124	55.48
100-fm	120					**Delete**		43	56.66	124	55.45
100-fm	A	44	2.340	124	55.455	Add	Seaward				
100-fm	B	43	59.175	124	56.944	Add	Seaward				
100-fm	C	43	56.738	124	56.738	Add	Seaward				
100-fm	D	43	55.764	124	55.764	Add	Seaward				
100-fm	E	43	55.406	124	52.205	Add	Seaward				
100-fm	F	43	54.622	124	48.229	Add	Seaward				
100-fm	G	43	55.901	124	41.112	Add	Seaward				
100-fm	H	43	57.359	124	38.681	Add	Shoreward				
100-fm	121	43	56.47	124	34.61	Retain	None	43	56.47	124	34.61

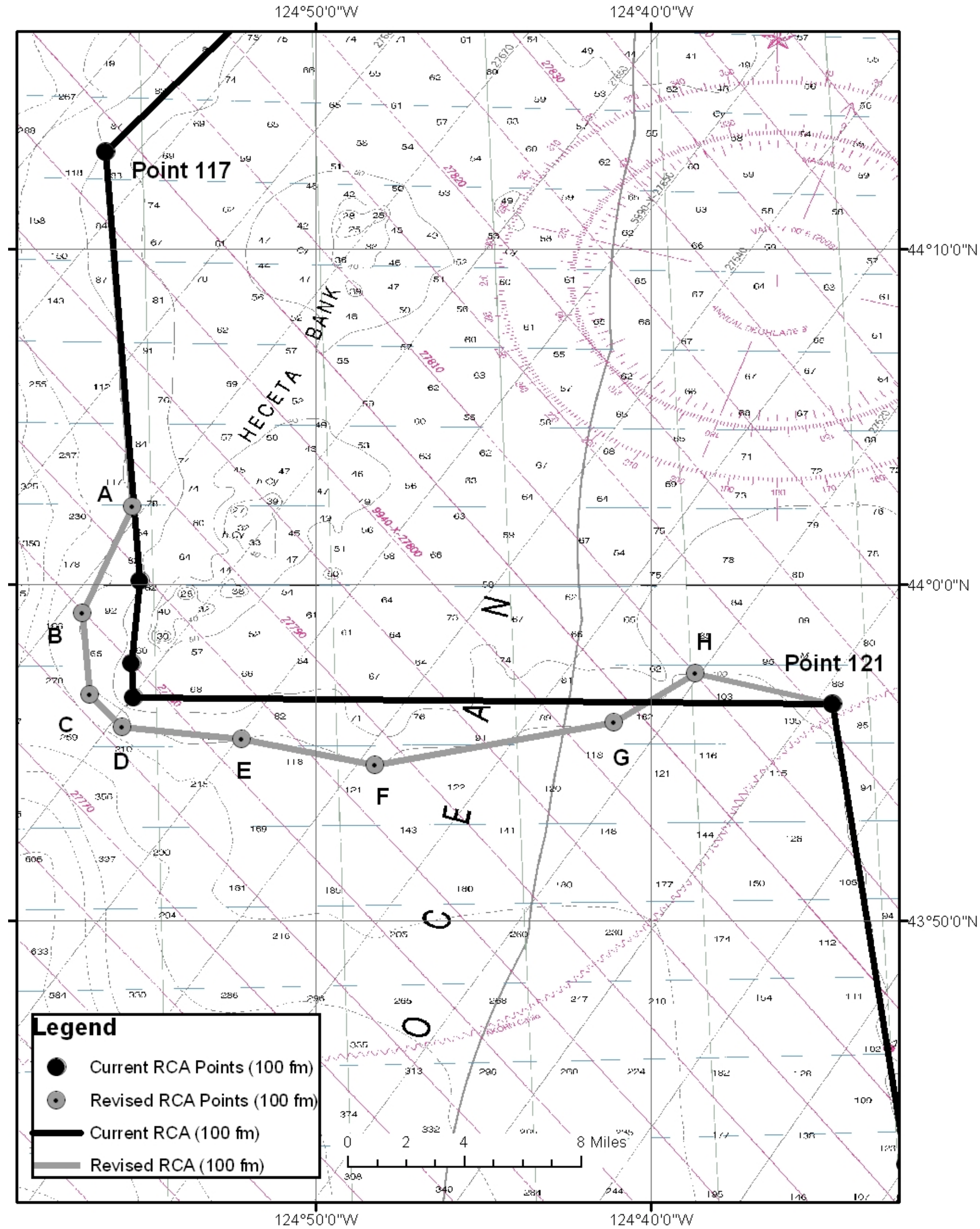


Figure B-2. ODFW changes to 100-fm RCA line off the southwest corner of Heceta Bank. Black solid line = original 100-fm RCA; Gray solid line = revised 100-fm RCA and points. Units are in fathoms.

Modification of the 200 fm petrale trawl RCA near Heceta Bank

Oregon proposes to modify the 200-fm petrale RCA near Heceta Bank (Table B-19 and Figure B-3). This adjustment will affect Oregon limited entry non-whiting trawl fishermen who fish seaward of the RCA. Currently, the modified 200 fm petrale RCA line is deeper than the 250-fm RCA, and in some cases extends across the 400 fm depth contour (Figure B-3). The fishing industry has requested to modify the 200-fm petrale RCA at this location so it is not deeper than the 250 fm RCA in this area. Two points would be removed from the current modified 200-fm petrale RCA (points 84 and 85) and two points would be added (A and B, which are the same as points 79 and 80 in the current modified 250-fm petrale RCA). This modification may increase opportunities for Dover sole while having minimal additional impact petrale sole. We note that some areas seaward of the proposed RCA are as shallow as 100 fm whereas others remain as deep as 300 fm due to the steep topography of this area. The Council adopted these modifications under the Final Preferred Alternative.

Table B-19. ODFW changes to the 200-fm petrale RCA near Heceta Bank.

Fathom Line	Proposed Coordinates					Action	Long Change	Original Coordinates Published in the Federal Register			
	Point	Lat		Long				Lat		Long	
		Deg	Min	Deg	Min			Deg	Min	Deg	Min
200-fm petrale	83	44	13.19	124	58.66	Retain	None	44	13.19	124	58.66
200-fm petrale	84					**Delete**		44	8.3	124	58.72
200-fm petrale	85					**Delete**		43	57.37	124	58.71
200-fm petrale	A	43	57.88	124	58.25	Addition	Shoreward				
200-fm petrale	B	43	56.89	124	57.33	Addition	Shoreward				
200-fm petrale	86	43	52.32	124	49.43	Retain	None	43	52.32	124	49.43

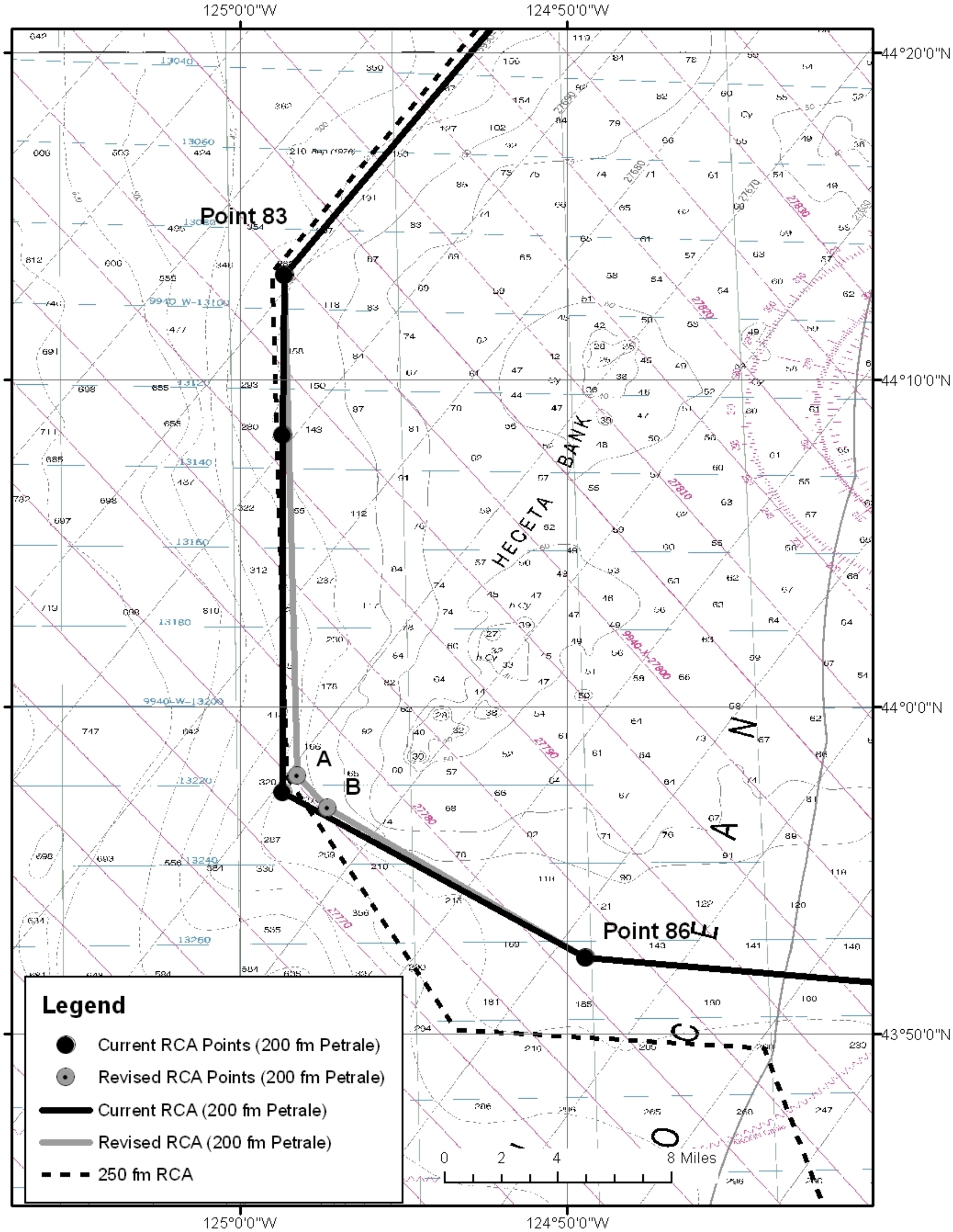


Figure B-3. ODFW changes to 200-fm petrale RCA near Heceta Bank. Black Solid Line = original 200-fm petrale RCA; Gray Solid Line = revised 200-fm petrale RCA; Dashed Line = 250-fm RCA.

CALIFORNIA

Adjustments to trawl and non-trawl RCA latitude and longitude lines in California are being proposed by industry and CDFG. Industry requests were made to modify the 200 fm trawl line in the Cape Mendocino area and the 60 fm non-trawl line in the San Diego area to better approximate depth contours or better align the RCAs to Essential Fish Habitat (EFH) boundaries. All proposed changes have been reviewed by CDFG Enforcement and verified that they do not conflict with existing EFH boundaries. CDFG does not anticipate additional impacts to overfished species since the proposed adjustments occur in areas of low bycatch. Adjustments are necessary because discrepancies exist between current and proposed depth contours, resulting in lost fishing ground and differences in actual versus predicted bycatch. Under the Final Preferred Alternative, the Council adopted these modifications.

Changes to Trawl RCAs in the Cape Mendocino Area

Table B-20 and Figure B-4 outlines the original coordinates and proposed coordinates for changing the RCA in the Cape Mendocino Area.

Changes to the 100 fm line: Revisions to the 100 fm line are required to eliminate cross-overs caused by industry proposed changes to the 200 fm line.

Changes to the 125 fm line: Revisions to the 125 fm line are required to eliminate cross-overs caused by industry proposed changes to the 200 fm line.

Changes to the 150 fm line: Revisions to the 150 fm line are required to eliminate cross-overs caused by industry proposed changes to the 200 fm line.

Changes to the 180 fm line: Revisions to the 180 fm line are required to eliminate cross-overs caused by industry proposed changes to the 200 fm line.

Changes to the 200 fm line: Revisions to the 200 fm line are proposed by industry and modified by CDFG to better approximate depth contours resulting in more accurate bycatch information by depth strata and to better align with EFH boundaries.

Table B-20. Final Preferred RCA. RCA Changes in the Cape Mendocino Area.

Fathom Line	Proposed Coordinates					Action	Long Change	Original Coordinates Published in the Federal Register			
	Point	Lat		Long				Lat		Long	
		Deg	Min	Deg	Min			Deg	Min	Deg	Min
100	156	40	30.37	124	37.30	crossover	shoreward	40	30.00	124	38.13
100		40	28.48	124	36.95	add					
125	180	40	30.35	124	37.52	crossover	shoreward	40	29.88	124	38.09
125		40	28.39	124	37.16	add					
150	157					delete		40	30.00	124	38.50
150	158	40	30.30	124	37.63	crossover	shoreward	40	29.76	124	38.13
180	159	40	30.22	124	37.80	crossover	shoreward	40	30.00	124	38.50
180		40	27.29	124	37.10	add					
200	**133**	**40**	**30.16**	**124**	**37.91**	**revision**		**40**	**30.00**	**124**	**38.15**
200	**136**	**40**	**22.34**	**124**	**31.22**	**revision**		**40**	**22.22**	**124**	**31.85**
200		**40**	**14.40**	**124**	**35.82**	**add**					

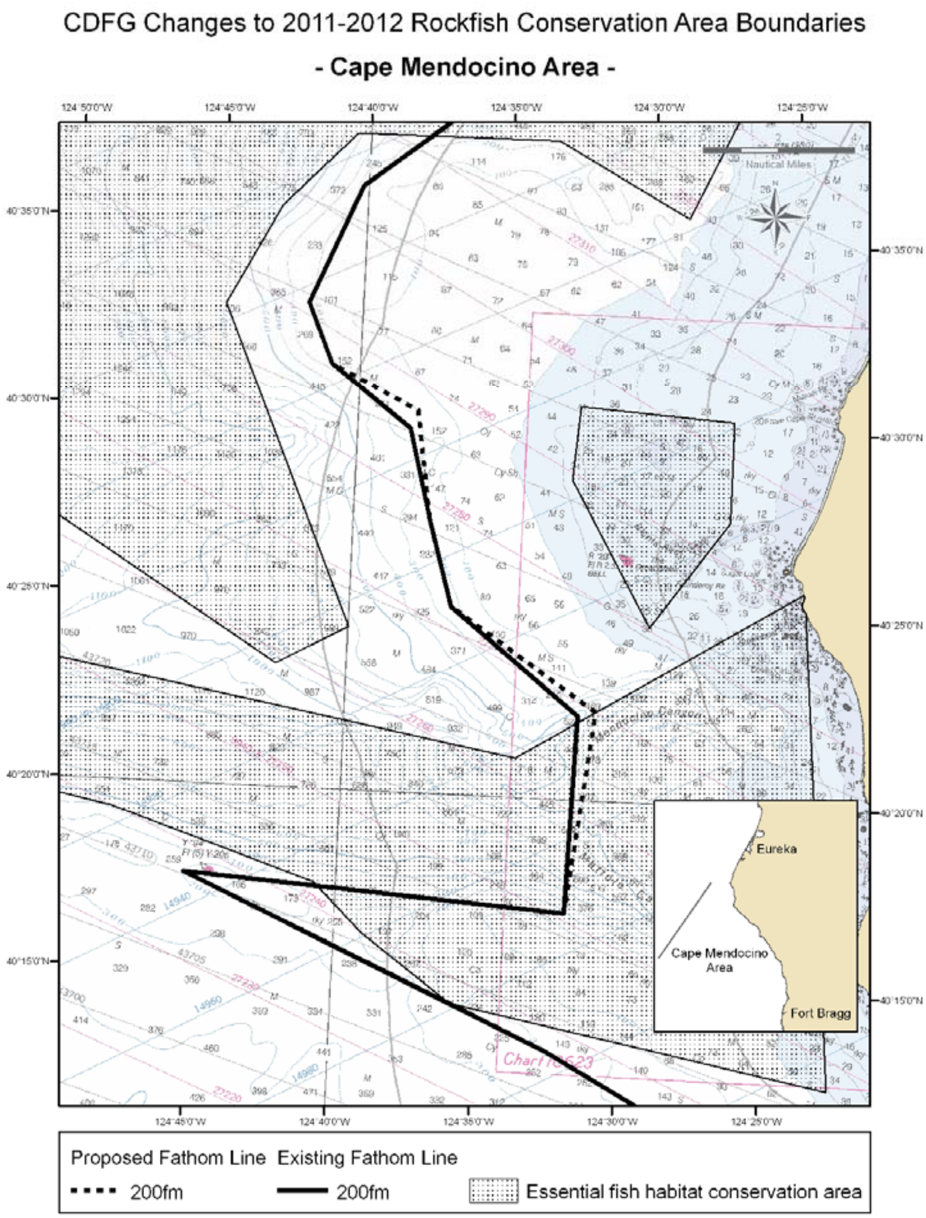


Figure B-4. CDFG proposed changes to the Cape Mendocino RCA boundaries.

Changes to the RCAs in the Big Sur Area

Table B-21 and Figure B-5 outlines the original coordinates and proposed coordinates for changing the RCA in the Big Sur Area.

Changes to the 40 fm line: Changes to the 40 fm line in the Big Sur area are proposed to better approximate depth contours resulting in more accurate estimates of actual bycatch.
Changes to the 50 fm line: Revisions to the 50 fm line are required to eliminate cross-overs caused by proposed changes to the 40 fm line.
Changes to the 60 fm line: Revisions to the 60 fm line are required to eliminate cross-overs caused by proposed changes to the 40 fm line.
Changes to the 75 fm line: Revisions to the 75 fm line are required to eliminate cross-overs caused by proposed changes to the 40 fm line.

Table B-21. Final Preferred. Changes to the RCA in the Big Sur Area.

Fathom Line	Proposed Coordinates					Action	Long Change	Original Coordinates Published in the Federal Register			
	Point	Lat		Long				Lat		Long	
		Deg	Min	Deg	Min			Deg	Min	Deg	Min
40	149	36	18.40	121	57.93	revision	seaward	36	17.52	121	57.33
40		36	16.80	121	59.97	add					
40	150	36	15.67	121	55.96	revision	seaward	36	15.90	121	57.00
40		36	15.67	121	54.41	add					
50		36	18.40	121	58.97	add					
50		36	18.40	122	0.35	add					
50	121	36	16.02	122	0.35	crossover	seaward	36	17.10	122	0.53
50		36	15.67	121	58.53	add					
50		36	15.67	121	56.53	add					
50		36	14.79	121	54.41	add					
60	140	36	16.80	122	1.76	crossover	seaward	36	17.3	122	1.55
60		36	14.33	121	57.80	add					
60		36	14.67	121	54.41	add					
75	181	36	17.49	122	3.08	crossover	seaward	36	18.23	36	18.23
75	182	36	14.21	121	57.80	crossover	seaward	36	14.21	36	14.21
75	183	36	14.53	121	54.99	crossover	seaward	36	14.68	36	14.68

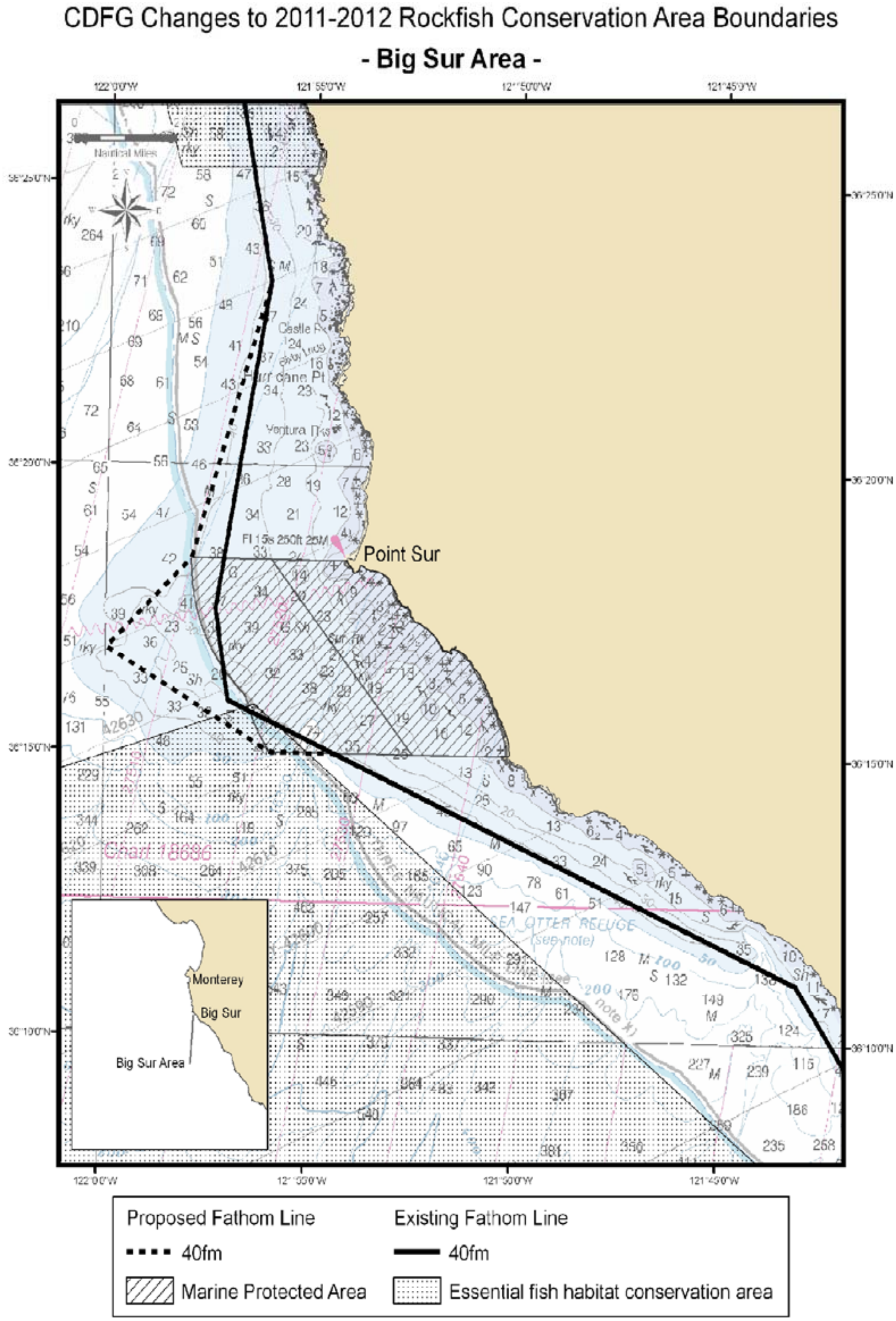


Figure B-5. CDFG proposed changes to the RCA in the Big Sur Area.

Changes to Non-Trawl RCAs in San Diego Area -

Table B-22 and Figure B-6 outlines the original coordinates and proposed coordinates for changing the RCA in the San Diego Area.

Changes to the 50 fm line: Revision to the 50 fm line in the San Diego area is required to eliminate a crossover.

Changes to the 60 fm line: Revision to the 60 fm line in the San Diego area is proposed by industry and modified by CDFG to better approximate depth contours resulting in more accurate bycatch information by depth strata.

Table B-22. Final Preferred. Changes to the RCA in the San Diego Area.

Fathom Line	Proposed Coordinates					Action	Long Change	Original Coordinates Published in the Federal Register			
	Point	Lat		Long				Lat		Long	
		Deg	Min	Deg	Min			Deg	Min	Deg	Min
50	188	32	55.35	117	18.65	crossover	shoreward	32	55.71	117	18.99
60	**198**					**delete**		**32**	**56.11**	**117**	**18.41**

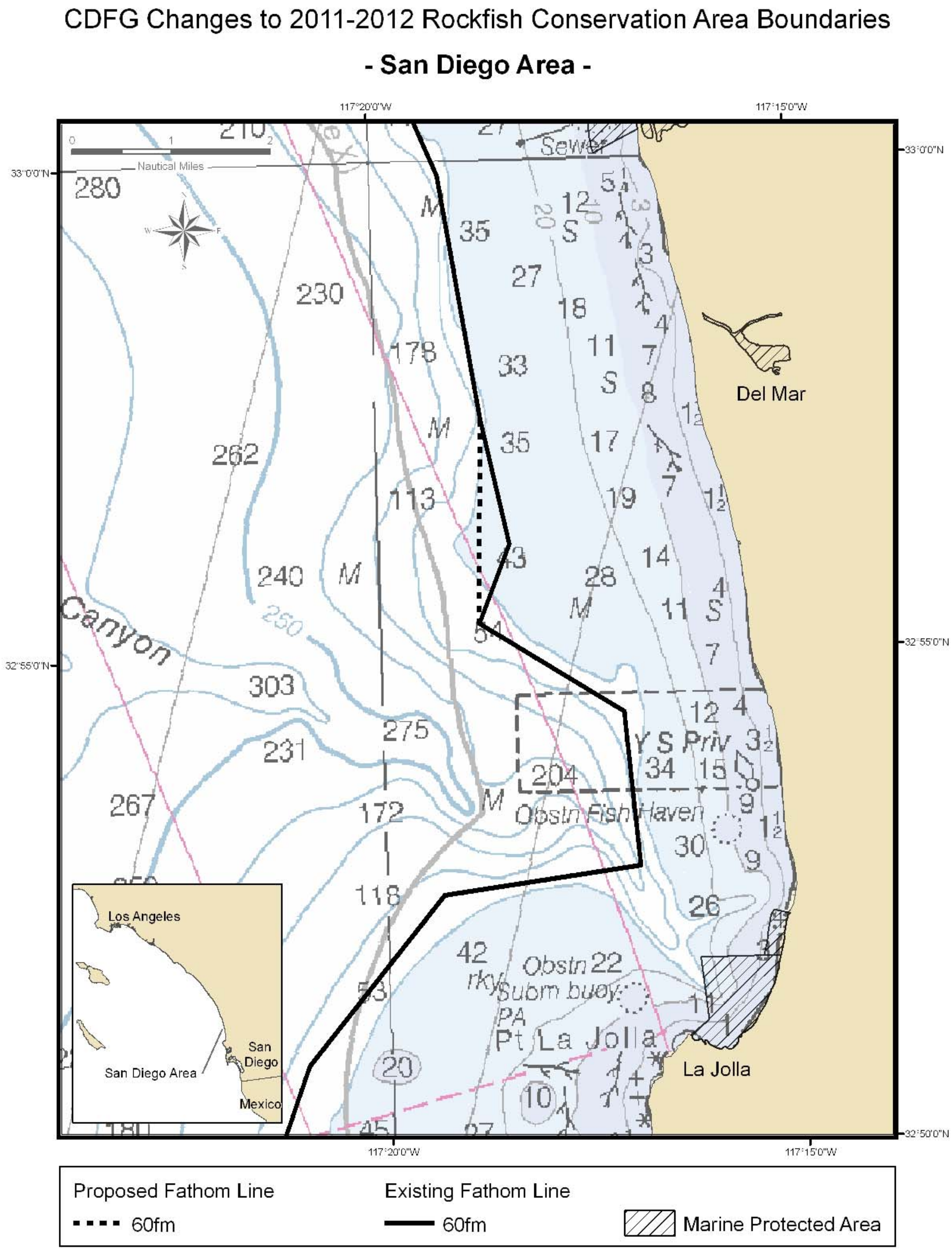


Figure B-6. CDFG proposed changes to the RCA in the San Diego Area.

B.3.2 Fishery Specific Management Measure Analysis

B.3.2.1 Limited Entry Non-Whiting Trawl Fishery

The following management measures were analyzed for use under a rationalized trawl fishery structure: trip limits for those species that are not managed under IFQs and an RCA configuration that applies to vessels harvesting QP with trawl or fixed gear. No new management measures (i.e., non-routine) were analyzed for the limited entry non-whiting trawl fishery under the cumulative trip limit management regime.

IFQ Incidental Trip Limits

Under Amendment 20: Trawl Rationalization, the Council opted to manage the following species within the shoreside sector (whiting and non-whiting) with trip limits, instead of individual fishing quotas: minor nearshore rockfish north and south, black rockfish, cabezon (46°16' N. to 42° N. latitude[4] and south of 42° N. latitude), California scorpionfish, spiny dogfish, longspine thornyhead south of 34°27' N. latitude, shortbelly rockfish, remaining fish (for the purposes of trip limits includes longnose skate, big skate, California skate, California scorpionfish, leopard shark, soupfin shark, finescale codling, Pacific rattail (grenadier), ratfish, kelp greenling, shortbelly, cabezon in Washington). The purpose of allowing trip limits for these species is to allow incidental catch to be landed and for the fishermen to be paid for those landings. Not having a trip limit would not prevent the fish from being caught. Rather, these species are caught incidentally regardless of whether there is a trip limit in place for them or not. When there is no trip limit, the fish must be discarded ("regulatory discard") or forfeited to the state at the time of landing.

To explore trip limits that would strike this balance, monthly landings in the limited entry non-whiting and whiting trawl fishery from 2008 and 2009 were compared to existing trip limits. Under Amendment 20, vessels with limited entry trawl permits have the ability to also use fixed gear (i.e., gear switching). The trip limit recommendations provide for incidental landing allowances and are implemented when vessels are using trawl or fixed gears to harvest the IFQ species with a limited entry trawl permit. These incidental trip limits were included as management measures under a rationalized fishery structure in the Council's Final Preferred Alternative.

Minor nearshore rockfish and black rockfish north and south of 40°10' N. latitude
For minor nearshore rockfish and black rockfish, no limited entry trawl vessel achieved the existing cumulative limits specified in regulation (300 lbs/month). The highest monthly landings were between 150-200 pounds; the majority of the landings were less than 50 pounds. In a rationalized trawl fishery, the GMT does not anticipate increases to minor nearshore rockfish and black rockfish landings, given existing state regulations. Generally speaking, state regulations are as follows:

- WA: commercial fishing with either trawl or fixed gear (including pots) in nearshore waters (0-3 miles) is prohibited.
- OR: Vessels must hold a state fixed gear nearshore permit to land targeted amounts of nearshore rockfish. Incidental amounts of nearshore rockfish are allowed by trawlers and

[4] The GMT notes that in 2010 the other fish category includes cabezon coastwide, while in 2011-2012 cabezon will be managed separately north of 42° N. latitude but with the other fish category in the south. As such, the GMT provides for the first time a cabezon trip limit for the limited entry trawl shoreside sector.

by fixed gear vessels without nearshore permits, however 2010 state trip limits for these species are more restrictive than the 2010 Federal trip limits.

- CA: Vessels must hold a state nearshore permit to land any nearshore rockfish.

Further, the trawl sector will receive a relatively small yelloweye rockfish allocation and the yelloweye rockfish bycatch rates are the highest in the nearshore. As such, it appears the risk of targeting nearshore rockfish is too high and it is unlikely such events will occur. That is, with individual accountability and the anticipated high cost of yelloweye rockfish quota pounds it seems unlikely that targeting nearshore rockfish would occur. As such, the Council-preferred Alternative recommends that the minor nearshore rockfish and black rockfish incidental landing limits for vessels using trawl or fixed gears to harvest IFQ species with a limited entry trawl permit north and south of 40°10' be specified at 300 lbs/month for periods 1-6, which would accommodate the landings seen in the last 2 years.

Cabezon (46°16' N. to 42° N. latitude[5] and south of 42° N. latitude)

Recent cabezon landings by the limited entry trawl fleet were infrequent and the majority was below 20 pounds. Under the Final Preferred Alternative, the Council recommended that the cabezon incidental landing limits for vessels using trawl or fixed gears to harvest IFQ species with a limited entry trawl permit be specified at 50 lbs/month for periods 1-6, which would accommodate the landings seen in the last two years.

Spiny Dogfish

Trip limits for spiny dogfish were implemented on March 1, 2006 and have generally stayed at the same levels since that time. The limits currently specified in regulation are 200,000 lbs/2 months Jan-Apr; 150,000 lbs/2 months May-Jun; 100,000 lbs/2 months Jul-Dec. In recent years, no limited entry trawl vessels attained or came close to reaching the spiny dogfish cumulative limits specified in Federal regulation.

Under a rationalized fishery, an IQ holder could target spiny dogfish with either trawl gear or fixed gear. There is available data to inform potential bycatch interactions while targeting spiny dogfish with trawl gear. With fixed gear, it is anticipated that yelloweye rockfish would constrain access to spiny dogfish. Feedback from industry indicates that the highest concentration of dogfish is near the 100 fm line, an area with a moderate bycatch rate of yelloweye. Similar to the discussion under minor nearshore rockfish, under a rationalized trawl fishery it is anticipated that the risk of yelloweye rockfish bycatch to an individual would likely outweigh the value of targeting spiny dogfish.

Under the Final Preferred Alternative, the Council recommends that the spiny dogfish incidental landing limits for vessels using trawl or fixed gears to harvest IFQ species with a limited entry trawl permit north and south of 40°10' be specified at 60,000 pounds/month, which would accommodate all monthly landings seen in recent years.

Longspine Thornyhead south of 34°27' N. latitude

Under the proposed Amendment 21 to the GFMP, the Council chose not to make a trawl/non-trawl allocation for longspine thornyhead south of 34°27' N. latitude. Under the proposed Amendment 20 to the GFMP, the Council chose to manage longspine thornyheads south of

[5] In 2010 the other fish category includes cabezon coastwide, while in 2011-2012 cabezon will be managed separately north of 42° N. latitude but with the other fish category in the south. As such, the GMT provides for the first time a cabezon trip limit for the limited entry trawl shoreside sector.

34°27’ N. latitude with trip limits, while longspine thornyhead in the north are managed with IFQ. This decision was a result of the limited catch history of longspine thornyhead by the trawl fishery south of 34° 27’ N. latitude. From 1995-2005, the trawl fishery harvested <0.1 of the longspine thornyhead OY. Additionally, total mortality by all fleets in recent years has been well below the OY; in 2008 4 percent of the OY was harvested. Feedback from industry indicates that longspine thornyhead is not typically targeted; it is caught in association with shortspine thornyhead, a higher valued, more marketable species and/or Dover sole and sablefish. Under a rationalized trawl fishery, it is possible that a fishery will evolve south of 34°27’ N. latitude either with trawl gear or fixed gear. Given the low exploitation of longspine thornyhead south of 34°27’ N. latitude, the existing trip limits could remain in place under a rationalized fishery. Under the Final Preferred Alternative, the Council recommends that south of 34°27’ N. latitude, the longspine thornyhead incidental landing limits for vessels using trawl or fixed gears to harvest IFQ species with a limited entry trawl permit be specified at 24,000 lbs/2 months, which is the limit currently specified in regulation for limited entry trawl gears.

Remaining fish
Currently, there are no limits imposed on the catch of species within the “other fish” complex for any of the commercial fisheries (limited entry trawl, limited entry fixed gear, or open access). The GMT recommends that this category be named “remaining fish” since the “other fish” definition for harvest specifications includes different species than the intent of the remaining fish incidental trip limits. For example, longnose skate was removed from the “other fish” harvest specifications category, yet for the purposes of the incidental IFQ trip limits longnose skate should be grouped with other skates. For the purposes of the incidental IFQ trip limits, other fish is to include: longnose skate, big skate, California skate, California scorpionfish, leopard shark, soupfin shark, finescale codling, Pacific rattail (grenadier), ratfish, kelp greenling, shortbelly, cabezon in WA.

The 2008 and 2009 limited entry trawl landings of the species that comprise the newly proposed remaining fish incidental trip limit were analyzed. Grenadier makes up the largest component of the remaining fish landings in the trawl fishery and most landings were less than 8,000 pounds with a few landings as high as 12,000 pounds. Historically, there was some buying/selling of grenadier in an attempt to develop a market, however recent year landings of grenadier likely represent incidental catch while targeting the DTS strategy. The remaining fish landings were less than 1,500 pounds with most monthly landings less than 1,000 pounds. Big skate and California skate also comprise the other fish category. In recent years, there has been interest in targeting and marketing skates. In recent years catches have been below the Council’s final preferred ACL decision for other fish.

Under the Final Preferred Alternative, the Council recommends that the remaining fish incidental landing limit for vessels using trawl or fixed gears to harvest IFQ species with a limited entry trawl permit remain unlimited. Should increased landings occur, the Council could implement the trip limits analyzed during this SPEX process and implement them through routine inseason action.

RCA Configurations for Vessels Harvesting QP with Trawl gear or Fixed Gear

RCAs are by far the most extensive and complex closed areas used in groundfish management. First implemented in 2002 as part of an in-season management action, RCAs extend from the Canadian border to the Mexican border of U.S. west-coast waters. The RCAs were implemented to reduce bycatch of overfished species, which may concentrate within specific depth ranges. Based on analysis of West Coast Groundfish Observer Data and vessel-logbook data, the boundaries of the RCAs were set to prohibit groundfish fishing within a range of depths where encounters with overfished species were most likely to occur. In order to make enforcement possible, in most cases the actual isobaths—lines of equal depth—are approximated by straight lines between published waypoints. The depths included in RCAs vary by season, latitude, and regulatory sector. Boundaries for limited entry trawl vessels are different than those for the limited entry fixed-gear and open access sectors.

Trawl RCA boundaries and cumulative limits are routinely adjusted inseason based upon fishery performance. Managers structure catch limit opportunities and closed areas with several objectives in mind including protecting rebuilding species while simultaneously providing for a year round fishing opportunity. While many adjustments to catch limits and trawl RCA boundaries are relatively minor, in recent years some of these adjustments have been relatively extreme and have closed fishing opportunity for wide areas of the coast mid-season. For example, in 2004 an unexpected amount of darkblotched rockfish catch occurred in the fishery leading to a large expansion of the trawl RCA and elimination of several target species opportunities, including petrale sole—one of the most important target species to bottom trawlers. In January and February of 2006, unseasonably favorable weather occurred making it easy for vessels to target petrale sole during their aggregation period. This led to a catch of petrale sole during the first 2-month cumulative trip limit period that was nearly twice the expected amount. This caused managers to eliminate petrale sole opportunities at the end of the year in an attempt at preventing overfishing of the stock in that year. In 2008, the area north of Cape Alava (48.10° N. latitude) was closed (RCA extended to the shore) in order to reduce canary rockfish impacts. IN. later years, this closure remained in place in order to reduce trawl impacts to yelloweye rockfish.

Non-whiting groundfish vessels fish in depths as shallow as 10 fm and as deep as 600 fm; in recent years the largest volume of retained catch has come from deeper than 250 fm. In recent years, the trawl RCA north of 40°10’ N. latitude has varied from a boundary line approximating the 75 fm depth contour (75 fm line) to the 100 fm line shoreward and 150 to 200 fm seaward. Most often, the shoreward boundary has been specified at 75 fm in an effort to reduce canary rockfish catch. The seaward line has varied from 150 fm, 200 fm, and 250 fm.

South of 40°10’ N. latitude, the RCA has remained at 100 fm to 150 fm to reduce bocaccio, canary, and cowcod encounters.

Under current management of the trawl fishery (i.e., No Action Alternative), catch projections (and estimates of total catch inseason) are made using what is often described as the “trawl bycatch model.” This model uses discard estimates from the WCGOP data and logbook information to develop temporal and spatially stratified bycatch rates for overfished species. The bycatch model can be used to estimate both target species and overfished species catch based on a proposed set of management measures (2-month cumulative trip limits and RCA configurations).

Under a rationalized fishery, individuals will be held accountable for their bycatch; however there is still a risk of exceeding the trawl allocation since overfished species interactions can be unpredictable. As such, the Council may wish to maintain a core RCA structure which would continue to close the area where encounters with overfished species are considered most likely. It is our understanding that the type of gear employed determines the RCA structure. As such vessels who harvest IFQ species with trawl gear will be held to the trawl RCA while vessels with fixed gear will be held to the fixed gear RCA.

The decision on where to set the shoreward and seaward boundaries of the trawl RCA is largely a risk call based on available data that, under a rationalized fishery, is not something that can be evaluated within the trawl model. That is, the bycatch rates that are used in the trawl model (See

Appendix A Table A.1) inform the potential risk of allowing fishing opportunity in certain depths, however the trawl model calculus (e.g., trip limits, assumptions of effort distribution, RCA, etc.) will no longer be applicable under trawl rationalization. The boundaries of the non-trawl RCA are recommended by the Council based on overfished species impacts predicted by the fixed gear models (nearshore and non-nearshore).

Reviewing the current trawl bycatch data by depth and season is still useful to inform a core trawl RCA structure for a rationalized trawl fishery (See Appendix A Table A.1). It is important to note that there is no way to know if the historical bycatch rates will be representative of a rationalized fishery, since rationalization has not yet occurred. However, these rates provide a starting point for considering RCA structures.

In addition to maintaining the core RCA structure, the Council has expressed the desire to use RCA adjustments inseason in order to prevent exceeding the trawl allocation for overfished species. For example, should the trawl sector attain its allocation of yelloweye rockfish, the available bycatch rate data suggests that moving the shoreward boundary to shore (i.e., close trawling shoreward of the RCA) would largely reduce further yelloweye rockfish impacts, while still allowing other species to be harvested on the seaward side of the RCA (Figure B-7, Figure 5). Should the canary rockfish allocation be attained, the seaward boundary could be set at 150 fm which would prevent reduce canary rockfish impacts substantially relative to shallower depths while still allowing other species to be harvested. Similarly, should the petrale sole allocation be attained midyear, the seaward RCA could be set at 250 fm in order to provide access to deep water stocks while preventing petrale sole impacts (Figure 8). These are only a few examples of the variety of inseason adjustments that can be made to the RCA to keep the trawl sector within their allocation, as seen in the figures.

Shoreward RCA Considerations

Shoreward of the RCA and north of 40°10’ N. latitude, yelloweye and canary rockfish interactions constrain access to target species. For yelloweye rockfish, the high bycatch rates occur in waters less than 100 fm (Figure 4). It appears that trawl catch of yelloweye rockfish shoreward of a 50 fm RCA would result in lowest impacts north and south, especially during the 1st, 2nd, and 6th periods. This would also limit access to target species, however, and may cause conflicts with open access and limited entry fixed gear fishermen. Yelloweye rockfish have a patchy distribution and as such using fleetwide bycatch rates over a large area (north and south of 40°10’ N. latitude) as currently implemented may be overly constraining, especially under the auspices of individual accountability. That is, in a rationalized fishery, the individual has the incentive to avoid the patchy areas of known yelloweye rockfish concentrations to minimize that individual’s bycatch rate and thereby maximizing their harvest of target species. It is still anticipated that individuals will encounter yelloweye rockfish unexpectedly, and thus, the Council may consider setting the shoreward RCA at either 75 or 100 fm and evaluate / refine the RCA structure as each year progresses, if data exists. Note that north of Cape Alava, yelloweye bycatch rates are lowest inside of the 60 fm line; bycatch rates would increase substantially if shoreward RCAs were moved from the 60 fm line to the 75 fm line (Figure 5).

For canary rockfish north of 40o 10’ N. latitude, bycatch rates increase when the shoreward RCA is specified at 100 fm relative to the 75 fm line and shallower depths (Figure 6), especially during the winter and spring months (Periods 1, 2, and 6) in the north. As such, if the Council desires to implement a 100 fm RCA boundary for the rationalized trawl fishery in the north to provide more fishing opportunities while reducing the risk of encounters with canary rockfish, it might consider doing so during Periods 3, 4, and 5 when canary-bycatch rates are lowest (Figure 6). It is important to realize, however that most spring/summer/fall bycatch rates are collapsed across periods 3–5 because of sample-size limitations, hence, the GMT does not have bycatch rate information for the individual periods in the spring/summer/fall. This problem makes it impossible to differentiate differences in bycatch rates among periods. Industry feedback indicates potential target species (e.g., sanddabs) could be accessed between 75 and 100 fm with low bycatch interactions (e.g., sanddabs) (Brad Pettinger, personal communication). Note that north of Cape Alava, RCAs would need to be set at the 75 fm line to minimize canary rockfish interactions as bycatch rates increase dramatically deeper than 75 fm (Figure 7).

Canary, cowcod, and bocaccio constrain access to target species shoreward of the RCA south of 40°10' N. latitude. For canary rockfish, the bycatch rates are lower when the shoreside RCA is set at 60 fm, compared to 75 fm (Figure 6). Similar to the northern bycatch rates, there is seasonal variation in bycatch rates. However, similar to the north, highest canary bycatch rates were observed in the south during the winter periods (1, 2, and 6). Cowcod bycatch rates are highest shoreward of 75 fm and 100 fm lines relative to shallower RCAs (i.e., < 60 fm; Figure 9). For bocaccio rockfish, bycatch rates are typically high only near the 100 fm line during winter months; rates are relatively low for this species at all other depths and during periods 3, 4, and 5 (Figure 10).

The southern shoreward RCA has been set at 100 fm in the past, and this action appears to have been successful in keeping bycatch of canary, cowcod, and bocaccio within acceptable limits. Hence, south of 40o 10' N, maintaining the 100 fm RCA may provide access to target species while minimizing impacts to overfished species.

RCA structures for widow rockfish are clear north of 40°10' N. latitude; seaward RCAs less than 60 fm are most protective for all seasons (Figure 11). Note that widow rockfish encounters are extremely low for all depths during periods 3, 4, and 5 relative to periods 1, 2, and 6. South of 40° 10' N. latitude widow rockfish bycatch remains fairly constant when the RCA is set at 150, 180 or 200 fm. These depths also represent the highest widow rockfish bycatch rates.

Seaward RCA Considerations

Darkblotched rockfish and POP constrain access to target stocks along the northern coast of the western U.S. For darkblotched rockfish, there is a significant change in the bycatch rate at 38° N. latitude and as such, rates are stratified at 38° rather than 40°10' N. latitude. A seasonal trend in darkblotched bycatch rates is apparent when the RCA is set at either 150 fm or 180 fm; rates are highest during winter months (periods 1 and 6). Darkblotched rockfish bycatch can be significantly reduced by moving the RCA deeper than the 200 fm line, while maintaining access to the DTS complex (Figure 12).

For POP, bycatch rates are highest when the RCA is specified at the150 fm or 180 fm line relative to deeper RCA options (Figure 13). The rates are the highest when the line is specified at 150 fm in periods 3 and 4.

Petrale Sole

Petrale sole exhibits distinct seasonal depth migrations. Hence, RCA structures for this species should vary seasonally. The general pattern for petrale sole is a shallower depth distribution during periods 3 and 4 and a deeper depth distribution during periods 1 and 6. Petrale sole are typically in transition as they migrate between shallow and deeper depths during periods 2 and 5.

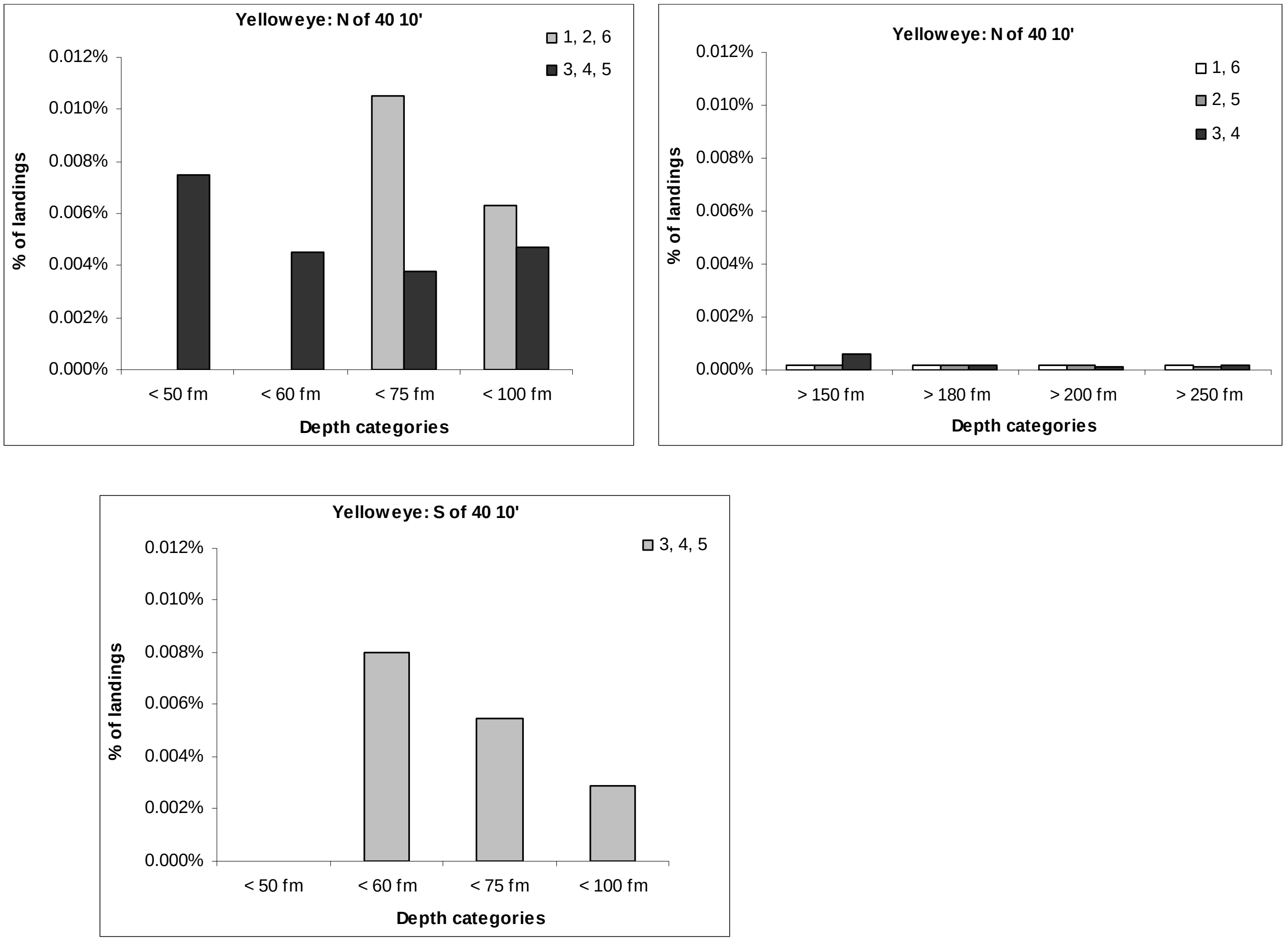


Figure B-7. Bycatch rates (OFS catch / landed species catch) of yelloweye rockfish north and south of 40º 10' by calendar period and depth category; north of Cape Alava closed.

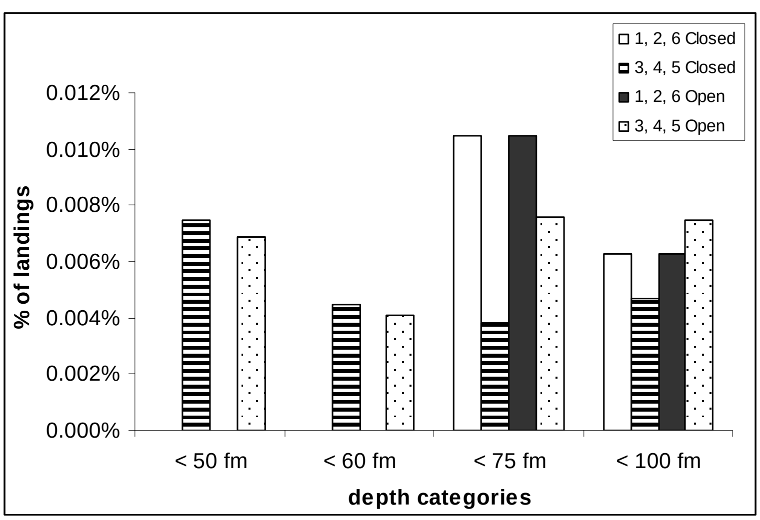


Figure B-8. Bycatch rates (OFS catch / landed species catch) of yelloweye rockfish north of 40º 10' by calendar period and depth category; north of Cape Alava open.

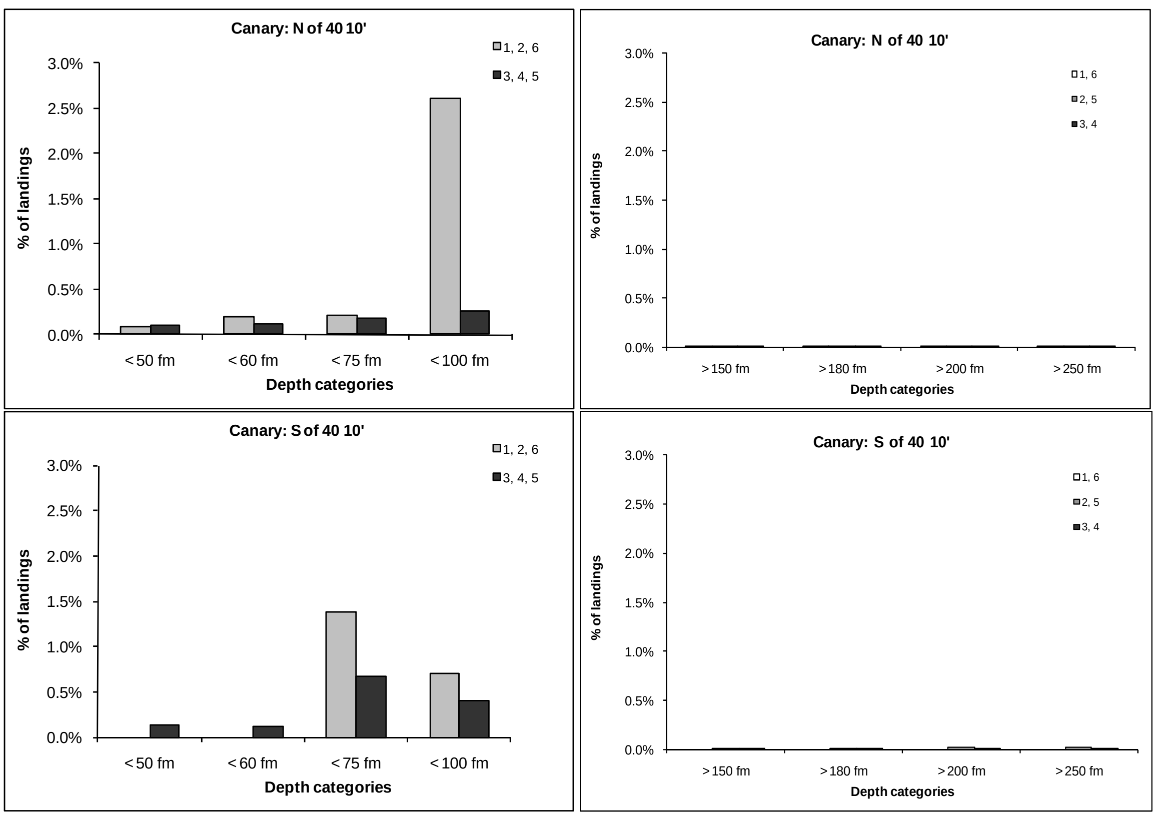


Figure B-9. Bycatch rates (OFS catch / landed species catch) of canary rockfish north and south of 40^o 10' by calendar period and depth category, with area north of Cape Alava closed.

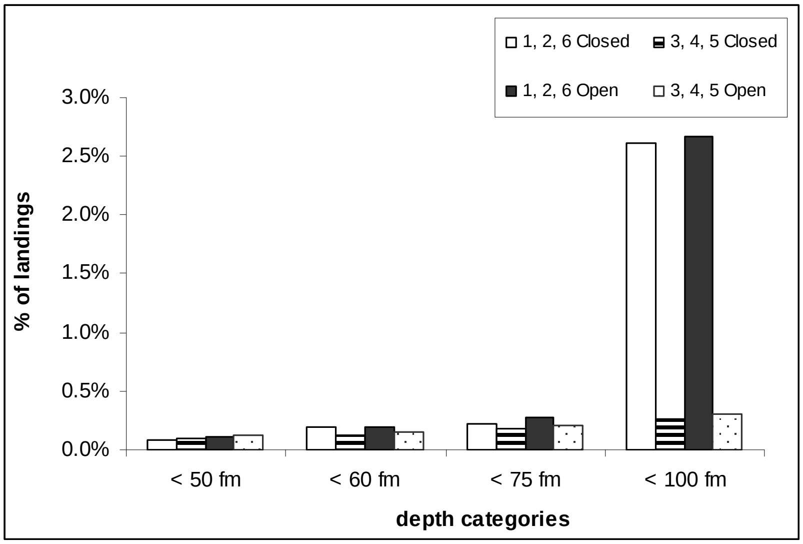


Figure B-10. Bycatch rates (OFS catch / landed species catch) of canary rockfish of 40^{o} 10' by calendar period and depth category, with area north of Cape Alava open.

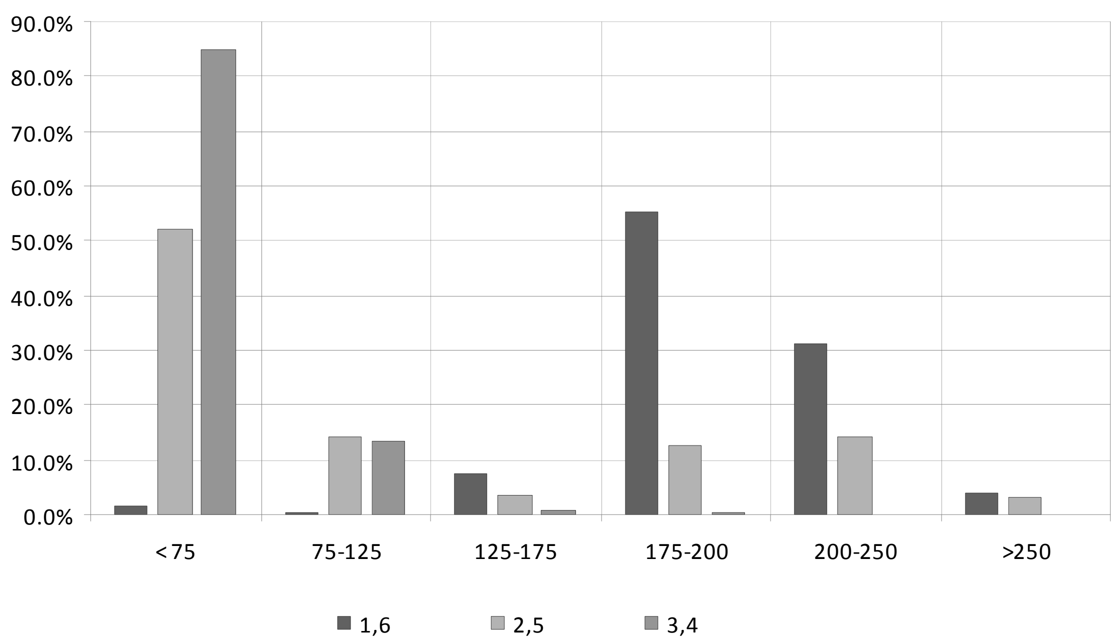


Figure B-101. Bycatch rates (OFS catch / landed species catch) of petrale sole by calendar period and depth category.

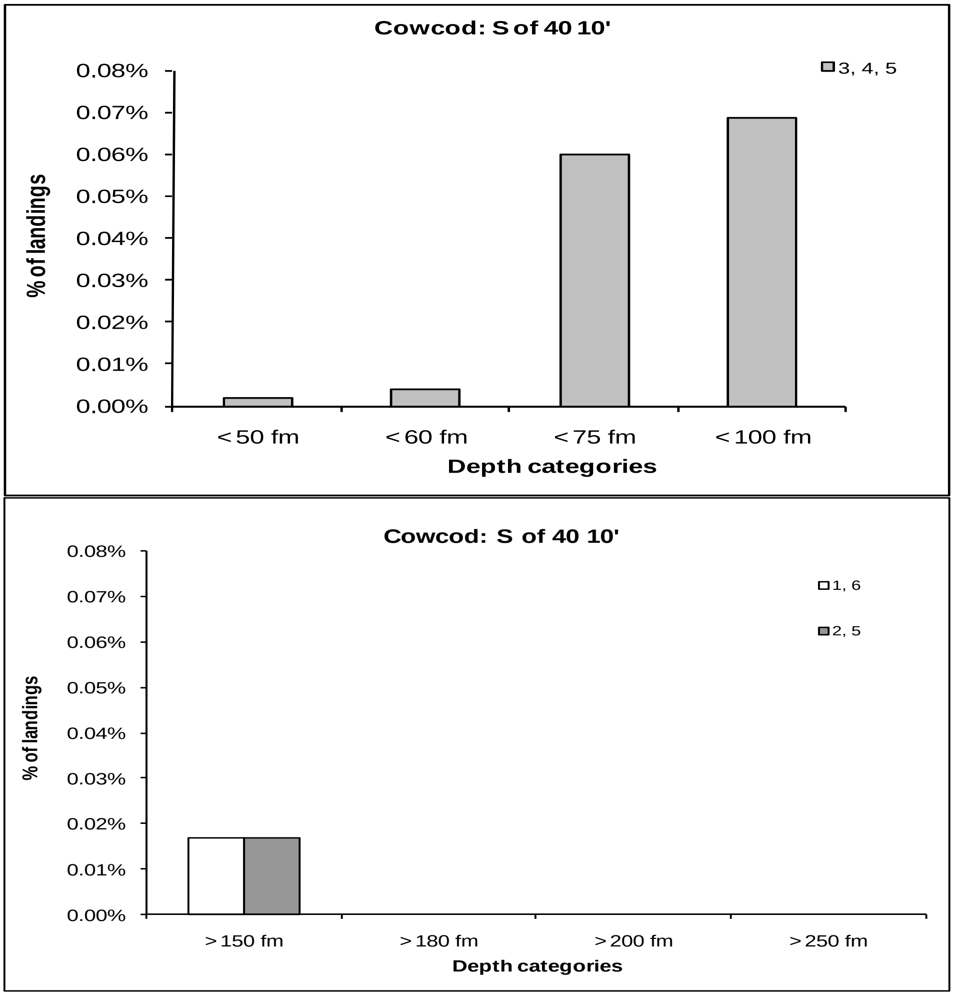
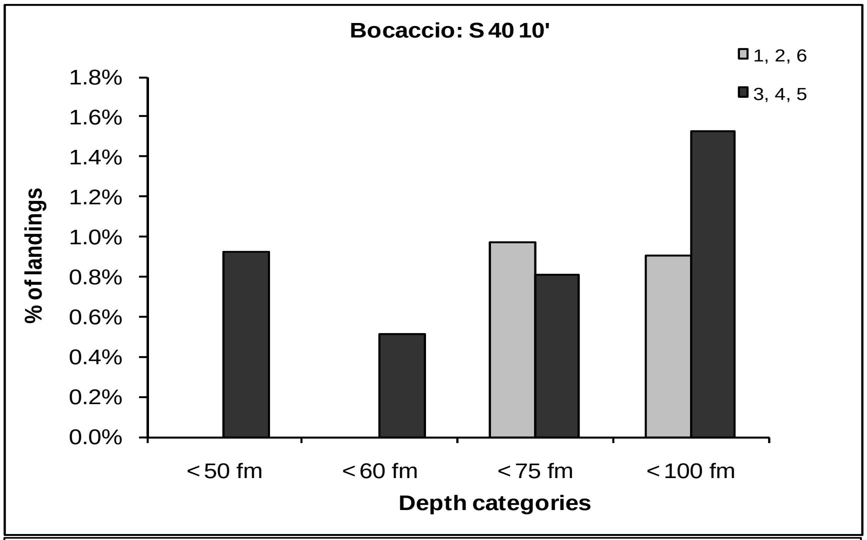


Figure B-11. Bycatch rates (OFS catch / landed species catch) of cowcod south of 40º 10' by calendar period and depth category.



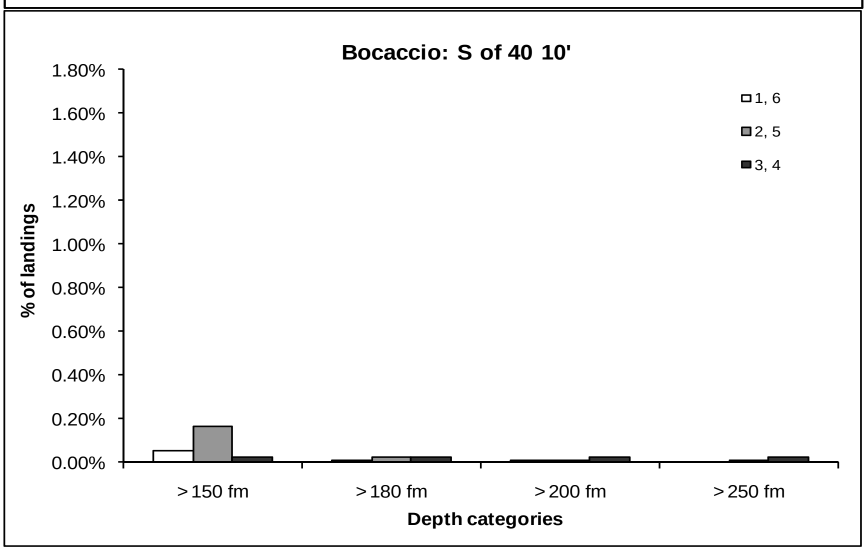


Figure B-12. Bycatch rates (OFS catch / landed species catch) of bocaccio rockfish south of 40^{o} 10' by calendar period and depth category.

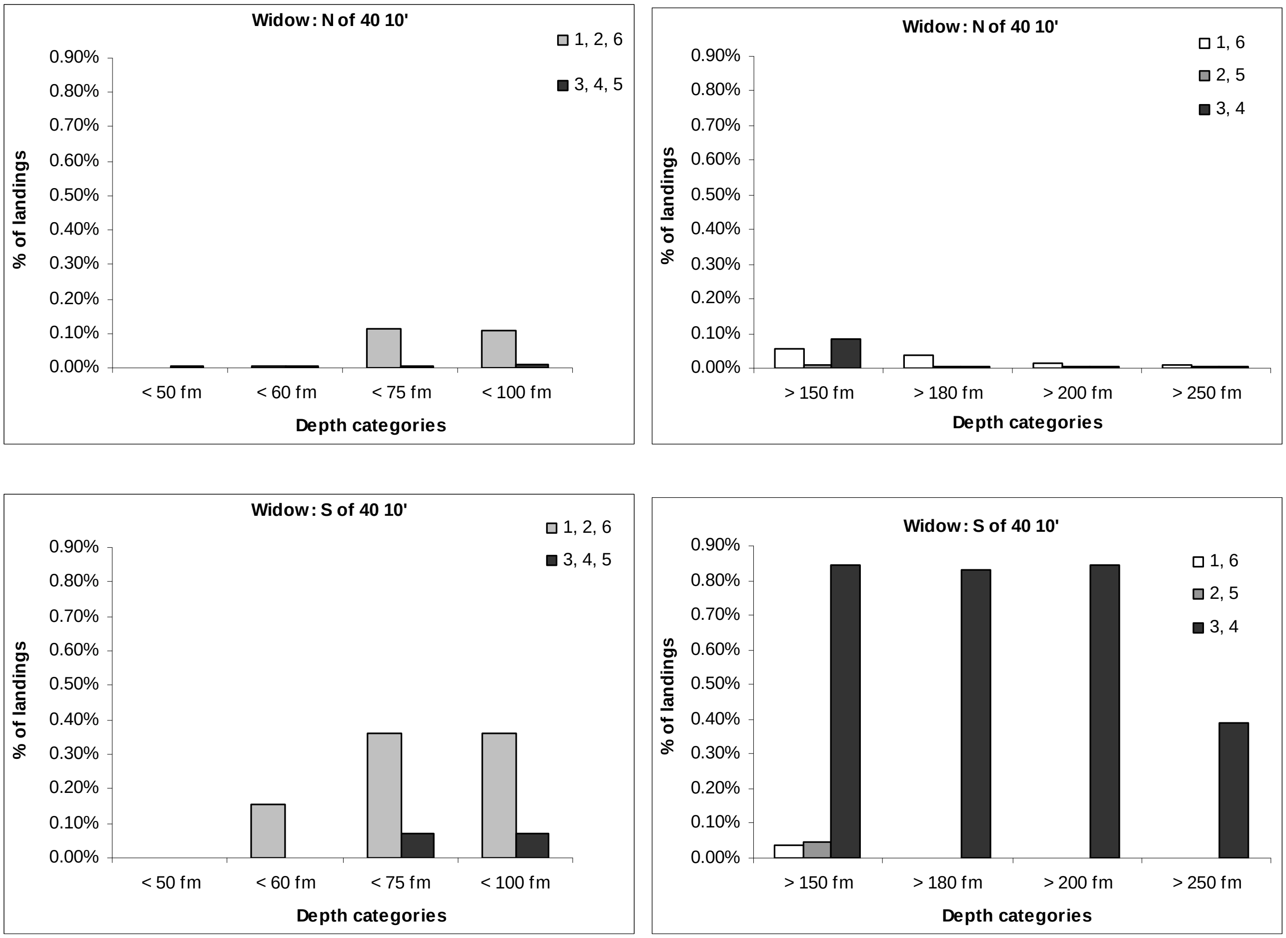


Figure B-13 Bycatch rates (OFS catch / landed species catch) of widow rockfish north and south of 40^{o} 10’ by calendar period and depth category.

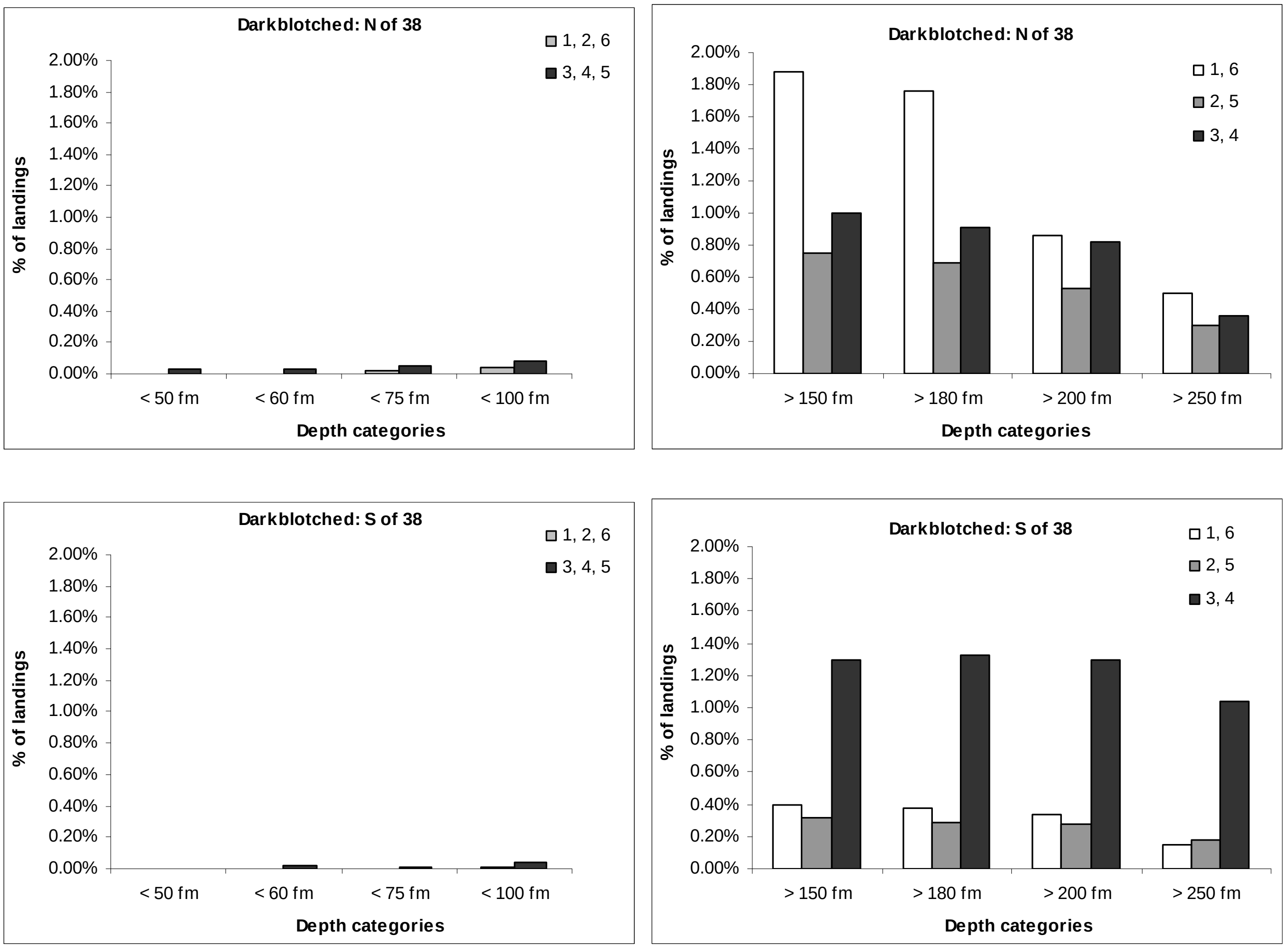


Figure B-14 Bycatch rates (OFS catch / landed species catch) of darkblotched rockfish north and south of 40^o 10’ by calendar period and depth category.

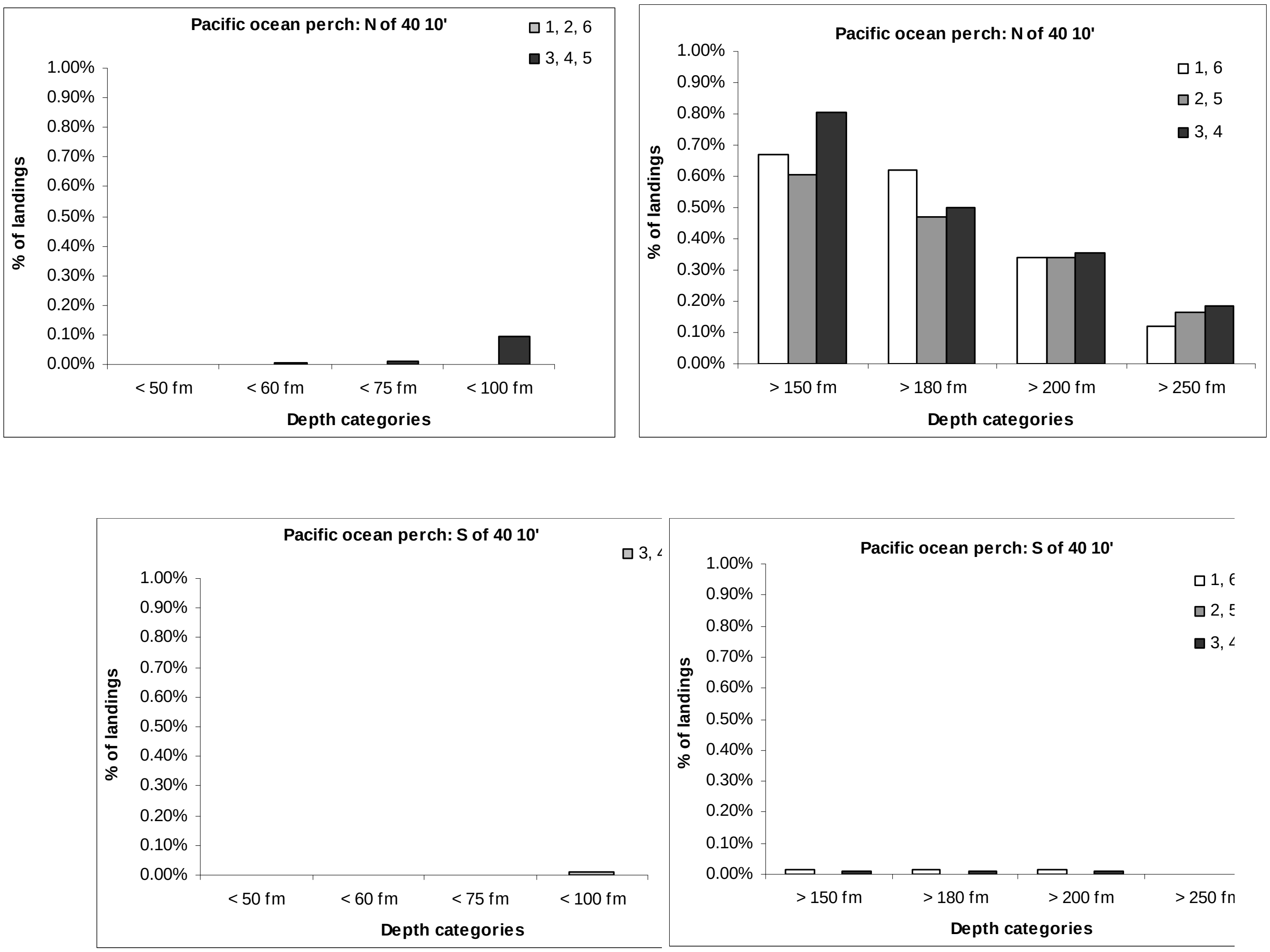


Figure B-15 Bycatch rates (OFS catch / landed species catch) of Pacific ocean perch north and south of 40º 10’ by calendar period and depth category.

Gear Switching and RCAs

The proposed Amendment 20 allows quota pounds associated with a limited entry trawl permit to be harvested with either trawl gear or legal fixed gear (known as gear switching). Regulations currently specify both a trawl and non-trawl RCA. It is our understanding that the type of gear employed determines the RCA structure. As such vessels who harvest IFQ species with trawl gear will be held to the trawl RCA while vessels with fixed gear will be held to the fixed gear RCA.

The final preferred trawl allocation for yelloweye rockfish is very low (0.6 mt). This allocation was informed by the trawl model and is low primarily because current management measures (e.g., trawl gear restrictions and RCAs) prohibit fishing in rocky habitats where yelloweye rockfish concentrate. Yelloweye rockfish bycatch rates in the nearshore fixed gear fisheries are much greater than the trawl fishery bycatch rates, largely because fixed-gear fishermen are able to fish over bottom with structure (e.g., rocky bottom). In certain geographic areas and depth ranges, canary rockfish bycatch rates are also higher in the nearshore model than in the trawl model. This information suggests that under trawl rationalization, special consideration may be given to those who switch gears to ensure that the yelloweye trawl allocations are not exceeded.

The Amendment 20 gear switching provision shoreward of the RCA may present an increased risk of exceeding the trawl sector allocation for yelloweye rockfish, and possibly canary rockfish. There is no available bycatch rate data to inform the fixed gear bycatch rates between 30 fm and 75-100 fm (the available trawl RCA north of 40'10). However, given that the trawl bycatch rates and survey data show that yelloweye are prevalent in this depth range, it is somewhat safe to assume that concerns discussed above using bycatch rates inside of 30 fm will likely be relevant to 100 fm.

Further, the final preferred shoreward non-trawl RCA is proposed to be implemented as follows:
Closed in WA

- 30 fm in northern Oregon and 20 fm in the remaining areas in Oregon (largely state waters)
- 20 fm in northern California (largely state waters)
- 30 fm in central California (largely state waters)
- 60 fm south of 34°27' N. latitude.

The trawl sector received no allocation of nearshore species and as such will be unlikely to operate shallower than 30 fm. Further, state regulations require nearshore permits to land targeted amounts of nearshore species. In Oregon, additional gear restrictions may restrict fixed gear operations in this area. For example, pot fishing in Oregon within the 3-mile limit is currently restricted to one state nearshore permit and can be only be changed through a State-legislative vote. In reviewing the proposed non-trawl shoreward RCA structure, it appears that the most viable opportunity for shoreward activity is south of 34°27' N. latitude.

Relative to the seaward side of the RCA, the gear switching provision will be much less risky for encountering overfished species and may be most beneficial for those operating under trawl rationalization. Allowing gear switching seaward of 100 fm, the non-trawl RCA structure under the preliminary preferred decision, may allow access to valuable species such as sablefish and shortspine thornyheads.

Potential for a Mid-water Opportunity in 2011-2012

There is an opportunity under the trawl rationalized program to allow targeting of species such as yellowtail rockfish within the RCA using midwater trawl gear during the primary whiting season. Under current trawl rationalization regulations, this opportunity may be permissible regardless of amount of whiting onboard. A cursory analysis of data reveals that the risk of a mid-water opportunity appears lower than for bottom trawl gear for some species (e.g., yelloweye); it may be equally as risky for species as canary; and appears to have a higher risk for species like widow rockfish. The GMT believes that the under a rationalized trawl fishery structure, individual accountability, and the preliminary preferred ACLs for canary and widow rockfish and subsequent trawl allocation, this opportunity could be afforded in 2011-2012.

Amendment 20: Carry-over Provision

Under the Council's final preferred alternative for Amendment 20, unused QP up to 10 percent of the used and unused QP in the vessel account may be carried over for use in the next year. Similarly, in order to cover an overage (landings that exceed the amount of QP held in a vessel account) QP that may be allocated in the next year may be transferred to the current year, up to 10 percent of the used and unused QP in the vessel account during the current year. In sum, Amendment 20 provides for 10 percent of the quota pounds to be carried over (excess quota pounds) or carried under (deficit quota pounds).

The rationale for the carryover is described in the Amendment 20 FEIS and is based around increased flexibility to fishery participants. Through the SPEX process we must consider how the carry-over provision works in relationship to the 2011-12 ACLs and the trawl allocation. It is essentially a question of management uncertainty, i.e. the risk the provision poses to our ability to stay within catch limits and whether that risk is acceptably low.

To explore this risk, the worst case scenario was analyzed. The largest potential overage from the carry-over alone is of course, 10 percent. Every QP holder would need to carry under their 10 percent for that situation to occur and all QP would need to be harvested. Such a scenario is of concern only for species that are "fully prescribed" in the TIQ fishery and seems like a low risk to us. Moreover, given the carry under is matched with a carry over for the next year, we would not expect the biological impact to be high.

Table B-23 outlines the non-overfished species for which the OY was attained by 80 percent or greater from 2005-2008. Of those species, Dover sole, sablefish, and short spine thornyhead are targets in the trawl fishery. The GMT anticipates that sablefish will be harvested at greater than 80 percent, especially given the lower ACL contemplated in 2011-2012 relative to recent OYs. Petrale sole is likely to be fully prescribed because of its market desirability and restrictive rebuilding ACL. Whiting is another candidate.

As for Dover sole, the preliminary preferred ACL for Dover sole is significantly greater (25,000 mt) than the OYs seen in 2005 and 2006 (7,476 mt and 7,564 mt, respectively). Even if markets expanded it seems unlikely that the trawl allocation would be exceeded or that all or a majority of permit holders would carry forward a deficit. As such, it is not likely that there is a risk of exceeding the Dover sole trawl allocation, let alone the ACL, given the carry over provision.

The GMT anticipates that in addition to sablefish and shortspine thornyheads, all overfished species will be greater than 80 percent prescribed and thus are potential species for which a carryover may be possible.

Table B-23. Species from 2005-2008 where the OY was attained by 80 percent or greater, compared to the 2011-2012 PPA ACL.

Species	Year	Catch/OY	11-12 PPA ACL
Black rockfish s. 46°16	2007	577/722	1,000
Black rockfish s. 46°16	2008	593/722	
Cabezon CA	2005	80/69	179 - 168
Cabezon CA	2006	106/69	
Dover Sole	2005	7,507/7,476	17,560
Dover sole	2006	7,730/7,564	
Nearshore rockfish coastwide	2005	590/737	805 a/
Nearshore rockfish N 40°10	2007	133/142	155
Nearshore rockfish S 40°10	2006	711/615	650
Nearshore rockfish S 40°10	2007	466/564	650
Sablefish	2005	6,543/7,761	5,858 - 5792 a/
Sablefish	2006	6,470/,7634	
Sablefish	2007	5,545/5,934	
Sablefish	2008	6,078/5,934	
Shortspine thornyhead (coastwide)	2005	796/999	1,978-1,957 a/
Shortspine thornyhead (coastwide)	2006	853/1018	1,978-1,957 a/
Shortspine thornyhead n. 34°27	2008	1,313/1,634	1,573 - 1,556

a/The Council's final preferred decision for nearshore rockfish, sablefish, and shortspine thornyhead does not contain the specification of a coastwide ACL. For the purposes of this comparison the ACLs north and south were summed to represent a coastwide ACL.

The GMT considered what would happen if a stock assessment was completed in 2011, an accompanying point of concern was issued, and the ACL was reduced mid-cycle. For example, consider petrale sole actions during 2009/2010, where the stock assessment indicated cause for concern and the OY was reduced mid-year during 2009 and further reduced during 2010 (Table B-24).

Table B-24. Example of petrale sole changes in OY through point of concern.

Year	OY (mt)	Trawl Allocation a/ (mt)	New OY (mt)	Trawl Allocation a/ (mt)	% Change in Allocation
2009	2,433	2,393	2,433	1995	17%
2010	2,393	2,393	1,193	1178	51%

a/ For analytical purposes it was assumed the projected impacts were the defacto trawl allocation.

In the case of a mid-year point of concern declaration, the Council could reduce the amount of potential carry over proportionately to the reduction in the ACL. A similar proportional reduction could apply if the 2013-2014 (next SPEX process) are reduced compared to the 2012 ACL (current SPEX process).

Further, the Council considered that the at-sea whiting set asides (See Chapter 2 Tables 2-37 and 2-38) were set at levels higher than catches seen since 1995 (PFMC 2010). As such, the at-sea whiting set asides may buffer the trawl allocation and reduce the possibility that the trawl allocation or the ACL will be exceeded.

Impact of Petrale Sole Harvest Reductions to Halibut IBQ

The 2011 petrale ACL reductions and arrowtooth ACL decision are tied directly to the initial allocation of individual bycatch quota (IBQ) for Pacific halibut. Halibut IBQ will be calculated using a formula based on quota share (QS) for arrowtooth flounder and petrale sole, two target species that correlate to Pacific halibut bycatch. Therefore, under the new lower petrale ACLs, those permits with relatively less arrowtooth QS will be allocated relatively less halibut IBQ. Conversely, the higher petrale ACL alternatives are more likely to result in the intended distribution of halibut IBQ under the Amendment 20 action.

B.3.2.2 Limited Entry Whiting Trawl Fishery

In the event that Amendment 20: Trawl Rationalization is not implemented on January 1, 2011, the Council requested that the GMT design cumulative limits for the primary shore-based whiting fishery.

Non-whiting Cumulative Limits for the Primary Whiting Season

In 2007, cumulative monthly limits were specified in the shoreside whiting Exempted Fishing Permit (EFP) for lingcod, minor slope rockfish (including darkblotched), minor shelf, shortbelly, widow, and yellowtail rockfish, Pacific Ocean perch, Pacific cod, and sablefish. The 2008 and 2009 EFP structure did not provide landing allowances for species other than whiting. Since those allowances were not made in the EFP, Federal regulations applied and only allowed fishermen to get paid for monthly landing allowances for yellowtail and widow rockfish (species for which there is a midwater gear trip limit specified in Federal regulation). In November 2009, the Council tasked the GMT and the Northwest Region with analyzing mid-water trawl trip limits for the shoreside whiting EFP for 2010. This analysis is included in the 2011-2012 Harvest Specifications and Management Measures EIS so that the limits can be species in Federal regulation, in the event Amendment 20 is not implemented January 1, 2011. Further, these trip limits would then be considered a routine management measure and, should data reflect the need, the limits could be adjusted inseason.

The GMT analyzed the 2007 trip limit structure specified in the EFP and compared it to landings in 2008 and 2009, years when overages were forfeited to the state, to determine whether these limits could be appropriate for the 2010 EFP. From 2007-2009, the whiting fishery operated north of 40º10’ N. latitude and as such the analysis and recommendations are limited to north of 40º10’ N. latitude. Overall, the limits specified in the 2007 EFP appear to be appropriate, although many boats would be expected to exceed the sablefish and slope rockfish limits. The GMT did not recommend increasing these limits to accommodate the higher landings because the whiting season is very short (~4-6 weeks) and there is limited opportunity to decrease limits inseason should it become necessary. These cumulative limits are not expected to change the species composition of the landings or the magnitude of landings; they are only to allow the fishermen to get paid for their incidental catch, instead of forfeiting those landings to the state.

The following limits were recommended for 2010 the shoreside non-treaty whiting fisheries operating north of 40º10' N. latitude and would also be appropriate for the 2011-2012 fishery:

- Lingcod: 600 lb per calendar month
- Minor slope rockfish, including darkblotched rockfish: 1,000 lb per calendar month
- Pacific ocean perch: 600 lb per calendar month
- Pacific cod: 600 lb per calendar month
- Sablefish: 1,000 lb per calendar month

These limits would be in addition to the current midwater trawl limits specified in Federal regulations (i.e., trip limit table 3) for widow rockfish and yellowtail rockfish north of 40º10' N. latitude. Midwater trawl limits south of 40º10' N. latitude remain unaffected by this recommendation.

B.3.2.3 Tribal Fisheries

Bycatch in the Tribal Groundfish Fisheries

Tribal directed groundfish fisheries are subject to full retention requirements. As such, there are no regulatory discards in treaty tribal groundfish fisheries. For some rockfish species, where the tribes do not have formal allocations, trip limits proposed by the tribes are adopted by the Council to accommodate incidental catch in directed fisheries for Pacific halibut, sablefish, Pacific cod, flatfishes, and yellowtail rockfish. These trip limits are generally intended to constrain direct catches of non-overfished rockfishes while allowing for small incidental catches of non-target rockfish (i.e. both overfished and non-overfished). Trip limits of 300 pounds each exist for canary rockfish, minor shelf rockfish, and minor slope rockfish. Yelloweye rockfish are subject to a 100 pound per trip limit. Widow rockfish are constrained to 10 percent of the yellowtail rockfish landed by a given vessel for the year. For all other species, trip limits listed in the 2011-2012 management measures proposal apply.

Trip limit overages are forfeited to the tribes. In 2007 the overages in the bottom trawl fishery were 477 lbs of minor shelf, 378 lbs of widow, 288 lbs of yellowtail, and 162 lbs of lingcod. Longline fisheries in 2007 had 1,209 lbs of sablefish overages. In 2008, the bottom trawl fishery had overages of 11,111 lbs of yellowtail, 448 lbs of shortspine thornyhead, and 410 lbs of lingcod. The midwater trawl fishery in 2008 had overages of 7,876 lbs of widow and the longline fishery had overages of 100 lbs of canary rockfish, 35 lbs of yelloweye, and 1,636 lbs of sablefish. For 2009 the bottom trawl fishery had an overage of 135 lbs of canary, the midwater fishery had overages of 1,783 lbs of yellowtail, 10,021 lbs of widow, 752 lbs of canary, and 2,201 lbs of minor shelf rockfish. The longline fishery in 2009 had overages of 1,178 lbs of sablefish, 1,540 lbs of lingcod, and 58 lbs of minor slope rockfish. Rockfish trip limits do not apply in the tribal Pacific whiting fishery (where all rockfish are retained and forfeited to the tribe for charitable contribution). Groundfish bycatch in the Pacific whiting fishery is estimated by NMFS observers.

Estimated groundfish bycatch in Makah trawl and troll fisheries in recent years is depicted in Table B-25 along with catch of some select target species. For example yellowtail is the primary target in the midwater trawl fishery and lingcod and shortspine thornyhead are increasingly important targets for some bottom trawlers. Among the overfished species, the table shows some bycatch of widow rockfish and canary rockfish in midwater and bottom trawl as well as salmon troll fisheries. Estimated bycatch in all tribal longline fisheries in recent years is shown in Table B-26. The table shows some bycatch of lingcod, canary rockfish, and yelloweye rockfish in tribal halibut and sablefish fisheries.

Table B-25. Groundfish bycatch and catch of select species in Makah trawl and troll fisheries 2005-2009.

	Midwater Trawl				
	2005	2006	2007	2008	2009
Species	Pounds	Pounds	Pounds	Pounds	Pounds
black	0	0	0	2	0
lingcod	695	2,920	142	2,989	4,220
canary	4,096	1944	6	1,426	2,828
yelloweye	0	0	0	0	0
widow	56,518	20274	1,179	28,695	77,446
yellowtail	1,058,316	245,165	16,019	342,812	946,087
POP	0	0	0	0	0
darkblotched	0	144	0	0	0
sp thornyhead	0	0	388	0	0
	Bottom Trawl				
	2005	2006	2007	2008	2009
Species	Pounds	Pounds	Pounds	Pounds	Pounds
black	279	0	0	0	0
lingcod	37,353	35,457	67,382	80,772	25,911
canary	1,699	1,158	1,708	1,271	3,307
yelloweye	0	0	0	7	13
widow	1,425	39	540	270	59
yellowtail	29,950	36,970	31,045	45,906	27,075
POP	7,160	8,228	4,009	1,288	382
darkblotched	0	260	200	21	17
sp thornyhead	13,926	32,995	69,645	58,171	39,714
	Salmon Troll				
	2005	2006	2007	2008	2009
Species	Pounds	Pounds	Pounds	Pounds	Pounds
black	322	0	0	0	0
lingcod	20,201	25,294	9,679	9,929	1,405
canary	1,219	387	161	278	53
yelloweye	364	236	211	113	0
widow	0	49	0	0	0
yellowtail	29,598	30,774	7,218	15,796	3,173
POP	0	17	0	0	0
darkblotched	0	0	0	0	0
sp thornyhead	42	0	0	4	0

Table B-26. Groundfish bycatch in tribal longline fisheries for halibut and sablefish from 2000-2009.

Target Species	Associated Bycatch	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Quinault											
Halibut		85,252	85,644	104,191	25,023	119,995	105,414	86,554	76,321	76,421	46,385
Sablefish		309,762	288,511	114,269	253,412	302,268	240,696	319,039	179,204	259,652	368,079
	black	N/A	0	0	0	0	0	0	0	0	0
	lingcod	N/A	0	0	225	475	328	609	378	8,609	873
	canary	N/A	0	4	0	100	3	0	0	3	5
	yelloweye	N/A	0	10	0	14	17	18	31	62	74
	yellowtail	N/A	0	4	0	0	40	18	24	81	111
	widow	N/A	0	0	0	0	50	0	0	52	85
	POP	N/A	0	0	0	0	0	18	24	40	43
	darkblotched	N/A	0	0	0	158	0	214	49	292	437
	sp thornyheads	N/A	542	570	197	237	1414	1053	1974	4,203	6,031
Quileute											
Halibut		42,666	45,034	67,290	28,737	51,965	40,788	38,337	53,782	47,360	27,043
Sablefish		164,016	143,591	92,438	76,352	155,164	72,184	71,437	69,152	47,622	36,631
	black	30	0	0	0	0	0	0	0	0	0
	lingcod	144	1,599	1,074	119	365	500	4,555	5,792	9,926	9,823
	canary	74	25	117	20	588	80	23	56	769	1,007
	yelloweye	2,365	4,224	3,287	520	1326	561	409	380	330	379
	yellowtail	63	19	74	154	2324	144	603	151	215	74
	widow	0	0	0	0	0	0	0	0	0	0
	POP	0	0	0	0	0	0	0	0	0	0
	darkblotched	0	0	0	0	0	0	0	0	0	0
	sp thornyheads	624	482	91	137	286	335	230	257	180	128
Makah											
Halibut		151,268	270,365	294,618	405,020	330,776	330,776	284,780	257,786	245,144	168,329
Sablefish		490,229	464,723	227,740	493,616	512,907	659,507	534,159	453,392	445,309	486,903
	black	0	0	0	0	2	150	0	0	0	0
	lingcod	3,434	6,138	10,793	16,150	10,379	6,460	16,774	11,898	23,718	41,774
	canary	19,547	2,330	597	999	384	365	412	37	150	131
	yelloweye	523	2,075	1,819	0	283	854	403	281	85	182
	yellowtail	0	382	235	690	384	243	0	98	3,420	117
	widow	3	19	0	0	0	239	22	20	0	0
	POP	0	0	0	0	0	0	0	0	0	0
	darkblotched	0	0	0	0	0	0	0	0	0	0
	sp thornyheads	7,662	10,081	9,229	11,531	8,778	6,907	12,157	13,212	21,418	27,748

Discard and Retention in Tribal Sablefish Fisheries

The tribal sablefish allocation is 10 percent of the OY for the area north of 36° N. latitude. This amount is reduced by about 1.5 percent to account for discard mortality. The tribal sablefish fishery is primarily a longline fishery. The discard mortality rate is estimated as the difference in the ratio of small (<3 pounds) versus large (>3 pounds) fish found in the landings of the competitive portion of the fishery (approximately 1/3 of the tribal allocation) compared to the noncompetitive tribal longline fisheries (approximately 2/3 of the tribal allocation) averaged over the past nine years (Table B-27). This difference is then applied to the noncompetitive fishery allocation share (2/3) to get the rate of discards, and multiplied by 20 percent to get the estimated sablefish mortality rate due to discards[6]. This calculation does not account for the increase in larger fish closer to shore as the season progresses, and so may overestimate actual discard and mortality. A small portion of the tribal sablefish allocation is also taken in the Makah bottom trawl fishery as an allowance to prevent discarding in the directed flatfish and Pacific cod fisheries. That portion of the tribal sablefish fishery that is taken by bottom trawl – 25,689 pounds in 2008 and 3,293 pounds in 2009 (dressed weight) – is subject to full retention requirements. At the end of the season, most trawl vessels make one or two directed sablefish tows to take the remainder of their allowance. All overages are forfeited to the tribe. The lack of discard in the tribal trawl fishery does not significantly affect the overall rate of 1.5 percent applied to tribal sablefish fisheries.

[6] Northwest Fisheries Science Center estimate of mortality as a share of total sablefish discards is 20%.

Table B-27. Calculation of sablefish discard mortality in tribal longline fisheries.

				Pounds of Sablefish by Market Size Category						
Year	Fishery	<2lb	2-3lb	3-4lb	4-5lb	5-7lb	>7lb	Total	%>3lb	difference
2001	Competitive	22,673	67,786	79,515	57,836	36,608	7,829	272,247	66.77%	-
	Noncompetitive	18,616	92,475	111,587	106,734	115,006	34,788	479,206	76.82%	10.04%
2002	Competitive	28,005	56,255	52,910	37,824	26,307	3,710	205,011	58.90%	
	Noncompetitive	16,078	52,816	60,262	47,543	56,071	18,206	250,976	72.55%	13.65%
2003	Competitive	51,952	140,467	49,847	25,420	25,918	7,857	301,461	36.17%	
	Noncompetitive	36,452	103,777	81,568	56,473	70,502	33,588	382,360	63.33%	27.15%
2004	Competitive	42,556	156,187	107,438	33,185	16,602	5,801	361,769	45.06%	
	Noncompetitive	38,757	175,244	145,979	76,893	62,886	23,264	523,023	59.08%	14.02%
2005	Competitive	11,315	81,743	109,237	64,471	24,878	4,226	295,870	68.55%	
	Noncompetitive	18,148	126,973	191,364	134,564	93,428	24,963	589,440	75.38%	6.83%
2006	Competitive	16,890	69,262	98,647	67,620	34,159	7,517	294,095	70.71%	
	Noncompetitive	25,507	120,739	148,894	111,003	98,244	37,798	542,185	73.03%	2.32%
2007	Competitive	13,238	52,597	71,856	57,866	39,221	7,419	242,196	72.82%	
	Noncompetitive	11,430	62,023	96,250	94,340	104,367	27,816	396,224	81.46%	8.64%
2008	Competitive	12,530	68,914	91,742	62,372	48,202	11,220	294980	72.39%	
	Noncompetitive	9,749	68,912	99,861	84,610	94,341	29,367	386,840	79.67%	7.28%
2009	Competitive	15,268	82,037	89,593	53,410	44,532	11,093	295,933	67.12%	
	Noncompetitive	17,312	115,090	159,388	113,325	115,536	45,911	566,562	76.63%	9.51%
Calculations										
	YEAR	DISCARD RATE[a/]	MORTALITY RATE[b/]							
	2001	0.067298	0.013460							
	2002	0.091454	0.018291							
	2003	0.181933	0.036387							
	2004	0.093937	0.018787							
	2005	0.045776	0.009155							
	2006	0.015547	0.003109							
	2007	0.057915	0.011583							
	2008	0.048748	0.00975							
	2009	0.063726	0.012745							
	AVG	0.074037	0.014807							

a/ Difference between "%>3lb" in noncompetitive fishery and competitive fishery x .67 (allocation to noncompetitive fishery).

b/ Discard rate x 20% (Northwest Fisheries Science Center estimate of mortality as a share of total sablefish discards).

Makah Trawl Observations

Makah trawl fisheries pursue two basic strategies – bottom trawl and midwater trawl. In an agreement with the National Marine Fisheries Service and the Pacific Fishery Management Council, the Tribe has had an observer program in place since 2003 to monitor maximum retention. Maximum retention is defined as retention of all marketable species and all overfished species. The program has a target observation rate of approximately 15 percent of all trawl trips in a given year, though in. Management is focused on avoidance of two overfished species: canary rockfish in both strategies and widow rockfish in midwater trawls. Makah Fisheries Management combines their maximum retention policy with an observer program to verify the accuracy of bycatch accounting (i.e. if observed bycatch rates are not significantly different than unobserved bycatch rates, managers are reasonably certain that landings reflect total mortality for overfished species). The following analyses are for the two most recent years of data. Prior years' analyses can be found in the 2009-2010 Specifications and Management Measures EIS.

Comparisons of bycatch rates in observed versus unobserved landings by year (2008-2009) were conducted for bottom trawl to test for differences in retention of canary rockfish. Separate analyses (*t* tests) were performed for vessels that carried an observer (Table B-28) and all vessels combined (i.e., including those vessels that had no observer coverage during the year) in 2009 (Table B-29). In 2008, all vessels carried an observer on at least one trip, so there is only one comparison. Bycatch rates were also compared for two separate target strategies in bottom trawl (shelf and slope) to examine whether bycatch was more prevalent in one strategy than the other. Two-tailed *t* tests found no significant difference between observed and unobserved trips for vessels that carried an observer during the season in any year. Likewise, no significant difference was measured between all observed and unobserved trips for any given year. Bycatch was not predominantly associated with either target strategy for bottom trawl when compared between the two years.

Midwater trawl fisheries were similarly analyzed for differences in retention of both canary and widow rockfish, as either may be constraining. Two-tailed paired *t* tests were conducted for 2009 only, as 2008 had limited participation and did not allow for confidential results. No significant differences were found between observed versus unobserved landings for either canary or widow rockfish in 2009 (Table B-30).

Table B-28. Yearly comparisons of canary rockfish bycatch rates (measured as pounds of canary rockfish divided by pounds of target category) for bottom trawl vessels that carried an observer at least once during a season.

Year	Target Species	Mean Bycatch Rates		d.f.	*t*	*p*
		Observed	Unobserved			
2008	Shelf	0.051760	0.010251	3	-0.91288	0.428615
	Slope	0.003362	0.001297	3	-1.45296	0.242185
	All Targets	0.002820	0.000960	3	-1.37944	0.261602
2009	Shelf	0.00680	0.00690	2	0.03435	0.975721
	Slope	0.08886	0.01692	2	-0.84492	0.487116
	All Targets	0.00567	0.00466	2	-0.36419	0.750612

Table B-29. Comparisons of canary rockfish bycatch rates (measured as pounds of canary rockfish divided by pounds of target category) for all observed and unobserved bottom trawl vessels in 2009.

Year	Target Species	Mean Bycatch Rates		d.f.	*t*	*p*
		Observed	Unobserved			
2009	Shelf	0.006800	0.006328	6	-0.12391	0.905433
	Slope	0.088861	0.011385	2	-0.91222	0.457945
	All Targets	0.005670	0.003589	2	-0.49315	0.670732

Table B-30. Comparisons of canary and widow rockfish bycatch rates (measured as pounds of bycatch divided by pounds of yellowtail) for midwater trawl vessels in 2009.

Year	Species	Mean Bycatch Rates		d.f.	*t*	*p*
		Observed	Unobserved			
2009	Canary	0.003243	0.002035	2	-0.60883	0.604578
	Widow	0.099908	0.077761	2	-1.20243	0.352243

B.3.2.4 Washington Recreational

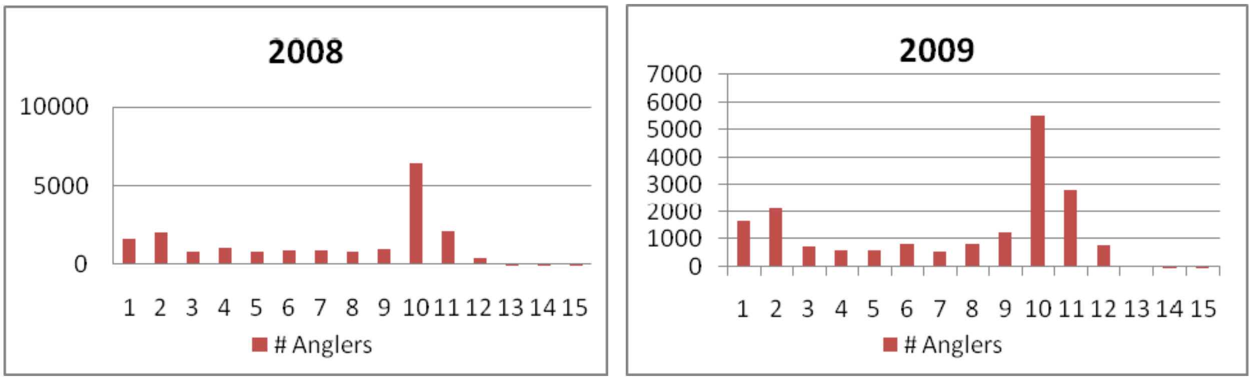
Recreational Groundfish Fishery Bag Limit Reduction and Cabezon Sub Limit Analysis

Washington would implement a reduced aggregate groundfish bag limit from 15 to 12 under all alternatives except the No Action Alternative. The most recent two seasons were analyzed to show the impacts of these changes. The analysis indicates that 99.9 percent of the anglers do not retain more than 12 groundfish and this change would impact less than 1 percent of the anglers (Table B-31).

Cabezon are subject to the aggregate gruondfish limit, but currently do not have a separate sublimit in coastal waters; however, there is a sublimit of two cabezon inside Puget Sound (i.e., east of the Bonilla-Tatoosh line and in Marine Catch Areas 5-13). As the status of cabezon off Washington is unknown and catches have recently increased on the coast WDFW would place a sublimit of two cabezon per angler per day under all alternatives except the No Action Alternative. This would promote consistency between the coast and Puget Sound. A summary of the analysis can be found in Table B-32.

Table B-31. Washington recreational groundfish bag limit analysis for Marine Areas 1-4.

Number of Bottomfish per Angler



% Unexpanded Catch (2008)

Rockfish	Lingcod	Cabezon	Other
91.25%	8.02%	0.55%	0.18%

% Unexpanded Catch (2009)

Rockfish	Lingcod	Cabezon	Other
89.61%	8.50%	0.88%	1.01%

Expanded Catches

Total Bottomfish: 195,517

Expanded Catches

Total Bottomfish: 216,700

Bottomfish Reduction (# of Fish)

14 Bag	13 Bag	12 Bag
0	30	107

Bottomfish Reduction (# of Fish)

14 Bag	13 Bag	12 Bag
6	32	150

% Bottomfish Reduction

14 Bag	13 Bag	12 Bag
0.00%	0.02%	0.05%

% Bottomfish Reduction

14 Bag	13 Bag	12 Bag
0.00%	0.01%	0.07%

Anglers Affected

Total Anglers: 94,443

	14 Bag	13 Bag	12 Bag
% Anglers	0.01%	0.03%	0.11%
# Anglers	6	29	99

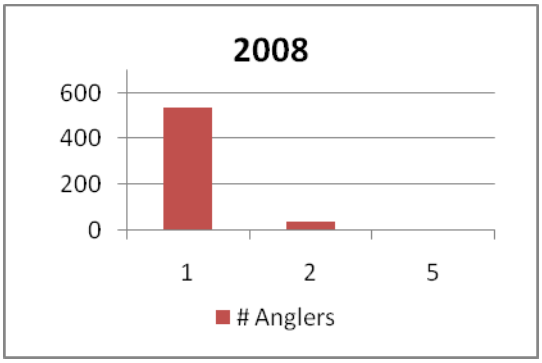
Anglers Affected

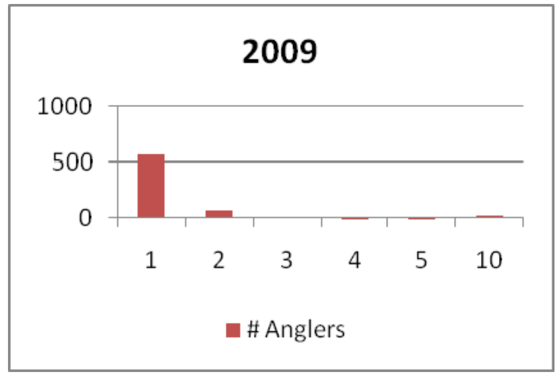
Total Anglers: 163,679

	14 Bag	13 Bag	12 Bag
% Anglers	0.01%	0.02%	0.11%
# Anglers	8	38	185

Table B-32. Washington recreational cabezon sublimit analysis for Marine Areas 1-4.

Number of Cabezon per Angler





Expanded Catches

Total Cabezon: 1,319

Cabezon Reduction (# of Fish)

2 Bag	1 Bag
13	61

% Cabezon Reduction

2 Bag	1 Bag
1.02%	4.59%

Expanded Catches

Total Cabezon: 2,401

Cabezon Reduction (# of Fish)

2 Bag	1 Bag
412	627

% Cabezon Reduction

2 Bag	1 Bag
17.15%	26.10%

Anglers Affected

Total Anglers: 94,443

	2 Bag	1 Bag
% Anglers	0.00%	0.07%
# Anglers	5	62

Anglers Affected

Total Anglers: 163,679

	2 Bag	1 Bag
% Anglers	0.06%	0.16%
# Anglers	99	264

B.3.2.5 Oregon Recreational

Groundfish Retention in the Pacific Halibut Fisheries

New management measure for Oregon included retention of groundfish in the Pacific halibut fisheries. This management measures was not included in the Final Preferred Alternative. The analysis can be found under Section B.4.4.1.

Recreational Groundfish Fishery Cabezon Sub Limit Analysis

Cabezon are subject to the aggregate marine fish bag limit. The status of cabezon off Oregon was assessed for the first time in 2009 and showed that the statewide (recreational and commercial) ACL should be similar to the level currently managed under state recreational and commercial landing caps. However, the state recreational landing cap does not take into account discard mortality or catch from beach and bank fisheries. Even without the additional impacts, the ocean boat fishery has been closed in recent years in August or September due to attainment of the state landing cap. The seasonal depth restriction used to reduce impacts to overfished species, does not have the same affect on cabezon in Oregon. Therefore to reduce recreational ocean boat impacts on cabezon to keep all recreational impacts below the recreational portion of the statewide ACL and attempt to allow for, limited, retention year round, a seasonal sub-bag limit was analyzed by adding a cabezon specific sub-bag limit factor to the Oregon recreational groundfish model (Figure B-16). This sub-bag limit factor did not change impacts to any other overfished or non-overfished species.

<table>
<tr><th></th><th>Jan</th><th>Feb</th><th>Mar</th><th>Apr</th><th>May</th><th>Jun</th><th>Jul</th><th>Aug</th><th>Sep</th><th>Oct</th><th>Nov</th><th>Dec</th><th>Ocean Boat Cabezon Impacts (mt)</th></tr>
<tr><td>1</td><td colspan="12">7</td><td>20.0</td></tr>
<tr><td>2</td><td colspan="12">3</td><td>19.7</td></tr>
<tr><td>3</td><td colspan="12">2</td><td>19.3</td></tr>
<tr><td>4</td><td colspan="12">1</td><td>3.8</td></tr>
<tr><td>5</td><td colspan="6">7</td><td colspan="2">1</td><td colspan="4">7</td><td>15.0</td></tr>
<tr><td>6</td><td colspan="5">7</td><td colspan="3">1</td><td colspan="4">7</td><td>12.0</td></tr>
<tr><td>7</td><td colspan="4">7</td><td colspan="4">1</td><td colspan="4">7</td><td>8.8</td></tr>
<tr><td>8</td><td colspan="3">7</td><td colspan="6">1</td><td colspan="3">7</td><td>6.1</td></tr>
</table>

Figure B-16. Seasonal bag/sub-bag limits for cabezon from the Oregon recreational ocean boat fishery and the projected impacts.

In most areas of Oregon and for most anglers, cabezon is not a targeted species. Since it is a bycatch species, the sub-bag limit had to be reduced to one fish for at least part of the year, to observe decreased impacts. During public meetings with ODFW, anglers requested the seasonal sub-bag limit coincide with the seasonal depth closure, for ease and consistency of regulations.

B.3.2.6 California Recreational

Combine the Monterey South-Central and Morro Bay South Central Management Areas

CDFG proposes to eliminate the division between the Monterey South-Central (from Pigeon Point to Point Lopez) and the Morro Bay South-Central (Point Lopez to Point Conception) Management Areas to form a single Central Management Area. The original justification for this management line was to allow for finer-scale management in Central California where the main species of concern is canary rockfish. The set harvest limit for canary rockfish has greatly increased since 2008, eliminating the need for the division between these areas. Furthermore, CDFG has not had to enact differing regulations in these two areas since 2006 when the line was put in place.

Add a Management Line at Cape Vizcaino

CDFG proposes to add a management line at Cape Vizcaino (39º 44' N. latitude) in the North-Central North of Point Arena Management Area. Currently, there are no management lines identified in the North-Central North of Point Arena Management Area between Fort Bragg and Shelter Cove. The additional management line allows for finer-scale inseason management for an area which accrues the vast majority of statewide yelloweye rockfish catch. If the yelloweye rockfish catch is projected to exceed the harvest guideline, the North-Central North of Point Arena Management Area may be divided at Cape Vizcaino in order to close groundfish fishing in the northern portion (Shelter Cove) and keep the southern portion (Fort Bragg) open to fishing.

Revise the Naming Convention

To simplify the names used to describe the recreational Management Areas, the longer less intuitive status quo names were replaced with single one word names that relate to the geographic location of the area. The names of the status quo management areas and the new equivalents are provided in Table B-33. Other than the elimination of division between the South-Central Management Areas at Point Lopez, the geographic points delineating each area have not changed. The geographic locations delineating the management areas are also provided.

Table B-33. New California Recreational Management Area Names for 2011-2012, points and latitudes delineating the new areas and the status quo management area name equivalent.

2011-2012 Management Area Name	Northern Border (Latitude)	Southern Border (Latitude)	Status Quo Management Area Name
Northern	CA/OR Border (42º N. lat.)	Near Cape Mendocino (40º 10' N. lat.)	Northern
Mendocino	Near Cape Mendocino (40º 10' N. lat.)	Point Arena (38º 57.5' N. lat.)	North-Central North of Point Arena
San Francisco	Point Arena (38º 57.5' N. lat.)	Pigeon Point (37º 11' N. lat.)	North-Central South of Point Arena
Central	Pigeon Point (37º 11' N. lat.)	Point Conception (34º 27' N. lat.)	Monterey South-Central Morro Bay South-Central
Southern	Point Conception (34º 27' N. lat.)	CA/Mexico Border	Southern

Eliminate the 10 fm Depth Closure around the Farallon Islands and Noonday Rock

CDFG proposes the elimination of the 10 fm depth closure around the Farallon Islands and Noonday Rock in the North-Central South of Point Arena Management Area. At present, take or possession of groundfish is prohibited in waters of 10 fm or less around the Farallon Islands and Noonday Rock. This management measure was initially put in place to reduce impacts on shallow nearshore rockfish species such as China, kelp, grass, black and yellow and gopher rockfishes. Marine Protected Areas (MPAs), effective May 1, 2010, prohibit fishing around the Islands. MPAs are depicted by light shading in Figure B-17. The MPAs are closed to fishing and encompass many of the areas within the 10 fm depth closure (as represented by the black hatched areas within the shaded MPAs in Figure B-17). Thus, the 10 fm fishery closure is redundant and results in unnecessary regulatory complexity. The remaining open areas not affected by MPAs which are 10 fm or less in depth around the Islands are represented by the black hatch areas outside of the shaded MPA areas in Figure B-17. These small areas (around Middle Farallon) will remain open to groundfish fishing under the proposed action, although minimal effort is expected to occur there.

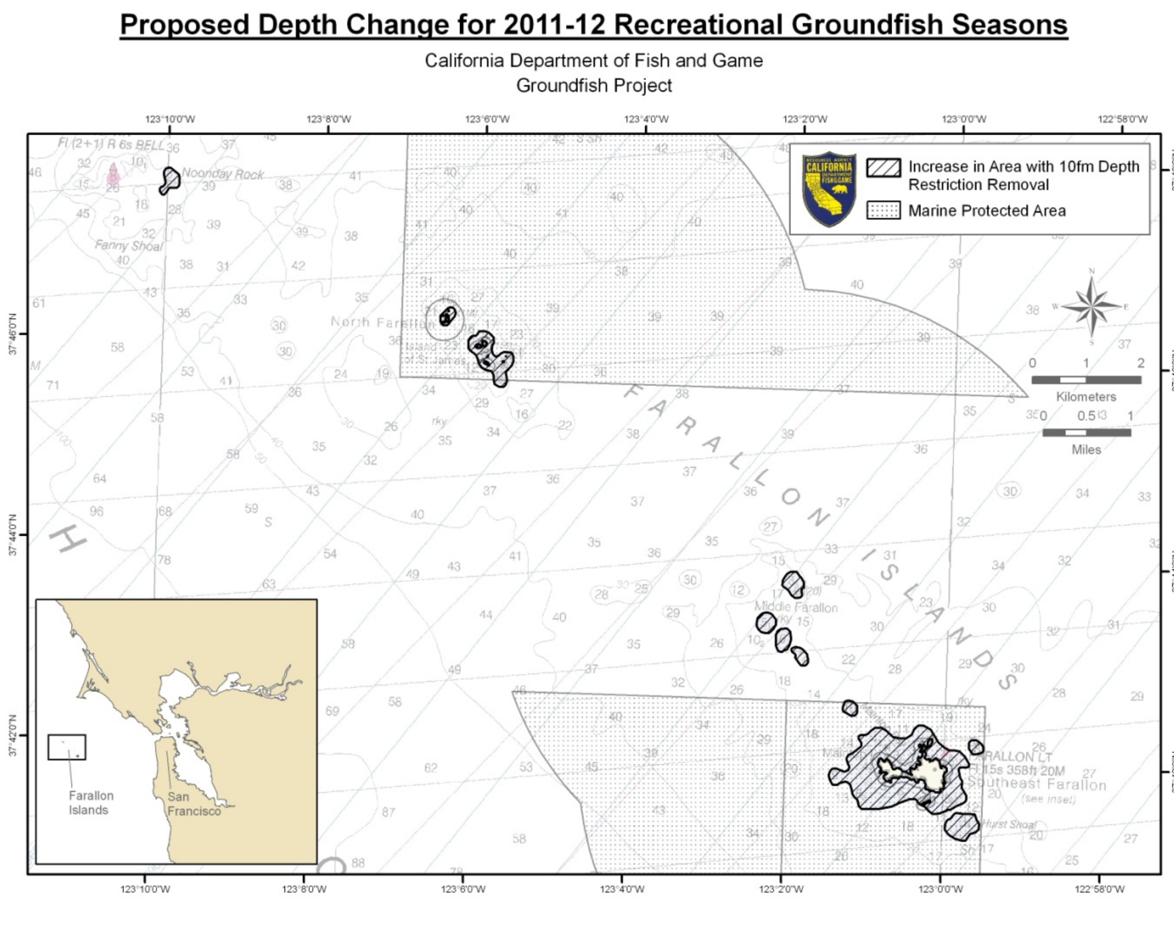


Figure B-17. **Areas within the current 10 fm depth restriction around the Farallon Islands and Noonday Rock and the location of Marine Protected Areas remaining closed to fishing for groundfish.**

Fishing Effort in the Proposed Open Areas

The Farallon Islands and Noonday Rock are located approximately 30 miles west of the of the San Francisco Bay entrance, limiting the number of private and rental boat anglers willing to travel the distance to fish. The party and charter boats that target groundfish in this area tend to fish in deeper water in pursuit of schooling species and lingcod, rather than the shallow nearshore. The long distance from shore in combination with poor weather and rough conditions limit the number of days that private and rental boats or party and charter boats anglers fish at the Islands during the open months of the season.

Shallow Nearshore Rockfish Catch

A vast majority of the shallow nearshore rockfish habitat is closed to fishing around the Farallon Islands through the MPAs. Even with the remaining areas open to fishing, the majority of fishing effort is anticipated to be focused on deeper depths (10 to 30 fm). Therefore, this proposed action is not expected to greatly increase the statewide catch minor nearshore rockfish south complex. Areas open to fishing would only represent less than one square mile of habitat, primarily distributed around the Middle Farallon and Noonday Rock (Table B-34). Though this is a small increase in the area open to fishing, elimination of the 10 fm depth closure will reduce regulatory complexity without greatly impacting minor nearshore rockfish.

Table B-34. **Area gained from elimination of 10 fm depth closure around the Farallon Islands and Noonday Rock.**

Location Opened to Fishing	Area Increase (sq. miles)
Farallon Islands - Noonday Rock	0.11
Farallon Islands – North*	0.02
Farallon Islands - Middle	0.40
Farallon Islands - Southeast*	0.00

* Little to no increase in area due to MPAs

California scorpionfish depth restriction

CDFG proposes to change the 40 fm California scorpionfish depth restriction to 60 fm year-round including January and February in which fishing is currently only open to 40 fm in the Southern Groundfish Management Area (Point Conception to the U.S.-Mexico border). This action will make the scorpionfish depth restriction consistent with the general groundfish depth restriction during the remainder of the year. The scorpionfish depth restriction will be set at 60 fm year-round, simplifying recreational regulations. The 2009 California scorpionfish take was only 62 percent of the recreational portion. The proposed action will provide additional fishing opportunity south of Point Conception and is not anticipated to result in an appreciable increase in take of overfished species.

Scorpionfish Impacts Relative to the Recreational Portion

The RecFISH model was used to project 2011–2012 annual scorpionfish and overfished species (e.g. bocaccio, canary, cowcod, yelloweye rockfishes) take with the modified depth restriction. The RecFISH model uses 2005–2009 data to project for 2011–2012. The projected increased impacts for the aforementioned overfished species were compared to the 2011 and 2012 recreational portion to evaluate whether those harvest guidelines would be exceeded as a result of this action. The RecFISH model projects that if scorpionfish is opened to 60 fm in the Southern Management Area in January and February, annual statewide scorpionfish take will increase only

1.3 mt from 75.7 mt to 77.0 mt in both years. The projected impacts under each ACL alternative with a 40 fm depth restriction and 60 fm depth restriction on California scorpionfish in January and February in the Southern Management Measure and the corresponding percentage of the 2012 recreational portion under the Council adopted ACL assuming the current catch sharing are in Table B-35. The projected scorpionfish take including this small increase is below the 2011 and 2012 recreational portion of 89 and 83 mt respectively. The RecFISH model projects this action will result in a negligible increase in the annual take of bocaccio, canary, cowcod, and yelloweye rockfishes (less than 0.01 mt).

Table B-35. **Projected California scorpionfish impacts in mt under each of the ACL alternatives with a 40 fm and 60 fm depth restriction in January and February in the Southern Management Area.**

ACL Alternative	Scorpionfish Impacts with 40 fm Open in Jan and Feb (SQ) (mt)	Scorpionfish Impacts with 60 fm Open in Jan and Feb (mt)	Percent 2012 Recreational Portion
PPA	61.4	63.8	76%
Intermediate	61.4	63.8	76%
Low	16.6	19.0	23%

Overfished Species Bycatch

To determine if an appreciable amount of overfished species are affiliated with scorpionfish from 40 fm to 60 fm, the RecFIN boat sample data were queried for 1999–2000 (before many of the recreational regulations were put in place) between 0-60 fm for trips where scorpionfish was targeted. The purpose was to identify whether the take of overfished species was associated with scorpionfish between 40 and 60 fm before the 40 fm depth restriction was in place. The boat sample data includes party and charter boats onboard data and party and charter boats dockside data and both show that few rockfishes were caught when boat anglers target scorpionfish. The top four ranked species affiliated with scorpionfish were: Pacific mackerel, flatfish order, barracuda, and Pacific sanddab (Figure B-18). No overfished species were recorded in the party and charter boats onboard sample data during 1999–2000. For the same years, the private and rental boats sample data show the top ranked affiliated species were: flatfish order, barred sandbass, California halibut and spotted sandbass (Figure B-19). No overfished species were recorded in the private and rental boats dockside sample data during 1999–2000.

To identify the species affiliated with scorpionfish in more recent years, the RecFIN California Recreational Fisheries Survey (CRFS) sample database was used for 2004–2009. All species that were caught in association with scorpionfish (targeted or caught) during the months of January and February south of Point Conception were queried and the data were stratified by party and charter boats and private and rental boats modes. Figure B-20 and Figure B-21 show the top six species caught in association with scorpionfish in January and February of 2004–2009 by mode; the results are similar to the boat sample data in Figure B-18 and Figure B-19**.** Few overfished fish were caught while anglers targeted or caught scorpionfish (Table 3-2). Some bocaccio were encountered while anglers fished for scorpionfish, but no yelloweye were caught, and only two canary rockfish and two cowcod were caught during the entire six-year span.

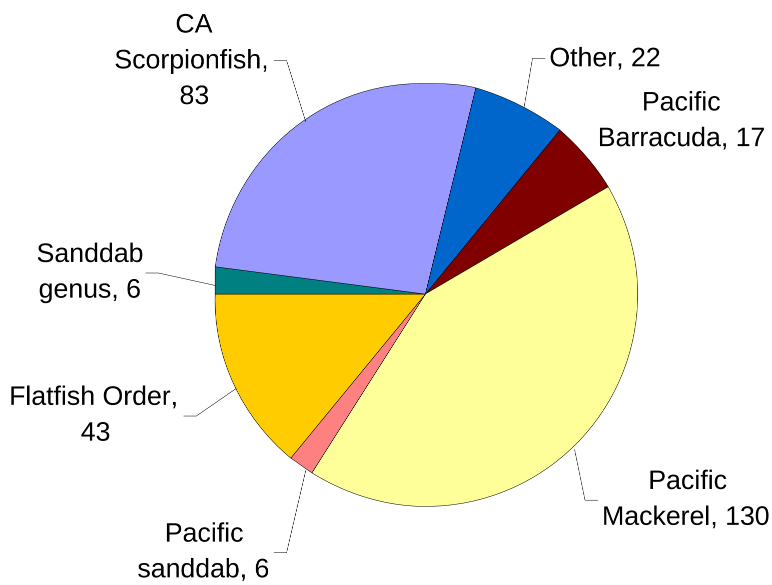


Figure B-18. Total fish caught onboard party/charter boats targeting California scorpionfish, 1999–2000, January and February, south of Point Conception. Data source: RecFIN boat sample data.

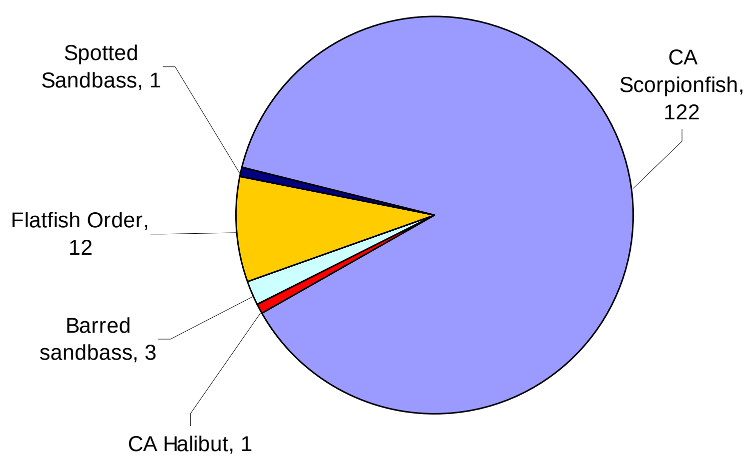


Figure B-19. Total fish caught onboard private/rental boats targeting California Scorpionfish, 1999–2000, January and February, south of Point Conception. Data source: RecFIN boat sample data.

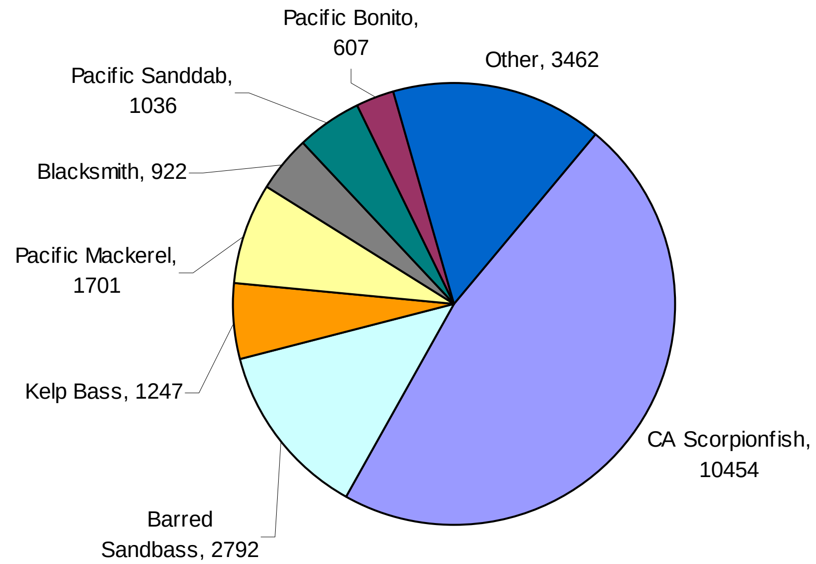


Figure B-20. Total fish caught on party/charter boats in association with California scorpionfish, 2004–2009, January and February, south of Point Conception. Data source: CRFS sample data.

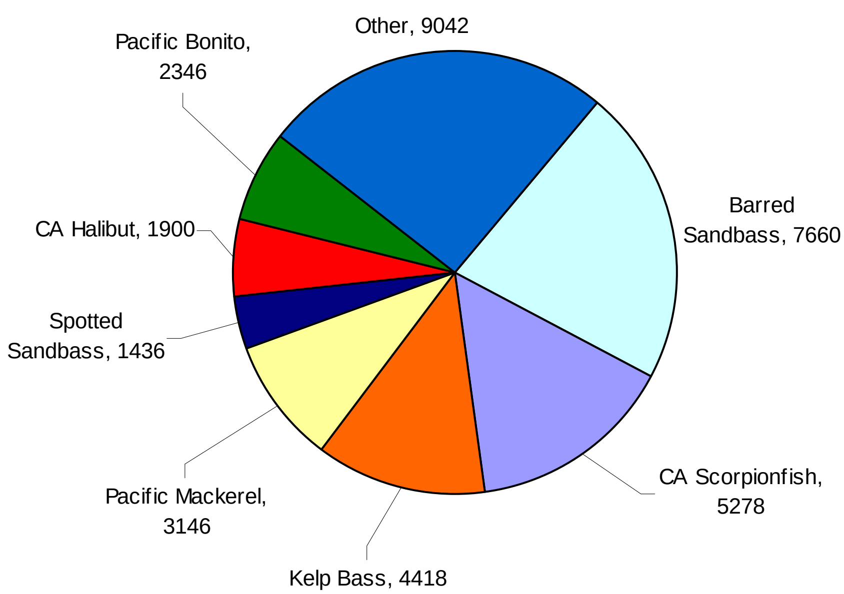


Figure B-21. Total fish caught on private/rental boats in association with California scorpionfish, 2004–2009, January and February, south of Point Conception. Data source: CRFS sample data.

Table B-36. Numbers of overfished species caught in association with California scorpionfish from boat modes in the Southern Management Area, January and February, 2004–2009. PC = party/charter boats, PR = private/rental boats. Data source: CRFS sample data.

	Numbers of Fish Sampled - PC				
Year	CA Scorpionfish	Bocaccio	Canary	Cowcod	Yelloweye
2004	5469	72	0	0	0
2005	282	0	0	0	0
2006	455	0	0	0	0
2007	1159	0	0	0	0
2008	2230	0	0	0	0
2009	859	0	0	0	0
	Numbers of Fish Sampled - PR				
Year	CA Scorpionfish	Bocaccio	Canary	Cowcod	Yelloweye
2004	3962	56	2	2	0
2005	174	5	0	0	0
2006	397	0	0	0	0
2007	255	0	0	0	0
2008	138	0	0	0	0
2009	352	8	0	0	0

Cabezon and Kelp Greenling Gear Restrictions

CDFG proposes to establish cabezon and greenlings gear restrictions such that no more than one rod with two hooks and one line may be used. This proposed action will eliminate the loophole in existing regulations and make gear restrictions consistent among cabezon, greenlings, rockfish and lingcod. This proposed action will eliminate the discrepancy in allowable methods of take among species which are commonly caught and managed together as the rockfish, cabezon, and greenling complex. This proposed action will prevent the excessive recreational fishing effort of multiple rods to target cabezon and kelp and rock greenling.

Cabezon Bag Limit

CDFG proposes to increase the statewide bag limit for cabezon. The proposed action will increase the cabezon bag limit from two to three fish statewide within the ten fish rockfish, cabezon, and greenling complex bag limit. Additional cabezon impacts can be accommodated within the higher ACL. California has management authority over cabezon and allocation of the statewide total allowable catch (TAC) between recreational and commercial sectors is defined in state regulations.

Increase in Catch Expected from Increasing the Cabezon Bag Limit from Two to Three fish

CDFG used the RecFIN methodology for Hypothetical Bag Limit Analyses to determine increased impacts on cabezon resulting from this change. The A+B1+B2 fish from 2004 to 2009 were used in estimating the increased impact based on all fish encountered. The A fish are sampled dead fish. CDFG assumes for cabezon that B1 includes fillets and there were no fish thrown back dead as cabezon have a high survival rate when released. B2 includes live fish over the bag limit or under the size limit of 15 inches.

Since there is no way to estimate the proportion of fish that were undersized, this analysis also assumes there were no fish thrown back as sub-legal and assumes that all B2 fish would be available if the bag limit were increased as the most conservative estimate. All bags over the existing limit are then set to the hypothetical limit to calculate increased take. Results show a consistent increase in expected catch.

The Hypothetical Bag Limit Analyses indicated that there would be a 10 percent increase in total harvested cabezon. The 10 percent increase results in a total projected impact of 28.9 mt under the preliminary preferred ACL alternative, which is 37 percent of the 2010 recreational allocation of the state total allowable catch of 79 mt. The recreational allocation of cabezon will increase to 122 mt under the preliminary preferred alternative ACL of 179 mt. Given the magnitude of the buffer between recent impacts with a two fish bag limit in place in 2009, an increase in the bag limit from two to three fish is not expected to result in the recreational allocation being exceeded. The projected impacts on cabezon resulting from increasing the two fish cabezon bag limit to three fish per angler can be accommodated within the recreational allocation under the adopted ACL.

Table B-37. Projected increase in impacts in mt from increasing the cabezon bag limit to three cabezon with each overfished ACL option and corresponding resulting percentage 2011 total allowable catch.

ACL Alternative	Present Cabezon Impacts 2 Fish Bag Limit (mt)	Projected Impacts with a Three Fish Limit (mt)	Percent 2011 Recreational Allocation of the TAC
PPA	26.3	28.9	30%
Intermediate	21.6	23.8	25%
Low	18.1	19.9	21%

Reduce the California Recreational Lingcod Size Limit

CDFG proposes to lower the minimum size limit for lingcod statewide from 24 inches to 22 inches. The lingcod size limit will be reduced to achieve an annual catch level closer to the recreational portion of the non-trawl allocation. The lingcod take has been nearly half of the recreational portion of the non-trawl allocation for the years 2004–2009, except 2006 (Table B-38). The previous stock assessment in 2005 shows the southern lingcod stock has rebuilt. The most recent stock assessment (2009) shows increasing abundance and the recreational portion of the non-trawl allocation will increase from 422 mt in 2009 to 1,151 mt in 2011 under the Council adopted ACL. Reducing the size limit will increase annual take, but projections show that the recreational portion of the non-trawl allocation will easily accommodate this change with a substantial residual yield left untaken.

The current lingcod size limit in recreational fisheries in Oregon and Washington is 22 inches, so this action will make recreational regulations consistent coast wide. Historically, the California recreational size limit has varied from no size limit prior to 1981 to 30 inches in 2004. The size limit in California has remained 24 inches since 2005, despite the lingcod catch staying well below the statewide ACL. This proposed action will help improve fishing opportunity and achieve the optimum yield of lingcod.

Table B-38. Recreational lingcod take by year as compared to the recreational portion of the non-trawl allocation.

Year	Recreational Portion of the Non-Trawl Allocation	Recreational Lingcod Catch (mt)	% Utilized
2004	269	130	48%
2005	422	242	57%
2006	422	301	71%
2007	422	174	41%
2008	422	99	23%
2009	422	121*	29%

*Includes RecFIN data through 10/31/09

Increased Impacts

Length frequency distributions of discarded and retained lingcod from 2005 to 2009 in combination with weight-at-length data from CRFS onboard sampling were used to estimate the percent increase in catch (by number of fish and weight). The only available length data for recreational discards are from the onboard sampling of party and charter boats. As a result, lengths from this mode were assumed to be representative of all modes.

In order to normalize the length frequency distributions for retained and discarded catch, the frequencies were converted to proportions of catch by length and multiplied by the respective catch estimates in numbers of fish. The size limit was 24 inches from 2005 to 2009 and normalized length composition data from all five years were combined to provide an aggregate length frequency distribution for this period. From this distribution, the proportional increase in lingcod catch (by number of fish) expected from a given reduction in the size limit was estimated. This was done by calculating the percentage of lingcod that were between the 24 inch size limit and the 22 inch size limit (Eq. 1 below).

Eq. 1. Proportional Increase in the Number of Lingcod for a Given Size Limit = Number of fish larger than new size limit / Number of fish larger than 24 inches.

The length-weight relationship from the 2009 stock assessment (Hamel 2009) was used to calculate the average weights of each length bin. The expected increase by weight was then estimated by multiplying the average weights by the frequency for that bin. The proportion of catch between the new size limit and the 24 inch size limit was then calculated, reflecting the percent increase mt (Eq. 2 below).

Eq. 2. Proportional Increase in the Weight of Lingcod for a Given Size Limit = Number of fish in each length bin larger than new size limit * weight of fish for each frequency bin (sum of Li x Wi for all i > x) / number of fish in each length bin larger than 24 inches * weight for each frequency bin (sum of Li x Wi for all i > 24).

Assumptions:

- Anglers will retain all fish above the size restriction.
- Anglers will discard all fish below the size restriction.

- The percent increase in catch from party and charter boats mode is representative of all recreational fishing modes in CRFS.
- The aggregate length frequency distribution for discarded and retained lingcod from 2005-2009 is representative of the stock structure in 2011 and 2012. In reality, it may vary depending on recent recruitment patterns.

The expected percentage increase in catch resulting from reduction of the size limit to 22, 20, or 18 inches and no size limit by number of fish and weight are shown in Table B-39. The increase in catch by weight is estimated to increase from between 19.4 percent for a 22 inch size limit to 39.3 percent in the absence of a size limit. Even if the lingcod size limit had been eliminated in the years 2005–2009, California would not have exceeded the recreational portion of the non-trawl allocation in any year. The length frequency distribution of discarded lingcod does not indicate unusually large year classes will be recruiting to the recreational fishery in the near future, which would have increased catch substantially as a result of a 22 inch size limit.

Table B-39. **Percent increase in recreational lingcod catch estimated to result from each prospective reduced size limit (2005–2009 RecFIN data).**

Size Limit (in.)	Percent Increase in Fish (#)	Percent Increase in Catch (mt)
22	38.0%	19.4%
20	65.5%	29.8%
18	83.7%	34.9%
None	115.2%	39.3%

Ability to Accommodate Increased Lingcod Impacts

It is possible to eliminate the lingcod size limit altogether, without exceeding the recreational portion of the non-trawl allocation, given the large anticipated increase in the ACL. If the size limit was lowered, the increased lingcod fishing mortality would decrease predation on and competition with the less productive *Sebastes* species. A lower lingcod size limit makes it more likely that an angler will obtain the two fish lingcod limit before attaining the rockfish, cabezon, and greenling complex limit and stop fishing, rather than continuing to discard rockfish in pursuit of lingcod. So, this proposed action will discourage high-grading and will reduce bycatch of rockfish.

Lingcod exhibit sexual dimorphism in depth distribution, with males found in shallower water than females and males displaying nest-guarding behavior. Males mature between 18 and 20 inches, while females mature between 27 and 30 inches. The current depth restrictions preserve a large proportion of the female spawning biomass in deeper waters, while redistributing fishing effort onto nearshore waters, increasing impacts on males. Thus, it may be prudent to maintain an appreciable size limit, like 22 inches, to ensure that male lingcod abundance is sufficient to maintain an adequate population of mature nest guarding males. With reduction to a 22 inch size limit, the fillet length restriction would also be reduced to reflect the change in the length restriction (i.e., 14 inch fillet length restriction under a 22 inch total length restriction).

Modification of Recreational Lingcod Spawning Closure in the Southern Management Area in California

A lingcod spawning closure has been in place in California from December through March since the southern stock was deemed overfished in 2001. This was done to protect nest-guarding males during the spawning period in the interest of rebuilding the southern lingcod stock more quickly. According to the most recent stock assessment, the southern lingcod stock has rebuilt to 70 percent of virgin biomass, well above the 40 percent target biomass set by the Council thus the need to continue the spawning closure is questionable. This will greatly increase the California recreational harvest guideline from 422 mt in 2010 to 1,151 mt in 2011 under the preferred ACL and the current catch sharing between sectors.

The lingcod closure is not the only time closure affecting nearshore fisheries. The recreational rockfish, cabezon, and greenling complex season in the Southern Groundfish Management Area is closed in January and February to boat-based anglers and open March through December. The December through March lingcod closure applies to all recreational anglers (boat-based as well as shore-based and spear divers). The current discrepancy in the rockfish, cabezon, and greenling complex and lingcod seasons can be resolved by allowing lingcod to be retained in March and December to reduce regulatory complexity and allow for additional take while remaining far below the recreational portion of the non-trawl allocation for lingcod.

The annual take in the California recreational fishery has been close to half of the recreational portion of the non-trawl allocation for the California recreational fishery since 2004 (Table B-38) due to constraints from over fished species. Under the Council adopted ACL, recreational portion of the non-trawl allocation for the California recreational fishery will more than double. With limited access to the primary depth distribution of lingcod in deeper waters, few management measures are available to harvest the full non-trawl allocation of lingcod in 2011 and 2012.

CDFG proposes to eliminate the lingcod spawning closure in the California recreational fishery to reduce regulatory complexity by maintaining consistent seasons with the other groundfish species including rockfish and enhance fishing opportunity during the months open to fishing. Lingcod would remain closed when the rockfish, cabezon, and greenling complex is closed to prevent anglers that would target lingcod from accruing regulatory discard mortality on rockfish. For example, in 2011, retention of lingcod would not be allowed in the Southern Management Area in January and February, during the closed season for the rockfish, cabezon, and greenling complex. From 2004–2009, not a single canary or yelloweye rockfish was encountered from the shore by anglers interviewed in the California Recreational Fishery Survey who were targeting lingcod and only about six tenths (0.6) of a metric ton of bocaccio were encountered in the shore mode statewide during those six years. Clearly, shore-based anglers have minimal impact on overfished species.

For the purpose of regulation consistency and brevity, the CDFG proposes to eliminate the lingcod spawning closure statewide for all modes of fishing including boat-based and shore-based fishing as well as spear diving.

<u>Lingcod Take Relative to Increased OYs/ACLs in 2011</u>

In 2011 and 2012 recreational portion of the non-trawl allocation under the Council adopted ACL will increase dramatically from 422 mt (2010) to 1151 mt (2011) and to 1184 mt (2012). The average statewide recreational lingcod take from 2005–2009 was only 197 mt, which is 47 percent of the 422 mt recreational portion of the non-trawl allocation in 2010 and 17 percent of the 2011 recreational portion of the non-trawl allocation (Table B-40). The annual lingcod take in 2009 was only 168 mt, which is only 40 percent of the 422 mt harvest guideline and only 14 percent of the 2011 harvest guideline. The unused yield will increase without changes to current management measures.

Table B-40. Recreational lingcod take by year as compared to the recreational portion of the non-trawl allocation.

Year	Recreational Portion of the Non-Trawl Allocation (mt)	Recreational Lingcod Catch (mt)	% Utilized
2005	422	242	57%
2006	422	301	71%
2007	422	174	41%
2008	422	99	23%
2009	422	168	29%
Average	422	197	44%

The monthly projected take of lingcod from January to March with the status quo 2010 depth restrictions by management area are reported in Table B-41. The RecFISH model projections indicate that opening the lingcod fishery in March and December in the Southern Groundfish Management Area will increase annual statewide catch by only 3.8 mt in 2011. If January through March and December were open to fishing in all management areas, lingcod impacts are only projected to increase by 47.8 mt although under the final preferred ACL (which is the least restrictive) these months would remain closed to fishing in most management areas. The projected impacts for December and March 2011 were 3.1 mt and 0.7 mt, respectively. This additional take is negligible relative to the 983 mt of unharvested lingcod between the 2011 recreational portion of the ACL of 1,151 mt and the estimated impacts in 2009 of 168 mt.

Table B-41. Projected impacts on lingcod in mt for each month from December to March in each management area if the season was open.

Management Area	Dec	Jan	Feb	Mar	Total All Months
Northern	0.9	0.7	0.7	4.0	6.3
North Central North of Point Arena	0.9	0.7	0.7	4.0	6.4
North Central South of Point Arena	10.5	2.3	2.3	8.2	23.3
South-Central Management Area	2.2	0.5	0.5	1.7	4.9
Southern Management Area	3.1	1.6	1.6	0.7	6.9
Total All Management Areas	17.6	5.8	5.8	18.6	47.8

Additional lingcod management measures options are also being proposed. An increase in the recreational bag limit to three or four fish per angler or a reduction of the lingcod size limit from 24 inches to 22 inches under consideration by the Council are not expected to appreciably increase impacts relative to the recreational portion of the non-trawl allocation of the preferred 2011 ACL. The constraints posed by the bycatch of canary rockfish and yelloweye rockfish continue to prevent commercial and recreational groundfish fisheries from accessing a higher lingcod biomass in deeper water. Few additional methods beyond size limits, bag limits and an increased season length are available to increase the fishing opportunity for lingcod. An even larger residual of lingcod will be left unutilized even if size limits are reduced, bag limits are decreased, and fishing is allowed during the spawning season. The projected lingcod impacts under each alternative and accounting for both allowing retention during the spawning season and a 22 inch size limit from the respective analyses are provided in Table B-42as well the corresponding percentage of the recreational portion of the non-trawl allocation for 2011.

Table B-42. Projected lingcod impacts (mt) under each of the overfished species ACL alternatives and management measures relative to the 2011 recreational portion of the non-trawl allocation under the final preferred alternative.

ACL Alternative	Present Lingcod Impacts	No Spawning Closure	Size Limit	No Spawning Closure and 22 in. Length Restriction	Percent 2011 Recreational Portion of the Non-Trawl Allocation
PPA	215.1	220.4	256.8	263.2	23%
Intermediate	170.3	175.6	203.4	209.7	18%
Low	164.7	164.7	196.7	196.7	17%

This residual should compensate for the loss of reproductive output resulting from removal of males during the spawning and nest-guarding period. Opening the spawning season is one of the few ways to harvest additional lingcod given the constraints on fishing deeper water posed by the bycatch of overfished species.

Species Retention in the California Recreational CCA

Under the Council's Final Preferred Alternative, shelf rockfish are allowed to be retained while fishing in the CCA. The original analysis, which is provided here, explored the risk of retention for both shelf and slope rockfish.

Under the current regulations, of the more than 90 species within the Pacific Coast Groundfish Management Plan, nearshore rockfish, cabezon, California scorpionfish, greenlings of the genus *Hexagrammos*, and lingcod may be retained within the depths and seasons open to recreational groundfish fishing in the CCA. Currently, all shelf and slope rockfishes encountered within the CCA must be discarded. A percentage of these discarded fish die due to barotrauma and hooking and handling injuries. These fish are wasted as regulatory discards as anglers continue pursuing their 10 fish rockfish, cabezon, and greenling complex bag limit while accruing additional discards. Minimization of regulatory discarding is an expressed preference of stakeholders. "Regulatory discards" represent forgone catch that will then be replaced by another fish to fill the 10 fish rockfish, cabezon, and greenling complex bag limit, increasing chances of encountering overfished species before reaching the bag limit. In conjunction with modifying the list of groundfish species that can be retained, CDFG is also considering an increase in the depth restriction in the CCA which would increase the likelihood of encountering shelf rockfish.

The current recreational depth restriction in the CCA is 20 fm. The CDFG proposes allowing retention of shelf and slope rockfishes within the depths open to recreational groundfish fishing within the CCA. This will make the retention regulations for these species consistent with regulations in the other groundfish management areas allowing retention both shelf and slope rockfish regardless of the depth restriction, even when a 20 fm depth restriction in place as in the Northern Management Area. Retention of cowcod, canary and bronzespotted rockfish will still be prohibited statewide. While this change results in a limited increase to overall take of shelf and slope rockfish, this change will eliminate wastage due to regulatory discarding. In addition, it will reduce regulatory complexity as differentiating nearshore rockfish from shelf and slope rockfish is difficult for anglers and the regulation change will greatly simplify regulations as a result. This action will also disperse some of the effort from larger boats which would have been targeted in the more frequently fished areas in 60 fm outside the CCA or within the very limited habitat within 20 fm in the CCA.

Risks of Exceeding the ACL for Overfished Species and Target Species under the Proposed Action

Using the National Standard 1 language, the standard for whether a management measure is permissible whether the risk of catch exceeding the ACL is "acceptably low." When considering the risk of exceeding the ACL for species likely to be encountered as a result of revised species retention regulations in the CCA, the concerns are whether the increased effort will substantially increase encounters with cowcod or target stocks and if a sufficient buffer exists between the projected impacts and the ACL to account for uncertainty catch estimates inseason, preventing the ACL from being exceeded.

Potential for increased fishing effort within the CCA as a result of the proposed action.

This improved fishing opportunity may result in increased fishing effort in the open depths of the CCA, but the long distance of the Area 1 of the CCA from any port makes it unlikely that many additional anglers will travel the 40 miles from the closest port to fish Santa Barbara Island, let alone travel the nearly 100 miles to Tanner or Cortes Bank to target bottomfish. Furthermore, the 60 fm depth restriction outside the CCA provides considerable opportunity in deeper water closer to shore. The area within the proposed depth restrictions is expected to receive effort from anglers that are pursuing highly migratory species in the area. These anglers may retain rockfish incidentally taken under the revised retention regulations while pursuing other target species or target rockfish as a secondary fishing opportunity before returning to port. A portion of these fish would be wasted under the current prohibition on retention, due to mortality from hooking and barotrauma related injuries after being released rather than being converted to retained catch as anglers continue to pursue yellowtail and nearshore rockfish in the area.

Shelf and slope rockfish catch and cowcod bycatch and the risk of exceeding the ACLs.

The OY is defined as the amount of fish that will provide the greatest overall benefit to the Nation, but in 2007 and 2008 the total mortality of Minor Shelf and Slope Rockfish South by all sectors was less than 51 percent of the OY for these complexes (Table B-43). This is in part due to the constraints posed by overfished species bycatch in the primary depth distribution of these species. The current Council final preferred ACLs for these complexes in 2011 and 2012 less than the OYs in 2007 and 2008. The large residual expected between the total mortality from all sectors and the preliminary preferred OYs for these complexes in 2011 and 2012 should accommodate any potential increases to species in these complexes.

Bocaccio is also a shelf rockfish that could be retained under the retention regulations so long as anglers abide by the present two fish bag limit. It is also subject to a rebuilding plan and restrictive annual harvest limits. Though bocaccio encounters are anticipated to increase within the CCA with proposed deeper depth restrictions, the projected recreational bocaccio impact with the Council's adopted regulations for 2011 is 55.4 mt, well below the 130 mt recreational apportionment of the non-trawl allocation. With a 74.6 mt buffer between the apportionment and the projected impacts, even a doubling of impacts would not cause the apportionment to be exceeded. Thus the risk of exceeding the apportionment, let alone the aggregate ACL bocaccio being exceeded as a result of the proposed action is very low.

The depth restriction analysis provided above indicates that few cowcod are expected to be encountered in depths shallower than the proposed depths within the CCA. At the June 2010 Council meeting 0.9 mt of cowcod out of the 4 mt ACL for 2011 was allocated to the non-trawl fishery including the recreational fishery. Since only de minimis take of cowcod has been observed in the non-trawl commercial fisheries, with less than a tenth of a mt estimated to have been taken in the last five years, a residual of nearly 0.7 mt is anticipated to be available to accommodate an unanticipated increase in impacts from the proposed action. In the event that the 0.9 mt non-trawl allocation is exceeded, there is a one mt portion of the ACL that was not allocated. This represents a one mt management uncertainty buffer between the three mt de-facto ACT for cowcod proscribed to sectors of the fishery and the four mt ACL. In the event that catch does accrue inseason at a rate greater than projected by the RecFISH model that would cause the 0.9 mt non-trawl allocation to be exceeded, action can be taken inseason to close the fishery before the ACL is reached.

Concerns have been expressed that allowing retention of shelf and slope rockfish within the proscribed depth restrictions would motivate anglers to fish in deeper depths in pursuit of these species potentially increasing impacts on cowcod. Discussions with CDFG enforcement indicated that the ability to enforce retention regulations does not differ based on the species that can be retained in this case. Enforcement personnel must encounter anglers in possession of groundfish in depths greater than the established depth restriction in order to issue citations. If there are any groundfish onboard while fishing in waters deeper than depth restriction, whether it be 20 fm, 30 fm or 40 fm, anglers can be cited.

Primary enforcement of the CCA will continue to be by the three 58 foot patrol vessels stationed on the South Coast. These vessels are capable of going far offshore for multiple days. Additionally the department has two radon craft vessels that can cover Santa Barbara Island. Enforcement has also utilized the Departments planes and Coast Guard vessels and helicopters on a regular basis to assist with enforcement of the CCA. As in any management area, enforcement of the regulations is vital to gaining compliance. The depth restrictions and species retention regulations under consideration by the Council would provide enforcement with the enforceable regulations to deter anglers from fishing in waters deeper than those proscribed in regulation with any groundfish onboard.

Continuing the prohibition on retention of slope rockfish would reduce the impetus for anglers in depths far greater than the existing and proposed depth restrictions. Regulatory complexity would not be as greatly reduced as anglers would still have to discriminate slope rockfish which could not be retained from shelf and nearshore rockfish that could. Love et al. (2002, p. 80) note that deepwater sport fishing for rockfish was common practice in Southern California for over 50 years. Though it is highly unlikely that anglers would encounter slope rockfish in the depths open to fishing, continued prohibition will make regulations more complex than in other management areas and may confuse anglers when identifying the catch. Cowcod, bronzespotted, canary and yelloweye rockfish are prohibited in the recreational fishery. Three slope species commonly occur in these areas (bank, blackgill, and aurora rockfish). Historically, bank rockfish (a slope species) was seasonally targeted by recreational fishermen, and ranked 9th among CPFV rockfish catch in Southern California (Ally et al., 1991).

Table B-43. Catch of minor shelf and slope rockfish in 2007 and 2008 compared to the OYs in each year. Data from the 2007 and 2008 WCGOP Total Mortality Report for West Coast Groundfish.

Species Complex	2007 Total Mortality (mt)	2007 OY (mt)	% OY	2008 Total Mortality (mt)	2008 OY (mt)	% OY
Minor Shelf Rockfish S. of 40º 10' N. lat.	365	714	51	212	714	30
Minor Slope Rockfish S. of 40º 10' N. lat.	149	626	24	189	626	30

Summary

While the impacts on shelf and slope rockfish including bocaccio are likely to increase as a result of allowing their retention in the open depths of the CCA, the impacts can be accommodated within the recreational harvest guideline with a minimal risk of exceeding the ACLs. The bycatch of cowcod is not expected to substantially increase as a result of the proposed action and what little increase that may occur can be accommodated within the non-trawl allocation. Regulations are actively enforced within the CCA and the proposed action is enforceable in that shelf and slope rockfish could only be retained within the open waters within the CCA and possession in deeper depths would result in citation as is the case for nearshore rockfish species under the status quo regulation. The proposed regulation change would reduce wastage from regulatory discarding of shelf and slope rockfish. This action will also allow anglers to achieve their 10 fish rockfish, cabezon, and greenling complex bag limits more quickly, thus may reduce the chances of them encountering cowcod in the process.

Proposed Changes to Depth Restrictions in the California Recreational CCA

The CCA was established in 2001 to reduce the impacts on cowcod from the recreational and commercial fishery and hasten the rebuilding of this overfished stock. The western CCA (also known as CCA 1) encompasses 4,200 square miles of area and includes the waters shallower than 20 fm surrounding Osborn, Santa Barbara and San Nicholas Islands and Tanner and Cortez Banks as well as Begg Rock, currently open to fishing for some species of groundfish. This open area currently represents about one percent of the CCA 1.

Adult cowcod are primarily encountered in depths greater than 50 fm (Butler et. al., 2003), which is deeper than the proposed 30 or 40 fm depth restrictions in the CCA. Juvenile cowcod (less than 45 cm total length) occur at depths greater than 30 fathoms (Love and Yoklavich, 2008), which is within the proposed 40 fathom depth restriction. Estimated encounter rates in the California recreational fishery have been extremely low since the current depth restrictions (60 fm outside the CCA and 20 fm inside the CCA), prohibition on retention and the CCA were put in place in 2001, resulting in recreational catch below the 0.3 mt harvest target, far below the 4 mt ACL for 2011. The main conservation consideration regarding the proposed changes to depth restrictions is whether effort distributed in proposed depths would result in increased encounters with cowcod and thus significantly increase the risk of exceeding the ACL. An increase in the depth restriction from 20 fm to 30 fm or 40 fm may not result in a significant increase in bycatch of adult (greater than 45 cm) cowcod in recreational fishery or appreciably increase the risk of the ACL being exceeded. However, the proposed 40 fm depth restriction may increase encounters with juvenile (less than 45 cm) cowcod by allowing fishing in known juvenile cowcod habitat within the CCAs. Continued disturbance of known nursery habitat could also have long-term, negative effects on rebuilding of this overfished species (Love and Yoklavich, 2008).

While the CCAs, in addition to depth restrictions outside the CCA and prohibitions on retention, have contributed to the reduced cowcod bycatch in the recreational fishery, helping keep catch below the OY/ACL, additional fishing opportunity could be made available by increasing the maximum depth restriction within the CCA without greatly increasing cowcod impacts. The CDFG has proposed increasing the depth restriction within the cowcod Conservation Area to 30 fm (180 ft.) or 40 fm (240 ft.) in some of the areas currently open to fishing under the current 20 fm depth restriction. This action would greatly increase fishing opportunity within the western CCA, by allowing the retention of rockfish incidentally encountered while targeting yellowtail in these depths and increasing fishing grounds for anglers targeting rockfish. Depth restrictions would be codified as waypoints connected to form RCA boundaries around the open areas within the CCA found in Table B-48. This analysis evaluates potential benefits to the fishery, as well as uncertainties and impacts to cowcod relative to the ACL associated with the proposed depth restrictions.

Definition of the Proposed Depth Restriction Changes and the Effects of 30 fm or 40 fm Depth Restrictions on Fishable Area

Depictions of the status quo 20 fm depth restriction and the RCA lines representing waypoints connected to delineate the area in which retention of specified species would be allowed with the proposed 30 fm and 40 fm depth restriction are provided in Table B-48. The areas represent large continuous fishing grounds in waters shallower than the common depth distribution of adult cowcod (or both juvenile and adult in the case of the 30 fm proposal). While the proposed areas would be open to take of specified groundfish, there are smaller areas that rise to a depth less than 30 or 40 fm that would remain closed. In these areas, depths drop off too rapidly and over too short a distance to allow them to be fished due to concern for the ability of anglers to comply with the depth restriction. These smaller areas are identified in black in Figure B-22, Figure B-23, Figure B-24, and Figure B-25. Only areas currently open under the 20 fm depth restriction are being opened to greater depths, with the exception of Osborn Bank and Begg Rock, which will be closed to fishing since depths change too abruptly in these areas.

The increases in fishable area made available by 30 and 40 fm depth restrictions in comparison to 20 fm are provided in Table B-44. Overall, the 30 fm depth restriction would increase the fishable area within the CCA by 61.2 square miles, representing an increase of 128 percent. This is more than double the current fishable area under the current 20 fm depth restriction. With a 40 fm depth restriction, the fishable area would increase by 104.4 square miles or 218 percent, more than tripling the fishable area in the CCA. Under the 30 and 40 fm depth restrictions, the percentage of the total area within the CCA open to fishing would only equal 2.6 percent and 3.6 percent of the total 4,200 sq mile CCA respectively.

Using the depth distribution of cowcod in 20 fm to 267 fm (Love et. al., 2002) and GIS layers of the bathymetry within the CCA, the area within these depths was estimated to be 1637 square miles. Given the estimated area within the proposed 40 fm depth restriction, 104.4 square miles or 6.4 percent of the cowcod habitat in the CCA would be open to fishing, while 61.2 square miles or 3.7 percent of the cowcod habitat within the CCA would be open to fishing under the 30 fm depth restriction. While the proposed depth restrictions would appreciably increase the area open to fishing for groundfish within the CCA, the total area open to fishing would still remain less than 7 percent of the cowcod habitat in the CCA, protecting the cowcod biomass in their predominant depth distribution. Thus the proposed depth restrictions would greatly increase fishing opportunity in the CCA while preventing impacts on adult cowcod in the vast majority of the cowcod habitat within the CCA. The proposed 30 fm depth restriction would most likely extend this habitat protection to both juvenile and adult cowcod.

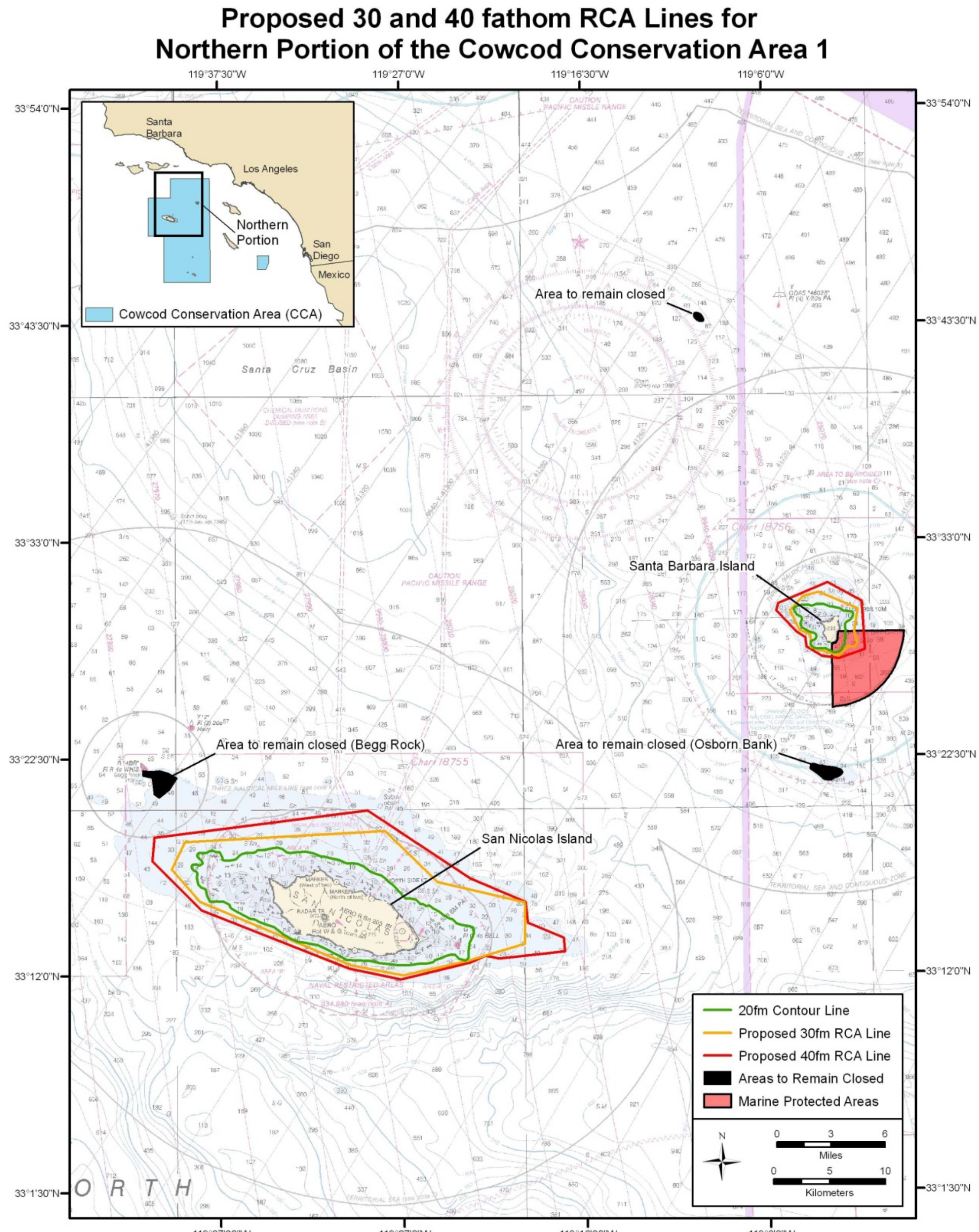


Figure B-22. Detailed chart of proposed 30 and 40 fm RCA lines for the northern portion of the western CCA. The Marine Protected Area shown above is closed to fishing for groundfish.

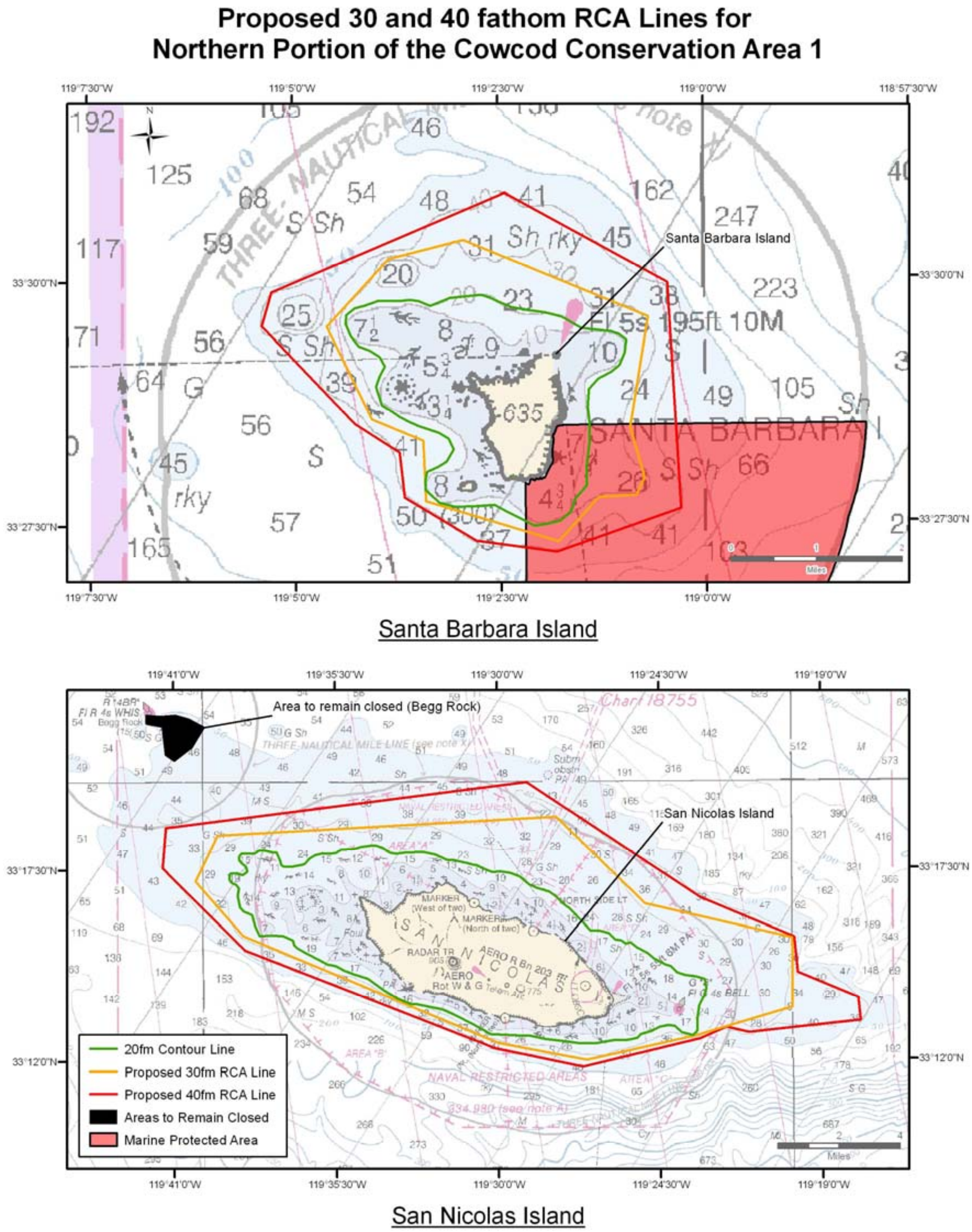


Figure B-23. Detailed charts of the proposed 30 and 40 fathom RCA lines for the northern portion of the western CCA. The Marine Protected Area shown above is closed to fishing for groundfish.

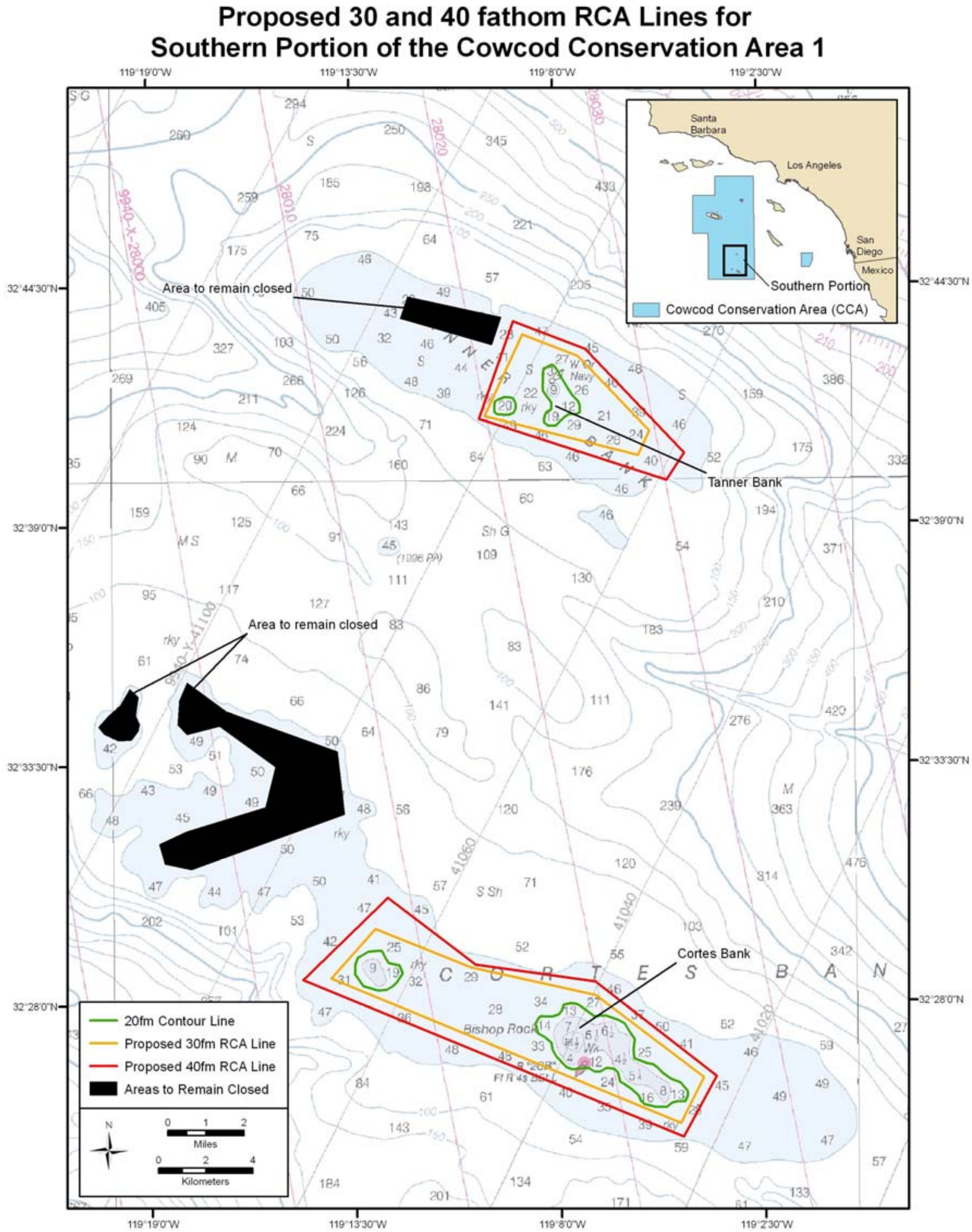


Figure B-24. Overview chart of proposed 30 and 40 fathom RCA lines for the southern portion of the western CCA.

Proposed 30 and 40 fathom RCA Lines for Southern Portion of the Cowcod Conservation Area 1

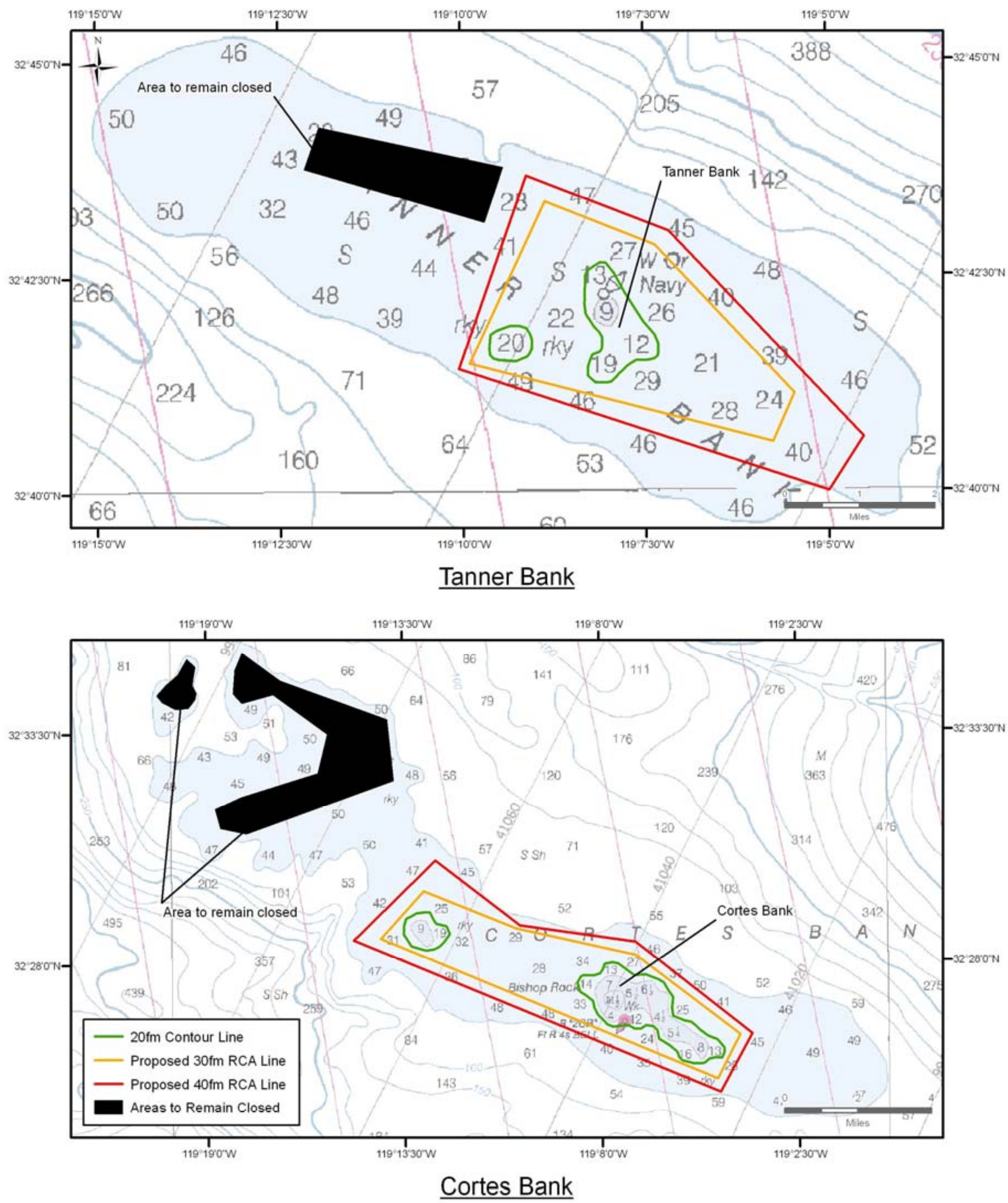


Figure B-25. Detailed charts of the proposed 30 and 40 fm RCA lines for the southern portion of the western CCA.

Table B-44. Area open to fishing within the status quo 20 fm depth restriction and the estimated increase in area open to fishing under the proposed depth restriction modification from 20 fm (status quo) to 30 fm or 40 fm and the corresponding percentage increase in area.

	Status Quo 20 fm Depth Restriction	Option 1 30 fm Depth Restriction			Option 2 40 fm Depth Restriction		
Open Area within CCA	**Area Less Than 20 fm (sq. miles)**	**Area Increase 20 to 30 fm (sq. miles)**	**Total Area to 30 fm (sq. miles)**	**Percent Increase 20 to 30 fm (sq. miles)**	**Area Increase 20 to 40 fm (sq. miles)**	**Total Area to 40 fm (sq. miles)**	**Percent Increase 20 to 40 fm (sq. miles)**
Santa Barbara Island	4.6	3.4	8	74%	8.3	12.9	180%
San Nicolas Island	36.5	39.6	76.1	108%	66.2	102.7	181%
Cortes Bank	5.5	12.1	17.6	220%	19.9	25.4	362%
Tanner Bank	1.1	6.1	7.2	553%	10.0	11.1	907%
CCA Total	47.7	61.2	108.9	128%	104.4	152.1	219%

Conservation Considerations Regarding Cowcod Depth Distribution Relative to Proposed Depth Restrictions and Potential Implications for Impacts on Cowcod

The main concern regarding the proposed changes to depth restrictions is whether effort distributed in deeper depths would result in increased encounters with cowcod and significantly increase the risk of exceeding the ACL. When considering this risk, the concerns are 1) whether the increased depth restrictions will substantially increase encounters with cowcod, 2) how much uncertainty there is in bycatch estimation, and 3) if a sufficient buffer exists between the projected impacts and the ACL to account for variability in catch estimates inseason.

Evaluation of the Potential for Increased Cowcod Encounters based on Common Depth Distribution

Though cowcod do occur from 20 fm to 267 fm (Love et. al., 2003), submersible surveys within the Southern California Bight indicate that juvenile cowcod occur from 28 fm (52 meters) to 180 fm (330 meters) and adults are most common at depths of 66 fm to 115 fm (Butler et al., 2003). Butler et al. (2003) reported depth ranges for juvenile that were based on a subset (21 observations) of the data used in the more recent and comprehensive study (216 observations) by Love and Yoklavich (2008). The study by Love and Yoklavich included sites within the CCAs, the area of interest, whereas the data available to Butler et al. were limited to areas outside the CCAs. These trends in the depth distribution are not inconsistent with the proportion of catch by depth from the trawl fishery in the Southern California Bight where cowcod were predominantly encountered in depths deeper than 65 fm (Butler et al., 1999). Submersible surveys within the CCA (Love, Yoklavich, and Fourney, 2008) found that adult cowcod occupy depths of 74-322 meters (40-176 fm). Recent submersible surveys also indicate that juvenile cowcod occur over a wide range of habitat types, at depths between 28 and 180 fm and typically avoid soft sediment substrate, favoring hard substrate such as cobble and boulder fields or rock ridges (Love and Yoklavich, 2008). Therefore, the proposed depth restriction of 30 fm would extend fishable area to the edge of juvenile cowcod habitat, and the proposed 40 fm limit would allow fishing in known cowcod habitat. The current 20 fm depth restriction provides a 10-fathomfm buffer between the fishable area and known cowcod habitat. Depth distribution data from the commercial fishery and submersible surveys indicate that adult cowcod are rarely encountered in waters shallower than the proposed 40 fm depth restriction, and that juvenile cowcod, which are still vulnerable to the recreational fishery (Figure B-26), are uncommon in waters shallower than the proposed 30 fm depth restriction.

Cowcod catch by depth data from the Marine Recreational Fishery Statistical Survey (MRFSS) from 1999 and 2000 reflects the proportion of catch by depth, including areas both inside and outside of the CCA, south of Point Conception (Table B-45) when there was no depth restriction or CCA. Though thousands of anglers were sampled, the sample size available for analysis is limited, due to the low cowcod encounter rate in the recreational fishery. The limited results indicate that cowcod are nearly absent from the catch from waters shallower than 40 fm; only 5.9 percent of the catch came from 0 to 30 fm, none were taken from 30 to 40 fm. Though the catch of cowcod still occurs in depths less than 60 fm, they are relatively uncommon in these depths and abundance increases with increasing depth as indicated by the catch per unit effort by 10 fm depth bins in Table B-46. Recent (2004 to 2009) California Recreational Fishery Survey (CRFS) depth of capture data are available from private and CPFV vessels fishing outside the CCA in southern California with a 60 fm depth restriction. These data also reflect the rarity of cowcod in depths less than 40 fm; only 6.8 percent of the catch reported as being taken in less than 40 fm (Table B-45).

Concerns have been expressed regarding the likelihood that anglers comply with existing depth restrictions in the CCA, and what compliance might be with new proposed depth restrictions. All cowcod catch events from recent CRFS data were taken in depths shallower than the current 60 fm depth restriction (Table B-46), which indicates that bottomfish anglers are aware of or abiding by the existing depth restriction, which bodes well for awareness of any proposed depth restrictions in the CCA. The Rockfish Conservation Area (RCA) lines established under the proposed 30 or 40 fm depth restrictions within the CCA are codified by connecting a series of waypoints that provide a definitive delineation of the area open to fishing. The 20 fm depth restriction based on general depth contours is not as clearly defined and allows fishing on small pinnacles where depth restrictions are difficult for anglers to comply with since depths change over too short a distance. The RCA lines delineating the proposed depth restrictions will allow enforcement based on possession inside verses outside the line making the proposed depth restrictions easier for anglers to comply with and for wardens to enforce. Primary enforcement of the CCA will continue to be by the three 58 foot patrol vessels stationed on the South Coast. These vessels are capable of going far offshore for multiple days. Additionally the department has two radon craft vessels that can cover Santa Barbara Island. Enforcement has also utilized the Departments planes and Coast Guard vessels and helicopters on a regular basis to assist with enforcement of the CCA.

Concerns regarding effects that changes to depth restrictions might have on the comparability fishery independent surveys through time have been stated as reason for forgoing previously proposed changes to the outer boundaries of the CCA for the commercial fishery. Fishery independent survey indices for cowcod should not be significantly affected by the currently proposed depth restrictions in the shallower depths of the CCA since the depth restrictions under consideration would open waters shallower than the predominant depth distribution of the species. Thus fishery independent survey indices should be comparable though time as survey sampling at stations in depths shallower than the depth restriction are not as indicative of the relative abundance as those in deeper waters where cowcod are commonly encountered. Considering the prohibition on retention, the relatively low mortality rates from barotraumas in the shallow depths under consideration and outreach encouraging anglers to use descending devices to minimize barotrauma induced mortality, of the few cowcod that are encountered, many are likely to survive after being discarded. Thus the effect on survey indices at the stations within the proposed depth restrictions should be minimal in any case due to the relatively low mortality suffered by discarded fish. Discard mortality rates are estimated to increase rapidly between 30 and 40 fm for rockfish (2009/2010 FEIS, Chapter 4; PFMC, 2009), so the status quo 20 fm and proposed 30 fm depth restrictions would be more effective at maintaining low rates of discard mortality for rockfish.

Data gathered from vessels fishing within the proposed depth restrictions could provide data to inform a fishery dependent index of abundance for species encountered by the recreational fishery in the CCA. This could potentially provide an index of relative abundance that can be compared to future data, if not historical data collected onboard CPFVs, properly stratified to provide a comparable CPUE index, such as data collected by PSMFC from 1999 to 2000 (MRFSS) and by the Department in the 1970s.

Table B-45. Number of cowcod encountered by Commercial Passenger Fishing Vessels (CPFV) and Private/Rental Boats (n = 17) by Depth of Capture from 1999 to 2001 from the Marine Recreational Fishery Statistical Survey (MRFSS), Recreational Fisheries Information Network (RecFIN). All the cowcod catch from Point Conception (34° 27') to the U.S./Mexico border (32° 32').

Depth Bins (fm)	Number of Fish	Percent of Catch
0-10	0	0.0%
11-20	0	0.0%
21-30	1	5.9%
31-40	0	0.0%
41-50	4	23.5%
51-60	2	11.8%
61-70	3	17.6%
71-80	1	5.9%
81-90	4	23.5%
91-100	0	0.0%
>101	2	11.8%

Table B-46. Number of cowcod encountered by 60 ft depth bins on Commercial Passenger Fishing Vessel (CPFV) and Private/Rental Boats (n = 29) from 2004 to 2009 from CRFS, Recreational Fisheries Information Network (RecFIN). The data represents all the cowcod catch data from Point Conception (34° 27') to the U.S./Mexico border (32° 32'). All encounters with cowcod on CPFV on-board and dock-side interviews that include the depth at which they were caught were analyzed.

Depth Bins (fm)	Number of Fish	Percent of Catch
0-10	0	0.0%
11-20	1	3.4%
21-30	0	0.0%
31-40	1	3.4%
41-50	8	27.6%
51-60	19	65.5%
61-70	0	0.0%
71-80	0	0.0%
81-90	0	0.0%
91-100	0	0.0%
>101	0	0.0%

Table B-47. CPUE of cowcod encountered by 60 fm depth bins on Commercial Passenger Fishing Vessel (CPFV) (n = 13) from 1999 to 2000 from CRFS, Recreational Fisheries Information Network (RecFIN). The data represents all the cowcod catch data from Point Conception (34° 27') to the U.S./Mexico border (32° 32').

Depth Bins (fm)	Number of Fish	Angler hours	CPUE
0-10	0	0	0
11-20	0	0	0
21-30	0	0	0
31-40	0	0	0
41-50	4	76.92	0.05
51-60	2	53.08	0.04
61-70	1	3.75	0.27
71-80	3	22.17	0.14
81-90	1	25.02	0.04
91-100	1	11.08	0.09
>101	1	10.5	0.10

Uncertainties in Encounter Rates and Catch Estimates

The stock of cowcod in the Southern California Bight is currently at 4.5 percent of unfished biomass, and was at less than 2.5 percent of unfished biomass in 1999-2000 (Dick et al., 2009). Depth-specific catch estimates from 1999-2001 may not be reliable indicators of potential habitat or the potential distribution of the stock in the future. Given the recently characterized distribution of juvenile cowcod (Love and Yoklavich, 2008), one would expect that recreational fisheries will encounter greater densities in the shallower habitats between 20 and 60 fm as the stock rebuilds. The known depth and habitat preferences of cowcod should also be considered in the context of vulnerability to the fishery at target biomass levels. Length composition data are available from 1975-1977 (Dick et al., 2007) from onboard observer data from the recreational fishery during this unregulated time period. The data show that juvenile cowcod were vulnerable to the gear when there were no depth restrictions and anglers could access the primary depth distribution cowcod, while it was legal to target and retain cowcod (Figure B-26). Given the depleted status of the stock, the predominant depth distribution and the proposed depth restrictions, it will be many decades until the stock reaches a density that would be expected to result in a significantly increased risk of exceeding the current ACL and at that time, the ACL would be increased with the improved status of the stock. Though encounters may increase as the stock rebuilds, so will the ACL. As a result, a buffer can be maintained between the impacts with the proposed depth restrictions and the ACL.

Other concerns have been expressed regarding the frequency of under-reporting of cowcod encounters to prevent additional regulation. The current depth and season restrictions have been in place since 2001 and regulatory action beyond the current restrictions have not been necessary to curtail impacts. Thus, anglers have not had a reason to under report impacts; although, there is no certainty that it is or is not currently occurring. With the increase in fishing opportunity in the CCA, there is concern that reporting of cowcod catch could result in reversion to status quo depth restrictions in the CCA and lead to under-reporting of catch, though the proposed 30 fm depth restriction is not expected to appreciably increase interaction with cowcod (under-reporting of juvenile cowcod catch may be a concern under the proposed 40 fm depth restriction).

The proportion of unidentified rockfish which may be cowcod, and how that might be affected under the proposed changes, was also considered. Since 2002, CDFG has provided identification materials in sport fishing booklets to help anglers identify cowcod, which should reduce the contribution of cowcod to unidentified rockfish. Given that the species has been prohibited for many years without further restrictions from reported catch, anglers are likely to know how to identify cowcod and report encounters. Thus the majority of cowcod interactions are likely to already have been reported and not contribute to the unidentified rockfish. At present, a full analysis of the composition of unidentified rockfish has not been undertaken and a robust estimate of the marginal contribution of cowcod impacts from unidentified rockfish is not available. The magnitude of unreported impacts and unidentified catch composed of cowcod is speculative in nature and cannot be reliably quantified at present.

The question of whether fishing effort would increase in the CCA with increased areas open to fishing, was also an expressed concern. The projected impacts are conservatively biased high relative to the encounter rates expected at a given level of effort in the CCA since the proportion of catch by depth to 60 fm rather than 20 fm is used in the model to represent catch South of Point Conception within U.S. waters. However, they do not account for the potential increase in effort in the CCA. The outcome of increased effort within the proposed depth restrictions in the CCA is difficult to quantify since effort redistributed to deeper depths within the CCA may result in increased cowcod impacts within the CCA.

Variability in bycatch estimates accruing during the course of the season may cause the bycatch estimates to exceed those projected by the RecFISH model. Cowcod are a prohibited species and as such, the vast majority of the encountered fish are discarded in accordance with regulations. The impacts on angler reported discarded fish are determined by the depth dependent mortality rates found in the 2009/2010 FEIS (PFMC, 2008) and the proportion of catch by depth in the Southern Management Area. The present bycatch estimation method applies a depth dependent mortality rate to discard estimates based on the 60 fm depth restriction currently in place in the Southern Management Area, including the CCA. Despite the 20 fm depth restriction in the CCA, the mortality rate is based on the 60 fm depth restriction resulting in an overestimation of mortality for fish caught in the CCA. Thus the bycatch estimate for discarded fish tracked against the harvest target is systematically biased high accounting for more mortality than is likely to be induced.

In addition, use of descending devices has been a component of California's outreach efforts to reduce discard mortality since 2007. More than 10,000 copies of "Bring That Rockfish Down" brochures have been distributed to bait and tackle shops, harbor masters and license vendors statewide to encourage anglers to use the devices to minimize mortality on discarded cowcod. Thus discard mortality may be far lower than estimated if anglers are more likely to identify cowcod and use descending devices to return fish back to depth, however this decrease is not quantifiable with available data.

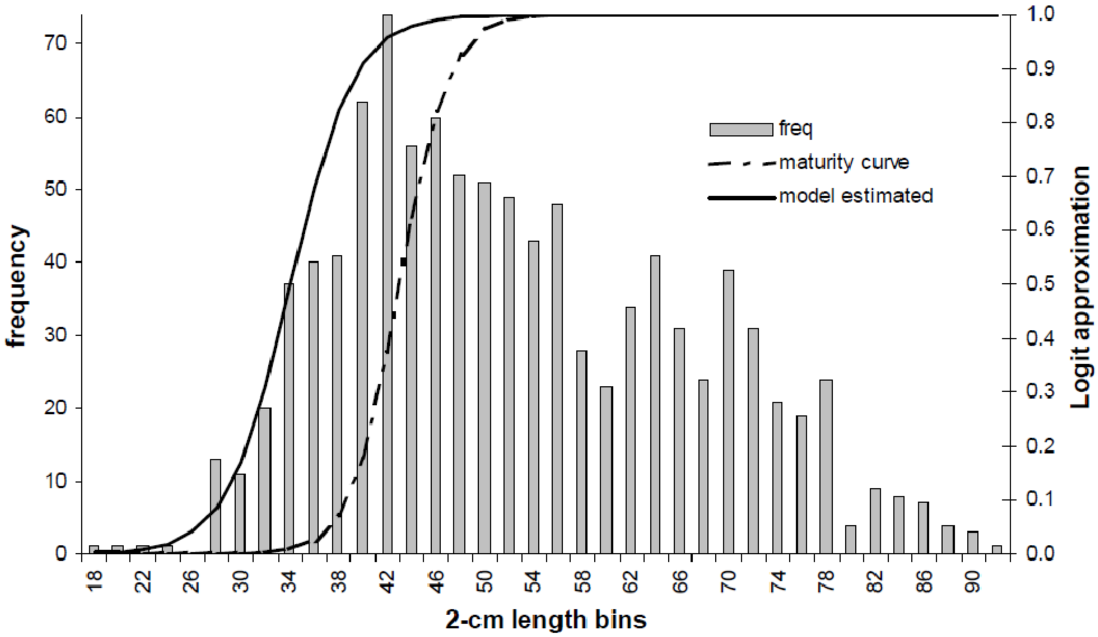


Figure B-26. Length composition data (1975-77) used to fit selectivity curves in the 2007 and 2009 cowcod assessments (Dick et al., 2007, Dick et al., 2009). The model-estimated selectivity is to the left of the maturity curve, showing that juvenile cowcod were vulnerable to the recreational fishery during this time period. Length at 50 percent selection is 34 cm.

Projecting Impacts on Overfished Species and the Risk of Exceeding the California Recreational Harvest Limits

California uses a catch projection model, called RecFISH, to estimate projected impacts of all species of interest taken in the recreational fishery, including the overfished species. The potential for the proposed depth restrictions to cause cowcod bycatch to exceed the non-trawl allocation can be measured by the projected impacts from RecFISH. The current model projections are based on the proportion of catch by depth during the unregulated period 1999-2000 including all waters both inside and outside the CCA. Projections assume the current 60 fm depth restriction in the Southern Management Area encompasses all waters from Point Conception (34°27' N. latitude) to the California/Mexico border including depths within the CCA. In other words, the model already assumes take in the CCA to a depth of 60 fm. Thus, the current 2011 statewide cowcod projection of 0.2 mt accounts for a depth restriction greater than either of those options proposed, biasing the projected impacts toward a higher value than is likely to result from a 30 or 40 fm depth restriction.

The 2010 statewide projected impact of 0.3 mt for cowcod in the California recreational fishery was established in the 2007-2008 management cycle based on projected impacts with a 60 fm depth restriction and was not the result of a Council allocation. The recreational portion of the non-trawl allocation is not a hard allocation and represents less than 7.5 percent of the current 4 mt cowcod ACL. At the June 2010 Council meeting 0.9 mt of cowcod out of the 4 mt ACL for 2011 was allocated to the non-trawl fishery including the recreational fishery. Since only deminimis take of cowcod has been observed in the non-trawl commercial fisheries, with less than a tenth of a mt estimated to have been taken in the last five years, a residual of nearly 0.7 mt is anticipated to be available to accommodate an unanticipated increase in impacts from the proposed action. In the event that the 0.9 mt non-trawl allocation is exceeded, there is a one mt portion of the ACL that was not allocated. This represents a one mt management uncertainty buffer between the three mt de-facto ACT for cowcod proscribed to sectors of the fishery and the four mt ACL. In the event that catch does accrue inseason at a rate greater than projected by the RecFISH model that would cause the 0.9 mt non-trawl allocation to be exceeded, action can be taken inseason to close the fishery before the ACL is reached.

Cowcod bycatch in the recreational fishery is tracked closely inseason by the State of California. While the California Recreational Fishery Survey tracks catch with a one and a half month lag, the Department tracks the catch of cowcod on a weekly basis using the weekly reports from samplers on the number of retained and discarded cowcod sampled in the field and the regression of past estimates of cowcod impacts with sampled catch. The CRFS estimates available to date are combined with the weekly catch tracking and projected impacts to provide a projected catch estimate for the season that will be tracked relative to the non-trawl allocation of cowcod to prevent it from being exceeded. In the event that recreational bycatch does accrue inseason at a rate greater than projected, which could cause the 0.9 mt non-trawl ACL to be exceeded, California has the ability to take action inseason well before the ACL is reached.

Though bocaccio encounters are anticipated to increase within the CCA with deeper depth restrictions, the projected recreational bocaccio impact with the Council's adopted regulations for 2011 is 55.4 mt, well below the 130 mt harvest guideline. As with cowcod, the predominant depth distribution of adult bocaccio is in depths greater than the proposed depth restrictions. Given the magnitude of the buffer between the harvest guideline and the projected impacts, even a doubling of impacts would not cause the harvest guideline to be exceeded as a result of the increased depth restrictions. A two fish bag limit is in place to minimize limit the take of bocaccio in the recreational fishery, reducing waste while minimizing targeting of bocaccio. As mentioned above, California tracks estimated catch of bocaccio inseason using CRFS estimates.

Bronzespotted rockfish have not been observed in the recreational fishery since 2001 when the current depth restrictions were put in place. The proposed depth restrictions are not anticipated to result in any impacts on bronzespotted rockfish, which have only been observed at depths greater than 40 fm (Love et. al., 2003) and are likely uncommon until even greater depths.

<u>Summary</u>

The proposed changes to the depth restriction in the CCA would provide a significant increase in the fishing opportunity within the CCA. While there is some concern regarding the potential for increased cowcod interactions within the CCA as a result of the increased depth restriction, any additional impacts are expected to be minimal. The primary depth distribution of adult cowcod is in deeper water and inseason catch is closely tracked to prevent the non-trawl allocation let alone the ACL from being exceeded. The risk of exceeding the ACL as a result of variability in catch estimates or under-projection of impacts with the proposed depth restrictions is greatly reduced by the remaining management measures that minimize impacts on cowcod, the weekly inseason catch tracking of cowcod, the 0.5 mt buffer of un-proscribed non-trawl allocation, the one metric ton buffer between the allocated catch and the ACL, and the state's ability to act inseason.

Though cowcod do occur from 20 fm to 267 fm (Love et. al., 2003, Love and Yoklavich, 2008, Miller and Lea 1972), The proposed depth restriction of 30 fathoms would extend to the edge of juvenile cowcod habitat, and the proposed 40 fathom limit would allow fishing in known cowcod habitat. The current 20 fathom depth restriction provides a 10 fathom buffer between the fishable area and known cowcod habitat. Encounters with cowcod in the recreational fishery data from the unregulated period increase gradually in depths greater than 40 fm (Table B-46 and

Table B-47) thus implementation of the 30 fm depth restriction, rather than 40 fm, would reduce the likelihood of encountering cowcod.

As noted in the cowcod stock assessment (Dick et al., 2009), projected increases in cowcod biomass have not been verified by observations, but are inferred from the model. No informative abundance indices are available to monitor recent trends in stock status. The estimated status of the stock (5% of unfished biomass) and uncertainty regarding progress toward rebuilding should be taken into account when considering modification to regulations concerning the CCAs.

Coordinates for Revising the CCA Boundaries

The following tables include the latitude and longitude points delineating for the proposed 30 and 40 fm RCA lines in the CCA. In the Council's Final Preferred Alternative the proposed changes to the 30 fm CCA lines were adopted, the 40 fm lines were not approved.

Table B-48. Proposed RCA lines for the CCA.

Santa Barbara Proposed 30fm RCA Points

Fathom Line	Proposed Coordinates						Action
		Lat			Long		
	Point	Deg	Min	Dir	Deg	Min	
30-fm	1	119	2.93	W	33	30.41	Add
30-fm	2	119	3.84	W	33	30.22	Add
30-fm	3	119	4.60	W	33	29.53	Add
30-fm	4	119	4.06	W	33	28.57	Add
30-fm	5	119	3.44	W	33	28.35	Add
30-fm	6	119	3.41	W	33	27.73	Add
30-fm	7	119	1.80	W	33	27.31	Add
30-fm	8	119	1.31	W	33	27.76	Add
30-fm	9	119	0.85	W	33	27.78	Add
30-fm	10	119	0.75	W	33	27.95	Add
30-fm	11	119	0.92	W	33	28.47	Add
30-fm	12	119	0.69	W	33	29.61	Add
30-fm	13	119	2.93	W	33	30.41	Add

Santa Barbara Proposed 40fm RCA Points

Fathom Line	Proposed Coordinates						Action
		Lat			Long		
	Point	Deg	Min	Dir	Deg	Min	
40-fm	1	119	2.42	W	33	30.89	add
40-fm	2	119	5.27	W	33	29.89	add
40-fm	3	119	5.39	W	33	29.54	add
40-fm	4	119	4.27	W	33	28.53	add
40-fm	5	119	3.73	W	33	28.23	add
40-fm	6	119	3.67	W	33	27.77	add
40-fm	7	119	2.80	W	33	27.32	add
40-fm	8	119	1.82	W	33	27.20	add
40-fm	9	119	0.31	W	33	27.64	add
40-fm	10	119	0.45	W	33	29.96	add
40-fm	11	119	2.42	W	33	30.89	add

Table B-48. Proposed RCA lines for the CCA. (continued)

San Nicolas Proposed 30fm RCA Points

Fathom Line	Proposed Coordinates						Action
	Point	Lat			Long		
		Deg	Min	Dir	Deg	Min	
30-fm	1	119	28.00	W	33	19.00	add
30-fm	2	119	39.5	W	33	18.50	add
30-fm	3	119	40.26	W	33	17.18	add
30-fm	4	119	38.65	W	33	15.61	add
30-fm	5	119	30.00	W	33	12.50	add
30-fm	6	119	27.00	W	33	12.00	add
30-fm	7	119	23.30	W	33	12.68	add
30-fm	8	119	20.00	W	33	13.50	add
30-fm	9	119	20.00	W	33	15.50	add
30-fm	10	119	25.00	W	33	16.50	add
30-fm	11	119	28.00	W	33	19.00	add

San Nicolas Proposed 40fm RCA Points

Fathom Line	Proposed Coordinates						Action
	Point	Lat			Long		
		Deg	Min	Dir	Deg	Min	
40-fm	1	119	29.00	W	33	20.00	add
40-fm	2	119	41.27	W	33	18.72	add
40-fm	3	119	41.38	W	33	17.56	add
40-fm	4	119	38.59	W	33	15.19	add
40-fm	5	119	30.11	W	33	12.35	add
40-fm	7	119	27.13	W	33	11.81	add
40-fm	8	119	23.15	W	33	12.60	add
40-fm	9	119	22.26	W	33	12.93	add
40-fm	10	119	21.48	W	33	12.78	add
40-fm	11	119	17.70	W	33	13.11	add
40-fm	12	119	17.77	W	33	13.77	add
40-fm	13	119	19.82	W	33	14.50	add
40-fm	14	119	19.94	W	33	15.52	add
40-fm	15	119	23.12	W	33	16.67	add
40-fm	16	119	29.00	W	33	20.00	add

Table B-48. Proposed RCA lines for the CCA. (continued)

Cortes Bank 30fm RCA Points

Fathom Line	Proposed Coordinates						Action
		Lat			Long		
	Point	Deg	Min	Dir	Deg	Min	
30-fm	1	119	12.95	W	32	29.73	add
30-fm	2	119	10.38	W	32	28.83	add
30-fm	3	119	7.04	W	32	28.17	add
30-fm	4	119	4.14	W	32	26.27	add
30-fm	5	119	4.77	W	32	25.22	add
30-fm	6	119	14.15	W	32	28.60	add
30-fm	7	119	12.95	W	32	29.73	add

Cortes Bank 40fm RCA Points

Fathom Line	Proposed Coordinates						Action
		Lat			Long		
	Point	Deg	Min	Dir	Deg	Min	
40-fm	1	119	12.61	W	32	30.45	add
40-fm	2	119	10.26	W	32	28.90	add
40-fm	3	119	7.04	W	32	28.49	add
40-fm	4	119	3.80	W	32	26.29	add
40-fm	5	119	4.70	W	32	24.91	add
40-fm	6	119	14.91	W	32	28.57	add
40-fm	7	119	12.61	W	32	30.45	add

Tanner Bank 30fm RCA Points

Fathom Line	Proposed Coordinates						Action
		Lat			Long		
	Point	Deg	Min	Dir	Deg	Min	
30-fm	1	119	8.86	W	32	43.37	add
30-fm	2	119	7.36	W	32	42.86	add
30-fm	3	119	5.46	W	32	41.13	add
30-fm	4	119	5.76	W	32	40.57	add
30-fm	5	119	9.90	W	32	41.49	add
30-fm	6	119	8.86	W	32	43.37	add

Table B-48. Proposed RCA lines for the CCA. (continued)

Tanner Bank 40fm RCA Points

Fathom Line	Point	Proposed Coordinates					Action
		Lat			Long		
		Deg	Min	Dir	Deg	Min	
40-fm	1	119	9.11	W	32	43.67	add
40-fm	2	119	7.17	W	32	43.02	add
40-fm	3	119	4.52	W	32	40.62	add
40-fm	4	119	5.00	W	32	40.00	add
40-fm	5	119	10.05	W	32	41.43	add
40-fm	6	119	9.11	W	32	43.67	add

B.4 Analysis for Management Measures Considered But Rejected

The following management measures were adopted by the Council for preliminary but were ultimately rejected for use in 2011-2012. The following is a summary of the analysis to date along with the rationale for not implementing the management measures.

B.4.1 Modify the Non-trawl RCA line at Catalina Island from 60 fm to 100 fm

In November 2009, the original request for analysis was for fixed gear fishing within 100 fm of Catalina Island to provide fishing opportunities after establishment of MPAs. Since then, industry amended the proposal to modify the RCA line at the west end of Catalina Island only. Liberalizing the RCA boundary will provide increased access for the commercial sector (specifically for chilipepper) that would otherwise be lost due to MPAs.

This proposal was predicated on adoption of the Bird Rock State Marine Conservation Area/Blue Cavern State Marine Area and the Farnsworth Onshore and Offshore State Marine Conservation into state regulations since area between the western boundaries of these MPAs is the area to be liberated under this proposal

CDFG staff consulted with Enforcement to verify whether or not this request is enforceable, verify the proposed modification does not conflict with Essential Fish Habitat Areas, and verify the proposed implementation date of the MPAs into state regulation. At the April 2010 Council meeting, the Enforcement Consultants did not support any change to the current 60 fm closure due to the location of an expanded area near proposed marine protected areas (Agenda Item I.4.b Supplemental EC report, April 2010). The increased regulatory complexity potential associated with small fishing opportunity in this area did not seem to justify the change and investment in resources to evaluate it. As a result, a further in-depth analysis of this management measure was discontinued.

B.4.2 Remove the Commercial Lingcod Spawning Closure Coastwide

Current commercial lingcod regulations for the limited entry and open access fixed gear fisheries north and south of 40°10' N. latitude include a spawning closure for the months of December through April. (Note: lingcod may be retained year round by the bottom trawl fishery north and south of 40°10' N. latitude) The limited entry and open access fixed gear seasonal closures were implemented to protect lingcod when it was declared overfished in 1999. The 2009 assessment showed that the northern stock has rebounded to an average depletion of 61.9 percent and the southern stock, 74 percent. Based on this information the GMT considered whether it was appropriate to reduce or eliminate the lingcod spawning closure for the limited entry and open access fixed gear fisheries north and south of 40-10 because the need for the restrictive management measure (i.e., rebuild depleted groundfish stocks) has been satisfied.

Although the lingcod ACLs in the south will be increasing based on the optimistic stock assessments, the amount available to harvest will be limited by available overfished species. Overfished species impacts attributed to lingcod (taken in 60 fm or less) are estimated from the nearshore model. The nearshore model only accounts for total landings and does not differentiate between limited entry and open access sectors. Many species taken in the nearshore fishery are covered under state specific permits, except for lingcod. Lingcod is one of the few species available in shallow water not covered under a state specific permit (only a general state commercial license is required to land lingcod); therefore, the number of participants can fluctuate within and among years.

The take of lingcod is currently limited by two month cumulative landing limits in the limited entry fixed gear sector and by monthly limits in the open access sector. Although the overall amount of fish available under each trip limit is the same (800 lb per 2 months) the monthly limit of 400 lb for the open access sector was implemented to help control effort in this fishery.

The amount of lingcod available to both sectors will be limited by available yelloweye due to the high interactions between the two species. If the spawning closure is removed, it is expected that the amount of lingcod would increase under status quo trip limits. Since the overall take of lingcod cannot increase without exceeding yelloweye impacts, removal of the spawning closure could effectively result in lower trip limits with year round availability.

Since lingcod will have state specific ACLs, the GMT examined modifying the spawning closures separately for each state and for each fishery (limited entry and open access).

B.4.2.1 Oregon Considerations for Removing the Lingcod Spawning Closure

The amount of lingcod available to the nearshore fishery is dependent on the final preferred yelloweye rockfish ACL and catch sharing options adopted by the Council. The nearshore fishery north of 42^{o} N. latitude is severely constrained by yelloweye rockfish impacts under the current ACL (17 mt) and catch sharing method. Yelloweye rockfish constraints could become more severe for the Oregon nearshore fishery as a result of the recent judgment in the case of Natural Resources Defense Council, et al. (Plaintiffs) v. Gary Locke, et al. (Defendants).

Following numerous runs of the nearshore model, which is used by the GMT to predict yelloweye rockfish impacts by the nearshore fishery, it is possible that extending the lingcod season into the winter and early spring spawning months (November – March) off Oregon may increase yelloweye rockfish impacts, even if trip limits were reduced throughout the year to compensate for the extended season. Lingcod spawn in shallow waters, and are therefore more accessible by small boats during the spawning season. This easier access may lead to increased effort (number of boats) by the open access fishery. Hence, removing the spawning closure could create an opportunity for a directed lingcod fishery (regardless of trip limit) by both open access and permitted vessels in the nearshore off Oregon, and therefore increase impacts to yelloweye rockfish. Under the current and possibly tighter yelloweye rockfish constraints, the GMT recommends that it is not prudent to extend the lingcod-retention season off Oregon due to the risk of increased bycatch of yelloweye rockfish. A further, in-depth analysis of this potential management measure for Oregon was discontinued upon this discovery.

B.4.2.2 California Considerations of Removing the Lingcod Spawning Closure

Prior to the overfished declaration of lingcod, approximately 12 percent of the catch (on average) was taken during December through February during 1994-1999 (data source PacFIN). Due to significant changes in the fishery since 2000, the GMT does not anticipate a similar increase in lingcod landings by removing the spawning closure.

Using PacFIN data, CDFG staff modeled trip limit scenarios with several different time series and proxy data to estimate the expected take of lingcod during December through February if the spawning closure was removed. Two time series, 2003-2009 and 2007-2009, were analyzed to reflect long-term participation versus the most recent participation. Similarly, historical landings data versus recent landings were used as proxies to estimate take during December through February. It was determined that the more recent time series and landings data (2007-2009) was the most appropriate for modeling purposes because the month of November was opened for more opportunity starting in 2007. This additional fishing opportunity is more informative of recent participation. The model runs were separated by limited entry and open access sectors to take into account different trip limit allowances and dissimilar variation in participation. Trip limits models assumed a 50:50 allocation between limited entry and open access with 7 percent discard mortality and 20 percent buffer applied to both sectors.

The amount of lingcod available to the nearshore fishery will ultimately be a direct result of the final preferred yelloweye ACL, catch sharing options adopted by the Council, and state specific input. The GMT notes that the current Federal trip limits may also be subject to change based on available yelloweye, independent of the spawning closure removal. Table B-49 shows a preliminary range of lingcod trip limits for both high and low ACL targets for status quo and removal of the spawning closure.

Table B-49. Comparison of lingcod trip limits under status quo and with removal of spawning closure.

	Status Quo (Dec-April closure)	Removal of Spawning Closure
Limited Entry	800 lbs/2 months	800-1,500 lbs/2 months
Open Access	400 lbs/month	150-400 lbs/month

Biological implications of status quo management (maintain spawning closure)

Current management will continue to result in discarding of lingcod from December through April while targeting other species. Unlike many other nearshore rockfish, lingcod have high survivorship (low mortality) and do not readily suffer from barotrauma due to the lack of a swim bladder. Under current management, the GMT does not expect any additional increase in mortality as a result of discarding.

Implications of removing the spawning closure

Since male lingcod are nest guarders, removing the spawning closure could result in a disproportional removal of males from the population. Since the 2009 southern lingcod stock assessment did not take into account differential male removals prior to the implementation of the spawning closure, the GMT was unable to quantify the effects on the overall population by opening up a winter fishery. The GMT does note that future stock trends are modeled based on full attainment of removals each year and this will not likely be realized due to the yelloweye constraints.

In California, most of the lingcod is taken incidental to other fisheries (nearshore, shelf, etc). Removing the spawning closure could create an opportunity for a directed lingcod fishery (regardless of the trip limit) and it is possible that many participants in this fishery will not have a nearshore permit. Since a nearshore permit is required to land nearshore species, many of the species caught incidentally with lingcod will have to be discarded.

Unlike lingcod, many rockfish species that inhabit the nearshore waters have low rates of survivorship (depending on the depths caught) and can suffer from barotrauma, leading to increased mortality as a result of discarding. Since little is known about the life history or stocks status of many of these species, the GMT was unable to quantify effects on the overall population as a result of discarding.

B.4.3 Remove Gear Restriction for 'Other Flatfish' in the California Commercial Fishery

In 2003, the limited entry and open access fixed gear fisheries south of 40°10' N. latitude were constrained by management measures to protect bocaccio. The current commercial gear restriction is "*no more than 12 #2 hooks, up to 2-1lb weights, not subject to the RCA"*. During the 2009-2010 management cycle, the recreational fishery removed their flatfish gear restriction because it was not effective in restricting the bycatch of overfished rockfish species. The commercial fishery is interested in pursuing a similar removal to have conforming regulations. CDFG staff consulted Enforcement and determined there are no additional enforcement issues resulting from removal of this gear requirement. CDFG does not anticipate that removing the gear restriction will increase impacts to overfished rockfish species because this fishery operates over sandy bottom habitats where overfished species are less likely to occur. However, due to a potential risk of petrale sole bycatch, which has been declared overfished, a further in-depth analysis of this management measure was discontinued.

B.4.4 Oregon Recreational

B.4.4.1 Analyze groundfish retention in the Oregon recreational all-depth Pacific halibut fishery

This action is consistent with the Purpose and Need because it takes into account the rebuilding of yelloweye rockfish while potentially allowing for increased harvest opportunity for an underutilized species. Anglers have expressed a desire to retain incidentally caught groundfish, specifically lingcod, while participating in the Central Oregon coast all-depth Pacific halibut fishery. Currently, retention of groundfish is prohibited when Pacific halibut are onboard recreational vessels, except for Pacific cod and sablefish, during all-depth Pacific halibut days. The Pacific halibut quota in Area 2A (Washington and Oregon) has decreased from 1.22 million pounds in 2008 to 0.95 million pounds in 2009 and 0.81 million pounds in 2010, drastically decreasing the number of days open to the all-depth fishery (Table B-50). It is anticipated that the Pacific halibut quota will continue to decrease, along with the number of open days, as the fishery transitions to more of a derby-style fishery. The current bag limit in Oregon for Pacific halibut is one fish per angler per day with an annual limit of six fish and for lingcod is two fish per angler per day.

Table B-50. Area 2A Pacific Halibut Quota in millions of pounds and days open to the Central Oregon all-depth Pacific halibut fishery, 2005-2010.

Year	2A Halibut Quota (million	Central Oregon All-Depth Open Days
2005	1.33	60
2006	1.38	36
2007	1.34	45
2008	1.22	44
2009	0.95	15
2010	0.81	11-16*

* projected number of days open in 2010

During the 2010 Pacific halibut Catch Sharing Plan (CSP) process, a regulation was added allowing the retention of lingcod in one halibut management area in Washington. The first season under that regulation will not be completed prior to the final adoption of management measures for 2011 and 2012; therefore, those data will not be available for this analysis. ODFW staff has completed some preliminary analysis on the impacts to yelloweye and canary rockfish from allowing retention of groundfish during all-depth Pacific halibut days. This option is included under the analysis of the integrated alternatives. Yelloweye and canary rockfish impacts, during years when groundfish retention was allowed, was compared to recent years when groundfish retention has been prohibited. The analysis projects the yelloweye rockfish impacts of allowing groundfish retention during all-depth halibut days to be 1.5 times those without groundfish retention. For canary rockfish the projection is 2.3 times what it would be if groundfish retention were not allowed.

Under the Final Preferred Alternative, this management measure was not adopted due to concerns over increased yelloweye and canary impacts, given the ACLs and associated state harvest guidelines.

B.4.5 California Recreational

B.4.5.1 Increasing the Depth Restriction around Catalina Island from 60 fm to 100 fm

Allowing fishing in depths between 60 fm and 100 fm would result in a significant increase in cowcod impacts and in the interest of rebuilding the stock in as quickly as possible, this management measure will not be implemented at this time.

B.4.5.2 Increase in Depth Restriction to 50 fm in the Monterey and Morro Bay Recreational Groundfish Management Areas

CDFG proposed to change the depth restriction in the Monterey and Morro Bay South-Central Management Area from 40 fm to 50 fm. Currently, the depth restriction is 40 fm in the South-Central Groundfish Management Areas (Monterey and Morro Bay South-Central Management Areas combined, from Pigeon Point to Point Conception). The area seaward of the depth restriction line is termed the Rockfish Conservation Area (RCA). The South-Central Management Areas have had a depth restriction in place since 2001. The change in RCA lines from 40 fm to 50 fm will provide increased fishing opportunities on the central coast but may not be feasible due to interactions with yelloweye rockfish.

The RecFISH model was used to project the 2011–2012 annual take of select groundfish species with the modified depth restriction. The RecFISH model uses data from 2005–2009 to project for 2011–2012. The RecFISH model projects that if the depth restriction is changed from 40 fm to 50 fm in the South-Central Management Areas in 2011 and 2012, the annual take of select species will increase. There will be no additional impacts for California scorpionfish, California sheephead, greenlings, cowcod, or cabezon. Most of the recreationally caught species commonly encountered in the South-Central Groundfish Management Areas will have small increases in statewide fishing impacts as a result of this action as compared to the Harvest Guideline for the recreational fishery.

Some of the most constraining species and species groups in the Central Groundfish Management Area are blue rockfish and the Minor Nearshore rockfish group. There is additional fishing opportunity available with the status quo ACL option likely for blue rockfish and the Minor Nearshore Rockfish group. The proposed action will increase impacts on Minor Nearshore Rockfish (8.0 mt), and blue rockfish (4.0 mt). Analyses of Minor Shelf Rockfish catch indicate that the increase in take can be accommodated within the status quo ACL which is the preliminary preferred alternative for 2011–2012, or the ACL determined by the Science and Statistical Committee (SSC).

Few cowcod and yelloweye rockfish are encountered in central California, however, at deeper depths, they are more common. With this action, there is projected to be impacts to bocaccio (20.2 mt), yelloweye (0.2 mt), canary (0.8 mt) and negligible impacts to cowcod (less than 0.01 mt). The 24 mt canary rockfish harvest guideline, 1.9 mt cowcod harvest guideline, and 163 mt bocaccio harvest guideline under the preliminary preferred alternatives will accommodate the projected impacts.

Yelloweye rockfish, however, is a cause for concern. The additional 0.2 mt of yelloweye rockfish catch projected to occur in the South-Central Management Areas represents a substantial increase in statewide yelloweye rockfish catch relative to the 3.4 mt preliminary preferred alternative. The high yelloweye catch, and variability of the catches in the North-Central North of Point Arena Management Area, make *any* increase in yelloweye rockfish catch a cause for concern. If significant residual yelloweye catch is left over between the 2011 catch and the 2011 harvest guideline, the 50 fm depth restriction could be put in place for the 2013–2014 management cycle.

B.4.5.3 Exempting Federally Managed Flatfish from Recreational Groundfish Depth and Season Closures

Exemption of federally managed flatfish, including petrale sole, from depth and season closures may be not be prudent at this time without regulation of bag limits (currently no bag limit), given the depleted status of petrale sole. The take of this species is predominantly in the commercial fishery at present. Additional analysis may be undertaken in the future to evaluate acceptable harvest limits for recreational fishery, bycatch rates for overfished species and bag limits to keep catch within harvest limits. Once the petrale sole stock has made suitable progress in rebuilding or is rebuilt, this management measure may be reconsidered.

B.4.5.4 Modify Regulations Regarding Filleting Federal Groundfish Species at Sea

Feedback from the public has identified a number of potentially adverse effects from prohibition of filleting at sea. Deck hands make a considerable portion of their income from filleting the catch of patrons on the way back to port. A prohibition on filleting at sea would result in reduction in much needed income. Party boat operators are required to allow California Recreational Fisheries Survey (CRFS) samplers to collect data onboard their vessels at sea, providing access to fish before being filleted.

The fish reported by the angler that are destined for a purpose that would be included in the "plan to eat" disposition code make up less than 9 percent of unidentified rockfish. Filleted fish make up an unknown but likely a small fraction of this percentage since anglers are required to leave the entire skin attached allowing identification of filleted fish. Given the limited potential for reduction of unidentified rockfish in the recreational catch, filleting regulations will not be changed in the 2011-2012 season.

B.4.5.5 Lingcod Bag Limit Increase

The CDFG proposed to increase the statewide bag limits for lingcod. The proposed action would increase the lingcod bag limit from two fish to three fish statewide. Additional lingcod impacts can be accommodated within the increased harvest guideline. The action would improve fishing opportunities especially in nearshore areas.

CDFG analyses of bycatch rates show that an increase in the lingcod bag limit is likely to increase the rockfish bycatch including overfished species. Anglers would have to fish for a longer period of time to obtain three lingcod and in the process may encounter additional overfished rockfish including yelloweye rockfish. Given the constraints presented by yelloweye rockfish, there is concern that catch rates may increase if anglers continue to fish for their lingcod bag limit and an increase in the bag limit may result in increased yelloweye rockfish catch per angler. Increasing the lingcod bag limit may also encourage high-grading behavior by recreational anglers as anglers encounter larger rockfish than are currently in their 10 fish bag and high grade these larger fish for smaller dead fish that were previously retained. Although the three fish lingcod bag limit could be accommodated by the lingcod harvest guideline, interactions with over fished species and potential high-grading prevent implementation of an increased lingcod bag limit at this time.

B.5 References

PFMC (Pacific Fishery Management Council). 2008. Status of the Pacific Coast Groundfish Fishery: Stock Assessment and Fishery Evaluation. Portland, Oregon: Pacific Fishery Management Council. Volume 1.

PFMC (Pacific Fishery Management Council). 2010. Allocation of harvest opportunity between sectors of the Pacific coast groundfish fishery [FMP Amendment 21]; Final environmental impact statement. Portland, OR: Pacific Fishery Management Council and National Marine Fisheries Service. June 2010.

Appendix C
DETAILED ANALYSIS OF THE INTEGRATED ALTERNATIVES

2011-2012 GROUNDFISH HARVEST SPECIFICATIONS
DRAFT ENVIRONMENTAL IMPACT STATEMENT

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Tables

Figures

This section provides more detailed information behind the analysis of the integrated alternatives, compared to what was presented in Chapter 2, Section 2.4. The impacts of implementing the strategic combination of overfished species ACLs along with the management measures necessary to stay within those ACLs or achieve other management objectives outlined in the GFMP are presented by alternative and fishery.

C.1 The No Action Alternative

C.1.1 Limited Entry Non-Whiting Trawl

If no action were taken by the Council, the 2010 OYs and management measures current trip limits specified in Federal regulations would prevail for the 2011-2012 fisheries. The trip limits, RCA boundaries, and projected impacts are listed in Table C-1and Table C-2.

Model projections before the June 2010 Council meeting estimated overages of 48 metric tons (101.6% of harvest guideline) for sablefish and 131 metric tons (107.8% of harvest guideline) for petrale sole for 2010. Trip limit reductions were instituted at the June Council meeting to reduce projected impacts beneath the LE trawl portion of the ACLs for these species. Sablefish and petrale sole trip limits were reduced directly from May 1, 2010 trip limits, along with Dover sole and other flatfish in periods 4, 5, and 6, in order to meet model targets. The RCA was not changed from the May 1, 2010 lines. In a precautionary response to a GAP request for a chilipepper trip limit increase to 20,000 pounds per 2 months, the chilipepper bimonthly trip limit was increased from 12,000 to 17,000 pounds, in the area south of 40° 10’ N. lat, to be implemented by September 1, 2010 through the remainder of 2010. Although there was some potential for increased impacts on bocaccio rockfish (a rebuilding species), since they co-occur; it is likely that only a few vessels will target chilipepper, and only in the area south of 38° north latitude, and there is considerable residual in the scorecard compared to the bocaccio OY.

Table C-1. No action alternative for limited entry trawl; 2010 trip limits after June inseason adjustment.

			2-month cumulative-poundage limits							
2-month period	RCA lines (fm) shallow	RCA lines (fm) deep	sable-fish	long-spine	short-spine	Dover sole	petrale sole	arrow-tooth	other flatfish	slope rockfish
N. of 40°10' N lat.										
Large/small footrope limits										
1	75	150	20,000	24,000	18,000	110,000	9,500	150,000	110,000	2,000
2	75	200	20,000	24,000	18,000	110,000	9,500	150,000	110,000	6,000
3	75	150/200	24,000	24,000	18,000	110,000	9,500	150,000	110,000	2,000
4	100	150/200	21,000	24,000	18,000	100,000	6,300	150,000	100,000	2,000
5	75	200	21,000	24,000	18,000	100,000	6,300	150,000	100,000	2,000
6	75	200	21,000	24,000	18,000	100,000	6,300	150,000	100,000	2,000
Selective gear limits										
1	75	150	9,000	5,000	5,000	65,000	9,500	90,000	90,000	
2	75	200	9,000	5,000	5,000	65,000	9,500	90,000	60,000	
3	75	150/200	9,000	5,000	5,000	65,000	9,500	90,000	60,000	
4	100	150/200	9,000	5,000	5,000	65,000	6,300	90,000	60,000	
5	75	200	9,000	5,000	5,000	65,000	6,300	90,000	60,000	
6	75	200	9,000	5,000	5,000	65,000	6,300	90,000	60,000	
38° - 40°10' N lat.										
1	100	150	22,000	24,000	18,000	110,000	9,500	10,000	110,000	15,000
2	100	150	22,000	24,000	18,000	110,000	9,500	10,000	110,000	15,000
3	100	150	22,000	24,000	18,000	110,000	9,500	10,000	110,000	15,000
4	100	150	21,000	24,000	18,000	100,000	6,300	10,000	100,000	15,000
5	100	150	21,000	24,000	18,000	100,000	6,300	10,000	100,000	15,000
6	100	150	21,000	24,000	18,000	100,000	6,300	10,000	100,000	15,000
S. of 38° N lat.										
1	100	150	22,000	24,000	18,000	110,000	9,500	10,000	110,000	55,000
2	100	150	22,000	24,000	18,000	110,000	9,500	10,000	110,000	55,000
3	100	150	22,000	24,000	18,000	110,000	9,500	10,000	110,000	55,000
4	100	150	21,000	24,000	18,000	100,000	6,300	10,000	100,000	55,000
5	100	150	21,000	24,000	18,000	100,000	6,300	10,000	100,000	55,000
6	100	150	21,000	24,000	18,000	100,000	6,300	10,000	100,000	55,000

*Chilipepper rockfish trip limit = 17,000 pounds/2 months.

Table C-2. No action alternative for limited entry trawl. Projected groundfish total fishing mortality for major target species and overfished species, under trip limits adjusted inseason, in June 2010.

	Projected Total Catch (mt)			Model	Proj. -	
	North of 40°10'	South of 40°10'	Projected Total	Target (mt)	Target (mt)	Proj. % of Target
Sablefish	2,539	376	2,915	2,955	-40	98.6%
Shortspine	1,180	168	1,335	1,567	-232	85.2%
Longspine	1,210	302	1,512	2,129	-617	71.0%
Dover sole	12,567	1,261	13,829	16,093	-2,264	85.9%
Petrale	904	207	1,111	1,140	-28	97.5%
Arrowtooth	5,168	13	5,181	9,755	-4,574	53.1%
English	515	83	598	9,645	-9,047	6.2%
Other flatfish	965	231	1,196	4,685	-3,489	25.5%
Canary	10.8	1.5	12.3	21.3	-9.0	57.9%
POP	94.3	0.2	94.5	100.8	-6.3	93.8%
Darkblotched	170.5	19.7	190.2	230.0	-39.8	82.7%
Widow	7.1	8.2	15.4	21.6	-6.2	71.3%
Bocaccio	1.4	6.1	7.5	16.1	-8.6	46.6%
Yelloweye	0.3	0.0	0.3	0.6	-0.3	43.6%
Cowcod	0.0	0.3	0.3	1.5	-1.2	20.4%

C.1.2 Limited Entry Trawl Whiting

A Pacific whiting OY of 193,935 mt was used to manage the 2010 west coast whiting fisheries and forms the basis for the No Action Alternative (75FR23620). The 2010 tribal allocation was set at 49,939 mt, based on an interim formula for tribal allocations for the 2010 season. An additional 3,000 mt of whiting was set aside from the U.S. OY to accommodate research catch and incidental bycatch in non-whiting fisheries. This left approximately 140,996 mt for the non-tribal whiting fleets. Under the fixed allocations for these fleets specified in the FMP and in Federal regulations, the 2010 whiting quotas were 59,218 mt (42 percent) for the shoreside whiting sector, 33,839 mt (24 percent) for the at-sea mothership sector, and 47,939 mt (34 percent) for the at-sea catcher-processor sector.

Limited entry whiting trawl management measures include sector-specific bycatch limits, the ability for NMFS to restrict the depths whiting vessels fish if necessary to reduce bycatch on a sector-specific basis, full monitoring of all whiting catcher vessels fishing in the RCA during the primary season, a request that NMFS automatically close the non-tribal whiting fishery upon projection of attainment of a bycatch limit rather than waiting until the limit is attained, 100 percent observer coverage for vessels fishing in the RCA during the primary season and sorting their catch at sea (observer coverage to be paid by the vessel owner), and an exemption from the at-sea processing rules for vessels less than or equal to 75 ft in length in the shoreside whiting sector to allow them to freeze and tail their whiting to allow for value-added product delivery.

In 2010, bycatch limits for canary, darkblotched, and widow rockfish were apportioned according to the pro-rata distribution of the whiting allocation with 34 percent of the available yields of these species' bycatch limits allocated to the catcher-processor sector, 24 percent to the mothership sector, and 42 percent to the shoreside sector. A rollover provision is also available for unused bycatch limit yields, such that when a whiting sector is closed by attaining its whiting allocation or if it is closed by projected attainment of a sector-specific bycatch limit, any remaining yield of the bycatch limit is distributed to the other non-tribal whiting sectors using the same pro-rata apportionment used to allocate whiting quota and sector-specific bycatch limits.

The No Action Alternative for the non-tribal whiting fisheries gives NMFS the ability to implement depth-based closures for the whiting fishery on a sector-specific basis as an inseason measure upon the projected attainment of one or more total catch bycatch limits for canary, darkblotched, widow rockfish, or any other bycatch species managed with a total catch limit. Any of the specified management lines between the 75-fm and 150-fm lines may be used to restrict fishing depths for the non-tribal sectors. Management measures also maintain the authority for NMFS to implement the Ocean Salmon Conservation Zone (i.e., fishing restricted to depths seaward of the 100 fm line) if the Chinook HG is projected to be attained inseason.

In 2010, the Council considered the historical performance of the Pacific whiting fisheries relative to overfished species bycatch (Table C-3) as well as the bycatch model estimates (

Table C-4) in order to set the 2010 bycatch limits that would also apply under the No Action Alternative. For canary rockfish, the Council recommended setting a bycatch cap of 14 mt in an effort to balance an increasing canary rockfish bycatch rate in the whiting fishery and the needs of the non-whiting sectors. Similarly, the whiting fishery has seen an increasing widow rockfish bycatch rate as the widow rockfish stock rebuilds. The GMT provided a linear interpolation of widow rockfish bycatch rates from 2006-2009 that resulted in an estimate of 279 mt. The Council considered this calculation and specified a 279 mt widow rockfish bycatch limit for 2010. For darkblotched rockfish the GMT discussed the rationale for maintaining the 2009 bycatch limit (25 mt) as reflected in the 2009-2010 specifications and management measures EIS (PFMC 2008a). Bycatch of shelf rockfish like canary is inversely proportional to bycatch of darkblotched. As such even though the darkblotched limit has not been fully attained in any year from 2006-2009, enough should be available to the fleet to prevent shutting down the fishery during the season. Given the recommendation to reduce the amount of canary available to the fleet (from 18 mt in 2009 to 14 mt in 2010), the GMT recommended and the Council approved maintaining the 25 mt darkblotched limit for the 2010 fisheries.

Table C-4 displays the adopted bycatch limits for the non-tribal limited entry 2010 Pacific whiting fishery as follows, which would apply under the No Action Alternative.

Table C-3. History of Pacific whiting harvest and bycatch impacts 2006-2009.

Species	Sector	2006		2007		2008		2009	
		Alloc/ Cap (mt)	**Catch (mt)**	**Alloc/ Cap (mt)**	**Catch (mt)**	**Alloc/ Cap (mt)**	**Catch (mt)**	**Alloc/ Cap a/ (mt)**	**Catch (mt)**
Pacific whiting	SS	97,469	97,297	87,398	73,280	58,669	50,423	40,738	40,771
	CP	78,903	78,864	70,751	73,263	115,789	108,121	35,376	34,620
	MS	55,696	55,355	49,942	47,809	58,087	57,432	24,034	24,091
	TOTAL	232,068	231,516	208,091	194,352	232,545	215,976	100,148	99,482
Canary	SS		1.64		2.01		1.66		2.31
	CP		0.10		0.35		2.43		0.23
	MS		0.85		1.62		0.74		0.60
	TOTAL	4.7	2.59	4.7	3.98	4.7 - 6.7	4.83	18.0	3.14
DRK	SS		2.28		0.95		0.94		0.87
	CP		6.73		5.28		2.40		0.11
	MS		4.24		6.73		3.93		0.20
	TOTAL	25.0	13.25	25.0	12.96	40.0	7.27	25.0	1.18
POP	SS		0.14		23.14		0.07		4.70
	CP		0.75		2.92		12.83		0.06
	MS		1.88		0.73		2.93		1.40
	TOTAL		2.77		26.79		15.83		6.16
Widow	SS		49.38		88.97		99.09		108.64
	CP		67.00		72.77		52.37		0.96
	MS		71.80		72.99		60.75		24.94
	TOTAL	220	188.18	220 - 275	234.73	275 - 287	212.21	250.0	134.54
YE	SS		0.06		0.04		0.00		0.00
	CP		0.01		0.01		0.01		0.00
	MS		0.02		0.00		0.00		0.00
	TOTAL		0.09		0.05		0.01		0.00

a/ In 2009, bycatch caps were divided among the three whiting sectors pro-rata. The totals of those sector-specific limits are given here.

Table C-4. Whiting bycatch model predictions of canary, darkblotched, and widow rockfish distributed pro-rata by sector under the 2010 whiting OY of 140,996 mt.

Sector	Canary	Darkblotched	Widow
Mothership	0.87	1.12	42.72
CP	1.24	1.59	60.52
Shoreside	1.53	1.96	74.76
Total	**3.64**	**4.67**	**178.01**

Table C-5. No Action. Non-tribal limited entry Pacific whiting trawl bycatch limits for 2011-2012.

Species	Total	Shoreside (42%)	Catcher-Processor (34%)	Mothership (24%)
Canary	14 mt	5.9 mt	4.8 mt	3.3 mt
Darkblotched	25 mt	10.5 mt	8.5 mt	6.0 mt
Widow	279 mt	117 mt	95 mt	67 mt

C.1.3 Non-Nearshore Fixed Gear

The non-nearshore bycatch model projects overfished species impacts for both the limited entry fixed gear sector and the open access daily trip limit fishery for sablefish north of 36° N. latitude, seaward of the non-trawl RCA. Inputs assume that the limited entry and open access sablefish allocations are completely harvested, and if reductions to overfished species impacts are needed, then adjustments are typically made to the non-trawl RCA in the areas with highest bycatch rates. In the event that non-trawl RCA adjustments do not accomplish the necessary overfished species impact reductions, then the target catch of sablefish could be reduced.

Under the No Action alternative, the 2010 sablefish OY and allocations specified in regulation are carried forward for 2011-2012 (Table C-6).

Table C-6. No Action Alternative: Sablefish north of 36° N. latitude limited entry fixed gear and open access allocations for 2011-2012.

Species	ACL (mt)	Fishery	Allocation (mt)
Sablefish N. 36° N. Lat.	6,471	LE Fixed Gear Primary	1,819
		LE Fixed Gear Daily Trip Limit	321
		LE Fixed Gear Total	2,140
		Open Access	529

Limited Entry North of 36° N. latitude

Under the No Action alternative, the sablefish ACL would be equal to the 2010 sablefish OY and the limited entry fixed gear allocation would be 2,140 mt (Table C-6). The current RCA configuration would remain in place under the no-action alternative (Figure C-1). Modeled-bycatch projections of overfished species would therefore be equivalent to those estimated for 2010 (Table C-7).

Seaward RCA Boundary	36°- 40° 10'	40°10'- Col/Eur 43°	Col/Eur 43°- Cascade Head 45.064°	Cascade Head 45.064°- Pt. Chehalis 46.888°	North of Pt. Chehalis 46.888°
Shoreward boundary to 100 fm					
100 fm					
125 fm					
150 fm					
>150 fm					

Figure C-1. No Action Alternative: Non-trawl RCA seaward configuration. The shoreward configuration of the RCA is driven by the nearshore model. Grey shading indicates areas closed to fishing.

Table C-7. No Action Alternative: Modeled-overfished species projected impacts for the limited entry fixed gear sector north of 36° N. latitude.

Species	Projected Impacts (mt)
Bocaccio	0.0
Canary rockfish	2.2
Darkblotched rockfish	3.9
Pacific ocean perch	0.4
Widow rockfish	0.0
Yelloweye rockfish	0.8

Open Access Sablefish DTL north of 36° N. latitude

As mentioned above, the open access sablefish DTL fishery impacts are projected by the non-nearshore model, which assumes the entire sablefish allocation is harvested. The open access and limited entry fixed gear sablefish fisheries are held to the same non-trawl RCA structure, which is driven by overfished species impacts.

Under the No Action alternative, the sablefish ACL would be equal to the 2010 sablefish OY with an open access allocation of 529 mt (Table C-6) and the current RCA configuration would remain in place (Figure C-1). Modeled-bycatch projections would therefore be equivalent to those estimated for 2010 (Table C-8). As in 2009-10, these projected impacts only cover bycatch for fishing in areas seaward of the RCA and north of 36° N. latitude.

Table C-8. No Action Alternative**:** Modeled-overfished species impacts for the open access sablefish daily trip limit fishery north of 36° N. latitude under the No Action alternative.

Species	Projected Impacts (mt)
Bocaccio	0.0
Canary rockfish	0.4
Darkblotched rockfish	0.6
Pacific ocean perch	0.1
Widow rockfish	0.0
Yelloweye rockfish	0.1

C.1.4 Nearshore Fixed Gear

Under the No Action alternative, landings projections for 2011-2012 would be based on final 2009 landings. It is important to recognize that landings in 2009-2010 were held at reduced levels, compared to historical harvest, by restrictive trip limits or state caps implemented to reduce impacts to overfished species (particularly yelloweye). As such, the No Action alternative does not represent full attainment of nearshore species ACLs.

Since 2003 the shoreward RCA boundary in the nearshore fishery was set at 30 fm for the entire area north of 34°27' N. latitude and 60 fm south of 34°27' N. latitude. In 2009 NMFS implemented a more restrictive 20 fm depth restriction between 43° N. latitude and 40°10' N. latitude and restricted target species landings to reduce yelloweye and canary impacts {Final Environmental Impact Statement (FEIS) for the Proposed ABC/OY Specifications and Management Measures for the 2009-2010 Pacific Coast Groundfish Fishery}

The 20 fm shoreward non-trawl RCA depth restriction currently in regulation would remain in effect between 43° N. latitude and 40°10' N. latitude (Appendix 1) to reduce yelloweye impacts. An April 2008 report from the WCGOP {NWFSC 2008} indicated that nearshore effort and yelloweye rockfish bycatch rates were low north of 43° N. latitude, compared to the area between 43° N. latitude and 40°10' N. latitude. Therefore, for 2009-2010 the Council recommended and NMFS implemented the status quo and less restrictive shoreward RCA (i.e., 30 fm) north of 43° N. latitude. Effort is exceptionally low between 20–30 fm in this northern area and yelloweye rockfish abundance is thought to be much lower relative to the area between 43° N. latitude and 40°10' N. latitude, which is supported by observer bycatch rates reported in an April 2008 report provided by WCGOP. A request to WGCOP will be made in 2010 to update catch data and verify the assumptions. Should observer data indicate that bycatch rates are not negligible north 43° N. latitude, inseason action may be taken in 2011 to move the shoreward RCA for the entire state of Oregon (north of 42° N. latitude) to 20 fm

Under the No Action alternative, depth restrictions south of 40°10' N. latitude would remain unchanged (30 fm between 40°10' N. latitude and 34°27' N. latitude; 60 fm south of 34°27' N. latitude).

The No Action alternative is modeled assuming the bycatch rates, weather, and market conditions experienced in 2009 are the same in 2011 and 2012. In 2009, inclement weather and soft markets affected landings south of 42 N. latitude, and as such, landings in 2009 were lower for California than in previous years for many species (landings were similar or slightly higher for Oregon during 2009 relative to previous years). Under the No Action alternative, this fishery would still be held to the projected yelloweye impacts (1.1 mt) regardless of weather or market conditions. The few remaining management measures available to reduce yelloweye impacts in this fishery (if needed) include drastic reductions to landed catch or total fishery closure north of 40°10’ N. latitude (vessel safety concerns preclude implementing a shallower depth restriction north of 40°10’ N. latitude). Modifications to depth restrictions or reductions in landed catch south of 40°10’ N. latitude would provide little (if any) yelloweye savings because this is an area of low bycatch.

Public testimony indicates that the 20 fm line has created unintended consequences in the nearshore fishery and inseason requests were submitted in 2009 {Agenda Item G.4.b, Supplemental GMT Report} and 2010 {Agenda Item E.5.b, Supplemental GMT Report} to modify the line back to 30 fm. The 20 fm depth restriction has caused gear conflicts in the nearshore fishery by forcing fishermen to concentrate in smaller areas and other individuals are afraid to fish with line gear for fear of gear drifting into deeper depths resulting in enforcement violations. In addition, this increased concentration of effort not only eliminated access to productive fishing grounds, but it also may lead to increased local depletion of certain species that show limited migration patterns. Inseason requests to liberate the 20 fm line to 30 fm were not recommended due to increased overfished species impacts {Agenda Item E.5.b, Supplemental GMT Report}.

In June 2010, the GAP recommended additional yelloweye be provided to the nearshore fishery to restore fishing opportunities citing loss of infrastructure and weak market conditions {Agenda Item B.7.b, Supplemental GAP Report}. Numerous letters received through public testimony in June 2010 also mirrored the GAP recommendation {Agenda Item B.5.c, Public Comment}. In summary, the restrictive RCAs and low available yelloweye will continue to constrain the nearshore fishery under the No Action alternative.

Table 9. No Action Alternative: Nearshore fishery projected total catch by area for 2011-2012.

Area	Projected Total Catch (mt) 2011/12
Grand Total	**456**
Black rockfish	224
Blue rockfish	8
Cabezon	48
Deeper nearshore RF	27
Kelp greenling	22
Lingcod	68
Other minor RF	13
Shallow nearshore RF	47
North of 40°10' N. lat.	**343**
Black rockfish	220
Blue rockfish	5
Cabezon	32

Area	Projected Total Catch (mt) 2011/12
Kelp greenling	21
Lingcod	52
Other minor nearshore rockfish	13
South of 40°10' N. lat.	**113**
Black rockfish	4
Blue rockfish	3
Cabezon	16
Deeper nearshore rockfish	27
Kelp greenling	1
Lingcod	16
Shallow nearshore rockfish	47

Shoreward RCA Boundary	South 34°27’	34°27’- 40° 10’	40°10’ – Col/Eur 43°	North Col/Eur 43° - 46°16’	North of 46°16’
Shore					
<20 fm					
<30 fm					
<60 fm to seaward RCA boundary					

Figure 2. No Action Alternative: Nearshore shoreward RCA configuration. Grey shading indicates areas closed to fishing.

Table 10. No Action Alternative: Overfished species bycatch projections for the nearshore fixed gear fisheries.

Species	Area	Projected Total Impacts (mt) 2011/12
Bocaccio		**0.3**
	North of 40°10	0
	South of 40°10	0.31
Canary		**2.9**
	North of 40°10	1.6
	South of 40°10	1.3
Widow		**0.3**
	North of 40°10	0.3
	South of 40°10	0.0
Yelloweye		**1.1**
	North of 40°10	1.1
	South of 40°10	0.1

C.1.5 Washington Recreational

The following recreational seasons applied in 2009 and 2010 and would remain in place under the No Action Alternative.

Groundfish Seasons and Bag Limits

Under the No Action Alternative, the Washington recreational fishery would be open year-round for groundfish except lingcod. The recreational groundfish bag limit would be 15 fish per day including rockfish and lingcod. Of the 15 recreational groundfish allowed to be landed per day, sub limits of 10 rockfish and 2 lingcod would apply. Washington would continue to prohibit the retention of canary and yelloweye rockfish in all areas.

Lingcod Seasons and Size Limits

The lingcod season in Marine Areas 1-3 (Washington-Oregon border at 46°16’ N. Latitude to Cape Alava at 48° 10’ N. Latitude) was open from the Saturday closest to March 15 through the Saturday closest to October 15, which was March 14 through October 17 in 2009 and March 13 through October 16 in 2010. Marine Area 4 (Cape Alava to the U.S. Canadian border) was open from April 16 through the Saturday closest to October 15, or October 15, whichever is earlier, which was April 16 through October 15 in 2009 and 2010.

Under the No Action Alternative, the following lingcod seasons and size limits for 2011 and 2012 would be as follows:

- Marine Areas 1-3: open from March 12 through October 1 in 2011 and March 17 through October 13 in 2012.
- Marine Area 4: open from April 16 to October 15 in 2011 and April 16 to October 13 in 2012.
- The lingcod minimum size limit during the open lingcod season would be 22 inches in Marine Areas 1-3 and 24 inches in Marine Area 4.

Area Restrictions

Under the No Action Alternative the Washington recreational groundfish and Pacific halibut fisheries would continue to be prohibited from fishing for, retention or possession of groundfish and halibut in the C-shaped yelloweye rockfish conservation area in the north coast and South Coast and Westport YRCAs in the south coast as they were in the 2009 and 2010 seasons.

Coordinates defining these YRCAs are provided in Federal regulations at 50 CFR 660.390.

Washington Recreational Groundfish Season under the No Action Alternative

<table>
<tr><th>Marine Area</th><th>Jan</th><th>Feb</th><th>Mar</th><th>Apr</th><th>May</th><th>June</th><th>July</th><th>Aug</th><th>Sep</th><th>Oct</th><th>Nov</th><th>Dec</th></tr>
<tr><td>3 & 4 (N. Coast)</td><td colspan="5">Open all depths</td><td colspan="4">Open <20 fm May 21-Sep 30 a/</td><td colspan="3">Open all depths</td></tr>
<tr><td>2 (S. Coast)</td><td colspan="2">Open all depths</td><td colspan="4">Open <30 fm Mar 15 - June 15 b/,c/</td><td colspan="2">Open all depths except lingcod prohibited on Fri. and Sat. >30 fm d/</td><td colspan="4">Open all depths</td></tr>
<tr><td>1 (Col. R.)</td><td colspan="4">Open all depths</td><td colspan="5">Open all depths e/</td><td colspan="3">Open all depths</td></tr>
<tr><td colspan="13">a/ Groundfish retention allowed >20 fm on days when Pacific halibut is open.
b/ Retention of sablefish and Pacific cod allowed seaward of 30 fm from May 1- June 15.
c/ Retention of lingcod allowed on days that the primary halibut season is open (applied in 2010 only).
d/ Retention of lingcod prohibited >30 fm, south of 46°58 on Fri. and Sat. from July 1 – August 31.
e/ Retention of groundfish, except sablefish and Pacific cod, prohibited with Pacific halibut on board.</td></tr>
</table>

North Coast (Marine Areas 3 and 4)

Prohibit the retention of groundfish seaward of a line approximating 20 fathoms from May 21-September 30, except on days that halibut fishing is open.

South Coast (Marine Area 2)

Prohibit the retention of groundfish seaward of a line approximating 30 fathoms from March 15-June 15. Prohibit the retention of groundfish, except sablefish and Pacific cod seaward of a line approximating 30 fathoms from May 1-June 15. Lingcod retention allowed seaward of 30 fathoms on days that the primary halibut season is open. Prohibit the retention of lingcod south of 46°58' N. latitude and seaward of 30 fathoms on Fridays and Saturdays from July 1 through August 31.

Columbia River (Marine Area 1)

Prohibit the retention of groundfish, except sablefish and Pacific cod, with halibut onboard from May 1 through September 30.

Washington Recreational Harvest Share and Projected Impacts under the No Action Alternative

No Action Alternative	WA Recreational Harvest Share	Projected Impacts (mt)
Canary	4.9	0.6

C.1.6 Oregon Recreational

Oregon and Washington shared harvest guidelines for canary and yelloweye rockfish of 20.9 mt and 5.1 mt, respectively in 2009-10. This same structure would remain in 2011-2012 under the No Action alternative for canary rockfish, Oregon's share of the canary harvest guideline 16.0 mt. At the June 2010 Council meeting, total yelloweye impacts had to be reduced from 17 mt to 14 mt to comply with the results of a lawsuit. Actions taken included reducing the Oregon and Washington shared harvest guideline for yelloweye rockfish to 4.9 mt, Oregon's share was reduced from 2.4 mt to 2.3 mt. Under the No Action alternative the Oregon recreational fisheries would operate under the 2.3 mt harvest guideline for yelloweye rockfish.

If either of the harvest guidelines were attained inseason, ODFW and WDFW would consult and decide if inseason state actions would be needed to maintain impacts within these harvest guidelines. Such state management actions included closing recreational fisheries, restricting recreational fishery seasons, and/or restricting the depths where the fishery was allowed to continue.

The following seasons, bag limits, size limits, and area restrictions also applied to 2009 and 2010 Oregon recreational groundfish fisheries and would apply under the No Action alternative (16.0 mt of canary and 2.3 mt of yelloweye rockfish).

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Open all depths			Open < 40 fm						Open all depths		

Figure C-3. No Action Alterative: Oregon recreational groundfish season structure for 2011-2012.

Bag and Size Limits

Under the No Action alternative, the marine fish daily bag limit of 10 fish in aggregate that was allowed in 2009-10 Oregon recreational fisheries and would carry forward for 2011-2012. The marine bag included all species other than lingcod, salmon, steelhead, Pacific halibut, flatfish, surfperch, sturgeon, striped bass, pelagic tuna and mackerel species, and bait fish such as herring, anchovy, sardine and smelt. A flatfish daily bag limit of 25, which includes all soles and flounders except Pacific halibut, was allowed in addition to the marine fish daily bag limit. Additionally a 3 fish bag limit was allowed for lingcod. Retention of canary and yelloweye rockfish was prohibited in 2009-10 and would also be prohibited under the No Action alternative.

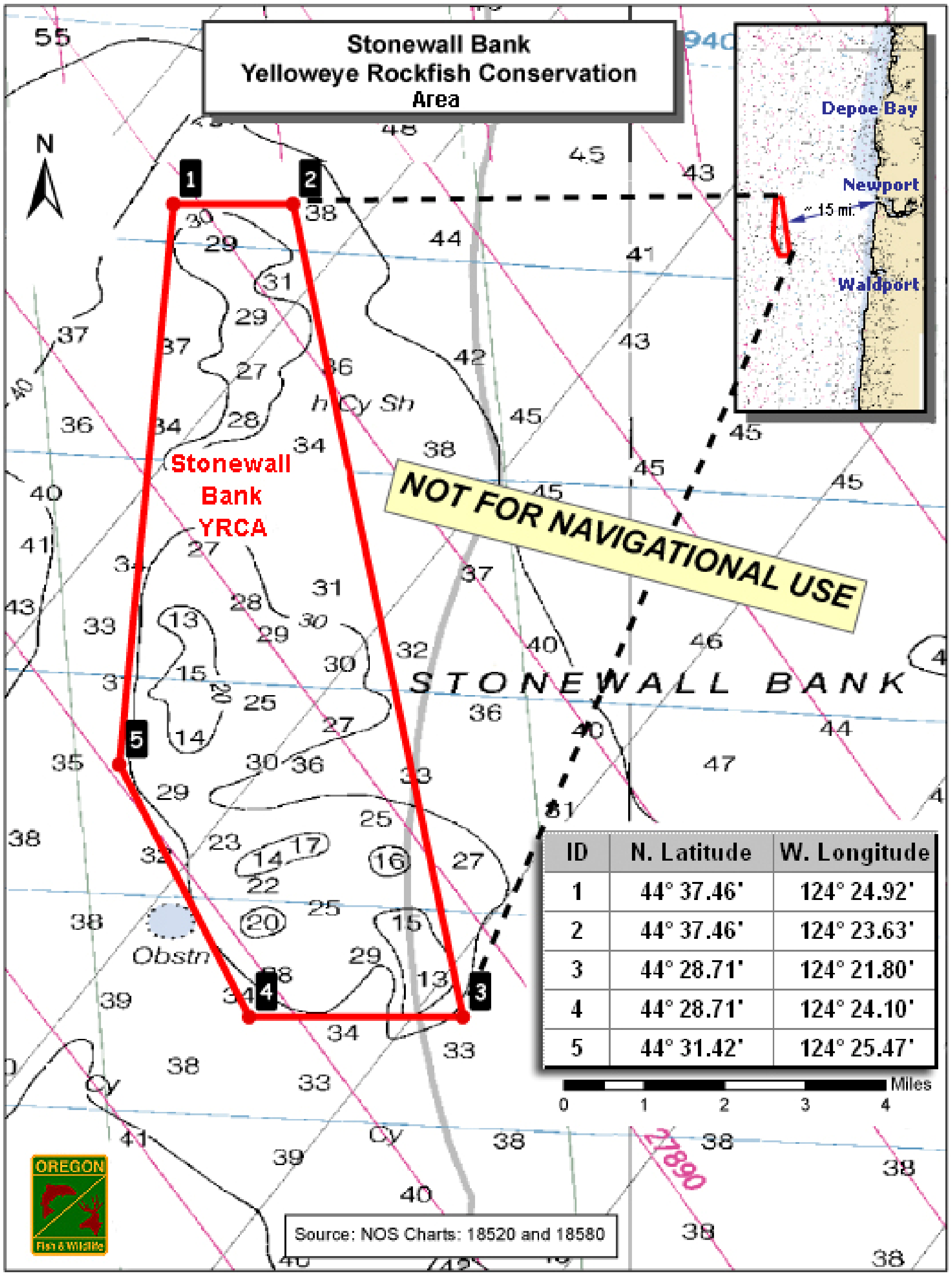
The following minimum size limits applied to 2009-10 Oregon recreational fisheries and would be carried forward under the No Action alternative:

- lingcod – 22 in.
- cabezon – 16 in.
- kelp greenling – 10 in.

Area Restrictions

A YRCA has been in place on Stonewall Bank since 2006 and would also remain under the No Action alterative (Figure C-4). No recreational fishing for groundfish and Pacific halibut can occur within this YRCA, which is bounded by the following waypoints:

44°37.458’ N lat 124°24.918’ W long;
44°37.458’ N lat 124°23.628’ W long;
44°28.71’ N lat 124°21.798’ W long;
44°28.71’ N lat 124°24.102’ W long;
44°31.422’ N lat 124°25.5’ W long.



ODFW, 05/22/06. Reprinted 12/12/06

Figure C-4. The Stonewall Bank Yelloweye Rockfish Conservation Area where recreational fishing for groundfish and Pacific halibut is prohibited. Under the No Action alternative, the area would remain closed.

C.1.7 California Recreational

The 2009-2010 California recreational groundfish fisheries were managed under harvest guidelines for canary and yelloweye rockfish. The harvest guideline for canary rockfish was 22.9 mt. The yelloweye harvest guideline was originally specified as 2.8 mt but it was revised downward on July 1, 2010 to 2.7 mt as a result of the court ruling (75FR38030). As of May

2010, CRFS estimates indicate that yelloweye rockfish catch is accruing at a lower rate than projected, in part due to bad weather and the closure of the tractor launch at the high catch site of Shelter Cove in the early months of the season. The California Recreational Fisheries Survey (CRFS) catch through May and projected impacts for the remainder of the year are below the 2.7 mt HG. If either of these harvest guidelines are projected to be attained inseason, CDFG would enact management actions, including closing recreational fisheries, restricting recreational fishery seasons, and/or restricting the depths where the fishery would be allowed to continue. Season and depth restriction diagrams are provided below (Figure C-5) under the No Action Alternative. Projected impacts to modeled species are presented in Table C-11 and Table C-12.

Management Area	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Months
Northern	CLOSED				May 15 - Sept 15 <20 fm								4
North-Central North of Pt. Arena	CLOSED				May 15 - Aug 15 <20 fm								3
North-Central South of Pt. Arena	CLOSED					June 13–Oct < 30 fm							4.5
South-Central Monterey	CLOSED				May – Nov 15 < 40 fm								6.5
South-Central Morro Bay	CLOSED				May – Nov 15 < 40 fm								6.5
Southern	CLOSED		Mar –Dec < 60 fm										10

Figure C-5. Rockfish, cabezon and greenling season and depth restrictions in each management area under the No Action Alternative.

Table C-11. No Action. California recreational projected impacts to overfished species.

Species	Projected Impacts (mt)	HG (mt)
Bocaccio	67.3	N/A
Canary Rockfish	22.9	22.9
Cowcod	0.3	N/A
Widow Rockfish	6.2	N/A
Yelloweye Rockfish	2.7	2.7

Table C-12. No Action. California recreational projected impacts to non-overfished species for 2011-2012.

Species	Projected Impacts (mt)
Black Rockfish	151.0
Blue Rockfish	178.3
Cabezon	23.3
California Scorpionfish	63.8
California Sheephead	31.7
Greenlings	10.5
Lingcod	196.0
Minor Nearshore Rockfish North	7.8
Minor Nearshore Rockfish South	308.6

All divers (boats permitted while diving for rockfish or other closed species during closed periods provided no hook-and-line gear on board or in possession while diving to catch rockfish) and shore-based anglers were exempt from the seasonal closures and depth restrictions for rockfish, greenlings, California scorpionfish, California sheephead, and ocean whitefish.

In the South Region, California scorpionfish was open 12 months: 0-40 fm January-February, 0-60 fm in March-December.

Bag Limits and Size Limits

Under the No Action Alternative, a statewide 10 fish rockfish, cabezon, and greenling bag limit with a sub-bag limit of 2 fish for bocaccio, cabezon and greenlings would be in place. Retention of cowcod, bronzespotted, canary, and yelloweye rockfish was prohibited in 2009-2010 and would also be prohibited under the No Action alternative. The following bag limits would also apply:

- Leopard Shark – 3 fish
- Scorpionfish – 5 fish
- Sheephead – 5 fish
- Soupfin Shark – 1 fish
- Pacific Halibut – 1 fish
- Sanddabs – None
- Petrale Sole – None
- Starry Flounder – None

A daily bag limit of 10 fish of any one species within the 20 finfish maximum bag limit would apply to the remaining species in the groundfish FMP.

The following minimum size limits applied to 2009-2010 California recreational fisheries and would be carried forward under the No Action alternative:

- Lingcod – 24 inches
- Cabezon – 15 inches
- Kelp Greenling – 12 inches
- Leopard Shark – 36 inches
- Scorpionfish – 10 inches
- Sheephead – 12 inches

Area Restriction Alternatives

CDFG evaluated and has available four potential YRCAs which include habitat in both state and Federal waters where high yelloweye encounter rates have been documented. If implemented, YRCAs are anticipated to reduce yelloweye impacts during the open fishing seasons in both the Northern Groundfish Management Area and the North-Central North of Pt. Arena Groundfish Management Area, possibly allowing for a longer fishing season.

The four areas identified for possible use in the 2009-2010 seasons are in the general area of Point St. George, South Reef, Reading Rock, and Point Delgada. The boundaries for these areas and the latitude and longitude coordinates can be found in (50CFR660.385(e)). To date, these YRCAs have not been implemented but would remain available management measures under the No Action Alternative.

C.2 The Council's Final Preferred Alternative

The Council's preferred integrated alternative for overfished species and management measures for the 2011 and 2012 fishing seasons was decided at their June 2010 meeting in Foster City, California. Impacts of the Final Preferred Alternative and preferred management measures by sector for implementation on January 1, 2011 are as follows.

C.2.1 Limited Entry Non-Whiting Trawl

Amendment 20 to the FMP is scheduled to implement a rationalized trawl fishery structure for the limited entry non-whiting trawl fishery on January 1, 2011. Under the Final Preferred Alternative for the non-whiting trawl fishery, considerations were provided for the rationalized trawl fishery along with contingency management measures in the event that trawl rationalization is delayed beyond January 1, 2011.

The Council recommended two-year trawl allocations for several species, which are further detailed in Section 2.3.1.3. This section also defines the trawl allocations that would occur under Amendment 21: Intersector Allocation, given the Council's final preferred ACL alternatives. In the event that Amendments 20 or 21 are not in place January 1, 2011, the same allocations described in Section 2.3.1.3 could be implemented. The difference would be that under a rationalized fishery structure the allocations would be unchanged during the biennium, while under the cumulative trip limit structure the allocation could be modified through routine inseason action.

C.2.1.1 Rationalized Fishery

Two-year management measures for a rationalized fishery include trawl allocations of species not covered under Amendment 21 (Section 2.3.1.3), trip limits for those species that are not managed under individual fishing quotas under Amendment 20, and RCA configurations that applies to vessels harvesting QP with trawl or fixed gear.

Further, the impacts of implementing the harvest specifications decisions on components of Amendment 20, specifically the initial allocation of individual bycatch quota for Pacific halibut, are noted. Management measure implications of Amendment 20 features such as the carry-over provision and the potential for a mid-water opportunity are also considered. These discussions can be found in Appendix B.

Under a rationalized fishery, individuals will be held accountable for their bycatch; however there is still a risk of exceeding the trawl allocation since overfished species interactions can be unpredictable. As such, the Council expressed the desire to maintain the trawl RCA, which would continue to close the area where encounters with overfished species are considered most likely. The type of gear (i.e., trawl or fixed gear) determines which RCA structure applies (i.e., trawl or non-trawl). As such vessels who harvest IFQ species with trawl gear will be held to the trawl RCA while vessels with fixed gear will be held to the non-trawl RCA. Section 2.4.2.3 describes the seaward non-trawl RCA boundaries and Section 2.4.2.4 describes the shoreward non-trawl RCA boundaries under the Council's Final Preferred Alternative.

The decision on where to set the shoreward and seaward boundaries of the trawl RCA is largely a risk call based on available data that, under a rationalized fishery, is not something that can be evaluated within the trawl model. That is, the bycatch rates that are used in the trawl model (See Appendix A Table A.1 and Appendix B) inform the potential risk of allowing fishing opportunity in certain depths, however the trawl model calculus (e.g., trip limits, assumptions of effort distribution, RCA, etc.) will no longer be applicable under trawl rationalization. The boundaries of the non-trawl RCA are recommended by the Council based on overfished species impacts predicted by the fixed gear models (nearshore and non-nearshore).

In recommending a trawl RCA structure for a rationalized fishery, the Council considered trawl fishery bycatch rate data by depth in order to determine an acceptable level of risk (see Appendix B). The Council-preferred trawl RCA for the rationalized fishery is to set the boundaries as they exist on June 17, 2010, which would be the same structure displayed in Table 2-50 (north of 40°10' N. latitude) and Table 2-51 (south of 40°10 N. latitude). Notable features of this RCA include a modified 200 fm line in the north and a modified 150 fm line in the south during periods 1 and 6. These modified lines are designed to provide access to petrale sole. Under a rationalized trawl fishery, with individual accountability, the risk of exceeding the petrale sole trawl allocation or ACL is lower than under cumulative trip limit management where the fleet is modeled as a whole. As such, under a rationalized fishery structure the modified petrale areas can be accommodated. Under the Final Preferred Alternative, trawl RCA boundaries can be routinely adjusted inseason based upon fishery performance.

Under the Final Preferred Alternative, the Council specified incidental trip limits for species not managed with IFQ for vessels using trawl or fixed gear to harvest IFQ species with a limited entry trawl permit (Table C-13). The purpose of allowing trip limits for these species is to allow incidental catch to be landed and for the fishermen to be paid for those landings. Not having a trip limit would not prevent the fish from being caught. Rather, these species are caught incidentally regardless of whether there is a trip limit in place for them or not. When there is no trip limit, the fish must be discarded (regulatory discard) or forfeited to the state at the time of landing.

The Council recommended that the remaining fish category incidental landing limit for vessels using trawl or fixed gear to harvest IFQ species with a limited entry trawl permit remain unlimited. Should increased landings occur the Council could implement the trip limits analyzed during this biennial cycle process and implement them through routine inseason action (see Appendix B).

Table C-13. Final Preferred Alternative: Incidental trip limits for vessels using trawl or fixed gear to harvest IFQ species with a limited entry permit.

Area	Species	Incidental Landing Limit
N. and S. of 40°10 N lat.	Minor nearshore rockfish & black rockfish	300 pounds/month for periods 1-6
	Cabezon (OR and CA)	50 pounds/month for periods 1-6
	Spiny dogfish	60,000 pounds/month for periods 1-6
	Remaining fish a/	Unlimited
South of 34°27 N lat.	Longspine thornyhead	24,000 pounds/2 months for periods 1-6

a/ Remaining fish includes: longnose skate, big skate, California skate, California scorpionfish, leopard shark, soupfin shark, finescale codling, Pacific rattail (grenadier), ratfish, kelp greenling, shortbelly, cabezon in WA

C.2.1.2 Cumulative Trip Limit Management

For 2011, trip limits and RCA structures can be found in Table C-14; projected species impacts can be found in Table C-15. For 2011, the Final Preferred Alternative has markedly lower trip limits for sablefish in the northern areas, in comparison with the No Action Alternative (14,750 lbs/2 months versus an average of 21,389 lbs/2 months, respectively). This reflects the lower sablefish ACL and trawl allocation for the Final Preferred Alternative compared with the No Action Alternative (2,538 mt versus 2,955 mt, respectively). The Final Preferred Alternative also has much lower petrale sole trip limits coast-wide (4,800 lbs/2 months versus an average of 7,900 lbs/2 months) and somewhat lower trip limits for shortspine thornyheads, which is tied to the lower sablefish limits, since these fish co-occur. The Dover sole trip limits are 33 percent higher (150,000 lbs/2 months vs. 100,000 lbs/2 months in the No Action Alternative), in order to increase utilization of this species and fulfill the much higher ACL and accompanying trawl allocation in the Final Preferred Alternative (22,235 mt vs. 16,093 mt in the No Action Alternative). Since Dover sole also co-occurs with sablefish and thornyheads, the Dover sole trip limits were not increased to fully exploit the trawl allocation for this species, to be precautionary regarding other DTS species, primarily with sablefish, which are constraining, and also shortspine thornyheads, which are projected as exploited to 98 percent of the trawl allocation under this trip limit structure, in the Final Preferred Alternative scenario.

Slope rockfish limits for the Final Preferred Alternative were set at the same levels as the beginning of 2010 (6,000 lbs/2 months), as modeling to these trip limits kept projections of POP and darkblotched rockfish impacts 15 percent to 20 percent below the trawl allocation, while allowing bycatch of other slope species within the trawl allocations. These trip limits could be lowered early in 2011 through routine inseason adjustment if future POP or darkblotched catch levels warrant, and in response to a GAP request for more temporally uniform slope rockfish trip limits structure, assuming that the fishery were managed under trip limits in 2011.

The Final Preferred Alternative for 2011 is nearly the same as Alternative 3 from the June Council meeting, except the trip limits reflect small comparative decreases to sablefish and Dover sole trawl allocations. These deductions represent removals for the at-sea whiting set-asides of 50 mt for sablefish and 5 mt for Dover sole. The at-sea whiting set asides were not included during the runs at the June Council meeting, but were addressed in the final model runs. Another notable difference between the Final Preferred Alternative and Alternative 3 for 2011 is that the bocaccio allocation is 60 mt in the Final Preferred Alternative, while it is 29.6 mt in Alternative 3.

The Final Preferred Alternative for 2012 has a higher petrale sole ACL and associated trawl allocation than for 2011 (1,055 mt versus 871 mt, respectively). The 2012 Final Preferred Alternative also shows a lower sablefish ACL and associated trawl allocation (2,459 mt) than in 2011 (2,538 mt). The Dover sole allocation remains the same at 22,235 mt for both years.

For 2012, trip limits and RCA structures can be found in Table C-16; projected species impacts can be found in Table C-17. Sablefish trip limits are lowered further, compared with the No Action Alternative, due to a lower ACL, and concomitant decrease to the trawl allocation. Shortspine thornyhead trip limits are also lowered slightly in response to the constraining sablefish ACL. Petrale sole trip limits are markedly higher in 2012 versus 2011 (6,400 lbs/2 months versus 4,800 lbs/2 months). Slope rockfish trip limits are the same for 2012 as 2011. Dover sole trip limits remain the same as 2011. Projected impacts and trip limits for 2012 are largely for comparative purposes to explain impacts of ACLs and trawl allocations in this document, and would be likely to change, due to the latest WCGOP and updated landings data between June 2010 and January 1, 2012.

Table C-14. Final Preferred Alternative: 2011 non-whiting LE trawl cumulative trip limits and RCA boundaries.

			2-month cumulative-poundage limits							
2-month period	RCA lines (fm) shallow	RCA lines (fm) deep	sable-fish	long-spine	short-spine	Dover sole	petrale sole	arrow-tooth	other flatfish	slope rockfish
N. of 40°10' N lat.										
Large/small footrope limits										
1	*75*	200	**14,750**	20,000	17,200	150,000	**4,800**	150,000	110,000	6,000
2	*75*	200	**14,750**	20,000	17,200	150,000	**4,800**	150,000	110,000	6,000
3	*75*	150/200	**14,750**	20,000	17,200	150,000	**4,800**	150,000	110,000	6,000
4	*75*	150/200	**14,750**	20,000	17,200	150,000	**4,800**	150,000	110,000	6,000
5	*75*	200	**14,750**	20,000	17,200	150,000	**4,800**	150,000	110,000	6,000
6	*75*	200	**14,750**	20,000	17,200	150,000	**4,800**	150,000	110,000	6,000
Selective gear limits										
1	*75*	200	**8,000**	5,000	5,000	65,000	**4,800**	90,000	60,000	
2	*75*	200	**8,000**	5,000	5,000	65,000	**4,800**	90,000	60,000	
3	*75*	150/200	**8,000**	5,000	5,000	65,000	**4,800**	90,000	60,000	
4	*75*	150/200	**8,000**	5,000	5,000	65,000	**4,800**	90,000	60,000	
5	*75*	200	**8,000**	5,000	5,000	65,000	**4,800**	90,000	60,000	
6	*75*	200	**8,000**	5,000	5,000	65,000	**4,800**	90,000	60,000	
38° - 40°10' N lat.										
1	100	200	**14,750**	20,000	17,200	150,000	**4,800**	10,000	110,000	15,000
2	100	150	**14,750**	20,000	17,200	150,000	**4,800**	10,000	110,000	15,000
3	100	150	**14,750**	20,000	17,200	150,000	**4,800**	10,000	110,000	15,000
4	100	150	**14,750**	20,000	17,200	150,000	**4,800**	10,000	110,000	15,000
5	100	150	**14,750**	20,000	17,200	150,000	**4,800**	10,000	110,000	15,000
6	100	200	**14,750**	20,000	17,200	150,000	**4,800**	10,000	110,000	15,000
S. of 38° N lat.										
1	100	200	**14,750**	20,000	17,200	150,000	**4,800**	10,000	110,000	55,000
2	100	150	**14,750**	20,000	17,200	150,000	**4,800**	10,000	110,000	55,000
3	100	150	**14,750**	20,000	17,200	150,000	**4,800**	10,000	110,000	55,000
4	100	150	**14,750**	20,000	17,200	150,000	**4,800**	10,000	110,000	55,000
5	100	150	**14,750**	20,000	17,200	150,000	**4,800**	10,000	110,000	55,000
6	100	200	**14,750**	20,000	17,200	150,000	**4,800**	10,000	110,000	55,000

Table C-15. Final Preferred Alternative: Non-whiting LE trawl target and bycatch species' allocations and projected impacts for 2011.

	Projected Total Catch (mt)			Harvest	Proj. -	
	North of 40°10'	South of 40°10'	Projected Total	Allocation (mt)	Allocation (mt)	Proj. % of Alloc.
Sablefish	2,181	327	2,509	**2,538**	-29	**98.8%**
Longspine	1,091	250	1,341	1,966	-625	**68.2%**
Shortspine	1,258	142	1,400	1,430	-30	**97.9%**
Dover sole	15,905	1,805	17,710	22,235	-4,525	**79.7%**
Arrowtooth	5,509	15	5,524	12,431	-6,907	**44.4%**
Petrale sole	683	156	839	**871**	-32	**96.3%**
English sole	382	76	458	18,654	-18,196	**2.5%**
Other flatfish	684	186	870	4,193	-3,323	**20.7%**
Slope Rockfish N	215		215	818	-603	**26.3%**
Slope Rockfish S		195	195	377	-182	**51.8%**
Canary	9.2	1.4	10.6	20.0	-9.4	**52.9%**
POP	90.0	0.2	90.2	107.0	-16.8	**84.3%**
Darkblotched	151.0	19.2	170.2	240.0	-69.9	**70.9%**
Widow	6.0	8.8	14.8	235.0	-220.2	**6.3%**
Bocaccio	1.7	5.5	7.1	60.0	-52.9	**11.9%**
Yelloweye	0.2	0.0	0.3	0.6	-0.4	**41.7%**
Cowcod	0.0	0.3	0.3	1.8	-1.5	**16.7%**

Table C-16. Final Preferred Alternative: 2012 non-whiting LE trawl cumulative trip limits and RCA boundaries.

			2-month cumulative-poundage limits							
2-month period	RCA lines (fm) shallow	deep	sable-fish	long-spine	short-spine	Dover sole	petrale sole	arrow-tooth	other flatfish	slope rockfish
N. of 40°10' N lat.										
Large/small footrope limits										
1	75	200	**14,000**	20,000	16,800	150,000	**6,400**	150,000	110,000	6,000
2	75	200	**14,000**	20,000	16,800	150,000	**6,400**	150,000	110,000	6,000
3	75	150/200	**14,000**	20,000	16,800	150,000	**6,400**	150,000	110,000	6,000
4	75	150/200	**14,000**	20,000	16,800	150,000	**6,400**	150,000	110,000	6,000
5	75	200	**14,000**	20,000	16,800	150,000	**6,400**	150,000	110,000	6,000
6	75	200	**14,000**	20,000	16,800	150,000	**6,400**	150,000	110,000	6,000
Selective gear limits										
1	75	200	**7,500**	5,000	5,000	65,000	**6,400**	90,000	60,000	
2	75	200	**7,500**	5,000	5,000	65,000	**6,400**	90,000	60,000	
3	75	150/200	**7,500**	5,000	5,000	65,000	**6,400**	90,000	60,000	
4	75	150/200	**7,500**	5,000	5,000	65,000	**6,400**	90,000	60,000	
5	75	200	**7,500**	5,000	5,000	65,000	**6,400**	90,000	60,000	
6	75	200	**7,500**	5,000	5,000	65,000	**6,400**	90,000	60,000	
38° - 40°10' N lat.										
1	100	200	**14,000**	20,000	16,800	150,000	**6,400**	10,000	110,000	15,000
2	100	150	**14,000**	20,000	16,800	150,000	**6,400**	10,000	110,000	15,000
3	100	150	**14,000**	20,000	16,800	150,000	**6,400**	10,000	110,000	15,000
4	100	150	**14,000**	20,000	16,800	150,000	**6,400**	10,000	110,000	15,000
5	100	150	**14,000**	20,000	16,800	150,000	**6,400**	10,000	110,000	15,000
6	100	200	**14,000**	20,000	16,800	150,000	**6,400**	10,000	110,000	15,000
S. of 38° N lat.										
1	100	200	**14,000**	20,000	16,800	150,000	**6,400**	10,000	110,000	55,000
2	100	150	**14,000**	20,000	16,800	150,000	**6,400**	10,000	110,000	55,000
3	100	150	**14,000**	20,000	16,800	150,000	**6,400**	10,000	110,000	55,000
4	100	150	**14,000**	20,000	16,800	150,000	**6,400**	10,000	110,000	55,000
5	100	150	**14,000**	20,000	16,800	150,000	**6,400**	10,000	110,000	55,000
6	100	200	**14,000**	20,000	16,800	150,000	**6,400**	10,000	110,000	55,000

Table C-17. Final Preferred Alternative: Non-whiting LE trawl target and bycatch species' allocations and projected impacts for 2012.

	Projected Total Catch (mt)			Harvest	Proj. -	
	North of 40°10'	South of 40°10'	Projected Total	Allocation (mt)	Allocation (mt)	Proj. % of Alloc.
Sablefish	2,100	321	2,421	**2,458**	-37	**98.5%**
Longspine	1,091	250	1,341	1,914	-573	**70.0%**
Shortspine	1,235	140	1,374	1,414	-40	**97.2%**
Dover sole	15,905	1,805	17,710	22,235	-4,525	**79.7%**
Arrowtooth	5,509	15	5,524	9,462	-3,938	**58.4%**
Petrale sole	825	192	1,017	**1,055**	-38	**96.4%**
English sole	382	76	458	9,533	-9,075	**4.8%**
Other flatfish	684	186	870	4,193	-3,323	**20.7%**
Slope Rockfish N	215		215	817	-602	**26.3%**
Slope Rockfish S		195	195	377	-182	**51.8%**
Canary	9.2	1.5	10.8	20.0	-9.3	**53.8%**
POP	89.9	0.2	90.1	107.0	-16.9	**84.2%**
Darkblotched	151.0	19.2	170.3	238.0	-67.8	**71.5%**
Widow	6.0	8.8	14.8	235.0	-220.2	**6.3%**
Bocaccio	1.7	5.7	7.4	60.0	-52.6	**12.3%**
Yelloweye	0.2	0.0	0.3	0.6	-0.4	**41.7%**
Cowcod	0.0	0.3	0.3	1.8	-1.5	**17.2%**

Comparison of Alternatives 1, 2, and 3 (PPA)

Trawl model runs were conducted for three alternatives in the months before the June 2010 Council meeting in order to explore the range of possible of ACLs for rebuilding species (including petrale sole, for 2011 and 2012), that was considered appropriate, given the projected fishery impacts, management measures, and revenue impacts that would result from these ACLs. Alternative 1 was the low ACL scenario, Alternative 2 was intermediate, and Alternative 3 was high. Sablefish ACLs and trip limits also varied among the three alternatives.

The three alternatives were modeled for 2011, which is the most realistic time frame within which to compare projected impacts, considering the current trip limits and available data and the largely unpredictable nature of changes which may occur over the next two years. Comparisons are drawn below among the 2011 runs. Comparisons are made between 2011 and 2012 model runs only within Alternative 3 and within the Final Preferred Alternative, for which runs for both years were conducted.

Since the June 2010 Council meeting, there were slight changes to some of the ACLs listed in these alternatives, but they are not of sufficient magnitude to reduce the exploratory and comparative value of the four trawl model runs presented here for the three alternatives explained below.

Alternative 3 is the Council Preliminary Preferred Alternative, which was updated at the Council meeting, and then was adjusted slightly and rerun after the Council meeting to become the Final Preferred Alternative, primarily by lowering sablefish and Dover sole trawl allocations in order to account for the at-sea whiting set asides.

Trip limits vary over the three alternatives, most noticeably for petrale sole and for sablefish. For sablefish, trip limits of accompanying DTS species (e.g. short-spine thornyheads) covary to some extent with the sablefish trip limits, to keep model projections of co-occurring species beneath the trawl allocations. The same can be said of petrale sole and co-occurring flatfish. Effort was made in the later model runs to keep trip limits as temporally uniform as possible for easier understanding of the regulations and compliance with them, as well as easier enforcement.

The RCA structure among Alternatives 1, 2, and 3 is essentially the same. The No Action Alternative, Alternatives 1 and 2 are equal, but in Alternative 3 (the PPA) and the Final Preferred Alternative, the shoreward RCA boundary in period 4 was brought in to 75 fathoms in order to further restrict access to summer petrale sole, along with lower trip limits (Table C-18). As in the trip limits, efforts were made toward a parsimonious RCA structure for the same reasons.

For a full comparison of trawl allocations for target and rebuilding species used in model runs used to explore the range of ACLs and allocations, as well as those in the No Action Alternative and the Final Preferred Alternative, see Table C-18.

Table C-18. LE non-whiting trawl-sector allocation ranges and alternatives; scenarios modeled for trip-limit management in 2011-2012.

	Range of Non-Whiting Trawl Allocations for 2011 &2012					
Species/Species Group/Area	No Action	Final Preferred	Low (1)	Mid (2)	High (3)	
Sablefish N of 36º N. lat.	**2,955**	**2,538**	**2,187**	**2,325**	**2,588**	*
Longspine thornyhead N. of 34 27' N. lat.	2,129	1,966	2,000	2,000	1,971	*
Shortspine thornyhead N. of 34 27' N. lat.	1,567	1,430	1,450	1,450	1,450	
Dover sole	**16,093**	**22,235**	**16,306**	**16,306**	**22,240**	
Arrowtooth flounder	9,755	12,431	14,166	14,166	12,441	*
Petrale sole	**1,140**	**871**	**337**	**643**	**865**	*
English sole	9,645	18,654	18,659	18,659	18,659	
Other flatfish	4,685	4,193	4,886	4,886	4,213	*
Minor Slope Rockfish N. of 40°10' N lat.	877	818	877	877	872	*
Minor Slope Rockfish S. of 40°10' N lat.	394	377	394	394	377	*
Canary rockfish	21.3	20	8.0	19.3	20.5	*
Pacific ocean Perch	100.8	107	33.8	63.3	100.3	*
Darkblotched rockfish	230	240	175.8	241.5	240.3	*
Widow rockfish	**21.6**	**235**	**60.8**	**148.1**	**235.5**	
Yelloweye rockfish	0.6	0.6	0.4	0.6	0.6	*
Bocaccio	**16.1**	**60**	**4.7**	**11.3**	**29.6**	
Cowcod	1.5	1.8	0.9	1.9	1.4	

*Note: adjustments were made to the high scenario when it became the Council PPA at the June meeting, which lowered some allocations from their previously run levels. The PPA is substituted for the initial version of Alternative 3 in the interest of brevity and paperwork reduction.

C.2.2 Limited Entry Trawl Whiting

C.2.2.1 Rationalized Fishery

For 2011-2012, the Council adopted new sector specific allocations as determined by Amendment 21 for trawl dominant species and a two year allocation for canary (Table C-19).

C.2.2.2 Bycatch Limit Management

In the event trawl rationalization does not occur on January 1, 2011, the preferred limited entry whiting trawl management measures adopted by the Council include the same management measures as under No Action including sector-specific bycatch limits, the ability for NMFS to restrict the depths whiting vessels fish if necessary to reduce bycatch on a sector-specific basis, full monitoring of all whiting catcher vessels fishing in the RCA during the primary season, a request that NMFS automatically close the non-tribal whiting fishery upon projection of attainment of a bycatch limit rather than waiting until the limit is attained, 100 percent observer coverage for vessels fishing in the RCA during the primary season and sorting their catch at sea (observer coverage to be paid by the vessel owner), and an exemption from the at-sea processing rules for vessels less than 75 ft. in length in the shoreside whiting sector to allow them to freeze and tail their whiting to allow for value-added product delivery. For 2011-2012, the Council adopted new sector specific bycatch limits (Table C-19), which were based on Amendment 21 allocations and a two year allocation for canary.

Table C-19. Final Preferred Alternative. Overfished species allocations by sector considering using Amendment 21 for darkblotched, POP, and widow and the Council's final preferred two year allocation of canary rockfish.

Catcher Processor

Species	2011 ACL (mt)	2012 ACL (mt)	2011 Allocation (mt)	2012 Allocation (mt)
Canary	102	107	4.8	5.0
DRK	298	296	9	9
POP	180	183	10	10
Widow	600	600	87	87

Mothership

Species	2011 ACL (mt)	2012 ACL (mt)	2011 Allocation (mt)	2012 Allocation (mt)
Canary	105	107	3.4	3.6
DRK	298	296	6	6
POP	180	183	7	7
Widow	600	600	61	61

Shoreside

Species	2011 ACL (mt)	2012 ACL (mt)	2011 Allocation (mt)	2012 Allocation (mt)
Canary	102	107	5.9	6.2
DRK	298	296	11	11
POP	180	183	13	13
Widow	600	600	107	107

New management measures include the following trips limits for the shoreside non-treaty whiting fisheries operating north of 40º10' N. latitude:

- Lingcod: 600 lb per calendar month
- Minor slope rockfish, including darkblotched rockfish: 1,000 lb per calendar month
- Pacific ocean perch: 600 lb per calendar month
- Pacific cod: 600 lb per calendar month
- Sablefish: 1,000 lb per calendar month

These limits would be in addition to the current midwater trawl limits specified in Federal regulations (i.e., trip limit table 3) for widow rockfish and yellowtail rockfish north of 40º10' N. latitude. Midwater trawl limits south of 40º10' N. latitude remain unaffected by this recommendation.

C.2.3 Non-Nearshore Fixed Gear

Table C-20 describes the Final Preferred Alternative for the sablefish ACL north of 36° N. latitude, compared to No Action, along with the sablefish allocations for limited entry and open access. The associated final preferred apportionment of overfished species for the non-nearshore fixed gear sector (open access and limited entry combined) can be found in Table C-21. These final preferred apportionments are the basis by which sharing of overfished species occurs within the non-trawl sector. These are not harvest guidelines, but an amount available to the non-trawl sector for the start of the biennium. As part of routine inseason management, the Council could decrease or increase these apportionments based on updated projections.

Table C-20. Final Preferred Alternative: Sablefish ACL and allocations north of 36° N. latitude compared to No Action (2010).

Species	Fishery	2010 (mt)	2011 (mt)	2012 (mt)
Sablefish N. 36° N. Lat.	**OY/ACL**	6,471	5,515	5,347
	LE Fixed Gear Allocation	2,140	1,874	1,816
	----LE Fixed Gear Primary	1,819	1,593	1,544
	----LE Fixed Gear Daily Trip Limit	321	281	272
	Open Access	529	463	449

Table C-21. Final Preferred Alternative: Apportionment of the non-trawl allocation of overfished species to the non-nearshore fixed gear sector. No further apportionment exists between limited entry fixed gear and open access DTL.

Species	2011 Apportionment (mt)	2012 Apportionment (mt)
Canary rockfish	2.3	2.3
Yelloweye rockfish	1.3	1.3

Under the Final Preferred Alternative, the seaward non-trawl RCA is defined by management lines specified with waypoints at roughly 100 fm in waters off northern California (north of 40°10' N. latitude) through Oregon and Washington (Figure C-6). The non-trawl RCA south of 40°10' N. latitude under the Final Preferred Alternative is defined by management lines specified with waypoints at roughly 150 fm.

Seaward RCA Boundary	36°- 40° 10'	40°10'-Col/Eur 43°	Col/Eur 43°-Cascade Head 45.064°	Cascade Head 45.064°-Pt. Chehalis 46.888°	North of Pt. Chehalis 46.888°
Shoreward boundary to 100 fm					
100 fm					
125 fm					
150 fm					
>150 fm					

Figure C-6. Final Preferred Alternative. Non-trawl RCA seaward configuration. Grey shading indicates areas closed to fishing.

Under the No Action Alternative, the non-trawl RCA from 43° N. latitude to Cascade Head (45.064° N. latitude) was specified at 125 fm, except on days when the directed halibut fishery is open, when the fishery is then restricted to waters seaward of the 100 fm line. This regulation, which was new in the 2009-2010 cycle, was implemented to reduce yelloweye rockfish impacts by fixed gear fishermen targeting sablefish and other target groundfish. For 2011-2012, the modeled-overfished species impacts by the limited entry and open access fisheries showed that given the lower sablefish ACLs for 2011 and 2012 compared to that under the No Action Alternative (Table C-20), along with the Council's final preferred apportionment of overfished species for the non-nearshore fishery (Table C-21), the 100 fm line could be accommodated.

The Council chose the 100 fm non-trawl RCA boundary as the Final Preferred Alternative to provide greater access to fishing grounds while having no increase of impacts to overfished species relative to the No Action Alternative. Moving the seaward RCA from 43° N. latitude to Cascade Head from 125 to 100 fm opens more fishing areas, may decrease conflicts among fixed gear fishermen, may reduce running time to some fishing grounds (which subsequently decreases expense and improves safety), and may increase sablefish catch rates in some instances. Fixed gear fishermen stressed that much of their productive fishing grounds are between 100 and 125 fm, and that moving the line to 125 fm created negative impacts for the fishery (Agenda Item B.3.b, ODFW Report, June 2010}. The GAP reported that sablefish catch in waters shallower than 125 fm during the fall typically yield larger and more valuable sablefish, along with increased catches of lingcod (Agenda Item, B.3.b, Supplemental GAP Report, June 2010). In addition, the GAP noted that fishing shallower would benefit smaller vessels (lack of space for increased gear that is required when fishing in deeper water) and enhance at-sea safety (Agenda Item, B.3.b, Supplemental GAP Report, June 2010). Finally, in some areas (particularly off Washington), the industry pointed out that RCA restrictions that push the fleet further off the coast results in more intense fishing pressure on increasingly less productive fishing grounds in smaller areas (decreased catch rates and increased gear conflicts over time) (Agenda Item B.7.b, Supplemental GAP Report, June 2010).

Under the Final Preferred Alternative, the Council will have the ability to routinely adjust non-trawl RCA configurations inseason for four northern subareas bounded by Cape Mendocino at 40°10' N. latitude, 43° N. latitude, Cascade Head, Pt. Chehalis at 46.888° N. latitude, and the U.S.-Canada border. These adjustments would be used to reduce overfished species impacts, if necessary.

C.2.3.1 Non-Nearshore Limited Entry Fixed Gear

The Council recommended that the No Action Alternative trip limits north and south of 40°10' N. latitude (Table 2-56 and Table 2-57, respectively) be carried forward for the 2011-2012 limited entry fixed gear fisheries, except for the sablefish limits described below.

Limited Entry North of 36° N. latitude

Under the Final Preferred Alternative, the Council recommended higher sablefish cumulative limits, compared to the No Action Alternative, for the limited entry fixed gear daily trip limit fishery as follows:

Period 1 = 6,500 lbs/2 months
Period 2 = 7,500 lbs/2 months
Period 3 = 7,500 lbs/2 months

Period 4 = 7,500 lbs/2 months
Period 5 = 7,500 lbs/2 months
Period 6 = 6,000 lbs/2 months

No daily limit is recommended but a weekly limit of not less than 25 percent of the bimonthly limit was included as part of the Council's Final Preferred Alternative. These limits are intended to allow the limited entry daily trip limit fishery attain their sablefish allocation.

The weekly landing limit of at least 25 percent of the bimonthly limit was recommended, even though the current model showed no significant relationship between weekly landing limits and actual bimonthly landings. It is possible that the weekly limit had some negative-effect to bimonthly landings, even though the effect was not detected. A more complex model will be applied to these data at a later date to better understand the relationship between weekly limits and actual bimonthly landings. In the mean time, dropping the daily limit and substantially increasing the bimonthly limit are major deviations from past management of this fishery. Hence, it is prudent to retain some weekly limit to ensure that landings do not increase unpredictably faster than anticipated.

Weekly landing limits have historically been set at approximately 25 percent of the bimonthly limit. A weekly limit set at 25 percent of the bimonthly limit would require at least four weeks of fishing for vessels to reach the bimonthly limit. Weekly limits should be no lower than 25 percent of the bimonthly limit, because it is likely that weather, breakdowns, and other unforeseen circumstances may prevent vessels from fishing.

The planned bimonthly landing limit is not constant. Hence, to simplify management, a constant weekly limit should be set at 1,900 lbs/week. This weekly limit represents 25 percent – 33 percent of the bimonthly landing limits set for 2011.

Impacts under the Final Preferred Alternative for limited entry fixed gear north of 36° N. latitude are displayed in Table C-22.

Table C-22. Final Preferred Alternative. Limited entry fixed gear impacts north of 36° N. latitude.

Species	2011 Impacts (mt)	2012 Impacts (mt)
Bocaccio	0.0	0.0
Canary rockfish	1.9	1.8
Darkblotched rockfish	3.5	3.4
Pacific ocean perch	0.3	0.3
Widow rockfish	0.1	0.1
Yelloweye rockfish	0.8	0.7

Limited Entry South of 36° N. latitude

In order to attain the sablefish ACL south of 36° N. latitude, the Council recommended sablefish trip limits in the Conception Area that are higher than the No Action limits. For limited entry, the Council recommended no daily limit, 2,000 pounds per week with no bi-monthly limit. Analysis of this trip limit is provided in Appendix A.

A recent WCGOP report indicates that there are trace (i.e., less than 0.1 mt) overfished species interactions in the area south of 36° N. latitude. As such action, the Final Preferred Alternative for the non-nearshore fisheries south of 36° N. latitude is not anticipated to result in appreciable overfished species impacts.

C.2.3.2 Non-Nearshore Open Access Fixed Gear

Routine management measures such as alternative trip limits and non-trawl RCA adjustments are included in the Council's Final Preferred Alternative for the non-nearshore open access fisheries. The same seaward non-trawl RCA adjustment alternatives described above would also apply to the non-nearshore open access sector (Figure C-6). Adjustments of the seaward non-trawl RCA boundary in the north largely affect sablefish targeting in the daily-trip-limit fishery, but also affect targeting opportunities on slope rockfish, spiny dogfish, shortspine thornyhead, and Pacific halibut. The Council recommended that the No Action Alternative trip limits north and south of 40 10 N. latitude (Table 2-58 and Table 2-59) be carried forward for the 2011-2012 open access fixed gear fisheries, except for the sablefish limits south of 36° N. latitude, described below.

Open Access Sablefish DTL north of 36° N. latitude

Impacts under the Final Preferred Alternative for open access fixed gear fisheries north of 36° N. latitude are displayed in Table C-23.

Table C-23. Final Preferred Alternative: Open access fixed gear north of 36° N. latitude projected impacts to overfished species.

Species	2011-2012 Impacts (mt)
Bocaccio	0.0
Canary rockfish	0.3
Darkblotched rockfish	0.8
Pacific ocean perch	0.1
Widow rockfish	0.0
Yelloweye rockfish	0.1

Open Access South of 36° N. latitude

The Council recommended higher sablefish DTL limits, compared to the No Action Alternative, for Conception area open access fisheries in order to achieve the Conception Area sablefish ACL. For open access, the Council recommended 400 pounds per day or one weekly landing of up to 1,500 pounds not to exceed 6,000 pounds in 2 months. Analysis of this trip limit is provided in Appendix A.

A recent WCGOP report indicates that there are limited (i.e., less than 0.1 mt) overfished species interactions in the area south of 36° N. latitude. As such action, the Final Preferred Alternative is not anticipated to result in any appreciable overfished species impacts.

C.2.4 Nearshore Fixed Gear

Under the Final Preferred Alternative, the nearshore fishery is modeled using finer area stratifications and average landings for Oregon and California. As discussed in Appendix A, overfished species impact projections were stratified into three areas: (1) north of 42° N lat; (2) between 42° and 40°10' N lat; and (3) south of 40°10' N lat. Instead of using a single previous year landings data, average landings based on 2007-2009 for Oregon and 2006-2008 for California were used to project target species catch and overfished species impacts (Table C-25). In previous years, overfished species impacts in the nearshore fishery were modeled for the area north of 40^{o}10' N lat and south of 40^{o}10' N lat. Overfished species impacts could not be attributed to an individual state and both states "co-managed" this area to ensure that the fishery stayed within the allowable overfished species impacts. The finer area stratification under the Final Preferred Alternative provides an opportunity for California and Oregon to independently manage their nearshore fisheries since overfished species impacts could be estimated for each state.

The Final Preferred Alternative maintains the No Action RCA restrictions for the nearshore fishery (30 fm north of 43° N; 20 fm between 43° N and 40° 10' N. latitude; 30 fm between 40° 10' N. latitude and 34° 27' N. latitude; 60 fm south 34° 27' N. latitude) (Figure C-7).

At the June 2010 Council meeting, the GAP statement and public testimony spoke to the hardship faced by the nearshore community under the restrictive yelloweye harvest amounts (Agenda Item B.7.b, Supplemental GAP Report and Agenda Item B.5.c, Public Comment). Although the Final Preferred Alternative is less restrictive than other analyzed alternatives, the nearshore fishery will continue to be constrained in Oregon and California due to the low yelloweye apportionment of the non-trawl allocation (Table C-24). Since the nearshore fishery is not modeled on full attainment of nearshore species ACLs, this fishery will continue to be held to reduced levels, resulting in lost economic opportunities. Under the Final Preferred Alternative, neither Oregon nor California will be able to maintain opportunities similar to 2009-2010. Modeled projected species impacts under this alternative are summarized by area in Table C-27.

Table C-24. Alternatives Comparison. Nearshore apportionment of the non-trawl allocation for canary and yelloweye rockfish for 2011/2012.

	No Action (mt)	Final Preferred (mt)	Alt 1 (mt)	Alt 2 (mt)	Alt 3 (mt)
Canary	3.6	4.0	1.4	3.1/3.3	3.5/ 3.7
Yelloweye	1.1	1.1	0.4	0.7	0.9

Table C-25. Previous years' nearshore landings by species and year for each modeled area.

OREGON	Year and MT landed			
Species	**2006**	**2007**	**2008**	**2009**
Black rockfish	92.9	101.1	98.3	130.5
Blue rockfish	4.7	4.2	2.7	2.8
Minor nearshore rockfishes	8.1	8.4	10.7	11.3
Cabezon	22.0	21.9	24.7	29.8
Kelp greenling	14.5	18.3	21.9	20.6
Lingcod	43.6	49.4	57.3	44.2
CALIFORNIA - 40°10' to 42° N lat				
Black rockfish	58.2	79.5	80.9	89.1
Blue rockfish	10.4	6.9	21.8	2.5
Other minor nearshore rockfishes	7.4	11.3	10.3	2.3
Cabezon	2.6	3.0	2.4	1.8
Kelp greenling	0.2	0.3	0.3	0.3
Lingcod	12.1	15.5	17.0	8.1
CALIFORNIA - South of 40°10'N lat				
Black rockfish	3.4	4.0	2.2	4.0
Blue rockfish	8.6	6.5	5.4	2.6
Shallow nearshore rockfishes	46.6	52.3	55.0	47.3
Deeper nearshore rockfishes	28.1	28.7	29.3	27.4
Cabezon	25.6	22.4	20.8	15.5
Kelp greenling	1.4	1.2	1.1	1.1
Lingcod	24.0	20.9	19.2	15.7

Table C-26. Final Preferred Alternative. Nearshore fishery projected total catch by area for 2011-2012.

Area	Projected Total Catch (mt) 2011/12
Grand Total	**525**
Black rockfish	203
Blue rockfish	20
Cabezon	95
Deeper nearshore RF	29
Kelp greenling	21
Lingcod	86
Other minor RF	20
Shallow nearshore RF	51
North of 42° N. lat.	**218**
Black rockfish	110
Blue rockfish	3
Cabezon	25
Kelp greenling	20
Lingcod	50
Other minor nearshore rockfish	10
42° - 40°10' N. lat.	**132**
Black rockfish	90
Blue rockfish	10
Cabezon	7
Kelp greenling	0
Lingcod	15
Other minor nearshore rockfish	10
South of 40°10' N. lat.	**175**
Black rockfish	3
Blue rockfish	7
Cabezon	63
Deeper nearshore rockfish	29
Kelp greenling	1
Lingcod	21
Shallow nearshore rockfish	51

Shoreward RCA Boundary	South of 34°27'	34°27' - 40°10'	40°10' - 42°	42°' - Col/Eur 43°	Col/Eur 43° - 46°16'	North of 46°16'
Shoreward RCA Boundary						
20 fm						
30 fm						
60 fm						

Figure C-7 Final Preferred Alternative: Nearshore shoreward RCA configuration. Grey shading indicates areas closed to fishing in 2011-2012.

Table C-27. Final Preferred Alternative: Nearshore overfished species bycatch projections for 2011-2012.

Species	Area	Projected Total Impacts (mt) 2011/12
Bocaccio		**0.3**
	OR: North of 42	0.0
	CA: 42° - 40°10	0.0
	CA: South of 40°10	0.3
Canary		**3.0**
	OR: North of 42	0.8
	CA: 42° - 40°10	0.8
	CA: South of 40°10	1.4
Widow		**0.3**
	OR: North of 42	0.0
	CA: 42° - 40°10	0.2
	CA: South of 40°10	0.0
Yelloweye		**1.1**
	OR: North of 42	0.8
	CA: 42° - 40°10	0.2
	CA: South of 40°10	0.1

C.2.5 Washington Recreational

Under the Final Preferred Alternative, Washington would allow for a year-round groundfish season with lingcod seasons that are the same as the No Action Alternative. The aggregate bottomfish limit would be reduced from 15 to 12 and would include a cabezon sub limit of two fish per angler per day in addition to the sub limits for rockfish (10) and lingcod (two). Management measures in Marine Areas 3 and 4 would continue to restrict the groundfish fishery to waters shallower than 20 fathoms as is in place under the No Action Alternative but would be in place starting June 1 instead of May 21, through September 30. This is consistent with the original intent to have the depth restriction apply after the halibut season which used to begin on

May 1 but has shifted to mid May in recent years. In Marine Area 2, groundfish fishing would continue to be prohibited in waters seaward of 30 fathoms from May 15 through June 15. Status quo provisions that allow for Pacific cod and sablefish retention from May 1 through June and lingcod on days that the primary halibut season is open (7 days in 2010, and expected to be similar in 2011 and 2012) and the prohibition to fish for or retain lingcod south of 46°58' N. latitude on Fridays and Saturdays seaward of 30 fathoms which are in place under the No Action Alternative would continue to be in place under this alternative. Under the Final Preferred Alternative rockfish retention would be allowed from May 15 through June 15 as encounters of overfished rockfish do not typically occur when anglers target rockfish in this area.

Groundfish Seasons and Bag Limits

Under the Final Preferred Alternative, the Washington recreational fishery would be open year-round except for lingcod. The aggregate groundfish bag limit would be reduced from 15 to 12 fish per angler per day. The aggregate groundfish bag limit would continue to include sub limits for rockfish (10 per angler per day) and lingcod (two per angler per day) but a new sub limit of two cabezon per angler per day would be added for 2011 and 2012.

Lingcod Seasons and Size Limits

Under the Final Preferred Alternative, the following lingcod seasons and size limits would apply in 2011 and 2012:

- Marine Areas 1-3 (from the Oregon/Washington border at 46º16' N. latitude north to Cape Alava at 48º10' N. latitude): open from March 12 through October 15 in 2011 and March 17 through October 13 in 2012.
- Marine Area 4 (Cape Alava to the US/Canadian border): open from April 16 to October 15 in 2011 and April 16 to October 13 in 2012.
- The lingcod minimum size limit during the open lingcod season would be 22 inches in Marine Areas 1-3 and 24 inches in Marine Area 4.

Area Restrictions

The Washington recreational groundfish and Pacific halibut fisheries would be prohibited from fishing for, retention or possession of groundfish and halibut in the C-shaped yelloweye rockfish conservation area in the north coast and South Coast and Westport YRCAs in the south coast as they were in the 2009 and 2010 seasons.

Table C-28. Final Preferred Alternative. Washington groundfish fishery season.

<table>
<tr><th>Marine Area</th><th>Jan</th><th>Feb</th><th>Mar</th><th>Apr</th><th>May</th><th>June</th><th>July</th><th>Aug</th><th>Sep</th><th>Oct</th><th>Nov</th><th>Dec</th></tr>
<tr><td>3 & 4 (N. Coast)</td><td colspan="5">Open all depths</td><td colspan="4">Open <20 fm June 1-Sep 30 a/</td><td colspan="3">Open all depths</td></tr>
<tr><td>2 (S. Coast)</td><td colspan="2">Open all depths</td><td colspan="4">Open <30 fm Mar 15 - June 15 b/, c/, d</td><td colspan="2">Open all depths except lingcod prohibited on Fri. and Sat. >30 fm e/</td><td colspan="4">Open all depths</td></tr>
<tr><td>1 (Col. R.)</td><td colspan="4">Open all depths</td><td colspan="5">Open all depths f/</td><td colspan="3">Open all depths</td></tr>
<tr><td colspan="13">a/ Groundfish retention allowed >20 fm on days when Pacific halibut is open.
b/ Retention of sablefish and Pacific cod allowed seaward of 30 fm from May 1- June 15.
c/ Retention of rockfish allowed seaward of 30 fm.
d/ Retention of lingcod allowed seaward of 30 fm on days that the primary halibut season is open.
e/ Retention of lingcod prohibited >30 fm, south of 46°58 on Fri. and Sat. from July 1 – August 31.
f/ Retention of groundfish, except sablefish and Pacific cod, prohibited with Pacific halibut on board.</td></tr>
</table>

North Coast (Marine Areas 3 and 4)

Prohibit the retention of groundfish seaward of a line approximating 20 fathoms from June 1-September 30, except on days that halibut fishing is open.

South Coast (Marine Area 2)

Groundfish retention, except rockfish would be prohibited seaward of 30 fathoms from March 15 through June 15. Sablefish and Pacific cod retention would be allowed in this area from May 1 through June 15. On days that the primary halibut season is open, lingcod may be retained throughout Marine Area 2. Retention of lingcod would be prohibited south of 46 deg. 58' and seaward of 30 fathoms on Fridays and Saturdays from July 1 through August 31. Fishing for, retention and possession of groundfish would be prohibited at all times in the South Coast YRCA and Westport Offshore YRCA.

Columbia River (Marine Area 1)

Prohibit the retention of groundfish, except sablefish and Pacific cod, with halibut onboard from May 1 through September 30.

Table C-29. Final Preferred Alternative. Washington recreational harvest guidelines and projected impacts.

Species	Projected Impacts (mt)	Harvest Guidelines (mt) 2011/2012
Canary	0.7	2.0
Yelloweye	2.5	2.6 / 2.6
Black rockfish	186.7	N/A
Minor nearshore rockfish	6.1	N/A

C.2.6 Oregon Recreational

The season structures and depth restrictions adopted as the Final Preferred Alternative for the Oregon recreational groundfish fishery in 2011 and 2012 are found in Figure C-8 . Impacts under the Final Preferred are in Table C-30. Details and rationale concerning the management measures associated with the Final Preferred Alternative are detailed below.

Season structure

Under the Final Preferred Alternative, the Oregon recreational groundfish fishery will be open offshore year-round, except from April 1 to September 30 when fishing is only allowed shoreward of 40 fm (Figure C-8). Closing the fishery outside of 40 fm from April 1 to September 30, months where yelloweye rockfish harvest is highest, mitigate the impacts to depleted yelloweye rockfish. The shorebased fishery will be open year-round as depleted yelloweye rockfish are not impacted.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Bottomfish Season	Open all depths			**Open < 40 fm**						Open all depths		
Marine Bag Limit [1]	Ten (10)			**1 Fish Cabezon Sub-Bag [2]**						Ten (10)		
Lingcod Bag Limit	Three (3)											
Flatfish Bag Limit [3]	Twenty Five (25)											

1 Marine bag limit includes all species other than lingcod, salmon, steelhead, Pacific halibut, flatfish, surfperch, sturgeon, striped bass, pelagic tuna and mackerel species, and bait fish such as herring, anchovy, sardine, and smelt

2 From April 1 through September 30, the marine bag limit is Ten (10) fish per day, of which no more than one (1) may be cabezon.

3 Flounders, soles, sanddabs, turbots and halibuts except Pacific halibut

Figure C-8. Final Preferred Alternative. Oregon recreational groundfish season in 2011-12.

Table C-30. Final Preferred Alternative. Oregon recreational projected impacts for modeled species for 2011-2012.

Species	Projected Impacts (mt)	HG (mt)
Canary Rockfish	2.4	7.0
Yelloweye Rockfish	2.1	2.4
Black Rockfish	330.5	N/A
Blue Rockfish	20.4	N/A
Other Nearshore Rockfish a/	12.7	N/A
Greenling (Kelp and Rock)	4.6	N/A

a/ Other Nearshore Rockfish includes: brown, china, copper, grass, and quillback rockfish

Bag limits

A marine fish daily-bag-limit of ten fish in aggregate was adopted under the Final Preferred Alternative. The marine fish daily-bag-limit includes all species other than lingcod, salmon, steelhead, Pacific halibut, flatfish, surfperch, sturgeon, striped bass, pelagic tuna and mackerel species, and bait fish such as herring, anchovy, sardine and smelt. This daily-bag-limit provides the flexibility to make necessary adjustments through the yearly state process, reflecting the progression of the current year's fishery. The state process will likely reduce the marine fish daily-bag-limit from ten fish in aggregate to manage the harvest of "other nearshore" rockfish complex within the recreational fishery state ocean boat landing cap which is adopted in the yearly state process. Reducing the marine fish daily-bag-limit will also affect black rockfish harvest rates and may prevent the fishery from harvesting its total allocation. The status of black rockfish was assessed in 2007 as healthy. The final preferred ACL for 2011-2012 is 1,000 mt for the area off Oregon and California with an Oregon harvest guideline of 580 mt, which is the same as in 2009-2010. Assuming the recreational share continues to be seventy-six percent as determined through the state process, the harvest guideline for black rockfish would be 440.8 mt. Reductions in the marine fish daily bag limit is not expected to reduce yelloweye rockfish impacts, as data showed little difference in trip hours under 10, 8, 6, or 5 fish bag limits.

A cabezon seasonal sub-bag limit of one fish, concurrent with the seasonal depth restrictions was adopted under the Final Preferred Alternative. This seasonal sub-bag limit will reduce cabezon impacts, while still allowing for at least some retention year round. The sub-bag limit occurring during the same months (April 1 through September 30) as the seasonal depth restrictions simplifies regulations.

A lingcod daily-bag-limit of three fish was adopted under the Final Preferred Alternative. This daily bag-limit provides the flexibility to make necessary adjustments through the yearly state process, reflecting the progression of the current year's fishery. The state process will likely reduce the lingcod bag limit to two fish for the opening of the 2011 season. In the event the Pacific halibut catch allocation is reduced significantly from 2010 levels or the marine bag limit is further reduced inseason, the lingcod daily bag limit could be increased to three fish so long as the harvest guidelines for depleted yelloweye rockfish and canary rockfish are not exceeded.

A flatfish daily-bag-limit of 25 fish in aggregate was approved under the Final Preferred Alternative and is consistent with the status quo management measures effective since 2007. The flatfish daily-bag limit consists of all soles and flounders except Pacific halibut. Adoption of the flatfish daily-bag-limit of 25 fish in aggregate promotes simplicity in regulations and provides the flexibility to create additional regulations specific to flatfish (i.e. allowed retention of flatfish in the Pacific halibut fishery, or allowed targeting of flatfish in the event of a closure due to rockfish harvest guideline attainment).

Shared Harvest Guidelines

Previously, the Final Preferred Alternative included shared recreational fishery harvest guidelines for yelloweye rockfish and canary rockfish between Oregon and Washington. The Final Preferred Alternative for 2011-2012 removed the shared harvest guidelines for canary and yelloweye rockfish, each state now has a specified harvest guideline for its recreational fisheries. The Oregon harvest guideline is 2.4 mt for yelloweye and 7.0 mt for canary for 2011-2012.

Minimum Length Limits

The Final Preferred Alternative includes minimum length limits:

- lingcod – 22 inches
- cabezon – 16 inches
- kelp greenling – 10 inches

This management measure is consistent with the status quo management measures effective in 2007-2008 and 2009-2010. These length limits are effective tools in reducing harvest of these species, primarily in the shore and estuary fishery.

Area Closures

Under the Final Preferred Alternative, targeting and retaining groundfish and Pacific halibut will be prohibited year-round in the Stonewall Bank Yelloweye Rockfish Conservation Area (YRCA), a high relief rocky habitat residing approximately 15 miles offshore from Newport, Oregon (Figure C-9). Targeting and retaining Pacific halibut and groundfish within the Stonewall Bank was prohibited to reduce yelloweye rockfish impacts attributed to those fisheries.

Two other alternative Stonewall Bank YRCA closure areas (Figure C-17) were not adopted under the Final Preferred Alternative because the extent of yelloweye rockfish incidental catch in the expanded area(s) has not been determined. Public comment expressed concern over enlargement of the YRCA as the present size is already very disruptive to the groundfish and halibut fishery out of Newport. Concern was expressed that if the YRCA area is increased, the potential may be lost for future opportunity to target healthy species such as yellowtail rockfish in the event that gear is developed to allow a targeted fishery, while avoiding yelloweye rockfish encounters.

Groundfish Retention in the All-Depth Pacific Halibut Fishery

Since 2009, only sablefish and Pacific cod may be retained in the Pacific halibut fishery at any depth in the area north of Humbug Mountain, Oregon. It is expected that groundfish retention in the all-depth Pacific halibut fishery will be similarly constrained in 2011 and 2012.

Inseason Management Tools

Oregon has a responsive port based monitoring program through their Ocean Recreational Boat Survey (ORBS) and regulatory processes in place to track harvest and take actions inseason if necessary. The following are suggested management measures that could be implemented inseason if the 2011 (or 2012) fishery does not proceed as expected.

Inseason management action may be implemented in 2011 or 2012 to reduce the impacts of the Oregon recreational groundfish fishery. Inseason management tools, designed to mitigate impacts, include bag limit adjustments (including non retention), length limit adjustments, gear restrictions, and season, days per week, depth, and area closures.

Season, depth, days open per week, and area closures are the primary inseason tools for limiting yelloweye rockfish and canary rockfish impacts, since retention of this species is prohibited. If catch rates indicate that the harvest targets for yelloweye rockfish will be reached prematurely, offshore depth closures may be implemented inseason at 30, 25, or 20 fm as these two species are less abundant nearshore and release survival rates are higher in shallow waters. Additionally, days per week may also be closed to reduced impacts. ODFW will monitor inseason progress toward recreational harvest targets for canary rockfish and yelloweye rockfish. Regulations will depend upon the timing of the determination for their need.

Adjustments to the marine fish daily-bag limit to no more than 10 fish may be implemented to achieve season duration goals in the event of accelerated or decelerated black rockfish or other nearshore rockfish harvest. The lingcod daily bag limits may be adjusted to no more than 3 fish in the event the marine bag limit changes or the halibut catch limit is reduced from 2010 levels. Season and/or area closures may also be considered if harvest targets are projected to be attained. Closing one or more days per week is an inseason tool that could be used to limit impacts for any managed species. Closing certain days each week would help lengthen the duration of a fishery approaching a harvest guideline.

Non-retention and length restrictions are the likely inseason tools to use for cabezon and greenling as release survival is very high. They may also be used to reduce impacts on nearshore species, such as black rockfish and other nearshore rockfish species.

Gear restrictions and/or release technique requirements may be implemented to reduce the impact of depleted rockfish species if successful techniques are developed, researched, reviewed, and accepted. Research in this area is currently being conducted and will continue into 2011-2012, testing the effectiveness and selectivity of various gears and the survivability of rockfish released at depth.

Directed flatfish fisheries may be implemented inseason, as were implemented in 2004, in the event of a closure of the recreational groundfish fishery due to attainment federal or state harvest guidelines or targets. Specific gear restrictions may be implemented in the event that flatfish fisheries remain open during a groundfish closure. Directed flatfish fisheries would be legal year round and open shoreward of 40 fm during any period the groundfish fishery has any depth restrictions (i.e. 40, 30, 25, and 20 fathom lines). The flatfish fishery would not have any depth restrictions when the groundfish fishery has no depth restrictions. Fisheries will be monitored to ensure that impacts to yelloweye and canary rockfish are within the harvest targets/guidelines.

In the event that the duration of total season is reduced from 12 months; the nearshore waters are closed to groundfish fishing due to management of nearshore species; or the Pacific halibut catch limit is reduced from 2010 levels, the fishery may be expanded to waters seaward of the RCA that is in effect at the time, promoting directed yellowtail rockfish and offshore lingcod opportunity. Fisheries will be monitored to ensure that impacts to yelloweye rockfish and canary rockfish are not in excess of the harvest targets/guidelines.

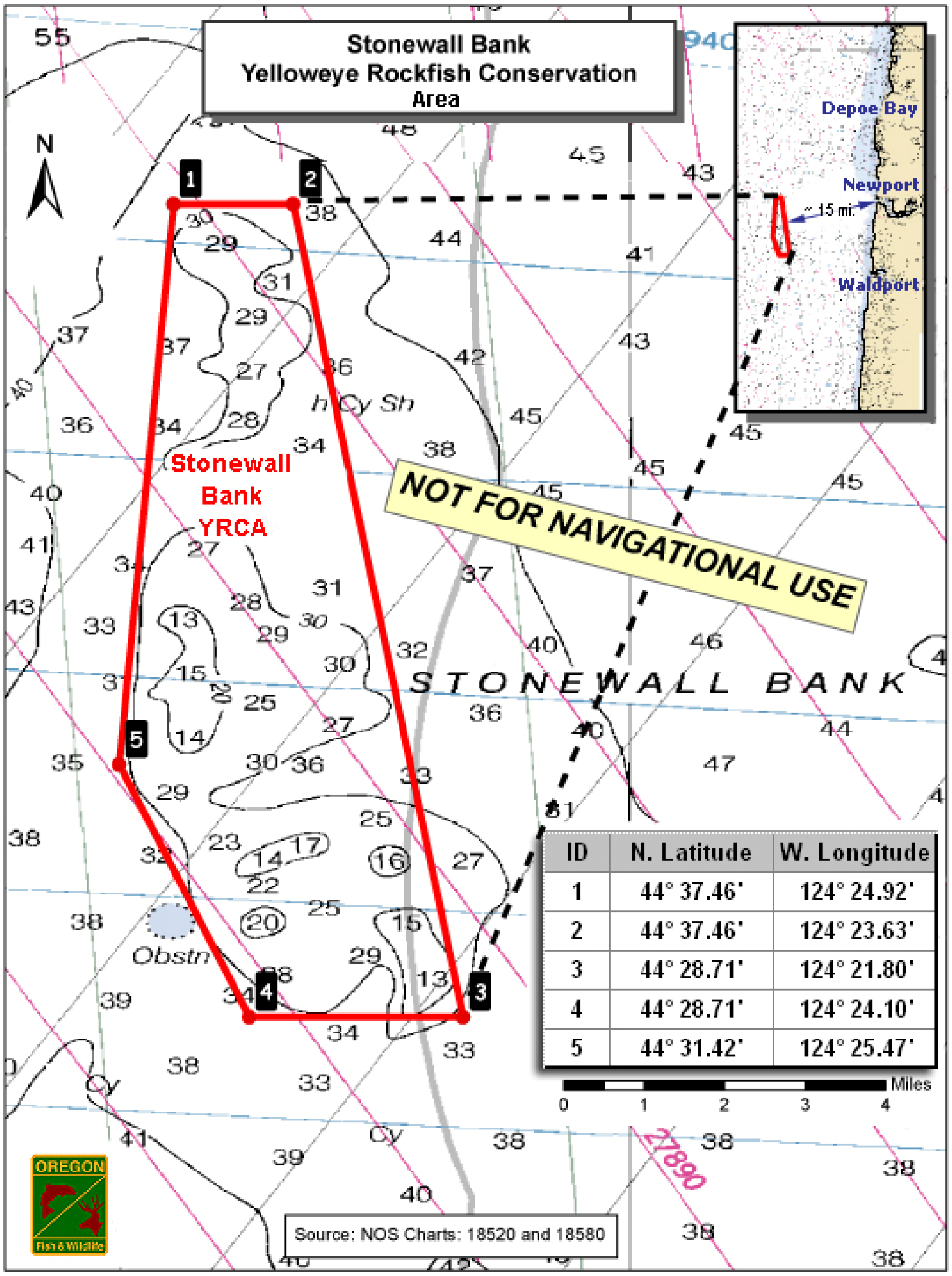


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Figure C-9. The Stonewall Bank Yelloweye Rockfish Conservation Area where recreational fishing for groundfish and Pacific halibut is prohibited. Under the No Action Alternative, the area would remain closed.

C.2.7 California Recreational

Season structure and depth restrictions adopted as the Final Preferred Alternative for the California recreational groundfish fishery in 2011 and 2012 are found in Figure C-10. The harvest guidelines and projected impacts under the Final Preferred Alternative can be found in Table C-31 and Table C-32. Table C-33 compares the season structures across the alternatives analyzed. Details and rationale concerning the management measures associated with the Final Preferred Alternative are detailed below.

Under the final preferred yelloweye rockfish ACL, the California recreational harvest guideline is 3.1 mt (Table C-31). This will allow the North-Central North of Point Arena to maintain the No Action Alternative season structure, which is a 3-month fishing season at 20 fms from the first Saturday in May to August 15. The season structure has been reduced since 2000 in the North-Central North of Point Arena Management Area and since 2005 in the Northern Management areas. Under the Final Preferred Alternative, the season opening date in the Northern and North-Central North of Point Arena would be the second Saturday in May, which is May 14 in 2011 and May 12 in 2012.

At its April 2010 meeting, the Council adopted a preliminary preferred yelloweye rockfish harvest guideline for California recreational fisheries of 2.6 mt under the 17 mt ACL. Under this scenario, the season length in the North-Central North of Point Arena would have been reduced by 2 weeks relative to No Action, which is a 17 percent reduction. The time period lost in the 2 week reduction has the highest effort and profit potential as this is the prime camping and fishing season. As such, the Council recommended the higher, 3.1 mt yelloweye harvest guideline, in order to provide for the status quo season length in the North-Central North of Point Arena. This is expected to result in increased opening weekend business, benefiting local communities.

The final preferred canary rockfish ACL and California recreational harvest guideline of 14.5 mt will provide a buffer between the projected impacts and the harvest guideline to prevent the harvest guideline from being exceeded due variability in the estimated catch of canary rockfish due to effort shifts, good weather or recruitment. Though the canary rockfish projected impacts under the proposed action are far below the HG, the annual catches of canary rockfish in the recreational fishery can vary greatly between years. Maintaining at least a 5 mt buffer between the projected impacts and the HG will help prevent the need for inseason action to close the fishery before the scheduled date. Inseason closures are disruptive to the reservation plans of charter vessels, the business plans of tackle shops, and the vacation plans of anglers.

Modifying the depth restriction in the CCA from the status quo boundary of 20 fm to 30 fm and allowing retention of shelf rockfish within the open waters of the CCA is not expected to appreciably increase cowcod bycatch, since they are predominantly found in waters deeper than 60 fm (see Appendix B). At the June 2010 Council meeting 0.9 mt of cowcod out of the 4 mt ACL for 2011 was allocated to the non-trawl fishery including the recreational fishery. Since only de minimis take of cowcod has been observed in the non-trawl commercial fisheries, with less than a tenth of a mt estimated to have been taken in the last five years. A residual of nearly 0.7 mt is anticipated to be available to accommodate an unanticipated increase in impacts from the proposed action. In the event that the 0.9 mt non-trawl allocation is exceeded, there is a 1 mt portion of the ACL that was not allocated. This represents a one mt management uncertainty buffer between the three mt de-facto ACT for cowcod proscribed to sectors of the fishery and the four mt ACL. The catch of cowcod is tracked inseason with a one week lag in the California recreational fishery, using the number of sampled cowcod to date in the current season and the relationship between the cumulative sampled catch and estimated catch from past seasons. In the event that catch does accrue inseason at a rate greater than projected by the RecFISH model that would cause the 0.9 mt non-trawl allocation to be exceeded, action can be taken inseason to close the fishery before the ACL is reached.

The recreational portion of the non-trawl allocation of bocaccio is 131 mt, which will accommodate any potential increase in bocaccio impacts in the recreational fishery as a result of allowing retention of shelf rockfish within the 30 fm depth restriction in the CCA. The projected bocaccio impacts of 56.4 mt in the California recreational fishery will result in a 74.6 mt residual between the projected impacts and the apportionment providing a buffer against management uncertainty.

The reduced catches of minor nearshore rockfish south and blue rockfish in the 2008 and 2009 seasons resulted in reduced projected impacts. In 2011-2012 there is a higher minor rockfish south ACL compared to No Action. These changes will allow a one-and-a-half month increase in the fishing season in the South-Central Management Area and a two-and-a-half month increase in the North-Central South of Point Arena Management Area, allowing fishing through December. The extended season length relative to the No Action Alternative will result in a negligible increase in overfished species impacts. The increase in fishing opportunity compared with the No Action Alternative will provide much needed economic opportunity in the respective areas during a critical time in November and December when the crabbing season complements the groundfish season to provide much needed holiday income.

In total, the proposed season and depth restrictions represent an additional seven months of fishing season statewide compared to the No Action Alternative, while maintaining the 3-month fishing season in the North-Central North of Point Arena Management Area. While this represents an increase in opportunity compared to No Action, it still represents limited fishing opportunity compared to a year-round fishing season and deeper depth restrictions which had been in place in California prior to 2001.

Summary of New Management Measures for California in 2011-2012

- Combine the Monterey South-Central and Morro Bay-South Central recreational management areas
- Add a management line at Cape Vizcaino (39º 44´ N. latitude)
- Revise the naming convention for the California recreational management areas
- Eliminate the 10 fathom depth closure around the Farallon Islands and Noonday Rock
- Set California scorpionfish (sculpin) depth restriction in the Southern Management Area to 60 fm when scorpionfish is open
- Modify cabezon and kelp greenling gear restrictions to be consistent with rockfish regulations (one rod with no more than two hooks)
- Increase the cabezon bag limit to three fish statewide
- Align lingcod seasons in the California recreational fishery for all fishing modes, consistent with those for rockfish in each management area
- Decrease the lingcod size limit to 22 inches statewide; this includes a 14 inch fillet length requirement
- Increase the recreational depth restriction in the CCA from 20 fm to 30 fm according to RCA lines proposed for the CCA
- Modify the list of groundfish species allowed to be taken recreationally in the CCA to include shelf rockfish

<table>
<tr><th>Management Area</th><th>Jan</th><th>Feb</th><th>Mar</th><th>Apr</th><th>May</th><th>Jun</th><th>Jul</th><th>Aug</th><th>Sep</th><th>Oct</th><th>Nov</th><th>Dec</th><th>Months</th></tr>
<tr><td>Northern a/</td><td colspan="5">CLOSED</td><td colspan="5">May 15 - Oct <20 fm</td><td colspan="2"></td><td>5.5</td></tr>
<tr><td>North-Central North of Pt. Arena a/</td><td colspan="5">CLOSED</td><td colspan="3">May 15 - Aug 15 <20 fm</td><td colspan="4"></td><td>3</td></tr>
<tr><td>North-Central South of Pt. Arena</td><td colspan="5">CLOSED</td><td colspan="7">June–Dec < 30 fm</td><td>7</td></tr>
<tr><td>South-Central Monterey</td><td colspan="4">CLOSED</td><td colspan="8">May – Dec < 40 fm</td><td>8</td></tr>
<tr><td>South-Central Morro Bay</td><td colspan="4">CLOSED</td><td colspan="8">May – Dec < 40 fm</td><td>8</td></tr>
<tr><td>Southern</td><td colspan="2">CLOSED</td><td colspan="10">Mar – Dec < 60 fm</td><td>10</td></tr>
</table>

a/ The season opening date in the Northern and North-Central North of Point Arena would be the second Saturday in May, which is May 14 in 2011 and May 12 in 2012.

Figure C-10. Final Preferred Alternative: California recreational rockfish, cabezon and greenling season structure by management area for 2011-2012.

Table C-31. Final Preferred: California recreational harvest guidelines and projected impacts for 2011-2012.

Species	2011 HG or Apportionment (mt) a/	2011 HG or Apportionment (mt) a/	Projected Impacts (mt)
Bocaccio	131.0	131.0	55.4
Cowcod	0.9	0.9	0.17
Canary Rockfish	14.5 (HG)	14.5 (HG)	9.5
Yelloweye Rockfish	3.1 (HG)	3.1 (HG)	3.1
Widow Rockfish	NA	NA	8.7

a/ Values for canary and yelloweye rockfish reflect the HG for 2011-2012. The values for bocaccio and widow reflect the recreational portion of the non-trawl allocation. The value for cowcod represents the non-trawl allocation for cowcod, which is shared between fixed gear commercial and California recreational.

Table C-32. Final Preferred Alternative: Projected impacts to non-overfished species in the California recreational fishery for 2011-2012.

Species	Projected Impacts (mt)
Black Rockfish	170.9
Blue Rockfish	200.3
Cabezon	33.9
California Scorpionfish	77.0
California Sheephead	31.7
Greenlings	12.0
Lingcod	321.2
Minor Nearshore North	11.2
Minor Nearshore South	357.7

Table C-33. California recreational. Number of months open to fishing, fishing season and projected impacts for yelloweye rockfish and canary rockfish in the California Recreational Fishery under the No Action Alternative, Alternative 3, and the Final Preferred Alternative.

	Months and Season of Fishing under each ACL Alternative		
Management Area	**No Action Alternative**	**Alt 3: Preliminary Preferred Alternative**	**Final Preferred Alternative**
Northern	4 May 15 - Sep 15	5.5 May 15 - Oct	5.5 May 14/12 - Oct
North-Central North of Pt. Arena	3 May 15 - Aug 15	3 May 15 - Aug 15	3 May 14/12 – Aug 15
North-Central South of Pt. Arena	4.5 Jun 13 - Oct	6 June - Nov	7 Jun - Dec
South-Central Monterey	6.5 May - Nov 15	8 May - Dec	8 May - Dec
South-Central Morro Bay	6.5 May - Nov 15	8 May - Dec	8 May - Dec
Southern	10 Mar - Dec	10 Mar - Dec	10 Mar -Dec
Total Months	34.5	40.5	41.5
	Impacts		
Species	**No Action Alternative**	**Alt 3: Preliminary Preferred Alternative ACLs**	**Adopted ACLs**
Canary Rockfish Impacts	8.0	9.1	9.5
Yelloweye Rockfish Impacts	3.0	3.1	3.1

C.3 Alternative 1- Low Overfished Species ACLs and Preliminary Preferred Non-Overfished Species ACLs

Analytical scenario

This alternative is designed to provide contrast in the time to rebuild for overfished species and needs of the community, relative to the high and intermediate ACL alternatives (Table C-34).

Table C-34. Alternative 1: 2011, 2012 Overfished species harvest specifications along with the time to rebuild and T_{TARGET} currently specified in the FMP, prior to the proposed action.

Species	T_{TARGET} in FMP	Median time to rebuild given ACL a/	ACL Alternative 2011 b/	ACL Alternative 2012 b/
Bocaccio	2026	2019	53	56
Canary	2021	[2025]	49	51
Cowcod	2072	2064	2	2
Darkblotched	2028	2022	222	222
POP	2017	[2019]	80	80
Petrale	TBD	2014	459	624
Widow	2015	2010	200	200
Yelloweye	2084	2065	13	13

a/ Values taken from Table 2-14. Brackets indicate times to rebuild that are longer than the T_{TARGET} currently specified in the FMP prior to the proposed action.
b/ Values taken from the harvest specification alternatives in Table 2-8 (2011) and Table 2-9 (2012).

C.3.1 Limited Entry Non-Whiting Trawl Fishery

C.3.1.1 Cumulative Trip Limit Management

Alternative 1 had the lowest trawl allocations for overfished and constraining target species of the three initial alternatives. Other target species were held constant for this exercise. Table C-35 details the RCA and trip limits while Table C-36 details the projected impacts to target and overfished species.

Petrale sole

Petrale sole is currently overfished and under the proposed action, a rebuilding plan will be fully implemented in 2011. Until recently, this species has supported a sizeable target fishery, and as such, it is currently managed and modeled as a target species, and has management area-specific trip limits. Alternative 1 has the lowest petrale sole trawl non-whiting trawl allocation (342 mt) compared to Alternative 2 (643 mt) and Alternative 3 (865 mt). The Alternative 1 allocation resulted in an average bimonthly trip limit of 1,458 lbs/2 months, compared with the average petrale sole trip limits in 2010 of 7,900 lbs/2 months (No Action Alternative) and the Final Preferred Alternative trip limits of 4,800 lbs/2 months for 2011 and 6,400 lbs/2 months for 2012.

Sablefish

Sablefish was a constraining target species in the Dover thornyhead sablefish (DTS) fishery. Under Alternative 1, the trawl allocation was 2,187 mt, this is 74 percent of the No Action Alternative, which was 2,955 mt, and 86 percent of the Final Preferred Alternative, which was 2,538 mt. This is reflected in the trip limits for sablefish, which were an average of 11,500 lbs/2 months in Alternative 1, versus 21,389 lbs/2 months in the No Action Alternative, and 13,063 lbs/2 months in the Final Preferred Alternative for 2011.

Canary rockfish

Canary rockfish, and the other six rebuilding rockfish, are modeled as bycatch in 2011-2012. Under Alternative 1, canary rockfish had a trawl allocation of 8 mt, which is 38 percent of the No Action Alternative (21 mt), and 45 percent of the Final Preferred Alternative (20 mt) in 2011.

Pacific Ocean perch (slope)

Under Alternative 1, Pacific Ocean perch (POP) had a trawl allocation of 33.8 mt. This is 34 percent of the No Action Alternative (100.8 mt), and 32 percent of the Final Preferred Alternative (107 mt) in 2011.

Darkblotched rockfish (slope)

Under Alternative 1, darkblotched rockfish had a trawl allocation of 175.8 mt. This is 76 percent of the No Action Alternative (230 mt), and 73 percent of the Final Preferred Alternative (240 mt) in 2011.

Widow rockfish (shelf)

Widow rockfish had a trawl allocation of 60.8 mt under Alternative 1, this is 278 percent of the No Action Alternative allocation (21.6 mt) and 26 percent of the Final Preferred Alternative (235 mt) in 2011.

Bocaccio rockfish (shelf)

Bocaccio rockfish had a trawl allocation of 4.7 mt under Alternative 1; this is 29 percent of the No Action Alternative (16.1 mt) and 8 percent of the Final Preferred Alternative (60 mt) in 2011.

Yelloweye rockfish (shelf)

Under Alternative 1, yelloweye rockfish had an allocation of 0.4 mt, which is 67 percent of the No Action Alternative (0.6 mt) and 67 percent of the Final Preferred Alternative (0.6 mt) in 2011.

Cowcod (shelf)

Under Alternative 1, cowcod had an allocation of 0.9 mt, which is 60 percent of the No Action Alternative (1.5 mt) and 50 percent of the Final Preferred Alternative (1.8 mt) in 2011.

Table C-35. Alternative 1. Limited entry non-whiting trawl RCA and trip limits for 2011-2012.

			2-month cumulative-poundage limits							
2-month	RCA lines (fm)		sable-	long-	short-	Dover	petrale	arrow-	other	slope
period	shallow	deep	fish	spine	spine	sole	sole	tooth	flatfish	rockfish
N. of 40°10' N lat.										
Large/small footrope limits										
1	*75*	250	**14,000**	20,000	18,000	110,000	**2,000**	150,000	110,000	6,000
2	*75*	250	**14,000**	20,000	18,000	110,000	**1,500**	150,000	110,000	6,000
3	*75*	250	**12,000**	20,000	18,000	110,000	**1,000**	150,000	110,000	6,000
4	*100*	250	**12,000**	20,000	18,000	110,000	**1,000**	150,000	110,000	6,000
5	*75*	250	**12,000**	20,000	18,000	110,000	**1,000**	150,000	110,000	6,000
6	*75*	250	**14,000**	20,000	18,000	110,000	**2,000**	150,000	110,000	6,000
Selective gear limits										
1	75	*250*	**7,000**	5,000	5,000	30,000	**1,000**	30,000	30,000	
2	75	*250*	**7,000**	5,000	5,000	25,000	**1,500**	25,000	25,000	
3	75	*250*	**7,000**	5,000	5,000	25,000	**1,500**	25,000	25,000	
4	100	*250*	**7,000**	5,000	5,000	25,000	**2,000**	25,000	25,000	
5	75	*250*	**7,000**	5,000	5,000	25,000	**1,500**	25,000	25,000	
6	75	*250*	**7,000**	5,000	5,000	30,000	**1,000**	30,000	30,000	
38° - 40°10' N lat.										
1	100	150	**13,000**	20,000	18,000	110,000	**1,500**	10,000	110,000	15,000
2	100	150	**13,000**	20,000	18,000	110,000	**1,500**	10,000	110,000	15,000
3	100	150	**13,000**	20,000	18,000	110,000	**1,500**	10,000	110,000	15,000
4	100	150	**13,000**	20,000	18,000	110,000	**1,500**	10,000	110,000	15,000
5	100	150	**13,000**	20,000	18,000	110,000	**1,500**	10,000	110,000	15,000
6	100	150	**13,000**	20,000	18,000	110,000	**1,500**	10,000	110,000	15,000
S. of 38° N lat.										
1	100	150	**13,000**	20,000	18,000	110,000	**1,500**	10,000	110,000	55,000
2	100	150	**13,000**	20,000	18,000	110,000	**1,500**	10,000	110,000	55,000
3	100	150	**13,000**	20,000	18,000	110,000	**1,500**	10,000	110,000	55,000
4	100	150	**13,000**	20,000	18,000	110,000	**1,500**	10,000	110,000	55,000
5	100	150	**13,000**	20,000	18,000	110,000	**1,500**	10,000	110,000	55,000
6	100	150	**13,000**	20,000	18,000	110,000	**1,500**	10,000	110,000	55,000

Table C-36. Alternative 1. Limited entry non-whiting trawl projected impacts for 2011-2012.

Major Target Species	Model Target	Model Projection	Proj. - Target	Proj. % of Target
Sablefish N of 36º N. lat.	2,187	2,161	-26	98.8%
Longspine N. of 34 27' N. lat.	2,000	1,326	-673	66.3%
Shortspine N. of 34 27' N. lat.	1,450	1,283	-167	88.5%
Dover sole	16,306	10,575	-5,731	64.9%
Arrowtooth flounder	14,166	3,447	-10,720	24.3%
Petrale sole	342	341	-1	99.7%
English sole	18,659	424	-18,236	2.3%
Other flatfish	4,886	797	-4,089	16.3%
Minor Slope Rockfish North	877	106	-771	12.1%
Minor Slope Rockfish South	394	234	-160	59.4%
Rebuilding Species				
Canary rockfish	8.0	7.3	-1	91.2%
Pacific ocean Perch	33.8	20.3	-14	60.0%
Darkblotched rockfish	175.8	68.4	-107	38.9%
Widow rockfish	60.8	8.4	-52	13.8%
Yelloweye rockfish	0.4	0.1	0	40.0%
Bocaccio	4.7	4.5	0	96.1%
Cowcod	0.9	0.2	-1	28.2%

C.3.2 Limited Entry Trawl Whiting

Pacific whiting harvest specifications are completed on an annual basis, thus the Council requested a range of potential whiting ACLs for more detailed analysis in order to understand the potential range of overfished species impacts and constraints (Table 2-8). Alternative 1 informs the bycatch impacts relative to a low whiting ACL (96,968 mt) and low overfished species ACLs (Table C-34). Under Alternative 1, the analysis assumes that Amendment 21: Intersector Allocation is implemented on January 1, 2011 and as such formal allocations of darkblotched, POP, and widow rockfish are made to the whiting sectors. That is, the bycatch model for projecting overfished species impacts relative to the whiting ACL is no longer used for setting darkblotched, POP, and widow rockfish. For canary rockfish, Alternative 1 was analyzed using the Council's preliminary preferred 2-year allocation of canary to the whiting sectors. Table C-37 contains the Pacific whiting and overfished species allocations under Alterative 1.

Table C-37. Alternative 1: Pacific whiting and overfished species allocations by sector using Amendment 21 for darkblotched, POP, and widow and the Council's preliminary preferred two year allocation of canary rockfish.

Catcher Processor

Species	2011 ACL (mt)	2012 ACL (mt)	2011 Allocation (mt)	2012 Allocation (mt)	Range of Impacts (mt)
Whiting	96,968	96,968	20,739	20,739	
Canary	49	51	1.8	1.9	0.2
DRK	222	222	9	9	0.1
POP	80	80	10	10	0.1
Widow	200	200	22	22	1.0

Mothership

Species	2011 ACL (mt)	2012 ACL (mt)	2011 Allocation (mt)	2012 Allocation (mt)	Range of Impacts (mt)
Whiting	96,968	96,968	14,640	14,640	
Canary	49	51	1.3	1.3	0.6
DRK	222	222	6	6	0.2
POP	80	80	7	7	1.4
Widow	200	200	16	16	25

Shoreside

Species	2011 ACL (mt)	2012 ACL (mt)	2011 Allocation (mt)	2012 Allocation (mt)	Range of Impacts (mt)
Whiting	96,968	96,968	25,619	25,619	
Canary	49	51	2.4	2.4	2.3
DRK	222	222	11	11	0.9
POP	80	80	13	13	4.7
Widow	200	200	28	28	108.6

Table C-37 compares the results of the overfished species allocation decisions to the impacts seen in 2009, a year with a similar whiting OY (100,148 mt) to the Alternative 1 ACL (96,968 mt) as well as the bycatch model predictions. While the whiting fishery is very dynamic and conditions (e.g., whiting schooling/availability, bycatch interactions, etc.) vary from year to year may vary, the comparison of overfished species impacts is still informative. For the catcher-processor sector the range of allocations are greater than the impacts seen in 2009. As such, in a similar situation the catcher-processor sector would likely reach their whiting allocation within the overfished species allocations. For the mothership and shoreside sectors, the Amendment 21 widow rockfish allocation is less than the impacts seen in 2009. As such, these fleets may need to actively avoid widow rockfish if fishing under similar conditions.

C.3.3 Non-Nearshore Fixed Gear

Alternative 1 includes the Council's preliminary preferred sablefish ACL (updated with the technical corrections made in June 2010 - Table C-38) along with the low overfished species ACL alternatives (Table C-39) and associated overfished species projected impacts for the non-nearshore fleet. This alternative demonstrates how the low overfished species ACL restrict access to the sablefish ACL and associated allocations.

Table C-38. Alternative 1. Sablefish ACL and allocations north of 36° N. latitude compared to No Action (2010).

Species	Fishery	2010 (mt)	2011 (mt)	2012 (mt)
Sablefish N. 36° N. Lat.	**OY/ACL**	6,471	5,515	5,347
	LE Fixed Gear Allocation	2,140	1,874	1,816
	----LE Fixed Gear Primary	1,819	1,593	1,544
	----LE Fixed Gear Daily Trip Limit	321	281	272
	Open Access	529	463	449

Table C-39. Alternative 1. Apportionment of the non-trawl allocation of overfished species to the non-nearshore fixed gear sector under the low overfished species ACLs.

Species	2011 Apportionment (mt)	2012 Apportionment (mt)	Comments
Canary rockfish	0.9	1.0	Combines impacts for OA DTL and LE FG
Yelloweye rockfish	1	1	Includes 0.2 mt for OA DTL and 0.8 mt for LE FG

Under Alternative 1, the apportionment of canary rockfish is so low that RCAs would have to be restricted to depths that are deeper than implemented since the inception of RCAs and sablefish allocations would have to be reduced by as much as 42 percent. The result of these measures may be significantly reduced annual catches, fewer areas to fish, and longer-distance runs to reach fishing grounds. Some impacts to fishermen and communities will likely be decreased revenue, decreased catch rates, increased time spent on the water, increased gear conflicts, increased safety concerns, etc. (see discussion under the Final Preferred Alternative). Yelloweye has no constraint on sablefish landings under this alternative because of the level of constraint imposed by the low canary rockfish apportionment. Details for each sector are described in detail below.

Limited Entry Fixed Gear north of 36° N. latitude

Under Alternative 1, yelloweye rockfish ceases to be the most constraining species and canary bycatch becomes the focus for management measures. Non-trawl RCA changes or a reduction in the allowable harvest of sablefish would be needed to reduce canary bycatch to the 0.9 mt in 2011 and 1.0 mt in 2012 (Table C-39).

With the No Action non-trawl RCA configuration (i.e., 125 fm line from the Columbia/Eureka Line to Cascade Head in place; and the final preferred sablefish ACL and allocations, the limited entry fixed gear sectors would be expected to take 2.0 mt of canary in 2011 and 1.8 mt in 2012 (Table C-40), far in excess of the impacts allowed for this fishery under Alternative 1 (Table C-39). Even with the seaward boundary set at 150 fm for all areas—the minimum canary bycatch scenario in the model—the expected canary impacts still reaches 1.4 mt (Table C-40), exceeding the allowable impact of 0.9 to 1.0 mt as shown in (Table C-39). This demonstrates that this low overfished species ACL Alternative 1 may not only require moving seaward RCAs deeper, and thus reducing fishing opportunities, but also require catch-reductions of target species (i.e., sablefish).

Table C-40. Alternative 1. Non-nearshore modeled-overfished species impacts for the limited entry fixed gear sablefish fishery north of 36° N. latitude for 2011 and 2012 for the No-Action RCA Configuration and for RCAs set at 150 fm for all areas. These model runs are included for comparison purposes only.

RCA Configuration	Model-Projected Canary Impacts (mt)	
	2011	2012
No Action	2.0	1.8
150 fm All Areas	1.4	1.4

The highest bycatch ratios of canary rockfish occurs in the area north of Point Chehalis (46.888º N. lat.) (Table C-41). Moving the RCA seaward to 150 fm in this area does not lower the expected encounter rate as it does in other areas; the canary bycatch ratios are 0.0029, 0.0026, and 0.0027 for RCAs set at 100 fm, 125 fm, and 150 fm north of Point Chehalis. This is a large area where the Juan de Fuca canyon and steep bathymetry in the north complicate the RCA boundaries and the WCGOP observer data, which is based on the average depth of a set. In addition, bycatch in the trawl fisheries and scientific surveys suggest that canary is relatively abundant off northern Washington. The 150 fm line is what the Council has used in the whiting fishery to minimize risk of canary bycatch, yet as seen in recent years, the catcher processor fleet had difficulty avoiding canary rockfish in the Juan de Fuca canyon area. A seaward boundary deeper than 150 fm would likely lower the canary bycatch rate to the degree seen in the other management areas, yet the data for these RCAs boundaries or depths is not built into the model.

Table C-41. The 2002-2008 canary rockfish bycatch ratios (total catch lbs /retained sablefish lbs) in the non-nearshore fixed gear sectors, by management area and depth.

Depth	40°10' – Col/Eur 43°	Col/Eur 43° - 45.064°	Cascade Head 45.064° - Point Chehalis 46.888°	North of Point Chehalis 46.888°
100 fm	0.0001	0.0002	0.0022	0.0029
125 fm	0.0000	0.0001	0.0001	0.0026
150 fm	0.0000	0.0001	0.0000	0.0027

To further reduce canary bycatch projected impacts to remain under apportionment goals shown in Table C-39, the Council would have two major options. Option 1a would seek to maintain full harvest of the fixed gear sablefish allocations and would require closing the area north of Point Chehalis completely to the non-nearshore sectors, or alternatively, pushing the RCA boundaries to 180 fm, 200 fm, or 250 fm (Figure C-11). The latter would involve some uncertainty because, as mentioned above, the appropriate bycatch rates to model the impact of these deeper RCA boundaries are not available.

Seaward RCA Boundary	36°- 40° 10'	40°10'- Col/Eur 43°	Col/Eur 43°- Cascade Head 45.064°	Cascade Head 45.064°- Pt. Chehalis 46.888°	North of Pt. Chehalis 46.888°
Shoreward boundary to 100 fm					
100 fm					
125 fm					
150 fm					
>150 fm					

Figure C-11. Alternative 1, Option 1a. Non-trawl RCA seaward configuration. The seaward area north of Point Chehalis would be closed completely. Grey shading indicates areas closed to fishing.

To model the complete closure, it was assumed that catch would distribute to the open areas in the same proportion it is estimated that catch occurs now such that all sablefish are harvested. The resulting bycatch impacts are shown in Table C-42 for limited entry fixed gear. In this case, canary bycatch is set to zero north of Point Chehalis due to the closure, and RCA lines between 40^{o} 10’ and 46.888’ N. latitude (Point Chehalis) are set at 100 fm (Figure C-11). Note that the RCA north of 40^{o} 10’ was 100 fm prior to 2009-2010. The area north of Point Chehalis encompasses some of the most important sablefish fishing grounds on the coast and is the area where most of the catch has occurred. The non-nearshore fleets are estimated to have taken an average of 44 percent, and as much as 55 percent, of the overall annual fixed gear allocations for the northern sablefish stock in this area during the 2002-2008 period used to model bycatch. A complete closure would thus represent a substantial change to these fisheries. In addition, with such a large portion of the catch coming from this area, it may be unrealistic to assume that the non-nearshore fleets could harvest their full allocations with the area closed.

To model a RCA boundary deeper than 150 fm off Point Chehalis, it is assumed that a lower bycatch rate for canary could be achieved. Specifically, it is assumed that the deeper RCA would lower the canary bycatch rate to the next highest bycatch rate at 150 fm, which is seen in the area between 43°–45.064° N. latitude (Table C-41). It is also assumed that the more restrictive RCA would shift more effort to the areas where the RCA is less restrictive. Specifically, the percentage of catch that occurs north of Point Chehalis would be equivalent to the lowest observed in the 2002-2008 timeframe, which is 24 percent. There is no quantitative basis for this redistribution of catch, yet it is employed as a precautionary assumption to account for more catch where canary rates could be higher. Again, without observations stratified at these depths, the bycatch projections north of Point Chehalis would be uncertain. In addition, it is uncertain how accessible sablefish would be to the fleets at these depths. Hence, modeling impacts of deeper RCAs is not presented herein.

Under Alternative 1, Option 1a, where the area north of Point Chehalis would be closed to non-nearshore fixed gears and the areas between 40° 10’ to 46.888’ N. latitude would be open to fixed gears seaward of 100 fm, the modeled overfished species impacts would be 0.6 mt for canary rockfish and 0.5 mt for yelloweye, which provides room under the total apportionment of canary rockfish (Table C-39) to provide a similar opportunity for the open access sectors (see the section “Open Access Sablefish Daily Trip Limit Fishery North of 36° N. latitude” below)

Table C-42. Alternative 1, Option 1a: Modeled-overfished species impacts for the limited entry fixed gear sector under the non-trawl RCA structure shown in Figure C-11, i.e., the area north of Point Chehalis is closed to the non-nearshore fixed gear sectors and the areas between 40° 10’ and 46.888’ are set at 100 fm.

Species	2011 Impacts (mt)	2012 Impacts (mt)
Bocaccio	0.0	0.0
Canary rockfish	0.6	0.6
Darkblotched rockfish	4.0	3.7
Pacific ocean perch	0.2	0.2
Widow rockfish	0.1	0.1
Yelloweye rockfish	0.5	0.5

The second option under Alternative 1 (Option 1b) for lowering the expected canary bycatch requires a reduction to the available harvest of sablefish (i.e., under-harvest of the allocation shown in Table C-38) and more constraining RCA lines in some areas (Figure C-12). The Council has the option of differentially reducing the sablefish harvest between the limited entry and open access fleets north of 36° N. latitude. However, for the purposes of this analysis, both sectors were reduced equally. Under Alternative 1, Option 1b, it would be necessary to reduce the sablefish allocation by 42 percent for the limited entry sablefish sector north of 36º N. latitude for 2011 (Table C-43). In addition, even though fishing would be allowed in all areas north of 36º N. latitude, more restrictive RCA boundaries would be required (i.e., the RCA boundaries would be 125 fm north of 43° N. latitude; Figure C-12). These measures would reduce the model-projected canary bycatch to 0.8 mt in 2011 (Table C-44), which is 0.1 mt lower than the apportionment of canary rockfish for 2011. A 33 percent reduction of the sablefish allocation would be required in 2012, along with the more restrictive RCA boundaries shown in (Figure C-12), to reduce canary rockfish catch (Table C-44) below the apportionment cap. The lower reduction of the sablefish allocation in 2012 relative to 2011 is due to reduced-sablefish ACL and increased-canary apportionment in 2012. Note that the catch of all other overfished species by the limited entry fishery (Table C-42, Table C-44) are far below their respective apportionment caps (Table C-39) because of the constraints imposed by canary rockfish. The management actions described herein provide space under the total canary rockfish apportionment cap (Table C-39) to allow similar fishing opportunities for the open access sector (see below).

Seaward RCA Boundary	36°- 40° 10'	40°10'- Col/Eur 43°	Col/Eur 43°- Cascade Head 45.064°	Cascade Head 45.064°- Pt. Chehalis 46.888°	North of Pt. Chehalis 46.888°
Shoreward boundary to 100 fm					
100 fm					
125 fm					
150 fm					
>150 fm					

Figure C-12. Alternative 1, Option 1b: Seaward RCA boundary configurations required to achieve canary rockfish bycatch reductions.

Table C-43. Alternative 1, Option 1b. The 2011-12 preliminary preferred alternative north of 36º N. latitude allocations (metric tons) and minimum allocation reductions necessary to achieve the canary rockfish allocation.

	LE FG Share
2011 Full Allocation	1,874
w/ 42% reduction	1,095
2012 Full Allocation	1,816
w/ 33% reduction	1,225

Table C-44. Alternative 1, Option 1b: Modeled –overfished species impact projections for the limited entry fixed gear sector for 2011 and 2012. Under Option 2, the sablefish allocation to the limited entry fixed gear fleet is reduced by 42 percent in 2011 and 33 percent in 2012.

Species	2011 Impacts (mt)	2012 Impacts (mt)
Bocaccio	0.0	0.0
Canary rockfish	0.8	0.9
Darkblotched rockfish	2.3	2.6
Pacific ocean perch	0.2	0.2
Widow rockfish	0.0	0.0
Yelloweye rockfish	0.3	0.3

Open Access Sablefish Daily Trip Limit Fishery North of 36° N. latitude

As mentioned under the limited entry fixed gear north of 36° N. latitude section, yelloweye rockfish ceases to be the most constraining species and canary bycatch becomes the focus for management measures under Alternative 1. To further reduce canary bycatch projected impacts, the Council would have two major options. Option 1a would seek to maintain full harvest of the fixed gear sablefish allocations but would require closing the area north of Point Chehalis completely to the non-nearshore sectors (Figure C-13). Option 1b would involve a reduction to the available harvest of sablefish (Table C-43) while imposing more constraining RCA lines in some areas (Figure C-12); this option would allow fishing north of Point Chehalis, however.

Under Alternative 1, Option 1a, where the area north of Point Chehalis would be closed to non-nearshore fixed gears and the areas between 40^{o} 10' to 46.888' N. latitude would be open to fixed gears seaward of 100 fm (Figure C-13), the modeled overfished species impacts would be 0.1 mt for canary rockfish and 0.1 mt for yelloweye for both 2011 and 2012 (Table C-45). The management measures described in this section results in overfished species impacts that, in addition to those predicted for limited entry *sector* (Table C-42), are equal to or lower than the apportionments for both sectors combined (Table C-39). As shown for limited entry *sector*, the impact to the remaining overfished species is low because of the constraints imposed by the low apportionment of canary rockfish.

Seaward RCA Boundary	36°- 40° 10'	40°10'- Col/Eur 43°	Col/Eur 43°- Cascade Head 45.064°	Cascade Head 45.064°- Pt. Chehalis 46.888°	North of Pt. Chehalis 46.888°
Shoreward boundary to 100 fm					
100 fm					
125 fm					
150 fm					
>150 fm					

Figure C-13. Alternative 1, Option 1a. Non-trawl RCA seaward configuration. The seaward area north of Point Chehalis would be closed completely. Grey shading indicates areas closed to fishing.

Table C-45. Alternative 1, Option 1a: Modeled-overfished species impact projections for the open access DTL fishery under the non-trawl RCA structure represented in Figure C-13, i.e., the area north of Point Chehalis is closed to the non-nearshore fixed gear sectors.

Species	2011 Impacts (mt)	2012 Impacts (mt)
Bocaccio	0.0	0.0
Canary rockfish	0.1	0.1
Darkblotched rockfish	0.8	0.8
Pacific ocean perch	0.0	0.0
Widow rockfish	0.0	0.0
Yelloweye rockfish	0.1	0.1

Under Alternative 1, option 1b, fishing would be allowed at all latitudes north of 36^{o} N. latitude, but access to the sablefish allocations would be severely reduced (Table C-46). The Council has the option of differentially reducing the sablefish harvest between the limited entry and open access fleets north of 36° N. latitude. However, for the purposes of the analysis the GMT reduced both sectors equally. As shown above for limited entry, it would be necessary to reduce sablefish allocations by 42 percent and 33 percent in 2011 and 2012, respectively, while implementing RCAs at 125 fm north of 43^{o} N. latitude (Figure C-12). The remaining RCAs would be similar to the No Action Alternative. The modeled impacts to canary rockfish would be 0.1 and 0.2 mt for 2011 and 2012 (Table C-47). The modeled impacts for yelloweye would be 0.1 mt for both years. The management measures described in this section results in overfished species impacts that, in addition to those predicted for limited entry (Table C-42), are equal to or lower than the apportionments for both sectors combined (Table C-39). As shown for limited entry, the impact to the remaining overfished species is low because of the constraints imposed by the low apportionment of canary rockfish (Table C-47).

Table C-46. Alternative 1, Option 1b. Non-nearshore sablefish north of 36º N. latitude allocations (metric tons) and minimum reductions necessary to achieve the canary allocations.

	Open Access (mt)
2011 Full Allocation	463
w/ 42% reduction	270
2012 Full Allocation	449
w/ 33% reduction	303

Table C-47. Alternative 1, Option 1b. Modeled-overfished species projected impacts for the open access daily trip limit fishery north of 36º N. latitude. Under Option 2, the sablefish allocation to the open access fleet is reduced by 42 percent in 2011 and 33 percent in 2012.

Species	2011 Impacts (mt)	2012 Impacts (mt)
Bocaccio	0.0	0.0
Canary rockfish	0.1	0.2
Darkblotched rockfish	0.5	0.6
Pacific ocean perch	0.0	0.2
Widow rockfish	0.0	0.0
Yelloweye rockfish	0.0	0.1

C.3.4 Nearshore Fixed Gear

Under Alternative 1, Oregon is severely constrained by yelloweye rockfish and California is constrained by yelloweye and canary rockfish. Under this harvest level, neither state can maintain opportunities similar to 2009-2010. As such, nearshore fishermen and communities will continue to be adversely impacted by the low available yelloweye. Since black rockfish and greenling are important target strategies in Oregon, lower reductions in landed catch were taken for these species relative to others to stay within overfished species impacts. In California, black rockfish is an important target strategy in the area between 42° and 40°10’ N lat and cabezon is an important target strategy statewide; therefore higher landings were maintained for these species relative to others while staying within overfished species impacts.

To facilitate modeling of target species, the GMT assumed two catch sharing relationships for yelloweye rockfish - 50:50 (OR:CA) and 55:45 (OR:CA). The rationale for these two options is described in Appendix A, Description of Catch Projection Models. The nearshore target species harvest by area and option and the shoreward RCA configuration are presented in Table C-48 and Figure C-14.

Under Alternative 1, option 1, the nearshore fishery is modeled assuming a 50:50 (OR:CA) catch sharing of yelloweye rockfish. Reductions to landed catch under this alternative are taken from average landings of 2007-2009 for Oregon and 2006-2008 for California (Table C-25).

North of 42° N. latitude – this option includes a 20 fm depth restriction from 42° N. latitude to 43° N. latitude and reductions to landed catch as follows: 69 percent for black rockfish and greenling, 79 percent remaining species.

South of 42° N. latitude – this option includes a statewide 20 fm depth restriction and reduced landings for many species except cabezon.

Under Alternative 1, option 2, the nearshore fishery is modeled assuming a 55:45 (OR:CA) catch sharing of yelloweye rockfish. Reductions to landed catch under this alternative are taken from average landings of 2007-2009 for Oregon and 2006-2008 for California (Table C-25).

North of 42° N. latitude – the only available option includes a 20 fm depth restriction from 42° N. latitude to 43° N. latitude and reductions to landed catch as follows: 66 percent for black rockfish and greenling, 77 percent remaining species.

South of 42° N. latitude – the only available option includes a statewide 20 fm depth restriction and reduced landings for many species except cabezon.

Projected overfished species impacts under this alternative are summarized by area and option in Table C-49.

Table C-48. Alternative 1. Nearshore target species harvest by area and option for 2011-2012.

Area	Projected Total Catch (mt) 2011/12 (option 1)	Projected Total Catch (mt) 2011/12 (option 2)
Grand Total	**226**	**232**
Black rockfish	107	110
Blue rockfish	14	14
Cabezon	75	76
Deeper nearshore RF	0	0
Kelp greenling	7	8
Lingcod	11	12
Other minor RF	12	12
Shallow nearshore RF	0	0
North of 42° N. lat.	**59**	**65**
Black rockfish	34	37
Blue rockfish	1	1
Cabezon	5	6
Kelp greenling	6	7
Lingcod	11	12
Other minor nearshore rockfish	2	2
42° - 40°10' N. lat.	**103**	**103**
Black rockfish	73	73
Blue rockfish	13	13
Cabezon	7	7
Kelp greenling	0	0
Lingcod	0	0
Other minor nearshore rockfish	10	10
South of 40°10' N. lat.	**64**	**64**
Black rockfish	0	0
Blue rockfish	0	0
Cabezon	63	63
Deeper nearshore rockfish	0	0
Kelp greenling	1	1
Lingcod	0	0
Shallow nearshore rockfish	0	0

Shoreward RCA Boundary	South 34°27’	34°27’- 40° 10'	40°10' - 42°	42° - Col/Eur 43°	Col/Eur 43° - 46°16’	North of 46°16’
Shore						
20 fm						
30 fm						
60 fm						

Figure C-14. Alternative 1: Nearshore shoreward RCA configuration under option 1 and 2. Grey shading indicates areas closed to fishing.

Table C-49. Alternative 1: Nearshore fixed gear overfished species bycatch projections under the option 1and 2 RCA structures.

Species	Area	Projected Total Impacts (mt) 2011/12	
		Option 1	Option 2
Bocaccio		**0.0**	**0.0**
	OR: North of 42	0.0	0.0
	CA: 42° - 40°10	0.0	0.0
	CA: South of 40°10	0.0	0.0
Canary		**0.9**	**0.9**
	OR: North of 42	0.2	0.2
	CA: 42° - 40°10	0.6	0.6
	CA: South of 40°10	0.1	0.1
Widow		**0.2**	**0.2**
	OR: North of 42	0.0	0.0
	CA: 42° - 40°10	0.2	0.2
	CA: South of 40°10	0.0	0.0
Yelloweye		**0.4**	**0.4**
	OR: North of 42	0.2	0.3
	CA: 42° - 40°10	0.2	0.2
	CA: South of 40°10	0.0	0.0

C.3.5 Washington Recreational

The most restrictive option for the Washington recreational groundfish fishery would be in place under Alternative 1(Figure C-15 and Table C-50). This option would continue to allow for a year-round groundfish season with lingcod seasons that are the same as the No Action Alternative. The aggregate bottomfish limit would be reduced from 15 to 12 and would include a cabezon sub limit of two per angler per day in addition to the sub limits for rockfish (10) and lingcod (2). To maintain yelloweye harvest levels that don’t exceed the Washington harvest share under this alternative would require increasing the time that the 20 fathom depth restriction is in place in Marine Areas 3 and 4 from what is in place under the No Action Alternative. Management measures for Marine Areas 1 and 2 would be the same as the No Action Alternative.

Groundfish Seasons and Bag Limits

Under Alternative 1, the Washington recreational fishery would be open year-round except for lingcod. The aggregate groundfish bag limit would be reduced from 15 to 12 fish per angler per day. The aggregate groundfish bag limit would continue to include the sub limits for rockfish (10 per angler per day) and lingcod (two per angler per day) that are in place under the No Action Alternative but would include a new sub limit of two cabezon per angler per day for 2011and 2012.

Lingcod Seasons and Size Limits

Under Alternative 1, the following lingcod seasons and size limits would apply in 2011 and 2012:

- Marine Areas 1-3 (from the Oregon/Washington border at 46º16’ N. latitude north to Cape Alava at 48º10’ N. latitude): open from March 12 through October 15 in 2011 and March 17 through October 13 in 2012.
- Marine Area 4 (Cape Alava to the US/Canadian border): open from April 16 to October 15 in 2011 and April 16 to October 13 in 2012.
- The lingcod minimum size limit during the open lingcod season would be 22 inches in Marine Areas 1-3 and 24 inches in Marine Area 4.

Area Restrictions

The Washington recreational groundfish and Pacific halibut fisheries would be prohibited from fishing for, retention or possession of groundfish and halibut in the C-shaped yelloweye rockfish conservation area in the north coast and South Coast and Westport YRCAs in the south coast as they were in the 2009 and 2010 seasons and in the No Action Alternative.

Marine Area	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
3 & 4 (N. Coast)	Open all depths					Open <20 fm May 15-Sep 30 a/				Open all depths		
2 (S. Coast)	Open all depths			Open <30 fm Mar 15 - June 15 b/ c/			Open all depths except lingcod prohibited on Fri. and Sat. >30 fm d/		Open all depths			
1 (Col. R.)	Open all depths				Open all depths e/					Open all depths		

a/ Groundfish retention allowed >20 fm on days when Pacific halibut is open.
b/ Retention of sablefish and Pacific cod allowed seaward of 30 fm from May 1- June 15.
c/ Retention of lingcod allowed seaward of 30 fm on days that the primary halibut season is open.
d/ Retention of lingcod prohibited >30 fm, south of 46°58 on Fri. and Sat. from July 1 – August 31.
e/ Retention of groundfish, except sablefish and Pacific cod, prohibited with Pacific halibut on board.

Figure C-15. Alternative 1. The Washington recreational groundfish season for 2011-2012.

North Coast (Marine Areas 3 and 4)

Prohibit the retention of bottomfish seaward of a line approximating 20 fathoms from May 15-September 30, except on days that halibut fishing is open.

South Coast (Marine Area 2)

Groundfish retention would be prohibited seaward of a line approximating 30 fathoms from March 15-June 15. Sablefish and Pacific cod retention would be allowed in this area from May 1 through June 15. On days that the primary halibut season is open, lingcod may be retained throughout Marine Area 2. The retention of lingcod would be prohibited south of 46°58 N. latitude and seaward of 30 fathoms on Fridays and Saturdays from July 1 through August 31.

Columbia River (Marine Area 1)

Prohibit the retention of bottomfish, except sablefish and Pacific cod, with halibut onboard from May 1 through September 30.

Table C-50. Alternative 1. Washington recreational harvest share and projected impacts for 2011-2012.

Species	Projected Impacts (mt)	HG (mt)
Canary	0.5	1.8 / 2.0
Yelloweye	1.6	1.6 / 1.6
Black rockfish	175.6	N/A
Minor nearshore rockfish	4.9	N/A

C.3.6 Oregon Recreational

Depth management is the main tool used for controlling yelloweye rockfish catch in the Oregon recreational fishery. The options range from the least restrictive (Oregon Recreational Option 1, Figure C-16), a year round season with April through September open only shoreward of 20 fathoms to the most restrictive option (Oregon Recreational Option 5, Figure C-16), a year round season open only shoreward of 20 fathoms. All options are more restrictive than the 2009-10 Oregon recreational groundfish season under the No Action alternative. Modeled impacts under Alternative 1 can be found in Table C-51.

<table>
<tr><th>Option</th><th>Jan</th><th>Feb</th><th>Mar</th><th>Apr</th><th>May</th><th>Jun</th><th>Jul</th><th>Aug</th><th>Sep</th><th>Oct</th><th>Nov</th><th>Dec</th></tr>
<tr><td>1</td><td colspan="3">Open all depths</td><td colspan="6">Open < 20 fm</td><td colspan="3">Open all depths</td></tr>
<tr><td>2</td><td colspan="3">Open < 40 fm</td><td colspan="6">Open < 20 fm</td><td colspan="3">Open < 40 fm</td></tr>
<tr><td>3</td><td colspan="3">Open < 30 fm</td><td colspan="6">Open < 20 fm</td><td colspan="3">Open < 30 fm</td></tr>
<tr><td>4</td><td colspan="3">Open < 25 fm</td><td colspan="6">Open < 20 fm</td><td colspan="3">Open < 25 fm</td></tr>
<tr><td>5</td><td colspan="12">Open < 20 fm</td></tr>
</table>

Figure C-16. Options for Oregon recreational groundfish season in 2011-12 under Alternative 1.

Table C-51. Alternative 1. Oregon recreational impacts by option for 2011-2012.

Species	Projected Impacts (mt)				
	Option 1	Option 2	Option 3	Option 4	Option 5
Canary Rockfish	1.7	1.4	1.4	1.4	1.3
Yelloweye Rockfish	1.45	1.15	1.14	1.11	1.04
Black Rockfish	330.5	333.2	333.2	333.2	333.2
Blue Rockfish	20.4	20.7	20.7	20.7	20.7
Other Nearshore Rockfish a/	12.7	12.8	12.8	12.8	12.8
Greenling (Kelp and Rock)	4.6	4.6	4.6	4.6	4.6

a/ Other Nearshore Rockfish includes: brown, china, copper, grass, and quillback rockfish

Under Alternative 1, the Oregon recreational groundfish fishery would able to operate a year round fishery with depth restrictions (25, 30, or 40 fathoms). Under this alternative, groundfish retention in the all-depth Pacific halibut fishery would not be allowed under any of the options in Figure C-16.

2011-12 Bag and Size Limit Alternatives

Bag limits for marine fish, lingcod, and flatfish under the No Action alternative would remain in place under Alternative 1, except for cabezon. These daily-bag-limits provide the flexibility to make necessary adjustments through the yearly state process, reflecting the progression of the current year's fishery. The state process will likely start off each season with reduced marine and lingcod daily bag limits and may increase or further reduced them inseason depending on the progression of the fishery relative to the impact on species with harvest targets/guidelines and state landing caps. A reduction in cabezon impacts would be necessary and can be accomplished with a seasonal sub-bag limit of one fish. The sub-bag limit coincides with the months that the groundfish fishery is restricted to inside of 20, 30, or 40 fathoms. Other than this option, all other bag and size limits are the same as specified in 2009-10 and described under the No Action Alternative, including no retention of yelloweye or canary rockfish at any time or depth.

The shore fishery would be managed as a year round season as yelloweye rockfish are not impacted. Also, fishing for, take, retention and possession of sanddabs and "other flatfishes", excluding Pacific halibut would be legal year round and open shoreward of 40 fathoms during any period the groundfish fishery has any depth restrictions. The flatfish fishery would not have any depth restrictions when the groundfish fishery has no depth restrictions (i.e. 40, 30, 25 and 20 fm lines).

2011-12 Area Restriction Alternatives

Two options for extending the status quo Stonewall Bank YRCA for 2011-12 recreational fisheries under Alternative 3 are shown in Figure C-17 and are defined by the following coordinates:

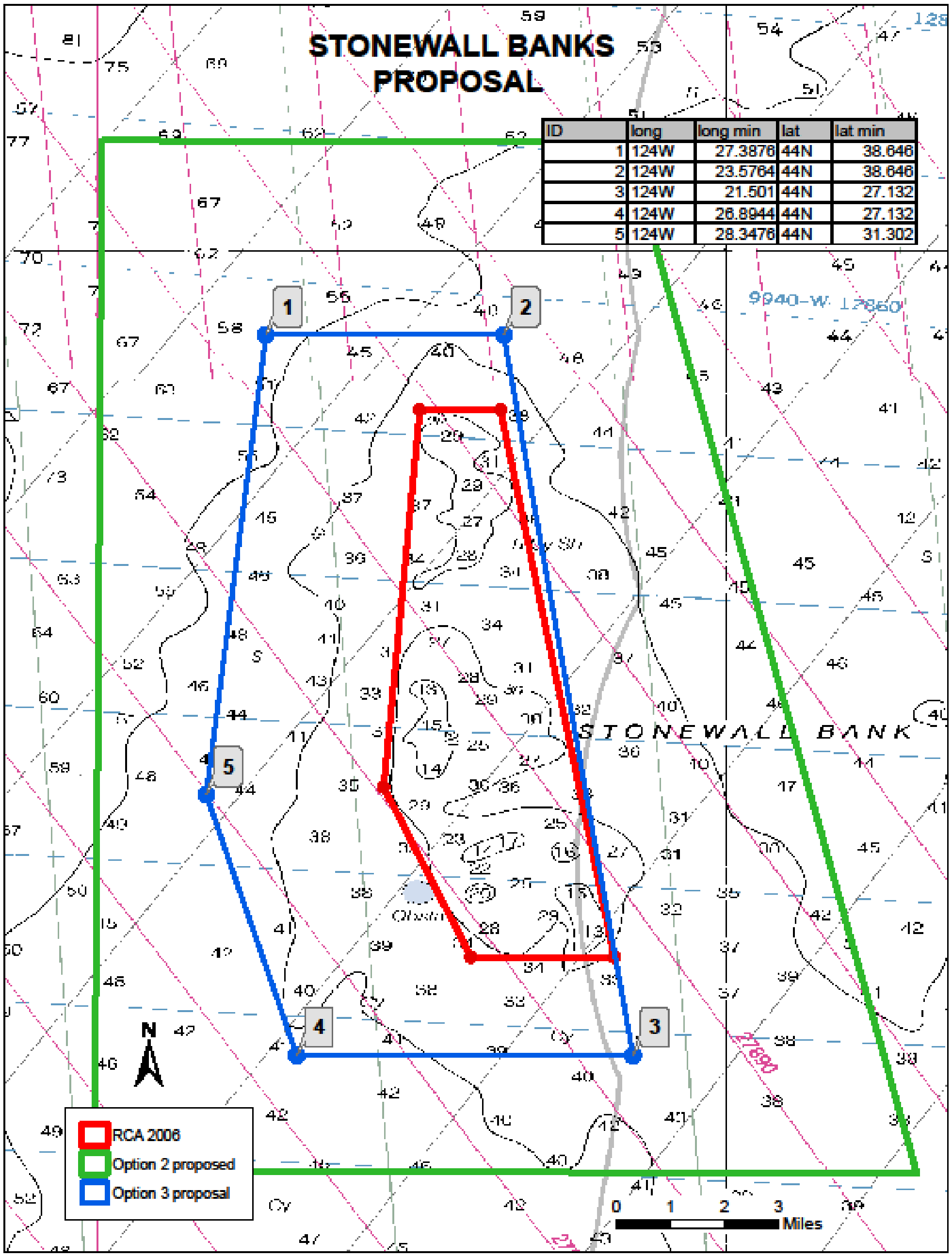
Stonewall Bank Option 2 (largest area):

44°41.7594' N lat. 124°30.018' W long.
44°41.7348' N lat. 124°21.603' W long.

44°25.2456’ N lat.	124°16.944’ W long.
44°25.2942’ N lat.	124°30.1404’ W long.
44°41.7594’ N lat.	124°30.018’ W long.

Stonewall Bank Option 3 (medium area):

44°38.544’ N lat.	124°27.4122’ W long.
44°38.544’ N lat.	124°23.8554’ W long.
44°27.132’ N lat.	124°21.501’ W long.
44°27.132’ N lat.	124°26.8944’ W long.
44°31.302’ N lat.	124°28.3476’ W long.



ODFW, 05/22/06

Figure C-17. The Stonewall Bank Yelloweye Rockfish Conservation Area where recreational fishing for groundfish and Pacific halibut is prohibited. Under Alternative 1, the expanded area (option 2 or 3) would be necessary to reduce yelloweye rockfish impacts.

C.3.7 California Recreational

Season and depth restriction diagrams (Figure C-18) as well as corresponding impacts on overfished species (Table C-52) and non-overfished species (Table C-53) under this alternative are provided below. The reduction in the yelloweye rockfish ACL to 14 mt would result in a 1.6

mt harvest guideline for the recreational fishery, which would not allow an increase in the four month fishing season in the Northern Management Area despite their reduced impacts on yelloweye rockfish since the 20 fm depth restriction was put in place in 2008. A reduction to the already highly constrained three month fishing season in the North-Central North of Point Arena Management Area would be needed to remain within the yelloweye rockfish harvest guideline; only a one and a half month season could be accommodated. In addition, the season length in the North-Central South of Point Arena Management Area would have to be decreased by a half month. Rather than the one month increase in season length in the South-Central Management Area proposed under Alternatives 2 and 3, the season would be reduced by 1 month to help maintain the 0.1 mt residual between the 1.6 mt harvest guideline and the 1.5 mt projected impacts for yelloweye rockfish and to remain below the bocaccio harvest guideline.

With the bocaccio harvest guideline of 27.6 mt, season lengths would have to be severely reduced by five months in the Southern Management Area resulting in only a five month fishing season during the least valuable months of the season. The resulting season would not encompass the critical months for rockfish fishing from March through April when Coastal Pelagic and Highly Migratory species are not available to the fishery. In addition, the season in the South-Central Management Area would be reduced by one month resulting in a six month fishing season to reduce bocaccio impacts to within the harvest guideline.

Under Alternative 1, the cowcod harvest guideline would be 0.1 mt under the status quo catch sharing (Option 1); cowcod is less constraining than the bocaccio ACL which requires severe season length reductions or shallower depth restrictions in the Southern Management Area to remain within its 27.6 mt harvest guideline. The bocaccio harvest guideline in 2011 and the cowcod harvest limit of 0.9 mt under the 2008 Total Mortality Report Catch (Option 2) sharing would provide a 0.85 mt residual catch any minimal increase in cowcod impacts due to the proposed increase in depth restriction in the CCA from 20 fm to 30 fm or 40 fm and retention of shelf and slope rockfish including bocaccio in the CCA. Potential increases in bocaccio impacts from these actions would be a concern given the 27.6 mt bocaccio ACL and the projected impacts of 26.6 mt in 2011, given the 1 mt residual between the projected impacts and the harvest guideline. Though there is concern as to whether the proposed changes to regulations in the CCA could be implemented, the alternative will accommodate all the other proposed changes to management measures. The reductions in season length in the Southern and South-Central Management Areas as well as forgone increases in fishing opportunity in the CCA would have extreme negative implications for fishing opportunity and the businesses in communities that rely on fishing for their economic well being.

Management Area	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Months
Northern	CLOSED				May 15 - Sep 15 <20 fm								4
North-Central North of Pt. Arena	CLOSED				May 15 - June <20 fm								1.5
North-Central South of Pt. Arena	CLOSED					June–Sep < 30 fm							4
South-Central Monterey	CLOSED				May – Oct < 40 fm								6
South-Central Morro Bay	CLOSED				May – Oct < 40 fm								6
Southern	CLOSED				May –Sep < 60 fm								5

Figure C-18. Alternative 1. California Rockfish, cabezon and greenling season structure for 2011-2012.

Table C-52. Alternative 1. California recreational projected impacts to overfished species for 2011-2012.

Species	2011 HG (mt)	2012 HG (mt)	Projected Impacts (mt)	2011 Percent HG	2012 Percent HG
Yelloweye Rockfish	1.6	1.6	1.5	95%	95%
Bocaccio	32.6	27.6	26.6	82%	97%
Cowcod Option 1	0.1	0.1	0.03	31%	31%
Cowcod Option 2	0.9	0.9	0.03	3%	3%
Canary Rockfish	8.6	9.1	7.6	88%	83%
Widow Rockfish	NA	NA	7.0	NA	NA

Table C-53. Alternative 1. California recreational projected impacts to non-overfished species. Results in parenthesis reflect changes to management measures other than season and depth.

Species	Projected Impacts
Black Rockfish	148.4
Blue Rockfish	150.3
Cabezon	18.1 (19.9)
California Scorpionfish	16.6 (19.0)
California Sheephead	10.3
Greenlings	9.0
Lingcod	164.7 (196.7)
Minor Nearshore North	10.0
Minor Nearshore South	279.0

C.4 Alternative 2: Intermediate Overfished Species ACLs and Preliminary Preferred Non-overfished Species ACLs

Analytical scenario

This alternative is designed to provide contrast in the time to rebuild for overfished species and needs of the fishing community, between the Council's preliminary preferred alternative and the low overfished species ACL alternative Table C-54.

Table C-54. Alternative 2: 2011, 2012 Overfished species harvest specifications along with the time to rebuild and T_{TARGET} currently specified in the FMP.

Species	T_{TARGET} in FMP	Median time to rebuild given ACL a/	ACL Alternative 2011 b/	ACL Alternative 2012 b/
Bocaccio	2026	2020	109	115
Canary	2021	[2026]	94	99
Cowcod	2072	2068	3	3
Darkblotched	2028	2025	298	296
POP	2017	[2019]	111	113
Petrale	TBD	2015	776	1,160
Widow	2015	2010	400	400
Yelloweye	2084	2074	17	17

a/ Values taken from Table 2-14.
. Brackets indicate times to rebuild that are longer than the T_{TARGET} currently specified in the FMP prior to the proposed action.
b/ Values taken from the harvest specification alternatives in Table 2-8 (2011) and Table 2-9 (2012).

C.4.1 Limited Entry Non-Whiting Trawl Fishery

C.4.1.1 Cumulative Trip Limit Management

Under Alternative 2, selective flatfish gear limits were lower than large and small footrope; the approach was to vary trip limits by season and gear types for petrale trip limits reduction, but average trip limits were representative and comparable to Alternative 1 and 3.

Petrale sole

Alternative 2 has the intermediate petrale sole ACL (643 mt) compared to Alternative 1 (342 mt) and Alternative 3 (865 mt). The non-whiting trawl allocation under the No Action Alternative was 1,140 mt and the Final Preferred Alternative was 871 mt in 2011. The Alternative 2 petrale model target resulted in an average bimonthly trip limit of 5,125 lbs/2 months, compared with 7,900 lbs/2 months for the No Action Alternative, 4,800 lbs/2 months for the Final Preferred Alternative in 2011.

Sablefish

Sablefish was a constraining target species in the DTS fishery. Under Alternative 2, the trawl allocation was 2,325 mt, the No Action Alternative was 2,955 mt, and the Final Preferred Alternative was 2,538 mt. This is reflected in the trip limits for sablefish, which were an average of 11,208 lbs/2 months in Alternative 2, versus 21,389 lbs/2 months in the No Action Alternative, and 13,063 lbs/2 months in the Final Preferred Alternative in 2011.

Canary rockfish (shelf)

Canary rockfish, and the other six rebuilding rockfish species, are modeled as bycatch for 2011-2012. Under Alternative 2, canary rockfish had a trawl allocation of 19.3 mt, which is 91 percent of the No Action Alternative (21.3 mt), and 97 percent of the Final Preferred Alternative (20 mt) in 2011.

Pacific Ocean perch (slope)

Under Alternative 2, Pacific Ocean perch (POP) had a trawl allocation of 63.3 mt. This is 63 percent of the No Action Alternative (100.8 mt), and 59 percent of the Final Preferred Alternative (107 mt) in 2011.

Darkblotched rockfish (slope)

Under Alternative 2, darkblotched rockfish had a trawl allocation of 241.5 mt. This is 105 percent of the No Action Alternative (230 mt), and 101 percent of the Final Preferred Alternative (240 mt) in 2011.

Widow rockfish (shelf)

Widow rockfish had a trawl allocation of 148.1 mt under Alternative 2, this is 685 percent of the No Action Alternative (21.6 mt) and 63 percent of the Final Preferred Alternative (235 mt) in 2011.

Bocaccio rockfish (shelf)

Bocaccio rockfish had a trawl allocation of 11.3mt under Alternative 2; this is 70 percent of the No Action Alternative (16.1 mt) and 19 percent of the Final Preferred Alternative (60 mt) in 2011.

Yelloweye rockfish (shelf)

Under Alternative 2, yelloweye rockfish had an allocation of 0.6 mt, which is 100 percent of the No Action Alternative (0.6 mt) and 100 percent of the Final Preferred Alternative (0.6 mt) in 2011.

Cowcod (shelf)

Under Alternative 2, cowcod had an allocation of 1.9mt, which is 127 percent of the No Action Alternative (1.5 mt) and 106 percent of the Final Preferred Alternative (1.8 mt) in 2011.

Table C-55. Alternative 2. Limited entry non-whiting trawl trip limit tables for 2011-2012.

2-month period	RCA lines (fm) shallow	RCA lines (fm) deep	2-month cumulative-poundage limits: sable-fish	long-spine	short-spine	Dover sole	petrale sole	arrow-tooth	other flatfish	slope rockfish
N. of 40°10' N lat.										
Large/small footrope limits										
1	*75*	250	**14,000**	20,000	18,000	110,000	**6,000**	150,000	110,000	6,000
2	*75*	200	**14,000**	20,000	18,000	110,000	**6,000**	150,000	110,000	6,000
3	*75*	200	**13,000**	20,000	18,000	110,000	**5,000**	150,000	110,000	6,000
4	*100*	200	**13,000**	20,000	18,000	110,000	**5,000**	150,000	110,000	6,000
5	*75*	200	**13,000**	20,000	18,000	110,000	**5,000**	150,000	110,000	6,000
6	*75*	250	**14,000**	20,000	18,000	110,000	**6,000**	150,000	110,000	6,000
Selective gear limits										
1	75	*250*	**7,000**	5,000	5,000	50,000	**3,500**	50,000	40,000	
2	75	*200*	**7,000**	5,000	5,000	50,000	**3,500**	50,000	40,000	
3	75	*200*	**8,000**	5,000	5,000	50,000	**3,500**	50,000	40,000	
4	100	*200*	**8,000**	5,000	5,000	50,000	**3,500**	50,000	40,000	
5	75	*200*	**7,000**	5,000	5,000	50,000	**3,500**	50,000	40,000	
6	75	*250*	**7,000**	5,000	5,000	50,000	**3,500**	50,000	40,000	
38° - 40°10' N lat.										
1	100	150	**12,000**	20,000	18,000	110,000	**5,000**	10,000	110,000	15,000
2	100	150	**12,000**	20,000	18,000	110,000	**5,000**	10,000	110,000	15,000
3	100	150	**12,000**	20,000	18,000	110,000	**5,000**	10,000	110,000	15,000
4	100	150	**12,000**	20,000	18,000	110,000	**5,000**	10,000	110,000	15,000
5	100	150	**12,000**	20,000	18,000	110,000	**5,000**	10,000	110,000	15,000
6	100	150	**12,000**	20,000	18,000	110,000	**5,000**	10,000	110,000	15,000
S. of 38° N lat.										
1	100	150	**12,000**	20,000	18,000	110,000	**5,000**	10,000	110,000	55,000
2	100	150	**12,000**	20,000	18,000	110,000	**5,000**	10,000	110,000	55,000
3	100	150	**12,000**	20,000	18,000	110,000	**5,000**	10,000	110,000	55,000
4	100	150	**12,000**	20,000	18,000	110,000	**5,000**	10,000	110,000	55,000
5	100	150	**12,000**	20,000	18,000	110,000	**5,000**	10,000	110,000	55,000
6	100	150	**12,000**	20,000	18,000	110,000	**5,000**	10,000	110,000	55,000

Table C-56. Alternative 2. Limited entry non-whiting trawl projected impacts for 2011-2012.

Major Target Species	Model Target	Model Projection	Proj. - Target	Proj. % of Target
Sablefish N of 36º N. lat.	2,325	2,324	-1	100.0%
Longspine N. of 34 27' N. lat.	2,000	1,337	-663	66.9%
Shortspine N. of 34 27' N. lat.	1,450	1,418	-32	97.8%
Dover sole	16,306	12,492	-3,814	76.6%
Arrowtooth flounder	14,166	4,607	-9,559	32.5%
Petrale sole	643	632	-11	98.3%
English sole	18,659	439	-18,220	2.4%
Other flatfish	4,886	840	-4,046	17.2%
Minor Slope Rockfish North	877	170	-707	19.4%
Minor Slope Rockfish South	394	234	-160	59.4%
Rebuilding Species				
Canary rockfish	19.3	9.7	-10	50.2%
Pacific ocean Perch	63.3	41.8	-21	66.0%
Darkblotched rockfish	241.5	108.8	-133	45.1%
Widow rockfish	148.1	8.7	-139	5.9%
Yelloweye rockfish	0.6	0.2	0	31.8%
Bocaccio	11.3	5.5	-6	48.3%
Cowcod	1.9	0.3	-2	14.1%

C.4.2 Limited Entry Trawl Whiting

Pacific whiting harvest specifications are completed on an annual basis, thus the Council requested a range of potential whiting ACLs for more detailed analysis in order to understand the potential range of overfished species impacts and constraints (Table 2-8). Alternative 2 informs the bycatch impacts relative to the intermediate whiting ACL (193,935 mt) and the intermediate overfished species ACLs. Under Alternative 2, the analysis assumes that Amendment 21: Intersector Allocation is implemented on January 1, 2011, and as such formal allocations of darkblotched, POP, and widow rockfish are made to the whiting sectors. That is, the bycatch model for projecting overfished species impacts relative to the whiting ACL is no longer used for setting darkblotched, POP, and widow rockfish sector bycatch limits. For canary rockfish, Alternative 2 was analyzed using the Council’s preliminary preferred 2-year allocation of canary to the whiting sectors. Table C-57 contains the Pacific whiting and overfished species allocations under Alterative 2.

Table C-57. Alternative 2: Pacific whiting and overfished species allocations by sector using Amendment 21 for darkblotched, POP, and widow and the Council's preliminary preferred two year allocation of canary rockfish.

Catcher Processor

Species	2011 ACL (mt)	2012 ACL (mt)	2011 Allocation (mt)	2012 Allocation (mt)	2007 Impacts (mt)
Whiting	193,935	193,935	47,939	47,939	
Canary	94	99	4.3	4.6	0.4
DRK	298	296	9	9	5.3
POP	111	113	10	10	2.9
Widow	400	400	55	55	72.8

Mothership

Species	2011 ACL (mt)	2012 ACL (mt)	2011 Allocation (mt)	2012 Allocation (mt)	2007 Impacts (mt)
Whiting	193,935	193,935	33,839	33,839	
Canary	94	99	3	3.2	1.6
DRK	298	296	6	6	6.7
POP	111	113	7	7	0.7
Widow	400	400	39	39	73.0

Shoreside

Species	2011 ACL (mt)	2012 ACL (mt)	2011 Allocation (mt)	2012 Allocation (mt)	2007 Impacts (mt)
Whiting	193,935	193,935	59,218	59,218	
Canary	94	99	5.3	5.7	2.0
DRK	298	296	11	11	1.0
POP	111	113	13	13	23.1
Widow	400	400	67	67	89.0

Table C-57 also compares the results of the overfished species allocation decisions to the impacts seen in 2007 (Chapter 2 Table 2-54), a year in which the whiting OY (208,091 mt) was similar to the Alternative 2 ACL (193,935 mt). While the whiting fishery is very dynamic and conditions (e.g., whiting schooling/availability, bycatch interactions, etc.) vary from year to year may vary, the comparison of overfished species impacts is still informative. For the catcher-processor sector, the allocations are higher than the impacts seen in 2007. As such, it is likely that the fleet will attain their whiting allocation within the overfished species allocations.

For the mothership sector, the Amendment 21 allocations are lower than the 2007 impacts for darkblotched and widow rockfish. For the shoreside sector, the POP and widow Amendment 21 allocation is less than the impacts seen in 2007. In 2007, the whiting fishery (all sectors) was closed on August 17, 2007 when the widow rockfish bycatch limit was reached (72FR46176) and re-opened in October when available widow yield was added to the total catch limit by the Council and NMFS (72FR56664). However, there was concern that the canary total catch limit would be exceeded that fall without a mitigating management restriction on the fishery. Therefore, the Council and NMFS re-opened the fishery with a 150 fm depth restriction, which forced the fleets to fish in deeper waters than they normally fished to avoid canary. As such, both sectors will need to be aware of the slope overfished species constraints under this alternative in order to successfully harvest their whiting allocation.

C.4.3 Non-Nearshore Fixed Gear

Alternative 2 analyses the Council's preliminary preferred sablefish ACL (updated with the technical corrections made in June - (Table C-58) along with the intermediate overfished species ACL alternatives and the associated preliminary preferred decision for apportionments of overfished species to the non-nearshore fleet (Table C-59). As shown previously, the sablefish ACL (and therefore the allocation for non-nearshore fixed gear fisheries) will be lower in 2011 and 2012 than observed in 2010 (Table C-58). Because the model used to estimate impacts of this fishery to overfished species assumes full attainment of the allocation, the reduced ACL for 2011 and 2012 will automatically reduce the modeled impacts of overfished species relative to 2010 (i.e., bycatch projections for the limited entry fixed gear fishery under Alternative 2 are lower compared to No Action).

Table C-58. Alternative 2: Preliminary preferred sablefish ACL and allocations north of 36° N. latitude compared to No Action (2010).

Species	Fishery	2010 (mt)	2011 (mt)	2012 (mt)
Sablefish N. 36° N. Lat.	**OY/ACL**	6,471	5,515	5,347
	LE Fixed Gear Allocation	2,140	1,874	1,816
	----LE Fixed Gear Primary	1,819	1,593	1,544
	----LE Fixed Gear Daily Trip Limit	321	281	272
	Open Access	529	463	449

Table C-59. Alternative 2: Non-nearshore apportionment of the non-trawl under the intermediate overfished species ACLs.

Species	2011 Apportionment (mt)	2012 Apportionment (mt)	Comments
Canary rockfish	3.3	3.5	
Yelloweye rockfish	1.6	1.6	Includes 0.3 mt for OA DTL and 1.3 mt for LE FG

Projected overfished species impacts are provided for two options under Alternative 2: option 1 provides impacts through implementation of the status quo seaward non-trawl RCA boundary configuration (Figure C-19) whereas option 2 shows impacts to overfished species with the seaward RCA boundary configuration that was used prior to the 2009-2010 (Figure C-20). Yelloweye is the stock for which the Council put the current non-trawl RCA boundaries into place. Regardless of the RCA configuration (option 1 or option 2), the modeled impact to overfished species by both limited entry and open access combined (Table C-60, Table C-61, Table C-62, Table C-63) is less than Council's preliminary preferred apportionment for these non-nearshore fisheries. This is due to the reduced-sablefish ACLs as described above. Overall, the modeled impacts for canary rockfish and yelloweye were 2.0 and 0.8 mt, respectively, for 2011. These predicted catch levels are much lower than the preliminary preferred apportionments of 3.3 and 1.6 mt for canary rockfish and yelloweye, respectively, for 2011. The modeled impacts for 2012 are also much lower than apportionments set for 2012.

Option 2 provides more fishing area to operate than option 1 by liberalizing the 125 fm seaward RCA to 100 fm between 43° and 45.064° N. latitude, while reducing impacts to canary and providing only marginal increased impacts to yelloweye relative to option 1 (0.1 mt or less increase projected yelloweye catch). This action would return the RCA structure to that observed prior to 2009. This action would provide more fishing grounds, reduce interactions and potential conflicts among non-nearshore fishermen and other sectors (e.g., bottom trawl), and decrease the expense and hazards of reaching the nearest fishing grounds.

Seaward RCA Boundary	**36°- 40° 10'**	**40°10'- Col/Eur 43°**	**Col/Eur 43°- Cascade Head 45.064°**	**Cascade Head 45.064°- Pt. Chehalis 46.888°**	**North of Pt. Chehalis 46.888°**
Shoreward boundary to 100 fm					
100 fm					
125 fm					
150 fm					
>150 fm					

Figure C-19. Alternative 2, Option 1. Non-trawl RCA seaward configuration. The shoreward configuration of the RCA is driven by the nearshore model. Grey shading indicates areas closed to fishing.

Seaward RCA Boundary	**36°- 40° 10'**	**40°10'- Col/Eur 43°**	**Col/Eur 43°- Cascade Head 45.064°**	**Cascade Head 45.064°- Pt. Chehalis 46.888°**	**North of Pt. Chehalis 46.888°**
Shoreward boundary to 100 fm					
100 fm					
125 fm					
150 fm					
>150 fm					

Figure C-20. Alternative 2, Option 2. Non-trawl RCA seaward configuration, which was the structure prior to 2009-2010, i.e., 100 fm north of 40°10' N. latitude. Grey shading indicates areas closed to fishing.

Limited Entry Fixed Gear North of 36° N. latitude

For limited entry fixed gear north of 36° N. latitude, the modeled impacts to overfished species under Alternative 2, option 1, which maintains status quo seaward RCA boundaries (Figure C-19) are shown in Table C-60. The impact for all overfished species is low relative to the Council's preliminary preferred apportionment of overfished species to non-nearshore sector. Under this option, no further reductions in sablefish harvest are necessary relative to the levels shown in Table C-58. Impacts to the limited entry and open access fixed gear sectors combined are described above.

Table C-60. Alternative 2, Option 1: Non-nearshore modeled-overfished species projected impacts for the limited entry fixed gear sectors north of 36° N. latitude with the 2009-10 RCA configuration, i.e., from Columbia/Eureka to Cascade Head at 125 fm.

Species	2011 Impacts (mt)	2012 Impacts (mt)
Bocaccio	0.0	0.0
Canary rockfish	1.7	1.6
Darkblotched rockfish	3.2	3.0
Pacific ocean perch	0.3	0.3
Widow rockfish	0.1	0.1
Yelloweye rockfish	0.7	0.6

For limited entry fixed gear north of 36° N. latitude, the modeled impacts to overfished species under Alternative 2, option 2, which liberalizes the seaward RCA boundary to the pre-2009 configuration (Figure C-20), are shown in Table C-61. The impact of this option for all overfished species is low relative to the Council's preliminary preferred apportionment of overfished species to non-nearshore sector. Under this option, no further reductions in sablefish harvest are necessary relative to the levels shown in Table C-58. Impacts to the limited entry and open access fixed gear sectors combined are described above.

Table C-61. Alternative 2, Option 2. Non-nearshore modeled-overfished species projected impacts for the open access fixed gear sectors north of 36° N. latitude with the RCA configuration prior to 2009-2010, i.e., north of 40°10 N. latitude the non-trawl RCA is at 100 fm.

Species	2011 Impacts (mt)	2012 Impacts (mt)
Bocaccio	0.0	0.0
Canary rockfish	1.7	1.6
Darkblotched rockfish	3.2	3.0
Pacific ocean perch	0.3	0.3
Widow rockfish	0.1	0.1
Yelloweye rockfish	0.7	0.6

Sablefish Open Access DTL Fishery north of 36° N. latitude

For the open access DTL fishery north of 36° N. latitude, the modeled impacts to overfished species under Alternative 2, option 1, which maintains status quo seaward RCA boundaries (Figure C-19), are shown in Table C-62. The impact of this option for all overfished species is low relative to the Council's preliminary preferred apportionment of overfished species to non-nearshore sector. Under this option, no further reductions in sablefish harvest are necessary relative to the levels shown in Table C-58. Impacts to the limited entry and open access fixed gear sectors combined are described above.

Table C-62. Alternative 2, Option 1. Non-nearshore modeled-overfished species projected impacts for the open access fixed gear sectors north of 36° N. latitude with the 2009-10 RCA configuration, i.e., from Columbia/Eureka to Cascade Head at 125 fm.

Species	2011 Impacts (mt)	2012 Impacts (mt)
Bocaccio	0.0	0.0
Canary rockfish	0.3	0.3
Darkblotched rockfish	0.8	0.8
Pacific ocean perch	0.0	0.0
Widow rockfish	0.0	0.0
Yelloweye rockfish	0.1	0.1

For the open access DTL fishery north of 36° N. latitude, the modeled impacts to overfished species under Alternative 2, option 2, which liberalizes the seaward RCA boundary to the pre-2009 configuration (Figure C-20), are shown in Table C-63. The impact of this option for all overfished species is low relative to the Council's preliminary preferred apportionment of overfished species to non-nearshore sector. Under this option, no further reductions in sablefish harvest are necessary relative to the levels shown in Table C-58. Impacts to the limited entry and open access fixed gear sectors combined are described above.

Table C-63. Alternative 2, Option 2. Non-nearshore modeled-overfished species projected impacts for the open access fixed gear sectors north of 36° N. latitude with the RCA configuration prior to 2009-2010, i.e., north of 40°10 N. latitude the non-trawl RCA is at 100 fm.

Species	2011 Impacts (mt)	2012 Impacts (mt)
Bocaccio	0.0	0.0
Canary rockfish	0.3	0.3
Darkblotched rockfish	0.7	0.7
Pacific ocean perch	0.0	0.0
Widow rockfish	0.0	0.0
Yelloweye rockfish	0.1	0.1

C.4.4 Nearshore Fixed Gear

Under Alternative 2, Oregon is severely constrained by yelloweye rockfish and California is constrained by yelloweye and canary rockfish. Under this harvest level, neither state can maintain opportunities similar to 2009-2010. As such, nearshore fishermen and communities will continue to be adversely impacted by the low available yelloweye. Since black rockfish and greenling are important target strategies in Oregon, lower reductions in landed catch were taken for these species relative to others to stay within overfished species impacts. In California, black rockfish is an important target strategy in the area between 42° and 40°10' N lat and cabezon is an important target strategy statewide; therefore higher landings were maintained for these species relative to others while staying within overfished species impacts

To facilitate modeling of target species, the GMT assumed two catch sharing relationships for yelloweye rockfish - 50:50 (OR:CA) and 55:45 (OR:CA). The rationale for these two options is described in Appendix A, Description of Catch Projection Models.

Under this alternative, two sub-options (a and b) are provided to show the tradeoffs between more restrictive depth restrictions and higher reductions in landed catch (Table C-64 and Table C-65). In Oregon, overfished species impacts are modeled assuming a 20 fm depth restriction (option a - Figure C-21) and a 30 fm depth restriction (option b - Figure C-22). In California, overfished species impacts are modeled assuming a 20 fm depth restriction statewide (option a) and a 20 fm depth restriction between 42° and 40°10' N lat only (option b). Although the 20 fm depth restriction provided little yelloweye savings in Oregon, it provided greater savings in California since a greater proportion of catch comes from the deeper depths (Table C-66 and Table C-67).

Under Alternative 2, option 1, the nearshore fishery is modeled assuming a 50:50 catch sharing of yelloweye rockfish between Oregon and California. Reductions to landed catch under this alternative are taken from average landings of 2007-2009 for Oregon and 2006-2008 for California (Table C-25).

North of 42° N. latitude – under option 1a, a 20 fm depth restriction would be maintained from 42° N. latitude to 43° N. latitude. Reductions to landed catch would be as follows: 51 percent for black rockfish and greenling, 62 percent remaining species. Under option 1b, the 20 fm depth restriction would be liberalized to 30 fm. In this case, yelloweye bycatch rates increase so landings would be further restricted to prevent exceeding the yelloweye share. The reductions to landed catch would be as follows: 58 percent for black rockfish and greenling, 69 percent other species.

South of 42° N. latitude – under option 1a, a 20 fm depth restriction would be implemented statewide. No reductions to landed catch would be necessary due to the savings afforded by the 20 fm depth restriction. Landings for black rockfish would be increased between 42° N. latitude and 40°10'N. latitude. Cabezon would be increased statewide to reflect the higher ACL available as a result of the new assessment. Under option 1b, a 20 fm depth restriction would remain in effect between 42° N. latitude and 40°10' N. latitude only. Reductions in landed catch (42 percent in 2011; 35 percent in 2012) would be necessary for some species except cabezon, which would remain at the maximum allowable amount under the higher ACL.

Under Alternative 2, option 2, the nearshore fishery is modeled assuming a 55:45 (OR:CA) catch sharing of yelloweye rockfish. Reductions to landed catch under this alternative are taken from average landings of 2007-2009 for Oregon and 2006-2008 for California (Table C-25).

North of 42° N. latitude – under option 2a, a 20 fm depth restriction would be maintained from 42° N. latitude to 43° N. latitude. Reductions to landed catch would be as follows: 47 percent for black rockfish and greenling, 59 percent remaining species. Under option 2b, a 30 fm depth restriction would be implemented. The bycatch rate for yelloweye would be expected to increase, which would lead to further reductions to landed catch as follows: 55 percent for black rockfish and greenling, 66 percent other species.

South of 42° N. latitude – under option 2a, a 20 fm depth restriction would be implemented statewide. No reductions to landed catch would be necessary due to the savings afforded by the 20 fm depth restriction. Landings for black rockfish would be increased between 42° N. latitude and 40°10'N. latitude. Cabezon would be increased statewide to reflect the higher ACL available as a result of the new assessment. Under option 2b, a 20 fm depth restriction would remain in effect between 42° N. latitude and 40°10' N. latitude only. Reductions in landed catch (42 percent in 2011; 35 percent in 2012) would be necessary for some species except cabezon, which would remain at the maximum allowable amount under the higher ACL.

Projected overfished species impacts under this alternative are summarized by area and option in Table C-66.

Table C-64. Alternative 2: Nearshore fishery projected total catch by area and option for 2011.

Area	Option 1a	Option 1b	Option 2a	Option 2b
Grand Total	**413**	**328**	**420**	**336**
Black rockfish	152	121	156	125
Blue rockfish	21	13	21	13
Cabezon	80	78	80	78
Deeper nearshore RF	29	17	29	17
Kelp greenling	11	9	12	10
Lingcod	55	52	57	53
Other minor RF	14	9	14	9
Shallow nearshore RF	51	30	51	30
North of 42° N. lat.	**98**	**82**	**105**	**89**
Black rockfish	54	46	58	50
Blue rockfish	1	1	1	1
Cabezon	10	8	10	9
Kelp greenling	10	8	11	9
Lingcod	19	16	21	17
Other minor nearshore rockfish	4	3	4	3
42° - 40°10' N. lat.	**140**	**109**	**140**	**109**
Black rockfish	95	73	95	73
Blue rockfish	13	8	13	8
Cabezon	7	7	7	7
Kelp greenling	0	0	0	0

Area	Option 1a	Option 1b	Option 2a	Option 2b
Lingcod	15	15	15	15
Other minor nearshore rockfish	10	6	10	6
South of 40°10' N. lat.	**175**	**137**	**175**	**138**
Black rockfish	3	2	3	2
Blue rockfish	7	4	7	4
Cabezon	63	63	63	63
Deeper nearshore rockfish	29	17	29	17
Kelp greenling	1	1	1	1
Lingcod	21	21	21	21
Shallow nearshore rockfish	51	30	51	30

Table C-65. Alternative 2: Nearshore fishery projected total catch by area and option for 2012.

Area	Option 1a	Option 1b	Option 2a	Option 2b
Grand Total	**413**	**328**	**420**	**336**
Black rockfish	152	121	156	125
Blue rockfish	21	13	21	13
Cabezon	80	78	80	79
Deeper nearshore RF	29	17	29	17
Kelp greenling	11	9	12	10
Lingcod	55	52	57	53
Other minor RF	14	9	14	9
Shallow nearshore RF	51	30	51	30
North of 42° N. lat.	**98**	**82**	**105**	**89**
Black rockfish	54	46	58	50
Blue rockfish	1	1	1	1
Cabezon	10	8	10	9
Kelp greenling	10	8	11	9
Lingcod	19	16	21	17
Other minor nearshore rockfish	4	3	4	3
42° - 40°10' N. lat.	**140**	**109**	**140**	**109**
Black rockfish	95	73	95	73
Blue rockfish	13	8	13	8
Cabezon	7	7	7	7
Kelp greenling	0	0	0	0
Lingcod	15	15	15	15
Other minor nearshore rockfish	10	6	10	6

Area	Option 1a	Option 1b	Option 2a	Option 2b
South of 40°10' N. lat.	**175**	**137**	**175**	**138**
Black rockfish	3	2	3	2
Blue rockfish	7	4	7	4
Cabezon	63	63	63	63
Deeper nearshore rockfish	29	17	29	17
Kelp greenling	1	1	1	1
Lingcod	21	21	21	21
Shallow nearshore rockfish	51	30	51	30

Shoreward RCA Boundary	**South 34°27’**	**34°27’- 40° 10'**	**40°10' - 42°**	**42° - Col/Eur 43°**	**Col/Eur 43° - 46°16’**	**North of 46°16’**
Shore						
20 fm						
30 fm						
60 fm						

Figure C-21. Alternative 2: Nearshore shoreward RCA configuration under option 1a and 2a, the higher landings more restrictive RCA option. Grey shading indicates areas closed to fishing.

Shoreward RCA Boundary	**South 34°27’**	**34°27’- 40° 10'**	**40°10' - 42°**	**42° - Col/Eur 43°**	**Col/Eur 43° - 46°16’**	**North of 46°16’**
Shore						
20 fm						
30 fm						
60 fm						

Figure C-22. Alternative 2: Nearshore shoreward RCA configuration under option 1b and 2b, the lower landings less restrictive RCA option. Grey shading indicates areas closed to fishing.

Table C-66. Alternative 2: Nearshore overfished species bycatch projections for the under the option 1 and 2 RCA structures for 2011.

Species	Area	Option 1a	Option 1b	Option 2a	Option 2b
Bocaccio		**0.0**	**0.2**	**0.0**	**0.2**
	OR: North of 42	0.0	0.0	0.0	0.0
	CA: 42° - 40°10	0.0	0.0	0.0	0.0
	CA: South of 40°10	0.0	0.2	0.0	0.2
Canary		**2.0**	**2.0**	**2.0**	**2.0**
	OR: North of 42	0.4	0.3	0.4	0.4
	CA: 42° - 40°10	0.9	0.7	0.9	0.7
	CA: South of 40°10	0.8	1.0	0.8	1.0
Widow		**0.3**	**0.2**	**0.3**	**0.2**
	OR: North of 42	0.0	0.0	0.0	0.0
	CA: 42° - 40°10	0.3	0.2	0.3	0.2
	CA: South of 40°10	0.0	0.0	0.0	0.0
Yelloweye		**0.7**	**0.6**	**0.7**	**0.7**
	OR: North of 42	0.4	0.4	0.4	0.4
	CA: 42° - 40°10	0.3	0.2	0.3	0.2
	CA: South of 40°10	0.0	0.1	0.0	0.1

Table C-67. Alternative 2. Nearshore overfished species bycatch projections under the option 1 and 2 RCA structures for 2012.

Species	Area	Option 1a	Option 1b	Option 2a	Option 2b
Bocaccio		**0.0**	**0.3**	**0.0**	**0.3**
	OR: North of 42	0.0	0.0	0.0	0.0
	CA: 42° - 40°10	0.0	0.0	0.0	0.0
	CA: South of 40°10	0.0	0.3	0.0	0.3
Canary		**2.1**	**2.1**	**2.1**	**2.1**
	OR: North of 42	0.4	0.3	0.4	0.4
	CA: 42° - 40°10	1.0	0.7	1.0	0.7
	CA: South of 40°10	0.8	1.0	0.8	1.0
Widow		**0.3**	**0.2**	**0.3**	**0.2**
	OR: North of 42	0.0	0.0	0.0	0.0
	CA: 42° - 40°10	0.3	0.2	0.3	0.2
	CA: South of 40°10	0.0	0.0	0.0	0.0
Yelloweye		**0.7**	**0.6**	**0.7**	**0.7**
	OR: North of 42	0.4	0.4	0.4	0.4
	CA: 42° - 40°10	0.3	0.2	0.3	0.2
	CA: South of 40°10	0.0	0.1	0.0	0.1

C.4.5 Washington Recreational

Washington groundfish fishery management measures under Alternative 2 are the same as the Final Preferred Alternative.

Groundfish Seasons and Bag Limits

Under Alternative 2, the Washington recreational fishery would be open year-round except for lingcod (Figure C-23). The aggregate groundfish bag limit would be reduced from 15 to 12 fish per angler per day. The aggregate groundfish bag limit would continue to include sub limits for rockfish (10 per angler per day) and lingcod (two per angler per day) but a new sub limit of two cabezon per angler per day would be added for 2011 and 2012.

Lingcod Seasons and Size Limits

Under Alternative 2, the following lingcod seasons and size limits would apply in 2011 and 2012:

- Marine Areas 1-3 (from the Oregon/Washington border at 46º16' N. latitude north to Cape Alava at 48º10' N. latitude): open from March 12 through October 15 in 2011 and March 17 through October 13 in 2012.
- Marine Area 4 (Cape Alava to the US/Canadian border): open from April 16 to October 15 in 2011 and April 16 to October 13 in 2012.
- The lingcod minimum size limit during the open lingcod season would be 22 inches in Marine Areas 1-3 and 24 inches in Marine Area 4.

Area Restrictions

The Washington recreational groundfish and Pacific halibut fisheries would be prohibited from fishing for, retention or possession of groundfish and halibut in the C-shaped yelloweye rockfish conservation area in the north coast and South Coast and Westport YRCAs in the south coast as they were in the 2009 and 2010 seasons.

Marine Area	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
3 & 4 (N. Coast)	Open all depths					Open <20 fm June 1-Sep 30 a/				Open all depths		
2 (S. Coast)	Open all depths		Open <30 fm Mar 15 - June 15 b/, c/, d				Open all depths except lingcod prohibited on Fri. and Sat. >30 fm e/		Open all depths			
1 (Col. R.)	Open all depths				Open all depths f/					Open all depths		

a/ Groundfish retention allowed >20 fm on days when Pacific halibut is open.
b/ Retention of sablefish and Pacific cod allowed seaward of 30 fm from May 1- June 15.
c/ Retention of rockfish allowed seaward of 30 fm.
d/ Retention of lingcod allowed seaward of 30 fm on days that the primary halibut season is open.
e/ Retention of lingcod prohibited >30 fm, south of 46°58 on Fri. and Sat. from July 1 – August 31.
f/ Retention of groundfish, except sablefish and Pacific cod, prohibited with Pacific halibut on board.

Figure C-23. Alternative 2. Washington recreational season structure for 2011-2012.

North Coast (Marine Areas 3 and 4)

Prohibit the retention of groundfish seaward of a line approximating 20 fathoms from June 1-September 30, except on days that halibut fishing is open.

South Coast (Marine Area 2)

Groundfish retention, except rockfish would be prohibited seaward of 30 fathoms from March 15 through June 15. Sablefish and Pacific cod retention would be allowed in this area from May 1 through June 15. On days that the primary halibut season is open, lingcod may be retained throughout Marine Area 2. Retention of lingcod would be prohibited south of 46 deg. 58’ and seaward of 30 fathoms on Fridays and Saturdays from July 1 through August 31. Fishing for, retention and possession of groundfish would be prohibited at all times in the South Coast YRCA and Westport Offshore YRCA.

Columbia River (Marine Area 1)

Prohibit the retention of groundfish, except sablefish and Pacific cod, with halibut onboard from May 1 through September 30.

Table C-68. Alternative 2. Washington recreational harvest guideline and projected impacts under Alternative 2

Species	WA Recreational Harvest Guideline (mt)	Projected Impacts (mt)
Canary	4.4 / 4.7	0.7
Yelloweye	2.6 / 2.6	2.5
Black rockfish	N/A	186.7
Minor nearshore rockfish	N/A	6.1

C.4.6 Oregon Recreational

Depth management is the main tool used for controlling yelloweye rockfish catch in the Oregon recreational fishery. The options range from the most restrictive (Oregon Recreational Option 1, Figure C-24), a year round season with April through September open only shoreward of 25 fathoms to the least restrictive option (Oregon Recreational Option 3, Figure C-24), a year round season with April through September open only shoreward of 40 fathoms. Oregon Recreational Option 3 reflects the No Action 2009-10 Oregon recreational groundfish season. Table C-69 outlines the projected impacts for modeled species by option under this alternative.

<table>
<tr><th>Option</th><th>Jan</th><th>Feb</th><th>Mar</th><th>Apr</th><th>May</th><th>Jun</th><th>Jul</th><th>Aug</th><th>Sep</th><th>Oct</th><th>Nov</th><th>Dec</th></tr>
<tr><td>1</td><td colspan="3">Open all depths</td><td colspan="6">Open < 25 fm</td><td colspan="3">Open all depths</td></tr>
<tr><td>2</td><td colspan="3">Open all depths</td><td colspan="6">Open < 30 fm</td><td colspan="3">Open all depths</td></tr>
<tr><td>3</td><td colspan="3">Open all depths</td><td colspan="6">Open < 40 fm</td><td colspan="3">Open all depths</td></tr>
</table>

Figure C-24. Alternative 2. Options for Oregon recreational groundfish season in 2011-12

Under Alternative 2, the Oregon recreational groundfish fishery would able to operate a year round fishery with April through September being under some depth restrictions (25, 30, or 40 fathoms). Under this alternative, groundfish retention in the all-depth Pacific halibut fishery would not be allowed under any of the options in Figure C-24.

2011-12 Bag and Size Limit Alternatives

Under Alternative 2, the No Action alternative bag limits for marine fish, lingcod, and flatfish would remain in place, except for cabezon. These daily-bag-limits provide the flexibility to make necessary adjustments through the yearly state process, reflecting the progression of the current year's fishery. The state process will likely start off each season with reduced marine and lingcod daily bag limits and may increase or further reduced them inseason depending on the progression of the fishery relative to the impact on species with harvest targets/guidelines and state landing caps. A reduction in cabezon impacts would necessary and can be accomplished with a seasonal sub-bag limit of one fish. The sub-bag limit is coincides with the months that the groundfish fishery is restricted to inside of 40 fathoms. Other than this alternative, all other bag and size limits are the same as specified in 2009-10 and described under the No Action Alternative, including no retention of yelloweye or canary rockfish at any time or depth.

The shore fishery would be managed for a year round season as yelloweye rockfish are not impacted. Also, fishing for, take, retention and possession of sanddabs and "other flatfishes", excluding Pacific halibut would be legal year round and open shoreward of 40 fathoms during any period the groundfish fishery has any depth restrictions. The flatfish fishery would not have any depth restrictions when the groundfish fishery has no depth restrictions (i.e. 40, 30, 25 and 20 fm lines).

2011-12 Area Restriction Alternatives

No changes to the current boundary of the Stonewall Bank YRCA would necessary.

Table C-69. Alternative 2. Oregon recreational projected impacts for 2011-2012 under the Council's preliminary preferred apportionment and intermediate overfished species ACLs.

Species	Projected Impacts (mt)		
	Option 1	Option 2	Option 3
Canary Rockfish	2.4	2.3	2.2
Yelloweye Rockfish	2.1	2.1	1.9
Black Rockfish	330.5	330.5	330.5
Blue Rockfish	20.4	20.4	20.4
Other Nearshore Rockfish a/	12.7	12.7	12.7
Greenling (Kelp and Rock)	4.6	4.6	4.6

a/ Other Nearshore Rockfish includes: brown, china, copper, grass, and quillback rockfish

C.4.7 California Recreational

Season and depth restriction diagrams (Figure C-25) as well as corresponding impacts on overfished species (Table C-70) and non-overfished species (Table C-71) under this alternative are provided below. This alternative would not allow an increase in the season length in the Northern Management Area despite their reduced impacts on yelloweye rockfish since the 20 fm depth restriction was put in place in 2008. This alternative would also result in a half month reduction in the already highly constrained three month season length in the North-Central North of Point Arena Management Area with the loss of the first two weeks of August. In the North-Central South of Point Arena Management Area, October would be closed to fishing while the season start date was moved from June 13th to June 1st, with the overall effect of reducing the season length by a half month relative to the No Action Alternative. In this management area, both yelloweye and blue rockfish constrain the season lengths. The season length in the Monterey and Morro Bay South-Central Management Areas could still be increased to include December, increasing the season length by one and a half months since yelloweye rockfish is not constraining in this area.

Though the canary rockfish impacts for the California recreational fishery in 2009 were far below the 22.9 mt harvest guideline, the annual catches of canary rockfish in the recreational fishery are variable and this residual buffer between projected impacts of 7.4 mt and the harvest guideline of 16.5 mt in 2011 should be maintained to prevent the need for inseason action to close the fishery before the proscribed date. The bocaccio harvest guideline of 61.9 mt in 2011 under the catch sharing alternative selected by the Council and the cowcod harvest limit of 1.4 mt under the Total Mortality Report catch sharing (Option 2) would provide sufficient residual catch to allow the proposed 30 fm or 40 fm depth restriction in the CCA and retention of shelf and slope rockfish including bocaccio in the CCA.

In addition the proposed options under Alternative 2 will accommodate the proposed changes to management measures other than depth and season.

Management Area	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Months
Northern	CLOSED				May 15 - Sep 15 <20 fm								5.5
North-Central North of Pt. Arena	CLOSED				May 15 - Jul <20 fm								2.5
North-Central South of Pt. Arena	CLOSED					June–Sep < 30 fm							4
South-Central Monterey	CLOSED				May – Dec < 40 fm								8
South-Central Morro Bay	CLOSED				May – Dec < 40 fm								8
Southern	CLOSED		Mar –Dec < 60 fm										10

Figure C-25. Alternative 2. California recreational rockfish, cabezon and greenling season structure for 2011-2012.

Table C-70. Alternative 2. California recreational projected impacts to overfished species for 2011-2012.

Species	2011 HG (mt)	2012 HG (mt)	Projected Impacts (mt)	2011 Percent HG	2012 Percent HG
Yelloweye Rockfish	2.6	2.6	2.4	94%	94%
Bocaccio	61.9	65.8	52.2	84%	79%
Cowcod Option 1	0.2	0.2	0.17	85%	85%
Cowcod Option 2	1.4	1.4	0.17	12%	12%
Canary Rockfish	16.5	17.7	7.4	45%	42%
Widow Rockfish	NA	NA	7.8	NA	NA

Table C-71. Alternative 2. California recreational projected impacts to non-overfished species for 2011-2012. Results in parenthesis reflect changes to management measures other than season and depth.

Species	Projected Impacts
Black Rockfish	145.0
Blue Rockfish	145.1
Cabezon	21.6 (23.8)
California Scorpionfish	61.4 (63.8)
California Sheephead	31.7
Greenlings	9.3
Lingcod	170.3 (209.7)
Minor Nearshore North	7.8
Minor Nearshore South	286.1

C.5 Alternative 3 – The Council's April 2010 Preliminary Preferred Overfished Species ACL Alternatives and Non-Overfished Species ACLs

Analytical scenario

The biological strategy underlying this alternative is to follow the process outlined in the Groundfish Fishery Management Plan and recommended by the Science and Statistical Subcommittee, and continue with a constant spawning biomass per recruit (SPR) harvest rate for most overfished species applied to the latest stock assessment, except for widow rockfish and yelloweye (Table C-72). Since widow rockfish appears to be rebuilt in 2010 under all 2011-2012 harvest removals (i.e., from 200 to 3,000 mt), the widow ACL is set at 600 mt to accommodate fisheries while still achieving rebuilding. The yelloweye ACL represents a departure from the status quo harvest rate (71.9 percent) which is also the ramp-down goal harvest rate. The reason for this departure is because maintaining the status quo harvest rate would not result in rebuilding by the T_{target} of 2084. As such, the ACL option is 20 mt for both 2011 and 2012 which is projected to result in rebuilding by T_{target}.

The Council stated that the bocaccio ACL is not a preliminary preferred, but an ACL for more detailed analysis. For the purposes of analysis, the bocaccio ACL was included under Alternative 3 with the remaining preliminary preferred overfished species ACLs.

Table C-72. Alternative 3: 2011, 2012 Overfished species harvest specifications along with the time to rebuild and T_{TARGET} currently specified in the FMP.

Species	T_{TARGET} in FMP	Median time to rebuild given ACL a/	ACL Alternative 2011 b/	ACL Alternative 2012 b/
Bocaccio	2026	2022	263 mt	274 mt
Canary	2021	[2027]	102 mt	107 mt
Cowcod	2072	2071	4 mt	4 mt
Darkblotched	2028	2027	332 mt	329 mt
Petrale	TBD	2016	976 mt	1,160 mt
POP	2017	[2020]	180 mt	183 mt
Widow	2015	2010	600 mt	600 mt
Yelloweye	2084	2084	20 mt	20 mt

a/ Values taken from Table 2-14.
. Brackets indicate times to rebuild that are longer than the T_{TARGET} currently specified in the FMP prior to the proposed action.
b/ Values taken from the harvest specification alternatives in Table 2-8 (2011) and Table 2-9 (2012).

C.5.1 Limited Entry Non-Whiting Trawl Fishery

C.5.1.1 Cumulative Trip Limit Management

Under Alternative 3, effort was made to keep trip limits as even as possible among gear types and seasons for petrale sole, sablefish, and other species. Table C-73 details the trip limit structure and RCA under Alternative 3 and Table C-74 details the projected species impacts.

Petrale sole

Alternative 3 has the highest petrale sole trawl model target (865 mt) compared to Alternative 2 (643 mt) and Alternative 1 (342 mt). The trawl allocation under the No Action Alternative was 1,140 mt and the Final Preferred Alternative was 871 mt. The Alternative 3 petrale model target resulted in an average bimonthly trip limit of 4,900 lbs/2 months, compared with 7,900 lbs/2 months for the No Action Alternative, and 4,800 lbs/2 months for the Final Preferred Alternative in 2011.

Sablefish

Sablefish was a constraining target species in the DTS fishery. Under Alternative 3, the trawl allocation was 2,588 mt, the No Action Alternative was 2,955 mt, and the Final Preferred Alternative was 2,538 mt in 2011. This is reflected in the trip limits for sablefish, which were an average of 13,625 lbs/2 months in Alternative 3, versus 21,389 lbs/2 months in the No Action Alternative, and 13,063 lbs/2 months in the Final Preferred Alternative for 2011.

Canary rockfish (shelf)

Canary rockfish, and the other six species in rebuilding for 2011 and 2012, are modeled as bycatch. Under Alternative 3, canary rockfish had a trawl allocation of 20.5mt, which is 96 percent of the No Action Alternative (21.3mt), and 103 percent of the Final Preferred Alternative (20mt) in 2011.

Pacific Ocean perch (slope)

Under Alternative 3, Pacific Ocean perch (POP) had a trawl allocation of 100.3mt. This is 99.5 percent of the No Action Alternative (100.8mt), and 99.6 percent of the Final Preferred Alternative (107mt) in 2011.

Darkblotched rockfish (slope)

Under Alternative 3, darkblotched rockfish had a trawl allocation of 240.3mt. This is 104 percent of the No Action Alternative (230mt), and 100 percent of the Final Preferred Alternative (240mt) in 2011.

Widow rockfish (shelf)

Widow rockfish had a trawl allocation of 235.5mt under Alternative 3, this is 11 times the No Action Alternative (21.6mt) and 100 percent of the Final Preferred Alternative (235mt) in 2011.

Bocaccio rockfish (shelf)

Bocaccio rockfish had a trawl allocation of 29.6mt under Alternative 3; this is 184 percent of the No Action Alternative (16.1mt) and 49 percent of the Final Preferred Alternative (60mt) in 2011.

Yelloweye rockfish (shelf)

Under Alternative 3, yelloweye rockfish had an allocation of 0.6mt, which is 100 percent of the No Action Alternative (0.6mt) and 100 percent of the Final Preferred Alternative (0.6mt) in 2011.

Cowcod (shelf)

Under Alternative 3, cowcod had an allocation of 1.4mt, which is 93 percent of the No Action Alternative (1.5mt) and 78 percent of the Final Preferred Alternative (1.8mt) in 2011.

Table C-73. Alternative 3. Limited entry trawl trip limits and RCA structures for 2011-2012.

2-month period	RCA lines (fm) shallow	RCA lines (fm) deep	2-month cumulative-poundage limits: sable-fish	long-spine	short-spine	Dover sole	petrale sole	arrow-tooth	other flatfish	slope rockfish
N. of 40°10' N lat.										
Large/small footrope limits										
1	*75*	200	**15,500**	20,000	17,000	150,000	**4,900**	150,000	110,000	6,000
2	*75*	200	**15,500**	20,000	17,000	150,000	**4,900**	150,000	110,000	6,000
3	*75*	150/200	**15,500**	20,000	17,000	150,000	**4,900**	150,000	110,000	6,000
4	*75*	150/200	**15,500**	20,000	17,000	150,000	**4,900**	150,000	110,000	6,000
5	*75*	200	**15,500**	20,000	17,000	150,000	**4,900**	150,000	110,000	6,000
6	*75*	200	**15,500**	20,000	17,000	150,000	**4,900**	150,000	110,000	6,000
Selective gear limits										
1	*75*	200	**8,000**	5,000	5,000	65,000	**4,900**	90,000	60,000	
2	*75*	200	**8,000**	5,000	5,000	65,000	**4,900**	90,000	60,000	
3	*75*	150/200	**8,000**	5,000	5,000	65,000	**4,900**	90,000	60,000	
4	*75*	150/200	**8,000**	5,000	5,000	65,000	**4,900**	90,000	60,000	
5	*75*	200	**8,000**	5,000	5,000	65,000	**4,900**	90,000	60,000	
6	*75*	200	**8,000**	5,000	5,000	65,000	**4,900**	90,000	60,000	
38° - 40°10' N lat.										
1	100	200	**15,500**	20,000	17,000	150,000	**4,900**	10,000	110,000	15,000
2	100	150	**15,500**	20,000	17,000	150,000	**4,900**	10,000	110,000	15,000
3	100	150	**15,500**	20,000	17,000	150,000	**4,900**	10,000	110,000	15,000
4	100	150	**15,500**	20,000	17,000	150,000	**4,900**	10,000	110,000	15,000
5	100	150	**15,500**	20,000	17,000	150,000	**4,900**	10,000	110,000	15,000
6	100	200	**15,500**	20,000	17,000	150,000	**4,900**	10,000	110,000	15,000
S. of 38° N lat.										
1	100	200	**15,500**	20,000	17,000	150,000	**4,900**	10,000	110,000	55,000
2	100	150	**15,500**	20,000	17,000	150,000	**4,900**	10,000	110,000	55,000
3	100	150	**15,500**	20,000	17,000	150,000	**4,900**	10,000	110,000	55,000
4	100	150	**15,500**	20,000	17,000	150,000	**4,900**	10,000	110,000	55,000
5	100	150	**15,500**	20,000	17,000	150,000	**4,900**	10,000	110,000	55,000
6	100	200	**15,500**	20,000	17,000	150,000	**4,900**	10,000	110,000	55,000

Table C-74. Alternative 3. Limited entry non-whiting trawl projected impacts for 2011-2012.

	Projected Total Catch (mt)			Harvest	Proj. -	
	North of 40°10'	South of 40°10'	Projected Total	Allocation (mt)	Allocation (mt)	Proj. % of Alloc.
Sablefish	2,239	337	2,575	**2,588**	-13	99.5%
Longspine	1,091	250	1,341	1,971	-631	68.0%
Shortspine	1,246	141	1,387	1,450	-63	95.7%
Dover sole	15,905	1,805	17,710	22,240	-4,529	79.6%
Arrowtooth	5,509	15	5,524	12,441	-6,918	44.4%
Petrale sole	693	158	851	**865**	-14	98.4%
English sole	382	76	458	18,659	-18,201	2.5%
Other flatfish	684	186	870	4,213	-3,343	20.6%
Canary	9.2	1.4	10.6	20.5	-9.9	51.7%
POP	90.2	0.2	90.4	100.3	-9.9	90.1%
Darkblotched	151.4	19.2	170.6	240.3	-69.7	71.0%
Widow	6.0	8.8	14.9	235.5	-220.6	6.3%
Bocaccio	1.7	5.5	7.2	29.6	-22.4	24.2%
Yelloweye	0.2	0.0	0.2	0.6	-0.4	41.4%
Cowcod	0.0	0.3	0.3	1.4	-1.1	21.7%

Alternative 3 for 2011 versus 2012

The difference between Alternative 3 between 2011 and 2012 were relatively small and primarily limited to petrale sole, sablefish, and Dover sole. Sablefish allocations and trip limits were lower in 2012 than 2011, and petrale sole allocations and trip limits were higher in 2012 than 2011. Dover sole allocations were lower in 2012 than 2011, but the trip limits were able to remain the same because of a precautionary approach in the 2011 modeling described earlier. Differences between allocations for other species, including rebuilding species were negligible.

C.5.2 Limited Entry Trawl Whiting

Pacific whiting harvest specifications are completed on an annual basis, thus the Council requested a range of potential whiting ACLs for more detailed analysis in order to understand the potential range of overfished species impacts and constraints (Table 2-8). Alternative 3 informs the bycatch impacts relative to a high whiting ACL that is 1.5 times higher (290,903 mt) than the No Action whiting OY (193,935 mt). Under Alternative 3, the analysis assumes that Amendment 21: Intersector Allocation is implemented on January 1, 2011 and as such formal allocations of darkblotched, POP, and widow rockfish are made to the whiting sectors. That is, the bycatch model for projecting overfished species impacts relative to the whiting ACL is no longer used for setting darkblotched, POP, and widow rockfish. For canary rockfish, Alternative 3 was analyzed using the Council's preliminary preferred 2-year allocation of canary to the whiting sectors. Table C-75 contains the Pacific whiting and overfished species allocations under Alterative 3.

Table C-75. Alternative 3: Pacific whiting and overfished species allocations by sector using Amendment 21 for darkblotched, POP, and widow and the Council's preliminary preferred two-year allocation of canary rockfish.

Catcher Processor

Species	2011 ACL (mt)	2012 ACL (mt)	2011 Allocation (mt)	2012 Allocation (mt)
Whiting	290,903	290,903	75,138	75,138
Canary	102	107	4.8	5.0
DRK	332	329	9	9
POP	180	183	10	10
Widow	600	600	87	87

Mothership

Species	2011 ACL (mt)	2012 ACL (mt)	2011 Allocation (mt)	2012 Allocation (mt)
Whiting	290,903	290,903	53,039	53,039
Canary	105	107	3.4	3.6
DRK	332	329	6	6
POP	180	183	7	7
Widow	600	600	61	61

Shoreside

Species	2011 ACL (mt)	2012 ACL (mt)	2011 Allocation (mt)	2012 Allocation (mt)
Whiting	290,903	290,903	92,818	92,818
Canary	102	107	5.9	6.2
DRK	332	329	11	11
POP	180	183	13	13
Widow	600	600	107	107

There has not been a whiting OY as high as that contemplated under Alternative 3. As such, there are no recent bycatch impacts to inform how the allocations compare. It is assumed that all sectors would need to actively avoid overfished species in order to prosecute this high whiting allocation.

C.5.3 Non-Nearshore Fixed Gear

Alternative 3 includes the Council's preliminary preferred sablefish ACL (updated with the technical corrections made in June - Table C-76) along with the preliminary preferred overfished species ACL alternatives (Table C-72) and the associated preliminary preferred decision for apportionments of overfished species to the non-nearshore fleet (Table C-77). As shown previously, the sablefish ACL (and therefore the allocation for non-nearshore fixed gear fisheries) will be lower in 2011 and 2012 than observed in 2010 (Table C-76). Because the model used to estimate impacts of this fishery to overfished species assumes full attainment of the allocation, the reduced ACL for 2011 and 2012 will automatically reduce the modeled impacts of overfished species relative to 2010 (i.e., bycatch projections for the limited entry fixed gear fishery under Alternative 2 are lower compared to No Action).

Table C-76. Alternative 3: Preliminary preferred sablefish ACL and allocations north of 36° N. latitude compared to No Action (2010).

Species	Fishery	2010 (mt)	2011 (mt)	2012 (mt)
Sablefish N. 36° N. Lat.	**OY/ACL**	6,471	5,515	5,347
	LE Fixed Gear Allocation	2,140	1,874	1,816
	----LE Fixed Gear Primary	1,819	1,593	1,544
	----LE Fixed Gear Daily Trip Limit	321	281	272
	Open Access	529	463	449

Table C-77. Alternative 3. Non-nearshore apportionment of the non-trawl allocation under the preliminary preferred overfished species ACLs.

Species	2011 Apportionment (mt)	2012 Apportionment (mt)	Comments
Canary rockfish	3.6	3.8	
Yelloweye rockfish	2.1	2.1	Includes 0.4 mt for OA DTL and 1.7 mt for LE FG

Projected overfished species impacts are provided for two options under Alternative 3: option 1 provides impacts through implementation of the status quo seaward non-trawl RCA boundary configuration (Figure C-26) whereas option 2 shows impacts of this fishery to overfished species with the seaward RCA boundary configuration that was used prior to the 2009-2010 (Figure C-27). Yelloweye is the stock for which the Council put the current non-trawl RCA boundaries into place. Regardless of the RCA configuration (option 1 or option 2), the modeled impact to overfished species by both limited entry and open access combined (Table C-78, Table C-79, Table C-80, Table C-81) is less than Council's preliminary preferred apportionment for these non-nearshore fisheries. This is due to the reduced-sablefish ACLs as described above. Overall, the modeled impacts for canary rockfish and yelloweye were 2.4 and 0.8 mt, respectively, for 2011. These predicted catch levels are much lower than the preliminary preferred apportionments of 3.6 and 2.1 mt for canary rockfish and yelloweye, respectively, for 2011. The modeled impacts for 2012 are also much lower than apportionments set for 2012.

Alternative 3, option 2 provides more fishing area to operate than Alternative 3, option 1 by liberalizing the 125 fm seaward RCA to 100 fm between 43^{o} and 45.064^{o} N. latitude, while reducing impacts to canary and providing only marginal increased impacts to yelloweye relative to option 1 (0.1 mt or less increase projected yelloweye catch). This action would return the RCA structure to that observed prior to 2009. This action would provide more fishing grounds, reduce interactions and potential conflicts among non-nearshore fishermen, and decrease the expense and hazards of reaching the nearest fishing.

Seaward RCA Boundary	36°- 40° 10'	40°10'- Col/Eur 43°	Col/Eur 43°- Cascade Head 45.064°	Cascade Head 45.064°- Pt. Chehalis 46.888°	North of Pt. Chehalis 46.888°
Shoreward boundary to 100 fm					
100 fm					
125 fm					
150 fm					
>150 fm					

Figure C-26. Alternative 3, Option 1. Non-trawl RCA seaward configuration. The shoreward configuration of the RCA is driven by the nearshore model. Grey shading indicates areas closed to fishing.

Seaward RCA Boundary	36°- 40° 10'	40°10'- Col/Eur 43°	Col/Eur 43°- Cascade Head 45.064°	Cascade Head 45.064°- Pt. Chehalis 46.888°	North of Pt. Chehalis 46.888°
Shoreward boundary to 100 fm					
100 fm					
125 fm					
150 fm					
>150 fm					

Figure C-27. Alternative 3, Option 2. Non-trawl RCA seaward configuration, which was the structure prior to 2009-2010, i.e., 100 fm north of 40°10' N. latitude. Grey shading indicates areas closed to fishing.

Limited Entry Fixed Gear North of 36° N. latitude

For limited entry fixed gear north of 36° N. latitude, the modeled impacts to overfished species under Alternative 3, option 1, which maintains status quo seaward RCA boundaries (Figure C-26) are shown in Table C-78. The impact for all overfished species is low relative to the Council's preliminary preferred apportionment of overfished species to non-nearshore sector. Under this option, no further reductions in sablefish harvest are necessary relative to the levels shown in Table C-76. Impacts to the limited entry and open access fixed gear sectors combined are described above.

Table C-78. Alternative 3, Option 1: Non-nearshore modeled-overfished species projected impacts for the open access fixed gear sectors north of 36° N. latitude with the 2009-10 RCA configuration, i.e., from Columbia/Eureka to Cascade Head at 125 fm.

Species	2011 Impacts (mt)	2012 Impacts (mt)
Bocaccio	0.0	0.0
Canary rockfish	2.1	2.1
Darkblotched rockfish	3.8	4.3
Pacific ocean perch	0.3	0.3
Widow rockfish	0.0	0.1
Yelloweye rockfish	0.7	0.7

For limited entry fixed gear north of 36° N. latitude, the modeled impacts to overfished species under Alternative 3, option 2, which liberalizes the seaward RCA boundary to the pre-2009 configuration (Figure C-27), are shown in Table C-79. The impact of this option for all overfished species is low relative to the Council's preliminary preferred apportionment of overfished species to non-nearshore sector. Under this option, no further reductions in sablefish harvest are necessary relative to the levels shown in Table C-76. Impacts to the limited entry and open access fixed gear sectors combined are described above.

Table C-79. Alternative 3, Option 2. Non-nearshore modeled-overfished species projected impacts for the open access fixed gear sectors north of 36° N. latitude with the RCA configuration prior to 2009-2010, i.e., north of 40°10 N. latitude the non-trawl RCA is at 100 fm.

Species	2011 Impacts (mt)	2012 Impacts (mt)
Bocaccio	0.0	0.0
Canary rockfish	1.9	1.8
Darkblotched rockfish	3.5	3.4
Pacific ocean perch	0.3	0.3
Widow rockfish	0.1	0.1
Yelloweye rockfish	0.8	0.7

Sablefish Open Access DTL Fishery north of 36° N. latitude

For the open access DTL fishery north of 36° N. latitude, the modeled impacts to overfished species under Alternative 3, option 1, which maintains status quo seaward RCA boundaries (Figure C-26), are shown in Table C-80. The impact of this option for all overfished species is low relative to the Council's preliminary preferred apportionment of overfished species to non-nearshore sector. Under this option, no further reductions in sablefish harvest are necessary relative to the levels shown in Table C-76. Impacts to the limited entry and open access fixed gear sectors combined are described above.

Table C-80. Alternative 3, Option 1. Non-nearshore modeled-overfished species projected impacts for the open access fixed gear sectors north of 36° N. latitude with the 2009-10 RCA configuration, i.e., from Columbia/Eureka to Cascade Head at 125 fm.

Species	2011 Impacts (mt)	2012 Impacts (mt)
Bocaccio	0.0	0.0
Canary rockfish	0.3	0.3
Darkblotched rockfish	0.8	0.8
Pacific ocean perch	0.0	0.0
Widow rockfish	0.0	0.0
Yelloweye rockfish	0.1	0.1

For the open access DTL fishery north of 36° N. latitude, the modeled impacts to overfished species under Alternative 3, option 2, which liberalizes the seaward RCA boundary to the pre-2009 configuration (Figure C-27), are shown in Table C-81. The impact of this option for all overfished species is low relative to the Council's preliminary preferred apportionment of overfished species to non-nearshore sector. Under this option, no further reductions in sablefish harvest are necessary relative to the levels shown in Table C-76. Impacts to the limited entry and open access fixed gear sectors combined are described above.

Table C-81. Alternative 3, Option 2. Non-nearshore modeled-overfished species projected impacts for the open access fixed gear sectors north of 36° N. latitude with the RCA configuration prior to 2009-2010, i.e., north of 40°10 N. latitude the non-trawl RCA is at 100 fm.

Species	2011 Impacts (mt)	2012 Impacts (mt)
Bocaccio	0.0	0.0
Canary rockfish	0.3	0.3
Darkblotched rockfish	0.7	0.7
Pacific ocean perch	0.0	0.0
Widow rockfish	0.0	0.0
Yelloweye rockfish	0.1	0.1

C.5.4 Nearshore Fixed Gear

Under Alternative 3, Oregon is severely constrained by yelloweye rockfish and California is constrained by yelloweye and canary rockfish. Under this harvest level, neither state can maintain opportunities similar to 2009-2010. As such, nearshore fishermen and communities will continue to be adversely impacted by the low available yelloweye. Since black rockfish and greenling are important target strategies in Oregon, lower reductions in landed catch were taken for these species relative to others to stay within overfished species. In California, black rockfish is an important target strategy in the area between 42° and 40°10' N lat and cabezon is an important target strategy statewide; therefore higher landings were maintained for these species relative to others while staying within overfished species impacts.

To facilitate modeling of target species, the GMT assumed two catch sharing relationships for yelloweye rockfish - 50:50 (OR:CA) and 55:45 (OR:CA). The rationale for these two options is described in Appendix A, Description of Catch Projection Models.

Under this alternative, two sub-options (a and b) are provided to show the tradeoffs between more restrictive depth restrictions and higher reductions in landed catch and thus total mortality (Table C-81 and Table C-82). In Oregon, overfished species impacts are modeled assuming a 20 fm depth restriction (option a - Figure C-28) and a 30 fm depth restriction (option b - Figure C-29). In California, overfished species impacts are modeled assuming a 20 fm depth restriction statewide (option a - Figure C-28) and a 20 fm depth restriction between 42° and 40°10' N lat only (option b - Figure C-29). Although the 20 fm depth restriction provided little yelloweye savings in Oregon, it provided greater savings in California since a greater proportion of catch comes from the deeper depths.

Under Alternative 3, option 1, the nearshore fishery is modeled assuming a 50:50 (OR:CA) catch sharing of yelloweye rockfish. Reductions to landed catch under this alternative are taken from average landings of 2007-2009 for Oregon and 2006-2008 for California (Table C-25).

North of 42° N. latitude – under option 1a, a 20 fm depth restriction would be maintained from 42° N. latitude to 43° N. latitude and a 30 fm line would remain north of 43° N. latitude. Reductions to landed catch north of 42° N. latitude would be as follows: 38 percent for black rockfish and greenling, 49 percent remaining species. Under option 1b, a 30 fm depth restriction would be implemented. More severe reductions to landed catch would be required because yelloweye bycatch rates would increase. Reductions would therefore be 47 percent for black rockfish and greenling, 58 percent other species.

South of 42° N. latitude – under option 1a, a 20 fm depth restriction would be implemented statewide. No reductions to landed catch would be necessary due to the savings afforded by the 20 fm depth restriction. Landings for black rockfish would be increased between 42° N. latitude and 40°10'N. latitude. Landings for cabezon would be increased to reflect the higher ACL available as a result of the new assessment. Under option 1b, a 20 fm depth restriction would remain in effect between 42° N. latitude and 40°10' N. latitude only. A 25 percent reduction in landed catch would be necessary for some species except cabezon, which would remain at the maximum allowable amount under the higher ACL.

Under Alternative 3, option 2, the nearshore fishery is modeled assuming a 55:45 (OR:CA) catch sharing of yelloweye rockfish. Reductions to landed catch under this alternative are taken from average landings of 2007-2009 for Oregon and 2006-2008 for California (Table C-25).

North of 42° N. latitude – under option 2a, a 20 fm depth restriction would be maintained from 42° N. latitude to 43° N. latitude. Reductions to landed catch would be as follows: 33 percent for black rockfish and greenling, 44 percent remaining species. Under option 2b, a 30 fm depth restriction would be implemented. Reductions to landed catch would be as follows: 43 percent for black rockfish and greenling, 54 percent other species.

South of 42° N lat – under option 2a, a 20 fm depth restriction would be implemented statewide. No reductions to landed catch would be necessary due to the savings afforded by the 20 fm depth restriction. Landings for black rockfish would be increased between 42° N. latitude and 40°10'N. latitude. Landings for cabezon would be increased to reflect the higher ACL available as a result of the new assessment. Under option 2b, a 20 fm depth restriction would remain in effect between 42° N. latitude and 40°10' N. latitude only. A 25 percent reduction in landed catch would be necessary for some species except cabezon, which would remain at the maximum allowable amount under the higher ACL.

Projected overfished species impacts under this alternative are summarized by area and option in Table C-84 and Table C-85.

Table C-82. Alternative 3: Nearshore fishery projected total catch by area and option for 2011.

Area	Option 1a	Option 1b	Option 2a	Option 2b
Grand Total	**419**	**371**	**431**	**380**
Black rockfish	144	133	150	138
Blue rockfish	22	16	22	16
Cabezon	83	81	84	82
Deeper nearshore RF	29	22	29	22
Kelp greenling	13	12	14	12
Lingcod	62	57	64	59
Other minor RF	15	12	16	13
Shallow nearshore RF	51	38	51	38
North of 42° N. lat.	**126**	**106**	**137**	**115**
Black rockfish	68	58	74	63
Blue rockfish	2	1	2	1
Cabezon	13	11	14	12
Kelp greenling	12	11	13	11
Lingcod	26	21	28	23
Other minor nearshore rockfish	5	4	6	5
42° - 40°10' N. lat.	**118**	**113**	**118**	**113**
Black rockfish	73	73	73	73
Blue rockfish	13	10	13	10
Cabezon	7	7	7	7
Kelp greenling	0	0	0	0
Lingcod	15	15	15	15
Other minor nearshore rockfish	10	8	10	8
South of 40°10' N. lat.	**175**	**152**	**176**	**152**
Black rockfish	3	2	3	2
Blue rockfish	7	5	7	5
Cabezon	63	63	63	63
Deeper nearshore rockfish	29	22	29	22
Kelp greenling	1	1	1	1
Lingcod	21	21	21	21
Shallow nearshore rockfish	51	38	51	38

Table C-83. Alternative 3: Nearshore fishery projected total catch by area and option for 2012.

Area	Option 1a	Option 1b	Option 2a	Option 2b
Grand Total	**476**	**371**	**476**	**380**
Black rockfish	201	130	207	135
Blue rockfish	22	16	15	16
Cabezon	83	81	84	82
Deeper nearshore RF	29	23	29	23
Kelp greenling	13	12	14	12
Lingcod	62	57	64	59
Other minor RF	15	11	11	12
Shallow nearshore RF	51	41	51	41
North of 42° N. lat.	**126**	**106**	**137**	**115**
Black rockfish	68	58	74	63
Blue rockfish	2	1	2	1
Cabezon	13	11	14	12
Kelp greenling	12	11	13	11
Lingcod	26	21	28	23
Other minor nearshore rockfish	5	4	6	5
42° - 40°10' N. lat.	**175**	**108**	**164**	**108**
Black rockfish	130	70	130	70
Blue rockfish	13	9	7	9
Cabezon	7	7	7	7
Kelp greenling	0	0	0	0
Lingcod	15	15	15	15
Other minor nearshore rockfish	10	7	5	7
South of 40°10' N. lat.	**175**	**157**	**176**	**157**
Black rockfish	3	2	3	2
Blue rockfish	7	6	7	6
Cabezon	63	63	63	63
Deeper nearshore rockfish	29	23	29	23
Kelp greenling	1	1	1	1
Lingcod	21	21	21	21
Shallow nearshore rockfish	51	41	51	41

Shoreward RCA Boundary	South 34°27’	34°27’- 40° 10'	40°10' - 42°	42° - Col/Eur 43°	Col/Eur 43° - 46°16’	North of 46°16’
Shore						
20 fm						
30 fm						
60 fm to seaward RCA						

Figure C-28. Alternative 3: Nearshore shoreward RCA configuration under option 1a and 2a, the higher landings more restrictive RCA option. Grey shading indicates areas closed to fishing.

Shoreward RCA Boundary	South 34°27’	34°27’- 40° 10'	40°10' - 42°	42° - Col/Eur 43°	Col/Eur 43° - 46°16’	North of 46°16’
Shore						
20 fm						
30 fm						
60 fm to seaward RCA						

Figure C-29. Alternative 3: Nearshore shoreward RCA configuration under option 1b and 2b, the lower landings less restrictive RCA option. Grey shading indicates areas closed to fishing.

Table C-84. Alternative 3. Nearshore overfished species bycatch projections under option 1 and 2 RCA structures for 2012.

Species	Area	Option 1a	Option 1b	Option 2a	Option 2b
Bocaccio		**0.0**	**0.3**	**0.0**	**0.3**
	OR: North of 42	0.0	0.0	0.0	0.0
	CA: 42° - 40°10	0.0	0.0	0.0	0.0
	CA: South of 40°10	0.0	0.3	0.0	0.3
Canary		**2.0**	**2.3**	**2.0**	**2.4**
	OR: North of 42	0.5	0.4	0.5	0.5
	CA: 42° - 40°10	0.7	0.7	0.7	0.7
	CA: South of 40°10	0.8	1.1	0.8	1.1
Widow		**0.2**	**0.2**	**0.2**	**0.2**
	OR: North of 42	0.0	0.0	0.0	0.0
	CA: 42° - 40°10	0.2	0.2	0.2	0.2
	CA: South of 40°10	0.0	0.0	0.0	0.0
Yelloweye		**0.7**	**0.8**	**0.8**	**0.8**
	OR: North of 42	0.5	0.5	0.5	0.5
	CA: 42° - 40°10	0.2	0.2	0.2	0.2
	CA: South of 40°10	0.0	0.1	0.0	0.1

Table C-85. Alternative 3. Nearshore overfished species bycatch projections under option 1 and 2 RCA structures for 2012.

Species	Area	Option 1a	Option 1b	Option 2a	Option 2b
Bocaccio		**0.0**	**0.3**	**0.0**	**0.3**
	OR: North of 42	0.0	0.0	0.0	0.0
	CA: 42° - 40°10	0.0	0.0	0.0	0.0
	CA: South of 40°10	0.0	0.3	0.0	0.3
Canary		**2.3**	**2.3**	**2.3**	**2.3**
	OR: North of 42	0.5	0.4	0.5	0.5
	CA: 42° - 40°10	1.1	0.7	1.0	0.7
	CA: South of 40°10	0.8	1.2	0.8	1.2
Widow		**0.3**	**0.2**	**0.3**	**0.2**
	OR: North of 42	0.0	0.0	0.0	0.0
	CA: 42° - 40°10	0.3	0.2	0.3	0.2
	CA: South of 40°10	0.0	0.0	0.0	0.0
Yelloweye		**0.8**	**0.8**	**0.9**	**0.8**
	OR: North of 42	0.5	0.5	0.5	0.5
	CA: 42° - 40°10	0.3	0.2	0.3	0.2
	CA: South of 40°10	0.0	0.1	0.0	0.1

C.5.5 Washington Recreational

Washington groundfish fishery management measures under Alternative 3 are the same as under Alternative 2 and the Final Preferred Alternative.

Groundfish Seasons and Bag Limits

Under Alternative 3, the Washington recreational fishery would be open year-round except for lingcod. The aggregate groundfish bag limit would be reduced from 15 to 12 fish per angler per day. The aggregate groundfish bag limit would continue to include sub limits for rockfish (10 per angler per day) and lingcod (2 per angler per day) but a new sub limit of 2 cabezon per angler per day would be added for 2011-2012.

Lingcod Seasons and Size Limits

Under Alternative 3, the following lingcod seasons and size limits would apply in 2011 and 2012:

- Marine Areas 1-3 (from the Oregon/Washington border at 46º16' N. latitude north to Cape Alava at 48º10' N. latitude): open from March 12 through October 15 in 2011 and March 17 through October 13 in 2012.
- Marine Area 4 (Cape Alava to the US/Canadian border): open from April 16 to October 15 in 2011 and April 16 to October 13 in 2012.
- The lingcod minimum size limit during the open lingcod season would be 22 inches in Marine Areas 1-3 and 24 inches in Marine Area 4.

Area Restrictions

The Washington recreational groundfish and Pacific halibut fisheries would be prohibited from fishing for, retention or possession of groundfish and halibut in the C-shaped yelloweye rockfish conservation area in the north coast and South Coast and Westport YRCAs in the south coast as they were in the 2009 and 2010 seasons.

Table C-86. Alternative 3. Washington recreational groundfish season for 2011-2012.

Marine Area	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
3 & 4 (N. Coast)	Open all depths					Open <20 fm June 1-Sep 30 a/				Open all depths		
2 (S. Coast)	Open all depths		Open <30 fm Mar 15 - June 15 b/, c/, d				Open all depths except lingcod prohibited on Fri. and Sat. >30 fm e/		Open all depths			
1 (Col. R.)	Open all depths				Open all depths f/					Open all depths		

a/ Groundfish retention allowed >20 fm on days when Pacific halibut is open.
b/ Retention of sablefish and Pacific cod allowed seaward of 30 fm from May 1- June 15.
c/ Retention of rockfish allowed seaward of 30 fm.
d/ Retention of lingcod allowed seaward of 30 fm on days that the primary halibut season is open.
e/ Retention of lingcod prohibited >30 fm, south of 46°58 on Fri. and Sat. from July 1 – August 31.
f/ Retention of groundfish, except sablefish and Pacific cod, prohibited with Pacific halibut on board.

North Coast (Marine Areas 3 and 4)

Prohibit the retention of bottomfish seaward of a line approximating 20 fathoms from June 1-September 30, except on days that halibut fishing is open.

South Coast (Marine Area 2)

Groundfish retention, except rockfish would be prohibited seaward of 30 fathoms from March 15 through June 15. Sablefish and Pacific cod retention would be allowed in this area from May 1 through June 15. On days that the primary halibut season is open, lingcod may be retained throughout Marine Area 2. Retention of lingcod would be prohibited south of 46 deg. 58’ and seaward of 30 fathoms on Fridays and Saturdays from July 1 through August 31. Fishing for, retention and possession of groundfish would be prohibited at all times in the South Coast YRCA and Westport Offshore YRCA.

Columbia River (Marine Area 1)

Prohibit the retention of groundfish, except sablefish and Pacific cod, with halibut onboard from May 1 through September 30.

Table C-87. Alternative 3. Washington recreational harvest guideline and projected impacts.

Alternative 3- Council Preliminary Preferred Overfished Species ACLs	WA Recreational Harvest Guideline (mt)	Projected Impacts (mt)
Canary	4.9 / 5.2	0.7
Yelloweye	3.3 / 3.3	2.5
Black rockfish	N/A	186.7
Minor nearshore rockfish	N/A	6.1

C.5.6 Oregon Recreational

Depth management is the main tool used for controlling yelloweye rockfish catch in the Oregon recreational fishery. The options range from the most restrictive (Oregon Recreational Option 1, Figure C-30), a year round season with April through September open only shoreward of 40 fathoms to the least restrictive option (Oregon Recreational Option 4, Figure C-30), a year round season with May through August open only shoreward of 40 fathoms. Oregon Recreational Option 1 reflects the No Action alternative and the 2009-10 Oregon recreational groundfish season. Oregon Recreational Options 2-4 reflects the possibility that the Pacific halibut catch limit may be reduced from the 2010 limit. These alternatives are based on the 2010 halibut catch limit (15 percent lower than the 2009 catch limit) and may allow for the retention of groundfish during the all-depth halibut days on the central Oregon coast. Table C-88 details the projected impacts for modeled species under this alternative.

Option	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	Open all depths			Open < 40 fm						Open all depths		
2	Open all depths				Open < 40 fm					Open all depths		
3	Open all depths			Open < 40 fm					Open all depths			
4	Open all depths				Open < 40 fm				Open all depths			

Figure C-30. Oregon recreational groundfish fishery season options under Alternative 3. Option 1 reflects the season structure under the No Action and Final Preferred Alternatives, which is also available under Alternative 3.

Table C-88. Alternative 3. Oregon recreational modeled projected impacts for 2011-2012.

Species	Projected Impacts (mt)			
	Option 1	Option 2	Option 3	Option 4
Canary Rockfish	2.4	2.5	2.5	2.7
Yelloweye Rockfish	2.1	2.3	2.3	2.5
Black Rockfish	330.5	328.8	328.4	326.7
Blue Rockfish	20.4	20.3	20.1	20
Other Nearshore Rockfish a/	12.7	12.6	12.6	12.5
Greenling (Kelp and Rock)	4.7	4.6	4.6	4.5

a/ Other Nearshore Rockfish includes: brown, china, copper, grass, and quillback rockfish

Under Alternative 3, the Oregon recreational groundfish fishery would able to operate a year round fishery with liberalized seasonal depth restrictions (Options 2-4) relative to the No Action alternative (Option 1). Options 2 and 3 would also be possible if groundfish retention during the all-depth Pacific halibut fishery was allowed.

2011-12 Bag and Size Limit Alternatives

Status quo bag limits for marine fish, lingcod, and flatfish would remain in place under Alternative 1, except for cabezon. These daily-bag-limits provide the flexibility to make necessary adjustments through the yearly state process, reflecting the progression of the current year's fishery. The state process will likely start off each season with reduced marine and lingcod daily bag limits and may increase or further reduce inseason depending on the progression of the fishery relative to the impact on species with harvest targets/guidelines and state landing caps. A reduction in cabezon impacts would necessary and can be accomplished with a seasonal sub-bag limit of one fish. The sub-bag limit coincides with the months that the groundfish fishery is restricted to inside of 40 fathoms. Other than this alternative, all other bag and size limits are the same as specified in 2009-10 and described under the No Action Alternative, including no retention of yelloweye or canary rockfish at any time or depth.

The shorebased fishery would be managed for a year round season as yelloweye rockfish are not impacted. Also, fishing for, take, retention and possession of sanddabs and "other flatfishes", excluding Pacific halibut would be legal year round and open shoreward of 40 fathoms during any period the groundfish fishery has any depth restrictions. The flatfish fishery would not have any depth restrictions when the groundfish fishery has no depth restrictions (i.e., 40, 30, 25 and 20 fm lines).

2011-12 Area Restriction Alternatives

No changes to the status quo boundary of the Stonewall Bank YRCA would necessary.

C.5.7 California Recreational

Season and depth restriction diagrams (Figure C-31) as well as corresponding impacts on overfished species (Table C-89) and non-overfished species (Table C-90) under this alternative are provided below. The 20 mt yelloweye rockfish ACL under the preliminary preferred alternative and the corresponding 3.4 mt harvest guideline allow the limited season in the North-Central North of Point Arena Management Area to be sustained as well as allowing a one and a half month increase to the season in the Northern Management Area. This alternative also provides one and a half months of additional fishing opportunities in the North-Central South of Point Arena Management Area and the Monterey and Morro Bay South-Central Management Areas while providing a 0.3 mt buffer between the projected impacts of 3.1 mt and the harvest guideline of 3.4 mt. The reduced catches of Minor Nearshore Rockfish South and blue rockfish in the 2008 and 2009 seasons resulted in reduced projected impacts for these species in 2011 and 2012, which will accommodate the one and a half month increases in the fishing season in these three management areas. The preliminary preferred alternative would allow for an additional 5.5 months of fishing season statewide over the No Action Alternative, though the resulting seasons still represent very limited fishing opportunity compared to a full year fishing season.

Under the remaining ACL alternatives, the season would have to be reduced in the North-Central North of Point Arena and in other management areas to prevent yelloweye rockfish impacts from exceeding the lower harvest guideline. Yelloweye rockfish impacts are extremely constraining to the fishery North of Point Arena and reductions in the ACLs from the preliminary preferred alternative of 20 mt would result in additional season length reductions in the North-Central North of Point Arena Management Area. This management area is already severely constrained, with only a three month fishing season at 20 fms. Lower ACL options will also require a reduction in the season length in the Northern or North-Central South of Point Arena Management Areas to remain within the yelloweye rockfish harvest guideline resulting in lost revenue to coastal communities in these areas as well.

Modifying the depth restriction in the CCA from 20 to 30 fms is not projected to result in increased catch of cowcod and can be accommodated under the 0.3 mt status quo catch sharing, but the 2008 Total Mortality Rate catch sharing would provide a excessive buffer between the projected impact of 0.17 mt and the 1.9 mt Harvest Guideline under the preliminary preferred alternative in the event of an increase. The 168.3 mt bocaccio ACL would accommodate any potential increase in bocaccio impacts in the recreational fishery from allowing retention of shelf and slope rockfish and a 30 fm depth restriction in the CCA.

The canary rockfish harvest guideline of 22.9 mt under the preliminary preferred alternative will provide a buffer between the projected impacts and variability in the estimated catch of canary rockfish.

In addition, the proposed options under the PPA will accommodate the proposed changes to management measures other than depth and season.

Management Area	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Months
Northern	CLOSED				May 15 - Oct <20 fm								5.5
North-Central North of Pt. Arena	CLOSED				May 15 - Aug 15 <20 fm								3
North-Central South of Pt. Arena	CLOSED					June–Nov < 30 fm							6
South-Central Monterey	CLOSED				May – Dec < 40 fm								8
South-Central Morro Bay	CLOSED				May – Dec < 40 fm								8
Southern	CLOSED		Mar –Dec < 60 fm										10

Figure C-31. Alternative 3. California recreational rockfish, cabezon and greenling season structure for 2011-2012.

Table C-89. Alternative 3. California recreational projected impacts to overfished species for 2011-2012.

Species	2011 HG (mt)	2012 HG (mt)	Projected Impacts (mt)	2011 Percent HG	2012 Percent HG
Yelloweye Rockfish	3.4	3.4	3.1	92%	92%
Bocaccio	161.8	168.9	55.0	34%	33%
Cowcod Option 1	0.3	0.3	0.2	64%	64%
Cowcod Option 2	1.9	1.9	0.2	11%	11%
Canary Rockfish	22.9	24.2	9.1	40%	38%
Widow Rockfish	NA	NA	8.7	NA	NA

Table C-90. Alternative 3. California recreational projected impacts to non-overfished species for 2011-2012. Results in parenthesis reflect impacts from additional changes to management measures other than season and depth.

Species	Projected Impacts
Black Rockfish	168.9
Blue Rockfish	176.7
Cabezon	26.4 (28.9)
California Scorpionfish	61.4 (63.8)
California Sheephead	31.7
Greenlings	11.9
Lingcod	215.1 (263.2)
Minor Nearshore North	5.6
Minor Nearshore South	347.1

Appendix D
DESCRIPTION OF THE INPUT-OUTPUT MODEL FOR PACIFIC COAST FISHERIES (IOPAC)

2011-2012 GROUNDFISH HARVEST SPECIFICATIONS
DRAFT ENVIRONMENTAL IMPACT STATEMENT

Document Version III (Draft)

October, 2009

Prepared by

Jerry Leonard
NOAA Fisheries
Northwest Fisheries Science Center
Seattle, WA
jerry.leonard@noaa.gov

and

Phil Watson
Dept. of Agricultural Economics and Rural Sociology
University of Idaho
Moscow, ID
pwatson@uidaho.edu

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Executive Summary

(July 13, 2010)

The Input-Output model for Pacific Coast Fisheries (IO-PAC) is designed to estimate the gross changes in economic contributions and net economic impacts resulting from policy, environmental, or other changes that affect fishery harvest. This is a brief description of the data used, assumptions made, and construction of the IO-PAC model. Complete details about the model are contained in the report "*Description of the Input-Output Model for Pacific Coast Fisheries*" that was presented at the Scientific and Statistical Committee of the Pacific Fishery Management Council on November 4, 2009.

IO-PAC was built by customizing the IMPLAN regional input-output software to enable its use for commercial fishing. The methodology employed in this model is similar to that used in the Northeast Region Commercial Fishing Input-Output Model developed by Steinback and Thunberg (2006). IO-PAC is designed to estimate the economic effects of changes in fishing harvest for various types of vessels and fish species, over multiple geographic areas along the Pacific Coast. The economic effects can be exhibited as a change in total economic output, income, or employment. Estimates can be calculated for the entire West Coast, the states of Washington, Oregon, and California, and 19 port area regions along the coast.

Data used to develop the fishing sectors were obtained from the Pacific Fisheries Information Network (PacFIN) fish ticket data maintained by the Pacific States Marine Fisheries Commission; the Northwest Fisheries Science Center's (NWFSC's) limited entry fixed gear, limited entry trawl and open access cost earnings survey; moorage rates from 19 ports along the West Coast; and collection statistics for the Washington Enhanced Food Fish Tax. Data included in PacFIN includes fish ticket and vessel registration data that is supplied by California Department of Fish and Game (CDFG), Oregon Department of Fish and Wildlife (ODFW), and Washington Department Fish and Wildlife (WDFW). The 2006 PacFIN fish ticket data, when aggregated into vessel classifications and commodity types, comprise the sales estimates that are included in the model. The default IMPLAN 2006 data is used in IO-PAC for the non-fishing economy of the regions such as the agricultural, manufacturing, trade, and service sectors as well as the various institutions in the region such as households and governments. The NWFSC's cost-earning surveys provide the majority of data necessary to construct the production functions in IO-PAC. The cost-earnings surveys were conducted for the limited-entry trawl, limited-entry fixed gear, and open access fleets. Data for 2004 were used from the limited entry surveys, and data for 2005 were used from the open access survey. Because the cost earnings surveys did not collect data on vessel moorage expenditures, moorage expenditures were estimated using 2009 data on moorage rates from 19 ports along the West Coast. Data on Washington Enhanced Food Fish Tax collections in 2006 were obtained from the Washington Department of Revenue and are used to estimate the flow of fish landings received by seafood wholesalers.

IO-PAC covers the groundfish, salmon, crab, HMS, CPS, lobster, and shrimper commercial fisheries on the West Coast. Commercial fishing vessels are classified by type using the 19 sector scheme developed by Radtke and Davis (2000). Vessels produce 32 unique species/gear outputs in the model. Since vessels that harvest groundfish are captured in all three NWFSC cost-earning surveys, the production functions for these vessels are likely more accurate than those in other fisheries. For this reason, IO-PAC is currently only used to estimate the impacts for the commercial groundfish sector.

There are several planned improvements to IO-PAC. The production functions for the non-groundfish fisheries will be improved through expanded cost earnings surveys. The production functions for the groundfish fisheries will be updated with newer cost earnings data. Recreational fisheries will be added. The product flow assumptions in the model will be updated as better data become available. In addition a new version of IMPLAN was very recently released and IO-PAC will be updated to use the new IMPLAN.

I. Introduction

When making decisions, federal fishery managers are required to consider the importance of fishery resources to fishing communities. National Standard 8 of the Magnuson-Stevens Fishery Conservation and Management Act (as amended through January 12, 2007) specifies that such considerations utilize economic and social data based upon the best scientific information available to provide for the sustained participation, and to the extent practicable, minimize adverse economic impacts on fishing communities. Policy changes involving fishery harvest affect individuals and businesses directly involved in the fishing industry. These decisions also affect gas stations that supply fuel to fishing vessels, grocery stores that supply provisions to vessel crew members, heath care providers that service communities in which crew families reside, and even teachers whose salary depends partially on sales and property taxes generated by fishing activity. This paper describes a new model developed by the Northwest Fisheries Science Center (NWFSC) to estimate these effects, and therefore provide information about the effects of fishing on regional economies.

The NWFSC's Input-Output model for Pacific Coast Fisheries (IO-PAC) is designed to estimate the gross changes in economic contributions and net economic impacts resulting from policy, environmental, or other changes that affect fishery harvest. The IO-PAC was built by customizing the IMPLAN regional input-output software to enable its use for commercial fishing. The methodology employed in developing this model is similar to that used in the Northeast Fisheries Science Center's Northeast Region Commercial Fishing Input-Output Model (Steinback and Thunberg, 2006).

The IO-PAC model is designed to estimate the economic effects of changes in fishing harvest for many types of vessels and fish species over multiple geographic areas along the Pacific Coast. Commercial fishing vessels are classified by type using the 19 sector scheme developed by Radtke and Davis (2000). Vessels produce 32 unique species/gear outputs in the model. Estimates can be calculated for the entire West Coast, the states of Washington, Oregon, and California, and the ports displayed in Figure D-1.C.

Data used to customize IMPLAN were derived from the Pacific Fisheries Information Network (PacFIN) fish ticket data maintained by the Pacific States Marine Fisheries Commission; the NWFSC's limited entry fixed gear, limited entry trawl and open access surveys; and information obtained from the California Department of Fish and Game, the Oregon Department of Fish and Wildlife, and the Washington Department of Fish and Wildlife. A critical component of IO-PAC is the estimation of unique production functions for each of the 19 vessel classifications included in the model. The NWFSC's cost-earnings surveys were the primary source of information used to estimate these production functions. Because the surveys primarily targeted vessels that had a minimum threshold of groundfish or troll caught salmon landings, the model is likely most accurate for the groundfish-related contribution and impact estimates. However, the surveys provided enough cost-earnings data to build unique production functions for some vessel classification sectors that are not designated as groundfish related. Other vessel classification sectors included in the model did not have sufficient data to estimate unique production functions. For these sectors, a weighted average production function was used. The NWFSC plans to survey these vessel categories in the near future, and the data will be incorporated into the model as it becomes available. In addition, the NWFSC plans to add additional sector (e.g., private recreational and charter recreational) in future versions of the model.

This paper provides an overview of the IO-PAC model's design, explains its operation, and displays the outputs generated by its use. The paper proceeds as follows. Section II, Elements of Input-Output Analysis, summarizes both the procedures used in input-output modeling and the required considerations for its use in a fishery management setting. Section III, Background Data, presents the data used in building the customized sectors contained in the model. Section IV, IO-PAC Model, describes the model in detail. Section V, Model Construction, discusses the model's incorporation into the default IMPLAN system. Section VI, Impact Estimation, explains the application of the model to generate impact assessments and offers two hypothetical examples. The last section, Discussion, reviews the IO-PAC model, discusses its limitations, and makes suggestions for further improvement.

II. Elements of Input-Output Analysis

When a business or firm expands or contracts, there is a ripple effect through the economy. For example, when fishing vessels increase their landings, they purchase more fuel and increase payments to labor. This new economic activity also generates activity in related businesses that sell to the fishing fleet. The related businesses then buy more inputs and hire more labor. Some of the additional labor income is subsequently spent on goods and services in the community. The change in one industry, therefore, is multiplied throughout the economy following its linkages to other businesses and payments to workers. To capture these effects, it is necessary to use an economic model that contains these linkages. Input-output analysis is a method of modeling relationships among businesses, and between businesses and consumers.

The short discussion of Input-Output (IO) models that follows is by no means exhaustive. More detailed descriptions of Input-Output analysis can be found in Miller and Blair (1985) and Hewings (1985). A survey of IO studies is found in Richardson (1985).

II.A Input-Output Fundamentals

The underpinning of input-output analysis is a double-entry accounting framework that tracks the flow of dollars in the economy. Expenditures and receipts of businesses and households are tracked. The sum of all expenditures made by businesses and households in the economy must equal the sum of all income received. These transactions are expressed in matrix form, and input-output multipliers are derived through the manipulation of this matrix as shown below.

The multipliers in input-output models describe the "backward" linkages among industries. As some exogenous economic event affects an industry under investigation, economic activity is then affected in input supply industries and from changes in personal income. Any economic changes found downstream, "stemming from" effects, must be exogenously incorporated into the model (Watson et. al, 2008).

The multipliers in input-output models are separated into three types of effects.

Direct effects refer to the production changes associated with a variation in final demand for the good itself. It is the initial activity that occurs in the economy, which is exogenous to the model.

Indirect effects refer to secondary activity caused by changing input needs of directly affected industries (e.g., additional input purchases to produce additional output).

Induced effects are caused by changes in household spending due to additional employment generated by direct and indirect effects.

The fundamental equation of input-output analysis is central to understanding multipliers:

$$X = (I\text{-}A)^{-1}Y$$

where X is a J x 1 vector of industry outputs, or sales, for each of J sectors, $(I\text{-}A)^{-1}$ is collectively referred to as the "Leontief inverse", with I being an JxJ identity matrix, while Y is a J x 1 vector of final demands for all J sectors' production. A is the matrix of technical coefficients, which describes the flow of inputs from sector i to sector j. For a simple two sector economy, the A matrix of inter-industry linkages would look as follows:

$$A = \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix}$$

with a_{11} showing purchases by Industry 1 from firms in the same sector, while a_{21} represents inputs that Industry 1 buys from Industry 2. The other elements are defined accordingly. (These values are usually reported per dollar of sales. Thus, a_{21}= 0.15 means that for each dollar of sales by Sector 1, Sector 1 would purchase $0.15 worth of inputs from Sector 2). The Leontief inverse of the A matrix is represented as:

$$(I\text{-}A)^{-1} = \begin{bmatrix} \alpha_{11} & \alpha_{12} \\ \alpha_{21} & \alpha_{22} \end{bmatrix}$$

The elements in the Leontief inverse matrix represent the total direct and indirect changes in output (measured in dollars) within the row industry resulting from an additional dollar's worth of final demand initiated in the column industry. To calculate an output multiplier for a region, a change in final demand for a given sector is hypothesized, which can come from added spending by consumers, exporters, investors or government. (For simplicity, we calculate the total effect of a one-dollar change in final demand for a given industry.) This is calculated as follows:

$$\Delta X_1 = (I\text{-}A)^{-1}\Delta Y_{1j} = \begin{bmatrix} \alpha_{11} \\ \alpha_{21} \end{bmatrix}$$

where ΔX_1 is a vector of changes in total industry output from a one-dollar change in final demand for sector 1, $(I\text{-}A)^{-1}$ is the Leontief inverse, and ΔY_{1j} is a column vector that contains a 1 in the first row to show the dollar change in final demand for sector 1, and 0 in all other positions. The result is equal to the first column of the Leontief inverse. The direct effect is α_{11}, while indirect effects relate to the off-diagonal elements, which is α_{21} in this case. The total output multiplier then is the sum of all changes in output that result from the increase in final demand for industry j, and is calculated as follows:

$$O_j = \sum_{i=1}^{n} \alpha_{ij}$$

for all j, where O_j is the output multiplier for industry j, which comes from the column sum of the α_{ij} values in the Leontief inverse.

The are two types of multipliers, Type I and Type II, that differ in what parts of the economy are endogenous in the A matrix. For a Type I multiplier, only inter-industry linkages are included, so, as in the example above, only *direct* effects of the change in final demand for industry j and the *indirect* effects on other sectors are included. The effects that arise as employees receive increased income and spend it are not included in the Type I multiplier. Thus, the Type I multiplier is defined as: Type I = (Direct effects + Indirect effects) / Direct effects.

Type II multipliers make household spending and wages endogenous. In this case, the modified A matrix is:

$$\overline{\mathrm{A}} = \left[\begin{array}{cc:c} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ \hdashline a_{31} & a_{32} & a_{33} \end{array}\right]$$

The new third column adds households as an endogenous sector that purchases products and services from other sectors based on their increased wages that are found in the added third row. (a_{33} shows the hiring of laborers directly by households, which might be a variety of personal services).

The additional spending that occurs in the economy due to new household income is called an induced effect. The direct, indirect, and induced effects together yield a "Type II" multiplier. The Type II multiplier is defined as follows: Type II = (Direct effects + Indirect effects + Induced effects) / Direct effects[1].

II.B IO Model Assumptions

There are several key assumptions of IO models. First, IO models are demand driven and assume that the supply of outputs is unlimited. As a result, an increase in demand is always met by an increase in supply. Second, IO models assume that commodity and factor prices are fixed regardless of any change in demand. Due to these assumptions, IO models tend to overestimate the effects of policy changes (Miller and Blair, 1985).   Third, IO models assume zero substitution elasticities in production and consumption. For producers, the technical coefficients (a_{ij}) are fixed. For consumers, the proportion of their total expenditures made on different commodities is fixed. As a result of the fixed factor ratios, IO models are less appropriate for studying economies that are facing factor constraints or changes in production technology (Seung and Waters, 2005).

II.C Study Area Considerations

Selection of the appropriate study area is an important dimension in IO analysis. Generally, larger geographic areas have larger multipliers in an IO model. The level of economic interdependence among entities in lager geographic areas is greater than that in smaller geographic areas. Smaller geographic areas tend to have lower economic diversity and must import a larger portion of goods and services (Miller and Blair, 1985). Consequently, businesses in larger geographic areas likely derive a higher proportion of their inputs from within the area than businesses in smaller geographic areas. Likewise, households in larger geographic areas likely source a higher share of consumed goods and services from within the area than households in smaller geographic areas. Thus, in IO models, the greater the interdependence among entities, the larger the resulting multipliers will be.

While choosing a larger study area will likely produce larger multipliers, it also may reduce the relative importance of a particular industry.   The larger the study area the more likely the effects of a change in

[1] Other multipliers, such as SAM multipliers, endogenize additional sectors, such as government expenditure or other institutions.

economic activity will be masked by other activity that is occurring within the area. The relative importance of a particular industry will be diluted (Watson et. al, 2007).

The appropriate size of the analysis region depends heavily on the purpose of the analysis and the particular policy issue that is being addressed. For example, if the question being addressed is how the output from the fishing industry in a small port in Oregon ripples through the Oregon economy, then a state-wide study area is appropriate. However, if the question is how a change in fishing regulations will affect the income of inhabitants of the same small port, then a smaller port-level study area is more appropriate.

II.D Trade Flow Considerations

Location quotients, supply-demand pooling and regional purchase coefficients (RPCs) are the varieties of methods used to estimate trade flows into and out of a study region. The IO-PAC model uses an RPC approach to estimate regional trade flows. Using RPCs is the approach generally suggested by makers of IMPLAN[2]. The RPCs used in the model are generated by IMPLAN software through a series of econometric equations. An RPC for a given commodity indicates the proportion of local demand for the commodity that is met by local production.

II.E Input Output Models in a Fishery Context

There are numerous studies that examine the economic contribution and impacts of recreational and commercial fisheries. Seung and Waters (2006) provided a detailed overview of the use of input output models in a fisheries context.

Steinback (2004) points out an important consideration that input-output models must address before they are appropriate for use in a fishery management context. Input-output models are designed to estimate the backward linked effects of an exogenous change in final demand. However, fishery managers do not control the sale of fishery resources in final markets such as grocery stores, restaurants, etc. Rather, fishery managers control harvest of fishery resources. Management is imposed at the point of production. If the standard input-output framework is not modified to account for this, and changes in production are entered as if they were changes in final demand, the estimates of economic impacts will be overstated.

There are several approaches to handling production changes rather than final demand changes in an input-output framework. The approach in the IO-PAC model is the same as that used by Steinback and Thunberg (2006). The regional purchase coefficients (RPCs) of the directly impacted sectors are set to zero, and then production changes are modeled as if they originated from final demand. This approach permits the utilization of the ready-made input output system IMPLAN. The directly impacted sectors that are added to IMPLAN are all given an RPC of 0 except for the bait supplying sector. The bait sector supplies the commodity of bait to the fish harvesters that are added to the model. No other sector purchases bait in the model. As a result, not setting the RPC to 0 for the bait supplying sector avoids the feedback effect that necessitates the RPCs be set to 0 as discussed in Steinback (2004). By setting the RPCs to 1 for the bait sector, we are assuming that harvesters will purchase 100% of bait from suppliers within the study area. The wholesale seafood trade sector that is added to the model is also assigned an RPC of 0. The default fish processing sector (IMPLAN sector 71) is also assigned an RPC of 0 because it will be modeled as a directly impacted sector in the same manner as the harvesting sectors. The default

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[2] See the *IMPLAN Professional Software, Analysis, and Data Guide* available at www.implan.com.

fishing sector in IMPLAN (Sector 16) is also assigned an RPC of 0 to avoid double counting of harvester level impacts when impacts on the seafood processing sector are entered.

II.F IMPLAN

IMPLAN (Impact Analysis for PLANning) is a commercially available data collection and regional modeling system that was developed by the USDA Forest Service with cooperation of the Federal Emergency Management Agency and the USDI Bureau of Land Management for use in land and resource management planning. It has been in use since 1979. The IMPLAN system has appeal due to its widespread use and availability of support literature. Integrating gear and species specific commercial fishing data into the IMPLAN framework permits anyone with knowledge of how to use IMPLAN to assess the impact of fishery specific management actions. Additionally, by using IMPLAN, the interrelationships among the newly created fishing related sectors and other industrial sectors are explicitly detailed.

III. Data

Data for the model come from three primary sources: 1) IMPLAN, 2) PacFIN, and 3) the NWFSC's cost-earnings surveys. In addition to these primary data sources, data on landing tax rates and moorage rates are described at the end of the section.

III.A IMPLAN Data

IMPLAN collects, organizes, and econometrically estimates the data that is necessary to construct regional economic impact models.[3] These data are collectively referred to as the region's "social accounts" and consist of purchases of inputs, labor, and capital by the respective sectors of the economy, the output production of each sector, household demands in the region, sources of income of households in the region, taxes paid and government spending in the region, and the regions imports and exports.

IMPLAN constructs county level social accounts based on a variety of data sources including the U.S. Census Bureau, U.S. Bureau of Economic Analysis (BEA), and ES-202 employment data. The procedure that IMPLAN uses to generate the social accounts consists of two main components. The first is the national make and use transaction tables, and the second is the county specific data on industry output, employment, value added, and final demands. Final demands, in turn, consist of household, government, and export purchases. The national make and use transaction tables are based on the 1997 Benchmark Input-Output study conducted by the BEA.

An absorption table is then created by dividing each of the elements of the use matrix by the respective industry's total output. This yields the percent of each dollar of output spent on intermediate inputs from other sectors. A column, then, represents the industry's production function or the proportion of intermediate inputs used to produce one dollar of output.

The actual industry mix, or the size of each industry in a region, is specific to the study area. IMPLAN uses county specific ES-202 data, county business patterns data from the U.S. Census Bureau, Bureau of Labor Statistics, and BEA's Regional Economic Information System (REIS) data to estimate employment for every sector in the region. Value-added components such as employee compensation, proprietor's income, and other property income are derived from National Income and Product Accounts data from the

[3] See the *IMPLAN Professional Software, Analysis, and Data Guide* available at www.implan.com.

BEA. Estimates of total industry output primarily come from the BEA's output series and from their Annual Survey of Manufactures.

The default IMPLAN 2006 data is used to represent the non-fishing economy of the regions such as the agricultural, manufacturing, trade, and service sectors as well as the various institutions in the region such as household and governments.

III.B PacFIN Data

IO-PAC utilizes 2006 fish ticket data from the Pacific Fisheries Information Network (PacFIN).[4] Data included in PacFIN includes fish ticket and vessel registration data that is supplied by California Department of Fish and Game (CDFG), Oregon Department of Fish and Wildlife (ODFW), and Washington Department Fish and Wildlife (WDFW). Each time a commercial fishing vessel lands fish along the West Coast, it is documented on a fish ticket. For all commercial landings sold to wholesale fish dealers or processors, the fish buyers are required to fill out a fish ticket that describes the species, weight, and total price paid for the fish purchased. It also contains information on the vessel ID of the seller, the gear type used to catch the fish, the date of the transaction, and the port where the fish is landed. If a commercial fishing harvester sells directly to consumers, the harvester is responsible for recording the receipts, filling out fish tickets and remitting the information to the appropriate state agency. Vessel registration information supplied by the states includes some physical characteristics such as length and engine horsepower. For this project, personnel at PacFIN supplied data on pounds landed and revenue received by species, gear type, and port for each vessel that landed more than $1,000 in 2006.

These data, when aggregated into vessel classifications and commodity types, comprise the sales estimates that are included in the model. The vessel classification scheme and commodity types will be discussed further in Section IV. PacFIN contains shoreside landings along the West Coast. There are no landings data for two of the vessel classifications: Alaska Fisheries Vessels and Mothership/Catcher Processors. As a result, the current version of IO-PAC cannot be used for estimating impacts resulting from harvest changes in these sectors.

In addition to landings data, PacFIN data contains vessel physical characteristics and permit information. The physical characteristics that come from vessel registrations include length and engine horsepower. Special endorsements and permit information such as federal limited entry trawl and limited entry fixed gear are also included. The length of the vessel information will be used in the calculation of moorage rates.

There is a PacFIN vessel identification issue that affects some estimates in IO-PAC. Fish ticket data are linked to individual vessels through an identification variable called Derived ID in PacFIN. Derived ID is generated primarily through the use of coast guard and state agency registration numbers. There are some instances when a fish ticket contains a vessel identifier that does not have a valid coast guard or state registration ID. These records are assigned a Derived ID that begins with "ZZZ." In 2006, nine percent of landings by value on the West Coast were attributable to fish tickets with a ZZZ identifier. This percentage is substantially higher when narrowing the scope to WA alone. Fish tickets with a Derived ID beginning with ZZZ are almost entirely tribal fishing vessels in WA. In 2006 91% of fish tickets with ZZZ IDs were from Indian tribal vessels in WA[5].

In a given year the ZZZ identifiers are intended to be unique to an individual vessel. Every fish ticket with the same vessel identification number that is not a valid Coast Guard or state registration number is

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[4] See http://pacfin.psmfc.org/index.php.
[5] Based on PacFIN data query.

given a single consistent ZZZ ID. However, uniquely identifying an individual vessel is problematic for the tribal vessels. Each fish ticket from a tribal vessel in WA has a unique tribe identifier in the first two digits of the tribal ID that is remitted to PacFIN. Following the first two digits, some tribal IDs have a number for an individual member of the tribe. Some tribe IDs do not include a number for an individual tribe member. When tribe IDs do not include a number for individual tribe member following the first two digits, a single ZZZ value within PacFIN can represent more than one vessel. Even in cases when the tribe IDs do include a number for individual tribe members, a single ZZZ ID in PacFIN is sometimes attributable to more than one vessel because an individual fisherman within a tribe will sometimes operate more than one vessel[6].

IO-PAC does not exclude the fish ticket data from vessels with ZZZ IDs. Vessels with ZZZ IDs are important for estimates of commercial fishing revenue, especially in WA. In instances where a unique ZZZ identifier represents more than one vessel, vessel classification as displayed in Table D-1 is affected, however, in IO-PAC it is assumed that misclassifying revenue by type of vessel is less problematic than excluding the revenue altogether. Additionally, failure to uniquely identify vessels results in a different approach to employment estimate in WA, which will be discussed in greater detail in the Section IV.H.

III.C NWFSC Cost-Earnings Survey Data

The NWFSC's cost-earning surveys provide the data necessary to construct the production functions in IO-PAC. There are three cost-earning surveys that were used in developing the production functions: the limited entry trawl survey, the limited entry fixed gear survey, and the open access survey. The costs categories from the surveys that were used in the model include fuel and oil, food and provisions, ice, bait, repairs/maintenance/improvements, insurance, leased permits, purchased permits, interest, crew expense, captain expense, length of vessel, and market value of vessel. The responses to the cost-earnings surveys can be easily matched to vessel landings by species, gear type, physical characteristics, and permit information contained in PacFIN. A short description of the surveys follows. For a more detailed description of the survey programs and summary statistics used in constructing the production functions see Lian (2009)[7].

The survey population for the limited entry trawl survey consisted of all vessels with a limited entry trawl permit and at least $5,000 in landings in 2004. The survey collected information for 2003 and 2004 through in-person interviews. There were 91 completed responses out of a total of 143 vessels for a response rate of 64%. Using the vessel classification scheme Radtke and Davis (2000) that is shown in Table D-1, Large Groundfish Trawler was the principle classification of respondents, but there were also a sizeable number of responses among vessels classified as Whiting and Crabber. There were five responses from vessels classified as Small Groundfish Trawler and a few responses classified as Alaska Fisheries Vessel, Shrimper, and Other.

The survey population for the limited entry fixed-gear survey consisted of all vessels with a limited entry fixed gear permit and at least $5,000 in landings in 2004. This survey also collected information for 2003 and 2004, and used in-person interviews. There were 61 completed responses out of a total of 121 vessels for a response rate of 51%. Sablefish fixed gear was the principle classification of respondents, but there were also a sizeable number of responses from vessels classified as Crabber, and Other Groundfish Fixed Gear.

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[6] Personal correspondence with Greg Konkel of WDFW July 14, 2009.
[7] See Tables 4, 5, 6, 10, 11 and 12 in *West Coast Limited Entry Earnings Survey Protocol and Results for 2004* and Tables 3, 4, 5, 6 in *West Coast Open Access Groundfish and Salmon Troller Survey Protocol and Result for 2005*.

The survey population for the open access survey consisted of all active commercial fishing vessels that (1) landed at least $2,500 of salmon and groundfish at West Coast ports during 2005 and 2006, (2) had at least one trip on which groundfish and salmon accounted for a majority of revenue from landings, and (3) did not hold a limited entry permit. All survey data was collected by either using in-person or telephone interviews. There were 532 vessels that met the above three requirements for which a telephone number was obtainable. The survey collected information for years 2005 and 2006. There were 168 completed responses out of a total of 532 vessels for an overall response rate of 32%. There were responses from vessels classified as Crabber, Other < $15,000, Other > $15,000, Other Groundfish Fixed Gear, and Salmon Trollers.

The production functions in IO-PAC rely on only the 2004 data from the limited entry trawl and fixed gear surveys and only on the 2005 data from the open access survey. The survey results differ considerably depending on which year is chosen for a couple of reasons.

In the limited entry trawl sector, differences between 2003 and 2004 reflect the implementation of the groundfish fishing capacity reduction program Congress enacted in 2003. The National Marine Fisheries Service (NMFS) invited program bids in July 2003. Bids were accepted during August 2003. One hundred eight groundfish permit owners submitted bids and the NMFS accepted bids involving 92 vessels. On December 4, 2003, accepted bidders were required to permanently stop all further fishing with the reduction vessels and permits (Federal Register, 2003).

The reduction in capacity had a sizeable impact on average vessel costs and revenue. For the purposes of IO-PAC it is assumed that the survey results from 2004 are more representative of current operations and are therefore used to construct the production functions.

Differences in open access survey results between 2005 and 2006 reflect the fishery failure for Pacific salmon. In August,2006 Secretary of Commerce declared a Commercial Fishery Failure for the California and Oregon salmon fisheries, pursuant to section 312 (a) of the Magnuson–Stevens Fishery Conservation and Management Act (Upton, 2008). The Pacific salmon fisheries failure had a sizeable impact on average vessel revenue for some vessel classifications. The change in revenue is relatively the greatest for vessels classified as Sablefish Fixed Gear, Other <$15,000, and Other >$15,000. Because of the salmon failure, 2006 is a major transitional year for open access fishing vessels. A high percentage of vessels classified as Salmon Trollers in 2005 shift into other vessel categories in 2006. It is unknown whether the transitional changes experienced in 2006 will become the new standard. For the purposes of IO-PAC it is assumed that the non-failure year provides better representation of the status quo for average costs and revenues of the open access fleet. Hence, the 2005 results are used to develop the production functions.[8]

III.D Landings Taxes and Moorage Rates

The voluntary cost-earnings surveys listed above were not designed to capture all possible cost sources that commercial fishing vessels encounter. Attempting to capture all potential costs would have resulted in more lengthy questionnaires and possibly lower response rates. To improve response rates and data accuracy, some cost categories were not captured. Two such categories are moorage and landings taxes. As a result, these cost categories were estimated with data obtained from other sources.

Commercial fishing moorage rates for various length vessels were obtained from numerous ports along the West Coast. Annual moorage rates for 2009 are displayed in Table D-2. Ports often handle moorage

[8] The cost-earnings survey for the open access fleet will be fielded again in 2010 and collected data for years 2008 and 2009. This assumption will be analyzed when 2008 and 2009 data become available.

costs differently. Some charge a straight cost per foot, while others charge an increasing cost per foot as the vessel surpasses specified thresholds. Some ports charge by the length of slip, regardless of the length of the vessel. If available information indicated that the maximum slip length in a port is smaller than a given vessel size, no rate is reported in the table. An average for each vessel size in each state is developed by calculating the mean for all non-blank ports in the table. The West Coast average is the mean of the CA, OR, and WA averages. Because CA has noticeably more harbors listed, taking the mean of all the harbors would increase the influence of the CA harbors on the overall total. By using the mean of the CA, OR, and WA averages, each has the same weight in the West Coast average.

Commercial fishing vessels also incur federal and state taxes. The federal and state tax rates are presented in Table D-3. There are landings taxes at the federal level to partially fund the groundfish fishing capacity reduction program. The tax programs in the three states differ in how they are administered and the rates that are levied by species. These taxes are referred to as landings taxes in California and landing fees in Oregon. The tax program in Washington is referred to as the enhanced food fish tax. Technically, the levy in Washington is on the first commercial possession by an owner of fish within the state. For the purposes of this discussion all of these levies are referred to as "landings taxes". Information on landings taxes was obtained from the ODGW, CDFG, and the Washington Department of Revenue (WDOR). In Washington, the taxes are administered by the WDOR with some assistance by the WDFW.

The landings taxes are typically paid by individuals or companies licensed as commercial fish receivers. These licensed fish receivers include wholesale fish dealers, seafood processors, and in the case of Oregon, licensed bait dealers. However, in all three states, in the event that a commercial fisherman sells fish directly to the ultimate consumer, thereby bypassing the transfer of fish to a licensed receiver, the commercial fisherman becomes liable for the tax[9].

In addition to landings tax liabilities for selling directly to the final consumer, it is common in WA for fish receivers to shift some of the tax liability they face back to commercial fishermen. In WA it is written in the tax code[10] that fish receivers can shift half of the landings tax back to fish sellers. As a result, fishermen and receivers typically negotiate a price that appears on the fish ticket that is the basis of the revenue in PacFIN. However, when receivers pay fishermen, one half of the receivers' tax liabilities are deducted from the amount paid. This does not happen in every transaction, but it is reported to occur in a substantial majority of cases[11].

In both OR and CA the tax code does not include the provision to shift some of the tax back to harvesters. It may occur in some cases, but according to personnel at the ODFW and CDFG, the price paid to the fish harvester by receivers that appears on the fish ticket is net of any tax agreement.[12] As a result, the revenue received by harvesters that is reflected in fish tickets is considered net of tax in CA and OR. For CA and OR, the only occurrence of state-level landings taxes paid by fish harvesters is when sales are made to the final consumer.

The federal government also places fees on certain fish landings to partially fund the groundfish fishing capacity reduction program. The fees are legally placed on the fish harvesters who sell the fish (50 C.F.R.

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[9] California fish and game code Section 8040-8070; Revised Code of Washington Chapter 82.27; 2006 Synopsis Oregon Commercial Fishing Regulations.
[10] Revised Code of Washington Chapter 82.27
[11] Personal correspondence with Lee Hoines of Washington Department of Fish and Wildlife on July 8, 2009.
[12] Personal correspondence with Terry Tillman CDFG on July 14, 2009 and Michelle Grooms of ODFW on July 14, 2009. Both Terry Tillman and Michelle Grooms indicated that this is not fully understood, but their understanding combined with that of the authors supported this assumption.

§ 600.1102), but fish buyers are directed to collect the fee and deduct it from the net trip proceeds that fish buyers pay to the fish sellers. The letter sent out to fish buyers (NMFS, 2009) clearly indicates that the full amount of the tax should be paid by fish sellers. We therefore assume that fish harvesters pay the full amount of the federal landings fee, and harvester proceeds on fish tickets are not net of these fees.

IV. The IO-PAC Model

The IO-PAC model is a fisheries specific input-output model, where 19 unique vessel classification sectors, one wholesale seafood dealer sector, and one bait supplying sector are incorporated into IMPLAN regional input-output software. The 19 fishing vessel classifications (Table D-1) are based on the rules developed by Radtke and Davis (2000). The vessel sectors produce 32 unique species/gear commodity outputs. The bait sector produces a single commodity, bait. The methodology employed to develop IO-PAC is modified from the Northeast Fisheries Science Center's Northeast Region Commercial Fishing Input-Output Model (NERIOM) developed by Steinback and Thunberg (2006). The approach differs from that of the Fisheries Economic Assessment Model (FEAM) that is currently being used in fisheries management along the West Coast.

The FEAM model is also based on an underlying IMPLAN input-output model and begins by extracting the regional economic multipliers from a pre-generated IMPLAN model. The IMPLAN multipliers are then applied to the estimates of the expenditures made by the respective fishing sectors to determine the total economic impact of the fishing sectors. In this way, the ripple effects of the expenditures made by the fishing vessel sectors are accounted for by externally multiplying the expenditures by their regional and industry specific multipliers. A similar process is used in FEAM to determine the economic impacts of the seafood processing sectors. This method is similar to the method used by Kirkley (2004) in the Mid-Atlantic regional impact model. When the multipliers are calculated through the regional absorption table inversion, the fishing sectors are not present in the model. This method requires relatively less effort to construct than the NERIOM approach. However, because this approach does not internalize the fishery sectors into the input-output model framework, it does not explicitly detail the relationships between the fishery-related sectors and other industrial sectors (Seung and Waters 2006).

The method employed by NERIOM and IO-PAC is to directly modify the sectors contained within the IMPLAN system. The regional linkages between the customized fishery sectors are established before the regional absorption table is inverted and the input-output model is calculated. This method fully takes into account the effects of the personal income generated by the fishing industry and the feedback interactions in the regional economy. Additionally, the approach of building the model in IMPLAN will also aid in the construction of a computable general equilibrium model (CGE) in the future. Information contained in the underlying social accounting matrix in IMPLAN can be used as the starting point for building a CGE model.

The IO-PAC model is constructed by first generating a default IMPLAN model based on the geographical area to be analyzed. New data for the 21 new industry sectors, 32 species/gear commodity outputs, and a single bait commodity are entered into the model. The model is then re-run with the new data to generate the fully customized regional input-output model. The model is then ready to complete economic impact estimates.

IV.A Industry Additions

The industrial sectors that are added to IMPLAN include 19 vessel sectors, a single bait sector, and a wholesale seafood dealers sector. The 19 vessel sectors entered in the model follow the vessel classification scheme of Radtke and Davis (2000). Each vessel was assigned to one of the 19 vessel sectors based on the criteria presented in Table D-1. The classifications are rank dependent so that a vessel is classified into the highest ranking sector in which it meets the classification rule. For example, if a vessel meets the rule to be classified as Sector 1 (Mothership/Cather Processor), then it is classified as Mothership/Catcher Processor regardless of whether it meets any additional classifications. Likewise, if a vessel satisfies the classification rule for Sectors 4, 12, and 18, then the vessel would be classified as Sector 4 because that is the highest ranking vessel sector to which it belongs. Classification of vessels was performed by personnel at PacFIN and appended to the fish ticket data that was supplied for the purposes of this project.

Alternative categorization schemes were considered, but this scheme has some historical precedence, so there is general familiarity with it by fishery managers on the West Coast. Additionally, it is a classification scheme that data from of a variety of different sources can be grouped with relative ease.

A wholesale seafood dealers sector is included in the model to account for economic effects of changes in the flow of fish to wholesale seafood dealers. Some fish flows from fish harvesters to parties other than seafood processors. This is necessary because some fish flows to wholesale seafood dealers, where it subsequently flows to restaurants, retailers, seafood processors, or is exported. In the default IMPLAN, wholesale seafood dealers are included in the default wholesale trade sector (Sector 390). Wholesale seafood dealers comprise a small portion of all wholesale dealers that are included in this IMPLAN sector. Consequently, the production functions, trade flows, and value added estimates in the default wholesale trade sector, which includes everything from electronics to lumber could differ from those of wholesales seafood dealers (Steinback and Thunberg, 2006). Hence, a wholesale seafood dealer sector was developed. The amount of fish that is expected to flow from harvesters to wholesale seafood dealers is detailed in Section IV.D.

A bait supplying sector is included in the model to provide a sector to allocate bait purchases made by fish harvesters. Recall that the RPCs of all directly impacted sectors are set to 0 in IO-PAC, so directing bait purchases to any of these sectors would have effectively forced bait purchases to be sourced from outside the study area. The bait supplying sector that is included is a stand-alone sector that only supplies bait to fish harvesters. No other sector purchases bait. As a result, the sector avoids the feedback problems that necessitate setting the RPC be set to 0 (see discussion in Steinback 2004). The inclusion of a stand-alone bait supplying sector enables bait purchases to be sourced from within the study area while avoiding the feedback effects.

The vessel classifications along with the bait sector and wholesale seafood dealer sector represent the industries added to IMPLAN. The IMPLAN codes for these classifications are displayed in Table D-4.

IV.B Commodity Additions

The commodities added to IMPLAN include 32 different species/gear combinations and one bait commodity. The commodities are displayed in Table D-5. The gear type portion of the commodity classification was made by grouping PacFIN (fish ticket) data along the gear categories presented in Table D-6. The species classifications portion of the commodity classification was made by grouping the PacFIN data into the categories displayed in Table D-7.

The total landings by vessel type and species/gear combinations are displayed in Table D-8. Landings are classified in the species/gear classifications even if species for particular gear types are considered bycatch.

Use of species/gear combinations increases the flexibility of IO-PAC. They permit impact estimates to be made for harvest changes on a commodity basis. In practice most impact estimates will likely be desired for particular gear classifications because regulations are often made based on vessels with particular permit authorization or gear type. However, there may be instances when impacts on a commodity basis will be preferable.

Impacts on a commodity basis will, unlike impact estimates on vessel classification basis, affect all vessels with landings of a particular species, regardless of vessel classifications. For example, suppose there is an area closure or some other regulation change that is expected to reduce fixed-gear sablefish landings. Vessels classified in several categories have appreciable fixed-gear sablefish landings. In 2006, these included Sablefish Fixed Gear (51%), Crabbers (36%), Other Groundfish Fixed Gear (4%), Other Less than 15k (3%), and Salmon Trollers (2%). The remaining 4% of fixed-gear sablefish landings was spread across the remaining vessel classifications. In this example, entering an exogenous reduction in the fixed-gear sablefish harvest would result in a negative impact on all of these vessel classifications. The size of the impact in each vessel classification is determined by the specifics of its production function and its respective share of total sablefish fixed-gear landings.

The overall impact would be different for a scenario in which the same exogenous reduction in harvest affects only vessels classified as Sablefish Fixed Gear. The greater the differences between the production functions of all the other vessel classifications with fixed-gear sablefish landings from those categorized as Sablefish Fixed Gear, the greater the difference in the results. Assuming the production functions differ considerably, similar results using the vessel classification approach would require separate exogenous harvest estimates for each vessel classification. Prior to entering the downturn in fixed-gear sablefish landings into model, the total downturn would require apportionment among the different vessel classifications and each expected change would be entered separately. For example, the total downturn in fixed-gear sablefish landings would first require apportionment among Sablefish Fixed Gear, Crabbers, Other Groundfish Fixed Gear, etc. Then, each of those expected changes would be entered in the model separately and the impacts estimated simultaneously.

IV.C Study Area

The IO-PAC model is a collection of region specific models. There are models for Washington, Oregon, California, and the whole West Coast. Additionally, there are models for the ports and port aggregates. Because each of the state, port, and port-aggregate models are sub-regions of the West Coast region, they will all be referred to as sub-regions in the following discussion. This follows the terminology used by Steinback and Thunberg (2006) in the NERIOM.

The collection of regional models is displayed in Figure D-1. A detailed list of how the ports aggregates were constructed using PacFIN data is presented in Appendix A. The port and port aggregates were designed to correspond to the location and composition of port groups present in the 2005-2006 Pacific Coast groundfish environmental impact statement (Pacific Fishery Management Council, 2004).[13]

The IO-PAC approach of region specific models is intended to be flexible enough to provide impact estimates for a wide variety of policy situations and analysis goals. It can provide coast wide, state wide, and port level impacts. The appropriate study area is dependent on the nature of the policy change, the goals of the analysis, and the resolution of the exogenous change in fish harvest that is expected.

[13] See Table 8-1 Appendix A. *2005-2006 Pacific Coast Groundfish Fishery FINAL Environmental Impact Statement.*

If a policy change will only affect a few ports along the West Coast, then, depending on the intent of the analysis, it may be preferable to use study areas for only those sub-regions. For example, assume that a given policy will reduce fish harvest in only Astoria and Westport, and estimating changes in income in these communities is the objective of the analysis. If exogenous estimates of the changes in harvest are known for Astoria and Westport, it will likely be preferable to estimate the impacts of the changes by using only Astoria and South Washington study areas. The multipliers from the Astoria and South Washington study areas will likely result in better estimates of income effects than using the entire West Coast as the study area. Additionally, performing an analysis on these smaller study areas will likely do a better job of depicting the relative importance of the fishing industry.

However, estimated impacts are often desired that follow political or administrative boundaries. For example, estimated impacts may be needed for states or for the entire West Coast. In these cases, the state level and West Coast models will likely be more appropriate. In the example of a downturn in fish harvest in Astoria, the effects of the reduction will have a greater total income impact on the state of Oregon as a whole than in Astoria alone. The economy of Oregon is more diversified than the economy of Astoria, so the multiplier will be larger.

While the impact of using the Oregon study area will be greater, the relative importance of the fishing industry will be less. Obtaining results at the state level or for the entire West Coast will come at the expense of obtaining a clear picture of the effects at a particular port. An advantageous feature of the IO-PAC model is that it is flexible enough to estimate the effects of changes in fishing regulations at many different levels of geographic resolution.

An underlying assumption in the downturn of fish sales in Astoria and Westport example is that the exogenous effects are known for a relatively small geographic area. For some policy or other effect on harvest, this may not be the case. However, the IO-PAC approach is also flexible enough to handle scenarios in which exogenous impacts are not known for individual ports. If a given policy is expected to result in a loss in fish sales across the entire West Coast, but no port level exogenous estimates are known, then the West Coast study area could be used to estimate the impacts of such a change. These West Coast impacts could then be apportioned to the state and port level of detail based on some metric of relative importance of the different regions to the whole. One such metric might be the proportion of landings of a particular species in the different geographic areas. Another approach used in the NERIOM is to apportion the indirect effects based on the relative importance of sub-regional economies to the total regional economy.

The IO-PAC approach to study area is intended to be flexible enough to handle numerous different types of analyses. For policies that only affect a few ports and the exogenous effects are known at that level, then models for port specific study areas can be used. For policies that will affect all ports along the West Coast, the model for the West Coast is available. Additionally, the state level study areas are available to develop state level impact estimates for cases in which exogenous impacts are state or port specific.

IV.D Product Flow

Product flow considerations are important for fishing industry impact and contribution models. Generally, as long as fish harvester sales are not to final consumers or exported from the study area, it continues to affect economic activity within the study area. Each firm that purchases the seafood may add value in the production of its own goods or services. Hence, a fish processor may add value to raw fish by filleting, packaging, cooking, canning, or icing. Wholesalers may add value by freezing, warehousing, providing an auction market, or shipping services. Retailers may add value by storing, icing, and displaying the product for purchase by final consumers. Restaurants may add value by cooking and preparing the seafood for patrons. At any of these stages, there is the potential that a change in fishery regulations will have an economic impact.

The product flow of fishery resources is complex and there are few sources of data that can be used to accurately account for these transactions in an economic model. Like other fishery IO models (Steinback and Thunberg, 2006 and Kirkley et. al, 2004), the IO-PAC model relies on simplifying assumptions. There are some data available to help guide these assumptions, and while by no means extensive, the data represents the best available at this time. The assumption about the flow of fish in IO-PAC were derived by utilizing data from the Washington Department of Revenue (WA DOR) and the absorption of fish made by the IMPLAN default seafood product preparation and manufacturing sector (Sector 71).

The WA form of a landing tax, the Enhanced Food Fish Tax, is administered by the WA DOR. Because the tax is levied on the individual or entity that first retains possession of the fish in WA, the tax records are useful in understanding the flow of fish between different types of buyers. When a commercial vessel sells fish directly to the public, the vessel pays the tax. Every business entity in the state of WA must file a master business application with the Licensing Division of WA DOR. On this application, the business explains the type of commercial activity in which it will be involved. The business is then analyzed and classified by North American Industry Classification System (NAICS) code based on its principle source of revenue. Revisions to the classifications of businesses are made through time based on reported activity contained in tax returns.[14] The proportion of the tax paid by businesses thus classified provides insight into the flow of harvested fish.

Table D-9 presents the proportion of Enhanced Food Fish Tax paid by type of business by six digit NAICS code in 2006. It indicates that Fish and Seafood Merchant Wholesalers paid 30.2% of the tax. Based on this proportion, IO-PAC assumes that 30% of all fish landed in each study area along the West Coast will pass through fish and seafood merchant wholesalers. The fish purchased by wholesale seafood dealers will subsequently be purchased by final consumers, exported out of the region, intermediate demand other than processing, and fish processors.

The proportion of fish landings in each study area that will flow to fish processors is determined by constructing a default IMPLAN model for each study area and then viewing the commodity balance sheet for the commercial fishing sector. For the West Coast Region as whole, approximately 45% of all the default commercial fishing sector sales are purchased by the seafood product preparation and manufacturing sector. This is similar to the 42.3% that flows to the seafood canning and fresh and frozen seafood processing sectors according to enhanced food fish tax records in WA.

The flow of fish in IO-PAC is displayed in Figure D-2. Each solid line between the different entities in the harvesting and product distribution schematic is included as a calculated impact in IO-PAC. Those represented with a dashed line are not incorporated in IO-PAC. Similar to the approach by Steinback and Thunberg (2006), there are expected to be a number of seafood substitutes available beyond fish and seafood merchant wholesalers and seafood processors. Hence, the impacts of most fishery management actions on final consumers and other intermediate demand industries are likely to be negligible.

IV.E Vessel Production Functions

The production functions in the IO-PAC were developed by weighting the results of the three different NWFSC cost-earnings surveys and incorporating information on landings taxes and moorage rates. The survey results provided the majority of the information used to construct the production functions. The results from the cost-earnings surveys were weighted to produce a single production function that

[14] Personal correspondence with Beth Leech of WA DOR, July 10, 2009.

represents the vessels contained in each of the vessel classifications. Moorage and landings taxes were estimated using external sources and added to the production functions. There are some vessel classifications that have not yet been included in the cost-earnings surveys. The assignment of production functions for these sectors are addressed in two ways. All of these sectors, with the exception of Small Groundfish Trawlers, were assigned a weighted average production function. Small Groundfish Trawlers were assigned the production function of large groundfish trawlers.

Cost-Earnings Surveys

The following steps describe how the results from the three cost-earnings surveys were used to generate the cost estimates for the production functions. First, the average expenditures by cost category from the three cost-earnings surveys were converted to a proportion of average revenue for each of the vessel classifications. If C_{ik} equals the average cost of each expenditure category (i) for vessel classification (k) and R_k is equal to the average revenue for vessel classification (k), then the proportion in each expenditure category from each survey (s) can be represented as $P_{iks} = \frac{C_{iks}}{R_{ks}}$.

Second, three of the vessel classifications shown in Table D-1, Crabber, Sablefish Fixed Gear, and Other Groundfish Fixed Gear, have survey results from more than one cost-earnings survey. For these categories a weighting mechanism was used to combine the results from the surveys.

Total West Coast landings for each of the vessel classifications were converted to constant 2006 dollars using the PPI for unprocessed and packaged fish. West Coast landings by vessel classification (k) from each survey (s) is represented by WC_{ks}. The weights to combine the results of the three different surveys are given by $\frac{WC_{ks}}{\sum_s^S WC_{ks}}$.

Altogether, the survey portion of the production function for all vessel classifications (k) and all expenditure categories (i) is given by $P_{iks} \frac{WC_{ks}}{\sum_s^S WC_{ks}}$.

There are some vessel classifications that have no data from any of the NWFSC's cost-earnings surveys. These include Mothership Catcher/Processors, Alaska Fishery Vessels, Small Groundfish Trawlers, Pelagic Netters, Migratory Netters, Migratory Liners, Shrimpers, Salmon Netters, Other Netters, Lobster Vessels, and Diver Vessels. For all but Small Groundfish Trawlers, these categories incorporate the survey data in the form of a weighted average production function. The production functions for all of the covered classifications were weighted based on their respective West Coast landings and included in this weighted average production function. Small Groundfish Trawlers are assumed to have the same production function as Large Groundfish Trawlers. As additional data becomes available, specific production functions for these categories will be developed and incorporated into IO-PAC.

Moorage

Moorage was calculated by converting the moorage cost data presented in Table D-2 to dollars per foot, multiplying dollars per foot by the average length of vessel by classification and survey population, and weighting the moorage expenditures of the different survey populations in the same manner described above. Dollars per foot from Table D-2 for the West Coast range from $40.40 to $47.30 with an overall average of $44.90 in 2009 dollars. This per-foot amount was converted to 2006 dollars by using the CPI and equals $41.80.

Landings Taxes

Average federal taxes by vessel classification were estimated by multiplying average value of landings by species by state within each vessel classification by the federal tax rates displayed in Table D-3. The federal tax rates are applied by species by state to all of the average landings made in each of the vessel classifications. The tax rate multiplied by the average landings by species is borne 100% by harvesters.

Average Washington taxes were estimated in two parts. First, Table D-9 indicates that WA commercial fishermen were responsible for 12.6% of landings taxes collections in 2006. Hence, it is assumed that for all vessel classifications 12.6% of average landings by species is sold directly to the public. On 12.6% of average landings by vessel classification by species, the full tax rate is assumed to be paid by harvesters. Second, because of the tax shifting arrangement in WA, harvesters are estimated to pay half of the tax rate displayed in Table 3 on the remaining 87.4% of average landings by species. Total average taxes by vessel classification are created by summing the direct to consumer and tax shifted components.

Average Oregon taxes were estimated by applying the tax rates by species in Table D-3 to 12.6% of the vessel landings for each classification. Oregon is assumed to have the same proportion of fish sold directly to consumers as Washington. It is possible to segment sales by species for commercial fishing harvesters holding "Limited Fish Seller Licenses" in Oregon. These licenses permit harvesters to sell directly to the public off their vessels. Sales by harvesters with these licenses are a much smaller proportion of all landings than 12.6%. It is reported to be closer to 1%.[15] However, some harvesters have "Wholesale Dealer Licenses," as they are required for harvesters who wish to sell landings directly to consumers and retail businesses from a location other than their vessel. The amount of landings sold in this manner is unknown, which necessitated an assumption that the flow of fish in Oregon is similar to Washington.

For each vessel classification, average California taxes were estimated by applying the tax rates by species in Table D-3 to 2% of trawl gear landings and 21% of fixed gear landings. Approximately 2% of trawl caught groundfish and 21% of fixed-gear groundfish bypassed wholesalers and processors and were purchased by final consumers in 2006.[16] These percentages are applied to all commodities in the model. The groundfish focus of the model at this time supports this assumption. As improved data for other species groups are added, these proportions will be adjusted.

The West Coast model includes an additional step that is not performed on any of the models for smaller study areas. For each vessel classification it sums the federal and state taxes that were calculated separately and then divides the sum by total west coast landings. This provides the percent of total revenue for each vessel classification that is used to pay landings taxes.

Table D-10 presents the final production functions included in the West Coast Model. The state and port level models differ slightly in the moorage and tax component, but the production functions for the other

[15] Based on data of landings by license type in 2006 supplied by Michelle Grooms of ODFW.

[16] Doreen Hansen, who worked with CDFG on development of the California Ocean Fish Harvester Economic (COFHE) Model, provided information on the proportion of groundfish sales made directly to consumers. These numbers were confirmed by Terry Tillman of CDFG as direct sales to the public in 2006 in personal correspondence June 23, 2009.

categories are identical. The production function for Other > $15,000 is not shown due to confidentiality restrictions. The expenditure categories shown in Table 10 must be mapped into IMPLAN commodity codes for inclusion in the model. The mapping of the expenditure categories in Table D-10 into IMPLAN commodity codes is presented in detail in Appendix B.

IV.F Processor and Wholesale Seafood Dealer Production Functions

The processor production function is the default IMPLAN production function for the seafood product preparation and packaging (Sector 71).

Wholesale seafood dealer production functions are assumed to equal those developed by Kirkley (2004), and subsequently used by Steinback and Thunberg (2006). This production function is presented in Table D-11. The mapping of the expenditure categories included in the production function into IMPLAN commodity codes is presented in detail in Appendix B.

IV.G Sales

Baseline sales for all but two of the vessel classifications are derived from Pac FIN fish ticket data. There are no landings data for Alaska Fisheries Vessels and Mothership Catcher Processors contained in the model.

Baseline sales for the wholesale seafood dealer sector are estimated by margining the 30% of harvested fish that is estimated to flow to wholesale seafood dealers. IO-PAC utilizes the same 40% markup margin as that used by Steinback and Thunberg (2006). Total sales are entered as the margin only, which excludes the costs of raw fish. This practice is analogous to the default IMPLAN treatment of the wholesale trade sector.

Baseline sales for the seafood processing sector are those contained in the default IMPLAN model for seafood product preparation and packaging (Sector 71).

IV.H Employment

In OR and CA, employment estimates for the vessel classifications are made by multiplying the weighted average number of crew plus captain by the number of unique vessel IDs. In WA, the ZZZ IDs necessitated an adjustment to the employment estimates. First, employment estimates for the vessel classifications are made by multiplying the weighted average number of crew plus captain by the number of unique non-ZZZ vessel IDs. The non-ZZZ employment estimates are then inflated to adjust for the ZZZ landings. It is assumed employees on vessels with ZZZ IDs are of equal productivity as those in vessels without a ZZZ ID. Thus, the number of ZZZ employees will be the same share of total employees as the value of ZZZ landings is of total landings.

The cost-earnings surveys capture the average number of crew members on each vessel not including the captain while performing five different activities: trawling, longlining, shrimping, crabbing, and trolling. IO-PAC uses the average number of crew for each vessel classification that best corresponds to the primary activity of the classification. For example, the applicable average number of crew for Large Groundfish Trawlers is assumed to be the average number of crew while the vessel is engaged in trawling.

For the three vessel classifications that are covered by more than one cost-earnings survey, a weighted average is used. The weighting scheme follows the approach used to weight the different elements of the production function. Essentially, for each vessel classification, the weights are comprised of the share of total inflation adjusted West Coast landings attributable to vessels covered by the respective surveys.

Employment for wholesale seafood dealers is calculated by dividing the portion of total value added paid to employees by the average wage paid to fish and seafood merchant wholesalers (NAICS Code 42446) from County Business Pattern data for 2006[17]. Average earnings per employee in WA and CA were $42,300 and $36,051 respectively. Average earnings per employee was not disclosed for OR, so the average for the West Coast was created by using the weighted mean for WA and CA, where the weights are the proportion of total employment in WA and CA that exists in each respective state. The number of paid employees was 1,015 in WA and 4,429 in CA, so the weighted earnings per employee is $36,057[18].

V. Model Construction

The following discussion details the steps used to construct the model in the IMPLAN system. Much of this discussion is drawn from Steinback and Thunberg (2006). IMPLAN contains more than 60 Microsoft Access tables. Table D-12 lists the underlying data tables in the IMPLAN system and a short descriptor of the type of data contained therein. The construction of IO-PAC entailed the modification of 14 of these tables, which are noted in Table D-12.

The modification procedure consists of the following steps. First, Excel worksheets that mirror the layout of the Access tables that needed to be modified were created. Second, all of the new data necessary to modify the Access tables was entered into the Excel worksheets. Third, the data were copied from the Excel worksheets and pasted at the bottom of the relevant Access table. Lastly, the Access tables were sorted based on the necessary variables to maintain the records format.

V.A Model Construction Steps

The following steps describe the creation of the IO-PAC model. These steps are repeated for each geographic area displayed in Figure D-1.

Step 1

A default West Coast region model was created with IMPLAN software.

Step 2

The default model was then opened using Microsoft Access 2003.

Step 3

Three of the US tables and the Observed RPCs table were then deleted. This step was necessary because all IMPLAN Pro models share the following five tables:

US Absorption Table
US Absorption Totals
US Byproducts Table
Observed RPCs
Margin Codes

[17] See Census Bureau County Business Patterns: http://www.census.gov/econ/cbp/index.html.
[18] Because earnings per employee was not reported for OR, the OR models utilize the $36,057 weighted earnings.

Deletion of these tables "breaks" the link so that any subsequent changes made in Access will not affect other IMPLAN models. No changes were made to the Margin Codes table so it was not necessary to remove the link to that table.

Step 4

The deleted tables (the three US tables and the Observed RPCs table) were then replaced with the same tables contained in the 2005 IMPLAN structural matrix file 06NAT509.IMS through the import feature in Access.

Step 5

For each of the 14 tables that needed to be modified, Excel worksheets were created that mirror the layout of the tables in Access.

Step 6

Data in these 14 tables were modified to better reflect the sectoral linkages among fisheries-related industries.

Step 7

After the new data for 14 tables are created in Excel, the data are copied and pasted from the Excel worksheets and pasted at the bottom of the relevant Access table.

Step 8

The Access tables are resorted to follow the original format.

Step 9

The modified model was then opened in IMPLAN, the model was reconstructed and multipliers were re-estimated. IMPLAN will not recognize changes made to the underlying data tables unless the model is reconstructed using the updated data.

V.B IMPLAN Table Adjustments

The following provides a more detailed discussion of modifications to certain Access tables.

Industry/Commodity Codes

This table contains unique code numbers for industries and commodities. Industries and commodities share the same name and number in an IMPLAN model. Modifications included adding 21 different industry classifications: 19 different vessel categories, a bait ship category, and a wholesale seafood dealer category. Additionally, 33 different commodity sectors were added: 32 different gear/species commodity sectors and a single sector for bait. These industry sectors identify the 19 different vessel classification categories developed by Radtke and Davis (2000). The industry/commodity sectors that are added along with their IMPLAN code numbers are displayed in Tables 4 and 5.

Type Codes

The Type Codes table contains coding information on all transaction types in the data sets. For this table, we added the 54 industry/commodity code designations discussed above and the associated 54 SAM Commodity codes. Transaction codes associated with Factors, Households, Institutions, Transfers, Employment, Output, and Trade remained the same.

US Absorption

This table contains the United States absorption matrix which, in IO terminology, is the coefficient form of the use table. Essentially, the US absorption matrix contains each industry's production function. We added 1,720 rows of data that contained the production functions of each of the 19 fisheries-related vessel categories, the bait ship category, and wholesale seafood dealer category that were added to the model.

US Absorption Totals

The US Absorption Totals table contains the sum of the absorption coefficients for each industry sector. We added the appropriate absorption coefficients for the 21 new industry sectors in the model. The sum of the coefficients from each sector in the US Absorption table must match the coefficients in the US Absorption Totals table.

US Byproducts

This table contains estimates of the proportions of each commodity an industry produces. In IO terminology it is the coefficient form of the "make" table derived by dividing each element by the make table row totals. Industries often produce more than one commodity. For this table, we added the commodity proportions for the 21 industries added to the model. The commodities produced by these industries include the 32 gear/species commodities and the bait commodity.

SACommodity Sales

This table shows sales of commodities by households and institutions in the study area. We assumed that no households or institutions sold any of the 33 commodities that were added. We also assumed that were no institutional (federal and state governments) production in any of the industries or commodities added to the model and that there would be no inventory additions. The table was modified by adding rows of zeros for the institutions and inventory additions for each of the industries and commodities added.

SAEmployment

The SAEmployment table delineates average annual jobs for each industry in the study area. Jobs are measured in terms of both full-time and part-time workers combined. Employment estimates for all industry categories added to the model were included here.

SAFinal Demands

The final demand table consists of purchases of commodities for final consumption by households and institutions. The objective of modifying this table is to assign final demands for each of the commodities added to the model. This was accomplished by using information about final demand for the default fishing sector contained in IMPLAN. Final demand for the default fishing sector is apportioned among households of different incomes, government entities, and inventory. These are referred to as “data type codes” in IMPLAN. We assume that the demand for the new species/gear commodities entered into the model will follow the same final demand distribution as default fishing sector (Sector 16). Demand totals for each of the type codes (households earning less than $10,000, $15,000-$25,000, federal Non-Defense, etc.) are generated by multiplying the proportion of default fishing sector demand (16) attributable to the different types by the total production of the new commodities entered into the model. Since the RPCs for the newly added sectors are set to 0 effectively there is no distribution of fish harvested to the final demand categories in the study area. IMPLAN will fulfill demand with imports to the study area.

SAForeign Exports

The SAForeign Exports table shows demands made for goods and services by consumers and industries outside the US. For this table, we estimated for exports of the 32 commodities added to the model by assuming the same proportion of each would be exported as appears for the default fishing sector in IMPLAN.

SAOutput

The SAOutput table is a vector of output values in millions of dollars that represents an industries total production. There is a single value for each of the 21 industrial sectors entered into the model.

SAValue Added

This table details payments made/received by each industry to employee compensation (wage and salary payments, insurance, retirement, etc.), proprietary income (all income received), other property type income (payments from interest, rents, royalties, dividends, corporate profits, etc.) and indirect business taxes (primarily excise and sales taxes). The value added transactions associated with the 21 industrial sectors were added to the table.

Observed RPCs

The Observed RPCs table contains forced regional purchase coefficient values for all states in the model. We added the 21 industrial sectors to the table and included and include and RPC value of 0 for all sectors except the bait sector, which is assigned an RPC of 1. We also added an RPC of 0 for the default IMPLAN fishing sector 16 and default seafood processing Sector 71.

RPC Methods

This table contains information for creation of the regional purchase coefficients. We added each of the newly created industry and commodities to the table, and set the Method variable of each added sector to “Observed.” Additionally, we changed the default seafood processing sector and default fish harvesting sector Method from “Regress” to “Observed.”

Deflator1

The Deflator1 table contains deflators that account for relative price changes over time. The IMPLAN deflators are derived from the Bureau of Labor Statistics Growth Model. The 2006 IMPLAN data base contains deflators from 1977 to 2020 for each commodity in the model. We replicated the deflators IMPLAN contains for the default fish harvesting sector for all of the newly created sectors except wholesale seafood dealers. For wholesale seafood dealers, we used the deflator for the default wholesale trade sector in IMPLAN.

VI. Impact Estimation

VI.A Estimation Procedure

IO-PAC can be used to assess the impact of a given fishery management action when an externally derived, exogenous, assessment of how the action will affect the gross output of industries or commodities that are included in the model is available. With and exogenous estimate of the effect of a management action on fish harvest, IO-PAC will estimate the backward linked impacts of the action on the economy.

Entering an exogenous impact on sales by fish harvesters is the first step in calculating an impact. However, doing so will not have any impact on the businesses that rely on the supply of fish as input in production, such as seafood processors. Since the RPC for all fishing related sectors have been set to 0, all supply of fish to these establishments will be sourced from outside the study area in the model. If the backward linked impact of the fishery management action on seafood processors and wholesale seafood dealers is included, then estimated changes in sales for these sectors must also be entered into the model.
With an exogenous estimate of a change in dollar value of sales by harvesters, the estimated change in sales of wholesale seafood dealers in the study area is made by utilizing the product flow and wholesale dealer mark-up margin assumptions discussed in Sections IV.F and IV.G. It is assumed that 30% of harvested fish in the study area flow to wholesale seafood dealers and that the wholesale seafood dealer markup margin is 40%. Because the wholesale seafood dealers are treated as margin sectors, the cost of fish purchased by wholesalers is excluded from estimated sales impacts. If ΔL_k represents the change in total fish landings among vessel classification *(k)* within the study area, then the change in sales for wholesale seafood dealers in the study area *(* ΔWS *)* is given by

$$\Delta WS = \left[\frac{\left(\sum_{k}^{K} \Delta L_k \right)(0.3)}{0.6} \right] - \left(\sum_{k}^{K} \Delta L_k \right)(0.3) \cdot$$

Estimated sales changes for seafood processors are made by using product flow and markup margin information contained in IMPLAN for the default seafood processing sector (71). IO-PAC assumes that landings from the fish harvesting sectors that are added to the model flows to seafood processors in the same proportion as IMPLAN indicates for sales from the default fish harvesting sector (16) to the default processing sector (71). This value can be determined by constructing a default IMPLAN model for the study area of interest and then examining the commodity balance sheet for the default commercial fishing sector. In 2006 the commodity balance sheet indicates that seafood processors purchase approximately 45% of the sales produced by the commercial fishing sector on the West Coast. In IO-PAC it is assumed that seafood processors will purchase the same share of fish landings directly from the harvesting sectors that were created.

The fish landings that are purchased by the processing sector in each study area are converted into revenue changes by applying the margins derived from the production function for processors in the area. For the West Coast, the margin for processors in 2006 was 70%. This value can be determined by constructing a default IMPLAN model for the study area and then examining the industry balance sheet for the default seafood processing sector. These producer values are then entered as the change in direct sales for the seafood processing sector. For each study area if *(p)* represents the proportion of landings purchased by the default seafood processing sector and *(m)* represents the margin among seafood processors then the change in sales for seafood processors *(ΔPS)* is given by

$$\Delta PS = \left[\frac{\left(\sum_{k}^{K} \Delta L_k \right)(p)}{(1-m)} \right].$$

The total effect on economic activity in the study area is derived by simultaneously multiplying the estimated exogenous gross output changes for the harvesting sectors, wholesale seafood dealers, and seafood processing sectors by their corresponding model-generated multipliers. This will capture the backward-linked effects associated with a change in commercial fishing harvest within the study area. This is accomplished by entering all three values in the IMPLAN impact analysis window.

VI.B Hypothetical Examples

Two hypothetical reductions in harvest are used to illustrate the outputs produced by IO-PAC. Scenario One will be used to illustrate the impact of a reduction in sales of a particular vessel classification. Scenario Two will be used to illustrate the impact of a reduction in sales for a particular commodity (species/gear type).

For Scenario One, assume that the fishery management action will result in a \$500,000 decline in total ex-vessel West Coast landings for Sablefish Fixed Gear vessels. If \$500,000 is the change in total ex-vessel revenue on the West Coast, then the decline in sales of Wholesale Seafood Dealers is \$100,000, and the decline in sales for seafood processors is \$756,412. All three of these effects are entered on the main impact analysis window in IMPLAN, and then the impact results are analyzed. Table D-13 displays the resulting effects on total output, value added, and employment. The results are aggregated at two digit NAICS code level for all of the sectors that were not added to the default IMPLAN model. The added sectors appear individually.

For Scenario Two, assume that the fishery management action will result in a \$500,000 decline in total ex-vessel West Coast landings for sablefish caught using fixed gear. This is the commodity classification, not the vessel classification. Vessels of numerous vessel classifications have sablefish landings while using fixed gear. If \$500,000 is the reduction in total ex-vessel revenue of the sablefish fixed-gear commodity on the West Coast, then the decline in sales of wholesale seafood dealers and processors is the same as Scenario One. All three of these effects are entered on the main impact analysis window in IMPLAN, and then the impact results are analyzed. Table D-14 displays the resulting effects on total output, value added, and employment. The major difference in the two scenarios is that numerous vessel classifications are affected in the commodity run. The effects are still the greatest for vessels classified as Sablefish Fixed Gear because they have the largest landings of this commodity, but sizable effects are also seen for vessels classified as Crabbers in the model. Which approach one should use depends of the specifics of the issue being analyzed.

VII. Discussion

IO-PAC is designed to estimate the backward linked multiplier effects of policy changes that affect gross revenues of commercial fish harvesters, wholesale seafood dealers, and seafood processors. The IO-PAC model is a fisheries specific input-output model where 19 customized unique harvesting sectors, one customized wholesale seafood dealer sector, and one bait producing sector that produce 34 unique commodities are incorporated into a customized IMPLAN regional input-output model.

IO-PAC is similar in many resects to the NERIOM model developed by Steinback and Thunberg (2006). The model is incorporated into the ready-made input-output IMPLAN system. Building the model directly in IMPLAN permits an analyst to trace the effects with a high level of industry detail and generate disaggregated estimates of indirect and induced multiplier effects. As pointed out by Steinback and Thunberg (2006) this approach differs from the mixed exogenous/endogenous variables models and spreadsheet-type models based on limited input-output multipliers. These approaches derive backward linked multiplier effects by aggregating or condensing the same ready-made models. The approach of building the model in IMPLAN will also aid in the construction of a computable general equilibrium model (CGE) in the future. Information contained in the underlying social accounting matrix in IMPLAN can be used as the starting point for building a CGE model.

The approach to study area in IO-PAC is intended to be flexible enough to provide impact estimates for a wide variety of policy situations and analysis goals. It can provide coast wide, state wide, and port level impacts. The appropriate study area is dependent on the nature of the policy change, the goals of the analysis, and the resolution of the exogenous changes in fish harvest that are anticipated.

The multiplier effects generated by IO-PAC are static and should be viewed as the immediate/short-term impacts of an analyzed policy change. There are several assumptions built into the model that diminish its accuracy in modeling change over an extended period of time. Underlying assumptions such as fixity of prices and zero-substitution elasticities in consumption and production are more applicable to shorter periods of time than longer. In reality, harvesters, seafood dealers, and seafood processors will all likely shift production practices to mitigate losses from changes in policy that result in reduced harvest and maximize opportunities from change in policy that will increase harvest. These longer term behavioral adjustments are not captured in IO-PAC.

IO-PAC does not include impacts beyond seafood wholesalers and processors. It is possible that restaurants and food service establishments along the West Coast could experience a reduction in local supply because of a restrictive fishery management action. This is likely to be particularly true in isolated port communities that source a high proportion of seafood demand from local producers. Following the approach of Steinback and Thunberg (2006) we have assumed that consumers would choose from among the many other close substitutes (e.g., other fish species, poultry, beef, etc.). As a result, retail level gross revenues would remain unchanged.

IO-PAC can accept input data for the years 2006 through 2020. Data contained in IMPLAN are based on economic relationships in 2006, the impacts of management actions in succeeding years are determined by converting the estimated changes in gross revenues to year 2006 dollars before the impacts are estimated. IO-PAC then converts the impact estimates back to the year of the input data (through 2020). This process accounts for the effects of inflation on the impact estimates.

IO-PAC is likely more accurate for estimating impacts resulting from changes in groundfish harvest than other species. Vessels pursuing groundfish are captured in all three NWFSC cost-earning surveys, so the production functions for these vessels are likely the more accurate. However, the cost-earnings surveys capture a sizeable number of Crab vessels and Salmon Trollers, so IO-PAC is likely reasonably accurate for these sectors as well.

There are a few areas where IO-PAC can potentially be improved. First, some simplifying assumptions were made regarding product flow, and the wholesale seafood dealer mark-up and production function. Future research efforts will attempt to obtain better information about these components. Second, IO-

PAC relies on economic relationships that existed in 2006, however, technological change and prices change at relatively slow rates, so the model can likely be used for subsequent years with minimal error. Third, IO-PAC relies on a “generic” production function for all commercial vessels on the West Coast that are currently not covered by NWFSC cost-earnings surveys. As a result, the model is likely more accurate for those sectors that have direct survey coverage. The NWFSC is currently planning data collections that will reach vessels in classifications that currently lack coverage. As cost-earnings data from these vessel classifications become available, it will be incorporated into the model.

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Table D-1. Vessel Sectors Used in the IO-PAC (Source: Radtke and Davis, 2000)

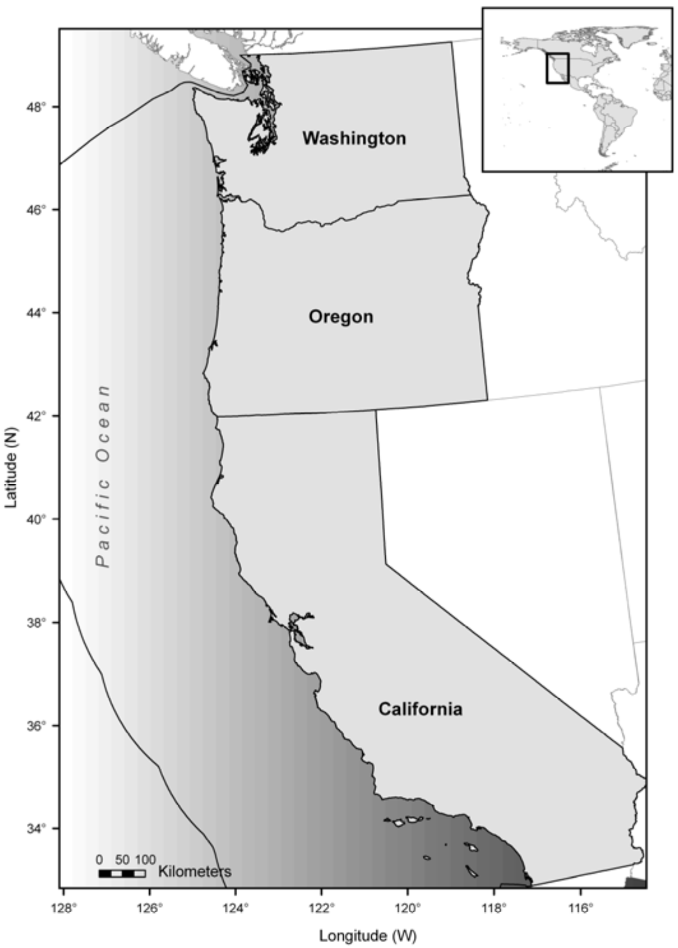
Order	Vessel Sector	Rule Description
1	Mothership/Catcher Processor	Identified by vessel documentation
2	Alaska Fisheries Vessel	Alaska revenue is greater than 50% of that vessel's total revenue
3	Pacific Whiting Onshore and Offshore Trawler	Pacific whiting PacFIN revenue plus U.S. West Coast offshore revenue is greater than 33% of that vessel's total revenue, and total revenue is greater than $100,000
4	Large Groundfish Trawler	groundfish (including sablefish, halibut, and California halibut) revenue from other than fixed gear is greater than 33% of that vessel's total revenue, and total revenue is greater than $100,000
5	Small Groundfish Trawler	groundfish (including sablefish, halibut, and California halibut) revenue from other than fixed gear is greater than 33% of that vessel's total revenue, and total revenue is greater than $15,000
6	Sablefish Fixed Gear	sablefish revenue from fixed gear is greater than 33% of that vessel's total revenue, and total revenue is greater than $15,000
7	Other Groundfish Fixed Gear	groundfish (including halibut and California halibut), other than sablefish, revenue from fixed gear is greater than 33% of that vessel's total revenue, and total revenue is greater than $15,000
8	Pelagic Netter	pelagic species revenue is greater than 33% of that vessel's total revenue, and total revenue is greater than $15,000
9	Migratory Netter	highly migratory species revenue from gear other than troll or line gear is greater than 33% of that vessel's total revenue, and total revenue is greater than $15,000
10	Migratory Liner	highly migratory species revenue from troll or line gear is greater than 33% of that vessel's total revenue, and total revenue is greater than $15,000
11	Shrimper	shrimp revenue is greater than 33% of that vessel's total revenue, and total revenue is greater than $15,000
12	Crabber	crab revenue is greater than 33% of that vessel's total revenue, and total revenue is greater than $15,000
13	Salmon Troller	salmon revenue from troll gear is greater than 33% of that vessel's total revenue, and total revenue is greater than $5,000
14	Salmon Netter	salmon revenue from gill or purse seine gear is greater than 33% of that vessel's total revenue, and total revenue is greater than $5,000
15	Other Netter	other species revenue from net gear is greater than 33% of that vessel's total revenue, and total revenue is greater than $15,000
16	Lobster Vessel	lobster revenue is greater than 33% of that vessel's total revenue, and total revenue is greater than $15,000
17	Diver Vessel	revenue from sea urchins, geoduck, or other species by diver gear is greater than 33% of that vessel's total revenue, and total revenue is greater than $5,000
18	Other > $15 Thousand	all other vessels not above who have total revenue greater than $15,000
19	Other <= $15 Thousand	all other vessels not above who have total revenue less than or equal to $15,000

Table D-2 Moorage Rates (2009)

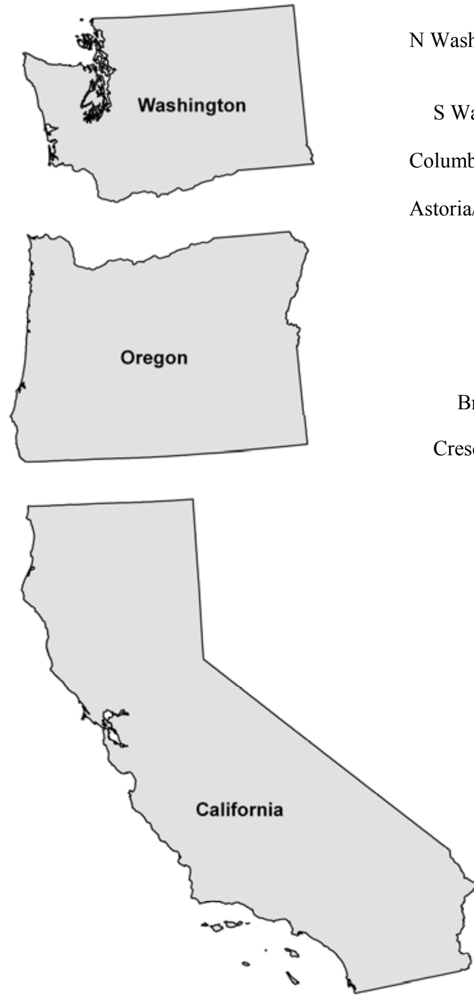
	Length of Vessel in Feet							
	85	**80**	**70**	**65**	**60**	**50**	**40**	**30**
California								
Crescent City			2381	2381	2041	1706	1450	1195
Humboldt Bay	3,315	3,120	2,730	2,535	2,340	1,950	1,560	1,170
Port of Los Angeles	4,325	4,070	3,562	3,307	3,053	2,544	2,035	1,526
San Francisco Fishermen’s' Warf						1065	959	639
San Francisco Hyde Street		4,688	4,688	4,688	4,688	2,930	2,344	2,344
Half Moon Bay CA				6677	6178	5178	4178	3179
Morrow Bay			2797	2597	2398	1998	1598	1439
Moss Landing	5,523	5,198	4,549	4,224	3,899	3,249	2,599	1,949
San Diego B street pier	3,258	3,066	2,683	2,491	2,300	1,916	1,533	1,150
Bodega Bay		5,659	4,952	4,598	4,244	3,537	2,830	2,122
CA Average	4,105	4,300	3,543	3,722	3,460	2,607	2,109	1,671
Oregon								
Astoria	2,295	2,160	1,890	1,755	1,620	1,350	1,080	810
Newport	3,304	3,128	2,583	2,420	2,145	1,701	1,306	1,056
Coos Bay	2,295	2,160	1,890	1,755	1,620	1,350	1,080	827
OR Average	*2,631*	*2,483*	*2,121*	*1,977*	*1,795*	*1,467*	*1,155*	*898*
Washington								
Westport Grays Harbor	3,146	2,961	2,591	2,406	2,221	1,851	1,480	1,110
Seattle, Fisherman's Terminal	9,792	9,216	4,544	4,220	3,895	3,246	2,597	1,948
Ilwaco	1,597	1,503	1,315	1,221	1,127	635	508	381
Bellingham Squalicum Harbor						3967	3174	2380
Bellingham Blaine Harbor					4760	3967	3174	2380
WA Average	*4,845*	*4,560*	*2,817*	*2,616*	*3,001*	*2,733*	*2,186*	*1,640*
West Coast Average	**3,860**	**3,781**	**2,827**	**2,771**	**2,752**	**2,269**	**1,817**	**1,403**

Figure D-1 Study Areas in IO-PAC

A. West Cost Study Area



B. State Study Areas



C. Port Study Areas

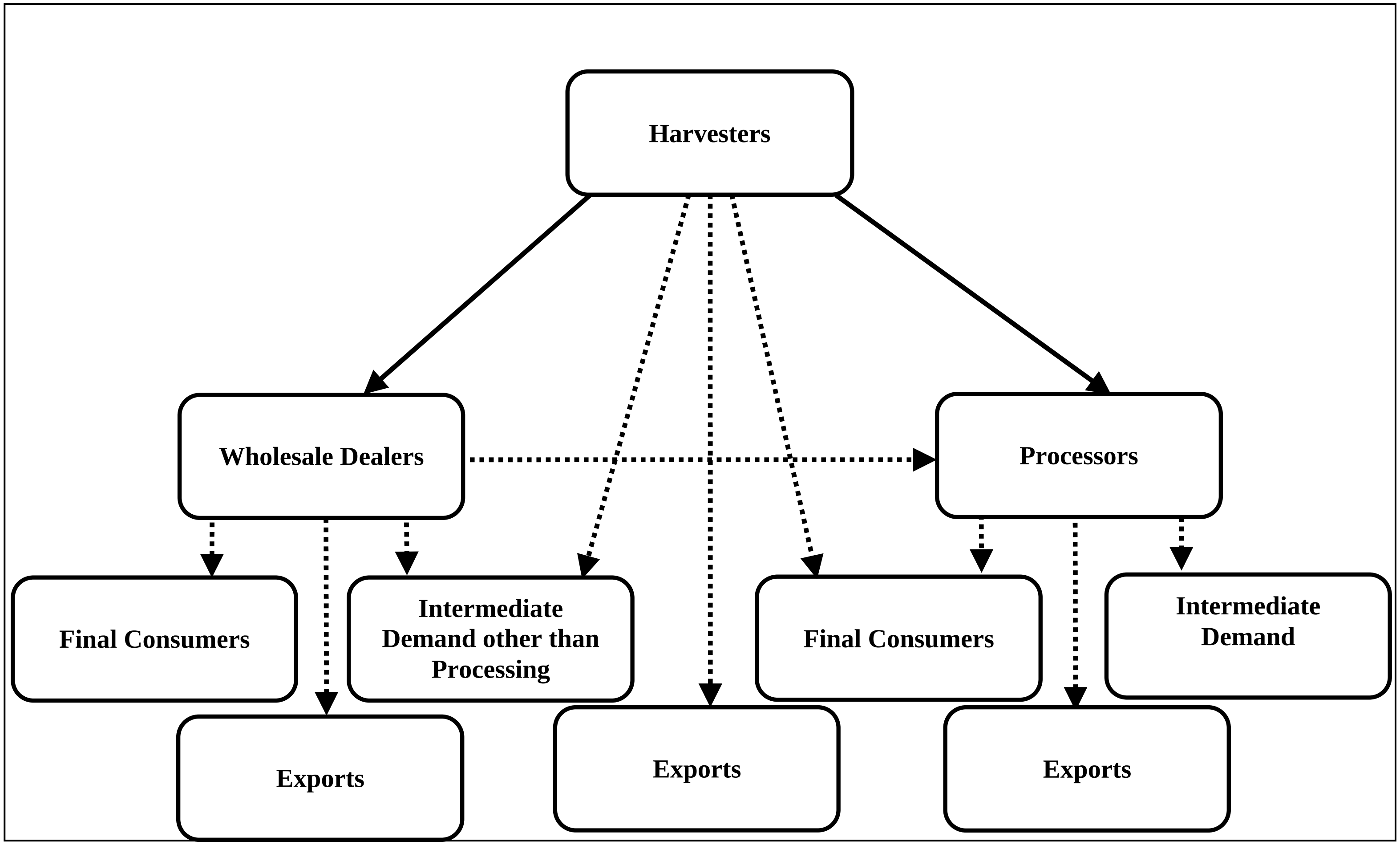


Figure D-2. IO-PAC Product Flows (Product flows illustrated by solid lines are captured in IO-PAC, and those illustrated with the dashed lines are excluded.)

Table D-3. Taxes on Commercial Fishing Vessel Landings

California (Levied on Landing Pounds)	**Rate Per Pound**
All species of fish and shellfish unless otherwise specified	$0.0013
Mollusks and crustaceans, excluding squid and crab	$0.0125
Crab	$0.0019
Squid	$0.0019
Salmon, based only on the weight in the round	$0.0500
Lobster	$0.0125
Abalone	$0.0125
Anchovies	$0.0013
Sardines	$0.0063
Mackerel	$0.0013
Halibut	$0.0125
Angel shark, based only on the weight in the round	$0.0113
Swordfish, based only on the weight in the round	$0.0125
Thresher shark, based only on the weight in the round	$0.0113
Bonito shark, based only on the weight in the round	$0.0113
Herring	$0.0125
Sea urchin	$0.0013
The following fish: Barracuda, Flying fish, Frogs, Giant sea bass, Saltwater worms, White sea bass, Yellowtail	$0.0125
Oregon	**Rate Per Dollar**
All species of fish and shellfish unless otherwise specified	1.09%
Salmon and steelhead	3.15%
Black/Blue Rockfish and Nearshore fish	5.00%
Washington	**Rate Per Dollar**
Food fish or eggs unless otherwise specified	2.30%
Chinook, Coho and Chum salmon, anadromous game fish and eggs	5.60%
Sea urchins and cucumbers	4.90%
Pink and Sockeye fish or eggs	3.40%
Oysters	0.10%
Federal Fees	**Rate Per Dollar**
Pacific Coast Groundfish (using trawl gear)	5.00%
California coastal Dungeness crab	1.24%
California pink shrimp	5.00%
Oregon coastal Dungeness crab	0.55%
Oregon pink shrimp	4.70%
Washington coastal Dungeness crab	0.16%
Washington pink shrimp	1.50%

Table D-4 Industry Categories and Associated IMPLAN Codes

IMPLAN Code	Category Description
510	Mothership catcher processor
511	Alaska fisheries vessel
512	Pacific whiting trawler
513	Large groundfish trawler
514	Small groundfish trawler
515	Sablefish fixed gear
516	Other groundfish fixed gear
517	Pelagic netter
518	Migratory netter

IMPLAN Code	Category Description
519	Migratory liner
520	Shrimper
521	Crabber
522	Salmon troller
523	Salmon netter
524	Other netter
525	Lobster vessel
526	Diver vessel
527	Other, more than 15K
528	Other, less than 15K
561	Bait ship
563	Wholesale seafood dealers

Table D-5. Commodities Added to IMPLAN and Associated Codes

IMPLAN Code	Species Gear Combinations
529	Whiting, At Sea
530	Whiting, Trawl
531	Whiting, Fixed Gear
532	Sablefish, Trawl
533	Sablefish, Fixed Gear
534	Dover/Thornyhead, Trawl
535	Dover/Thornyhead, Fixed Gear
536	Other Groundfish, Trawl
537	Other Groundfish, Fixed Gear
538	Other Groundfish, Net
539	Crab, Trawl
540	Crab, Fixed Gear
541	Crab, Net
542	Crab, Other Gear
543	Shrimp, Trawl
544	Shrimp, Fixed Gear
545	Salmon, Trawl
546	Salmon, Fixed Gear
547	Salmon, Net
548	HMS, Fixed Gear
549	HMS, Net
550	CPS, Trawl
551	CPS, Fixed Gear
552	CPS, Net
553	CPS, Other Gear
554	Halibut, Trawl
555	Halibut, Fixed Gear
556	Halibut, Net
557	Other Species, Trawl
558	Other Species, Fixed Gear
559	Other Species, Net
560	Other Species, Other Gear
562	Bait

Table D-6. Gear Groupings and Associated PacFin Variables

IO-PAC	GearID	Description
Trawl	TWL	TRAWLS EXCEPT SHRIMP TRAWLS
Trawl	TWS	SHRIMP TRAWLS
Fixed Gear	NTW	NON-TRAWL GEAR
Fixed Gear	HKL	HOOK AND LINE GEAR EXCEPT TROLL
Fixed Gear	TLS	TROLL GEAR
Fixed Gear	POT	POT AND TRAP GEAR
Net	NET	NET GEAR EXCEPT TRAWL
Other Gear	MSC	OTHER MISCELLANEOUS GEAR
Other Gear	DRG	DREDGE GEAR

Table D-7. IO-PAC Commodity Groupings

IO-PAC	SPID	Common Name	Scientific Name
CPS	CMCK	CHUB MACKEREL	SCOMBER JAPONICUS
CPS	JMCK	JACK MACKEREL	TRACHURUS SYMMETRICUS
CPS	NANC	NORTHERN ANCHOVY	ENGRAULIS MORDAX
CPS	PBNT	PACIFIC BONITO	SARDA CHILIENSIS
CPS	PHRG	PACIFIC HERRING	CLUPEA HARENGUS PALLASI
CPS	PSDN	PACIFIC SARDINE	SARDINOPS SAGAX
CPS	UMCK	UNSP. MACKEREL	N/A
Crab	BTCR	BAIRDI TANNER CRAB	CHIONOECETES BAIRDI
Crab	DCRB	DUNGENESS CRAB	CANCER MAGISTER
Crab	OCRB	OTHER CRAB	N/A
Crab	RCRB	ROCK CRAB	CANCER PRODUCTUS
Crab	UCRB	UNSPECIFIED CRAB	N/A
Crab	UKCR	UNSP. KING CRAB	N/A
Dover/Thornyhead	DOVR	DOVER SOLE	MICROSTOMUS PACIFICUS
Dover/Thornyhead	LSP1	NOM. LONGSPINE THORNYHEAD	N/A
Dover/Thornyhead	SSP1	NOM. SHORTSPINE THORNYHEAD	N/A
Dover/Thornyhead	THDS	THORNYHEADS (MIXED)	SEBASTOLOBUS SPP
Other Groundfish	ARR1	NOM. AURORA ROCKFISH	N/A
Other Groundfish	ART1	NOM. ARROWTOOTH FLOUNDER	N/A
Other Groundfish	ARTH	ARROWTOOTH FLOUNDER	ATHERESTHES STOMIAS
Other Groundfish	BCC1	NOM. BOCACCIO	N/A
Other Groundfish	BGL1	NOM. BLACKGILL ROCKFISH	N/A
Other Groundfish	BLK1	NOM. BLACK ROCKFISH	N/A
Other Groundfish	BLU1	NOM. BLUE ROCKFISH	N/A
Other Groundfish	BNK1	NOM. BANK ROCKFISH	N/A
Other Groundfish	BRW1	NOM. BROWN ROCKFISH	N/A
Other Groundfish	BRZ1	NOM. BRONZESPOTTED ROCKFISH	N/A
Other Groundfish	BSOL	BUTTER SOLE	ISOPSETTA ISOLEPIS
Other Groundfish	BYL1	NOM. BLACK-AND-YELLOW ROCKFISH	N/A
Other Groundfish	CBZ1	NOM. CABEZON	N/A
Other Groundfish	CBZN	CABEZON	SCORPAENICHTHYS MARMORATUS
Other Groundfish	CHN1	NOM. CHINA ROCKFISH	N/A
Other Groundfish	CLP1	NOM. CHILIPEPPER	N/A

IO-PAC	SPID	Common Name	Scientific Name
Other Groundfish	CNR1	NOM. CANARY ROCKFISH	N/A
Other Groundfish	COP1	NOM. COPPER ROCKFISH	N/A
Other Groundfish	CSOL	CURLFIN SOLE	PLEURONICHTHYS DECURRENS
Other Groundfish	CWC1	NOM. COWCOD ROCKFISH	N/A
Other Groundfish	DBR1	NOM. DARKBLOTCHED ROCKFISH	N/A
Other Groundfish	DSRK	SPINY DOGFISH	SQUALUS ACANTHIAS
Other Groundfish	DVR1	NOM. DOVER SOLE	N/A
Other Groundfish	EGL1	NOM. ENGLISH SOLE	N/A
Other Groundfish	EGLS	ENGLISH SOLE	PAROPHRYS VETULUS
Other Groundfish	FLG1	NOM. FLAG ROCKFISH	N/A
Other Groundfish	FSOL	FLATHEAD SOLE	HIPPOGLOSSOIDES ELASSODON
Other Groundfish	GBL1	NOM. GREENBLOTCHED ROCKFISH	N/A
Other Groundfish	GPH1	NOM. GOPHER ROCKFISH	N/A
Other Groundfish	GRDR	UNSP. GRENADIERS	N/A
Other Groundfish	GRS1	NOM. GRASS ROCKFISH	N/A
Other Groundfish	GSP1	NOM. GREENSPOTTED ROCKFISH	N/A
Other Groundfish	GSR1	NOM. GREENSTRIPED ROCKFISH	N/A
Other Groundfish	HNY1	NOM. HONEYCOMB ROCKFISH	N/A
Other Groundfish	KGL1	NOM. KELP GREENLING	N/A
Other Groundfish	KLP1	NOM. KELP ROCKFISH	N/A
Other Groundfish	LCOD	LINGCOD	OPHIODON ELONGATUS
Other Groundfish	LCD1	NOM. LINGCOD	N/A
Other Groundfish	LSRK	LEOPARD SHARK	TRIAKIS SEMIFASCIATA
Other Groundfish	MXR1	NOM. MEXICAN ROCKFISH	N/A
Other Groundfish	NUSF	NOR. UNSP. SHELF ROCKFISH	N/A
Other Groundfish	NUSP	NOR. UNSP. SLOPE ROCKFISH	N/A
Other Groundfish	NUSR	NOR. UNSP. NEAR-SHORE ROCKFISH	N/A
Other Groundfish	OFLT	OTHER FLATFISH	N/A
Other Groundfish	OGRN	OTHER GROUNDFISH	N/A
Other Groundfish	OLV1	NOM. OLIVE ROCKFISH	N/A
Other Groundfish	PCOD	PACIFIC COD	GADUS MACROCEPHALUS
Other Groundfish	PDAB	PACIFIC SANDDAB	CITHARICHTHYS SORDIDUS
Other Groundfish	PDB1	NOM. PACIFIC SANDDAB	CITHARICHTHYS SPP.
Other Groundfish	PLCK	WALLEYE POLLOCK	THERAGRA CHALCOGRAMMA
Other Groundfish	PNK1	NOM. PINK ROCKFISH	N/A
Other Groundfish	POP2	NOMINAL POP	N/A
Other Groundfish	PTR1	NOM. PETRALE SOLE	N/A
Other Groundfish	PTRL	PETRALE SOLE	EOPSETTA JORDANI
Other Groundfish	QLB1	NOM. QUILLBACK ROCKFISH	N/A
Other Groundfish	RATF	SPOTTED RATFISH	HYDROLAGUS COLLIEI
Other Groundfish	RCK2	UNSP. BOLINA RCKFSH	N/A
Other Groundfish	RCK4	UNSP. REDS RCKFSH	N/A
Other Groundfish	RCK5	UNSP. SMALL REDS RCKFSH	N/A
Other Groundfish	RCK6	UNSP. ROSEFISH RCKFSH	N/A
Other Groundfish	RCK7	UNSP. GOPHER RCKFSH	N/A
Other Groundfish	RDB1	NOM. REDBANDED ROCKFISH	N/A
Other Groundfish	REX	REX SOLE	GLYPTOCEPHALUS ZACHIRUS
Other Groundfish	REX1	NOM. REX SOLE	N/A
Other Groundfish	ROS1	NOM. ROSY ROCKFISH	N/A
Other Groundfish	RSOL	ROCK SOLE	LEPIDOPSETTA BILINEATA
Other Groundfish	RST1	NOM. ROSETHORN ROCKFISH	N/A
Other Groundfish	SBL1	NOM. SHORTBELLY ROCKFISH	N/A

IO-PAC	SPID	Common Name	Scientific Name
Other Groundfish	SCR1	NOM. CALIF. SCORPIONFISH	N/A
Other Groundfish	SFL1	NOM. STARRY FLOUNDER	N/A
Other Groundfish	SNS1	NOM. SPLITNOSE ROCKFISH	N/A
Other Groundfish	SPK1	NOM. SPECKLED ROCKFISH	N/A
Other Groundfish	SSO1	NOM. SAND SOLE	N/A
Other Groundfish	SSOL	SAND SOLE	PSETTICHTHYS MELANOSTICTUS
Other Groundfish	SSRK	SOUPFIN SHARK	GALEORHINUS ZYOPTERUS
Other Groundfish	STR1	NOM. STARRY ROCKFISH	N/A
Other Groundfish	STRY	STARRY FLOUNDER	PLATICHTHYS STELLATUS
Other Groundfish	SWS1	NOM. SWORDSPINE ROCKFISH	N/A
Other Groundfish	TGR1	NOM. TIGER ROCKFISH	N/A
Other Groundfish	TRE1	NOM. TREEFISH	N/A
Other Groundfish	UDAB	UNSP. SANDDABS	CITHARICHTHYS SPP.
Other Groundfish	UDNR	UNSP. DEEP NEAR-SHORE RF	N/A
Other Groundfish	UFLT	UNSP. FLATFISH	N/A
Other Groundfish	UPOP	UNSP. POP GROUP	N/A
Other Groundfish	URCK	UNSP. ROCKFISH	N/A
Other Groundfish	USHR	UNSP. NEAR-SHORE ROCKFISH	N/A
Other Groundfish	USLF	UNSP. SHELF ROCKFISH	N/A
Other Groundfish	USLP	UNSP. SLOPE ROCKFISH	N/A
Other Groundfish	UTRB	UNSP. TURBOTS	N/A
Other Groundfish	VRM1	NOM. VERMILLION ROCKFISH	N/A
Other Groundfish	WDW1	NOM. WIDOW ROCKFISH	N/A
Other Groundfish	YEY1	NOM. YELLOWEYE ROCKFISH	N/A
Other Groundfish	YTR1	NOM. YELLOWTAIL ROCKFISH	N/A
Halibut	CHL1	NOM. CALIF HALIBUT	N/A
Halibut	CHLB	CALIFORNIA HALIBUT	PARALICHTHYS CALIFORNICUS
Halibut	OCRK	OTHER CROAKER	N/A
Halibut	PHLB	PACIFIC HALIBUT	HIPPOGLOSSUS STENOLEPIS
Halibut	WCRK	WHITE CROAKER	GENYONEMUS LINEATUS
HMS	ALBC	ALBACORE	THUNNUS ALALUNGA
HMS	BTNA	BLUEFIN TUNA	THUNNUS THYNNUS
HMS	ETNA	BIGEYE TUNA	THUNNUS OBESUS
HMS	STNA	SKIPJACK TUNA	KATSUWONUS PELAMIS
HMS	UTNA	UNSPECIFIED TUNA	N/A
HMS	YLTL	YELLOWTAIL	SERIOLA LALANDI
HMS	YTNA	YELLOWFIN TUNA	THUNNUS ALBACARES
Other	ASRK	PACIFIC ANGEL SHARK	SQUATINA CALIFORNICA
Other	BCLM	BUTTER CLAM	SAXIDOMUS GIGANTEUS
Other	BMSL	BLUE OR BAY MUSSEL	MYTILUS EDULUS
Other	BSRK	BLUE SHARK	PRIONACE GLAUCA
Other	BTRY	BAT RAY	MYLIOBATIS CALIFORNICA
Other	CKLE	BASKET COCKLE	CLINOCARDIUM NUTTALLIL
Other	CMSL	CALIFORNIA MUSSEL	MYTILUS CALIFORNIANUS
Other	CUDA	PACIFIC BARRACUDA	SPHYRAENA ARGENTEA
Other	DRDO	DORADO	CORYPHAENA HIPPURUS
Other	EELS	UNSPECIFIED EELS	N/A
Other	ESTR	EASTERN OYSTER	CRASSOSTREA VIRGINICA
Other	EULC	EULACHON	THALEICHTHYS PACIFICUS
Other	EURO	EUROPEAN OYSTER	OSTREA EDULIS
Other	GBAS	GIANT SEA BASS	STEREOLEPIS GIGAS
Other	GCLM	GAPER CLAM	TRESUS CAPAX
Other	GDUK	GEODUCK	PANOPE ABRUPTA
Other	GSTG	GREEN STURGEON	ACIPENSER MEDIROSTRIS

IO-PAC	SPID	Common Name	Scientific Name
Other	HCLM	HORSE CLAMS	TRESUS SPP.
Other	ISRK	BIGEYE THRESHER SHARK	ALOPIAS SUPERCILIOSUS
Other	KSTR	KUMAMOTO OYSTER	CRASSOSTREA GIGAS
Other	LCLM	NATIVE LITTLENECK	PROTOTHACA STAMINEA
Other	LOBS	CALIF. SPINY LOBSTER	PANULIRUS INTERRUPTUS
Other	LSTR	OLYMPIA OYSTER	OSTREA LURIDA
Other	MACL	MUD CLAMS	MACOMA SPP.
Other	MAKO	SHORTFIN MAKO SHARK	ISURUS OXYRINCHUS
Other	MCLM	MANILA CLAM	TAPES PHILIPPINARUM
Other	MEEL	MONKEYFACE EEL	CEBIDICHTHYS VIOLACEUS
Other	MISC	MISC. FISH/ANIMALS	N/A
Other	MSC2	MISCELLANEOUS FISH	N/A
Other	MSHP	PLAINFIN MIDSHIPMAN	PORICHTHYS NOTATUS
Other	MSQD	MARKET SQUID	LOLIGO OPALESCENS
Other	OABL	OTHER ABALONE	N/A
Other	OBAS	OTHER BASS	N/A
Other	OCTP	UNSP. OCTOPUS	N/A
Other	OMSK	OTHER MOLLUSKS	N/A
Other	OSKT	OTHER SKATES	OTHER RAJIDAE
Other	OSRK	OTHER SHARK	N/A
Other	OURC	OTHER SEA URCHINS	N/A
Other	PROW	PROWFISH	ZAPRORA SILENUS
Other	PSRK	PELAGIC THRESHER SHARK	ALOPIAS PELAGICUS
Other	PSTR	PACIFIC OYSTER	CRASSOSTREA GIGAS
Other	RCLM	RAZOR CLAM	SILIQUA PATULA
Other	RURC	RED SEA URCHIN	STRONGYLOCENTROTUS FRANCISCANUS
Other	SCLM	SOFT-SHELLED CLAM	MYA ARENARIA
Other	SCLP	UNSP. SCULPIN	COTTIDAE SPP.
Other	SHAD	UNSPECIFIED SHAD	N/A
Other	SHP1	NOM. CALIFORNIA SHEEPHEAD	N/A
Other	SMLT	UNSP. SMELT	N/A
Other	SQID	UNSP. SQUID	DECAPODA
Other	SRFP	SURFPERCH SPP.	SURFPERCH SPP.
Other	SWRD	SWORDFISH	XIPHIAS GLADIUS
Other	TSRK	COMMON THRESHER SHARK	ALOPIAS VULPINUS
Other	UCLM	UNSPECIFIED CLAM	N/A
Other	UECH	UNSPECIFIED ECHINODERM	N/A
Other	UHAG	UNSPECIFIED HAGFISH	EPTATRETUS SP.
Other	UMSK	UNSPECIFIED MOLLUSKS	N/A
Other	USCU	UNSP. SEA CUCUMBERS	N/A
Other	USKT	UNSP. SKATE	UNSPECIFIED RAJIDAE
Other	USRK	UNSP. SHARK	N/A
Other	WBAS	WHITE SEABASS	ATRACTOSCION NOBILIS
Other	WEEL	WOLF EEL	ANARRICHTHYS OCELLATUS
Other	WSTG	WHITE STURGEON	ACIPENSER TRANSMONTANUS
Salmon	CHNK	CHINOOK SALMON	ONCORHYNCHUS TSHAWYTSCHA
Salmon	CHUM	CHUM SALMON	ONCORHYNCHUS KETA
Salmon	COHO	COHO SALMON	ONCORHYNCHUS KISUTCH
Salmon	PINK	PINK SALMON	ONCORHYNCHUS GORBUSCHA
Salmon	SOCK	SOCKEYE SALMON	ONCORHYNCHUS NERKA
Salmon	STLH	STEELHEAD	ONCORHYNCHUS MYKISS
Salmon	USMN	UNSP. SALMON	N/A
Sablefish	SABL	SABLEFISH	ANOPLOPOMA FIMBRIA

IO-PAC	SPID	Common Name	Scientific Name
Shrimp	BSRM	UNSP. BAIT SHRIMP	N/A
Shrimp	GPRW	GOLDEN PRAWN	PENAEUS CALIFORNIENSIS
Shrimp	GSRM	GHOST SHRIMP	CALLIANASSA CALIFORNIENSIS
Shrimp	MSRM	MUD SHRIMP	UPOGEBIA PUGETTENSIS
Shrimp	OSRM	OTHER SHRIMP	N/A
Shrimp	PSHP	PINK SHRIMP	PANDALUS JORDANI
Shrimp	RPRW	RIDGEBACK PRAWN	EUSICYONIA INGENTUS
Shrimp	SPRW	SPOTTED PRAWN	PANDALUS PLATYCEROS
Shrimp	USRM	UNSP. OCEAN SHRIMP	N/A
Whiting	PWHT	PACIFIC WHITING	MERLUCCIUS PRODUCTUS

Table D-8. Landings by Vessel Type and Commodity Code, 2006 Value

IMPLAN Code		Vessel Classification 510	511	512	513	514
529	Whiting, At Sea					
530	Whiting, Trawl			16,049,437	1,135,712	126,452
531	Whiting, Fixed Gear					
532	Sablefish, Trawl			1,068,257	5,730,702	138,606
533	Sablefish, Fixed Gear			138,319	28,729	38,053
534	Dover/Thornyhead, Trawl			551,623	4,604,122	83,753
535	Dover/Thornyhead, Fixed Gear			21	2,423	45
536	Other Groundfish, Trawl			665,810	9,788,725	352,668
537	Other Groundfish, Fixed Gear			235	17,014	3,888
538	Other Groundfish, Net				3,284	45,670
539	Crab, Trawl			35	1,850	77
540	Crab, Fixed Gear			3,349,458	6,782,547	36,395
541	Crab, Net				6,090	1,894
542	Crab, Other Gear					
543	Shrimp, Trawl			21,632	1,300,335	1,182
544	Shrimp, Fixed Gear					
545	Salmon, Trawl			35,861	1,326	1,147
546	Salmon, Fixed Gear				87,169	82,705
547	Salmon, Net					
548	HMS, Fixed Gear			3,629	123,084	
549	HMS, Net				46	1,724
550	CPS, Trawl			6,422	446	
551	CPS, Fixed Gear					
552	CPS, Net				7	1,342
553	CPS, Other Gear					
554	Halibut, Trawl			4,257	1,112,077	597,291
555	Halibut, Fixed Gear			13,817	31,021	41,902
556	Halibut, Net				77,175	198,605
557	Other Species, Trawl			66,680	355,360	39,601
558	Other Species, Fixed Gear			865	487	41,364
559	Other Species, Net				36,319	169,934
560	Other Species, Other Gear					
	Total			**21,976,357**	**31,226,049**	**2,004,297**

IMPLAN Code		Vessel Classification 515	516	517	518
529	Whiting, At Sea				
530	Whiting, Trawl				
531	Whiting, Fixed Gear	76	564		
532	Sablefish, Trawl	53,272			
533	Sablefish, Fixed Gear	7,919,824	661,001	40,726	23
534	Dover/Thornyhead, Trawl	47,975			
535	Dover/Thornyhead, Fixed Gear	269,410	951,126		
536	Other Groundfish, Trawl	72,835			
537	Other Groundfish, Fixed Gear	499,699	1,711,622	2,111	7,336
538	Other Groundfish, Net			24	20,694
539	Crab, Trawl				
540	Crab, Fixed Gear	2,822,517	787,886	608,683	
541	Crab, Net				64
542	Crab, Other Gear				
543	Shrimp, Trawl	40,758			

544	Shrimp, Fixed Gear	5,175			
545	Salmon, Trawl				
546	Salmon, Fixed Gear	913,815	119,999	11,461	63,198
547	Salmon, Net	97,408	30,329	431,989	
548	HMS, Fixed Gear	248,577	15,015	1,464	326,417
549	HMS, Net			99,204	28,216
550	CPS, Trawl				
551	CPS, Fixed Gear	7	1,383	14,157	10
552	CPS, Net	482		13,428,930	2,525
553	CPS, Other Gear			130	
554	Halibut, Trawl	2,167	191		578
555	Halibut, Fixed Gear	1,937,697	4,419,302	374	57
556	Halibut, Net			4,532	24,823
557	Other Species, Trawl	580			
558	Other Species, Fixed Gear	103,281	35,273	14,958	5,768
559	Other Species, Net	294	23,352	26,808,914	2,481,457
560	Other Species, Other Gear	2,176	22,474		556,267
	Total	**15,038,025**	**8,779,517**	**41,467,657**	**3,517,434**

		Vessel Classification			
IMPLAN Code		**519**	**520**	**521**	**522**
529	Whiting, At Sea				
530	Whiting, Trawl		248	120,114	
531	Whiting, Fixed Gear			75	
532	Sablefish, Trawl			404,879	
533	Sablefish, Fixed Gear	164,342	22,474	5,692,071	325,330
534	Dover/Thornyhead, Trawl			265,548	
535	Dover/Thornyhead, Fixed Gear	85		6,655	1,133
536	Other Groundfish, Trawl		5,046	428,986	
537	Other Groundfish, Fixed Gear	5,537	20,897	382,240	94,442
538	Other Groundfish, Net			2,321	
539	Crab, Trawl	738	149		
540	Crab, Fixed Gear	2,456,793	3,265,246	120,966,903	156,663
541	Crab, Net		212	10,137	
542	Crab, Other Gear			23,912	1,677
543	Shrimp, Trawl	26,239	5,068,270	685,320	
544	Shrimp, Fixed Gear		4,073,820	784,724	
545	Salmon, Trawl			4	
546	Salmon, Fixed Gear	819,124	9,952	2,857,295	4,633,803
547	Salmon, Net		85,904	3,952,646	21,664
548	HMS, Fixed Gear	17,765,249	123,245	4,887,944	204,346
549	HMS, Net	2,424		2,803	146
550	CPS, Trawl		40	11	
551	CPS, Fixed Gear	2,884	36	894	357
552	CPS, Net	38		262,979	11
553	CPS, Other Gear			2,152	
554	Halibut, Trawl		20,490	10,972	
555	Halibut, Fixed Gear	140,159	49,680	2,536,750	279,460
556	Halibut, Net		582		
557	Other Species, Trawl		69,948	13,421	
558	Other Species, Fixed Gear	116,537	575,411	434,165	372

559	Other Species, Net	160,485	1,918	397,151	514
560	Other Species, Other Gear	80,051	263	39,955	
	Total	**21,740,683**	**13,393,830**	**145,173,028**	**5,719,919**

		Vessel Classification			
IMPLAN Code		**523**	**524**	**525**	**526**
529	Whiting, At Sea				
530	Whiting, Trawl				
531	Whiting, Fixed Gear				
532	Sablefish, Trawl				
533	Sablefish, Fixed Gear	11,554		17,637	
534	Dover/Thornyhead, Trawl				
535	Dover/Thornyhead, Fixed Gear			33	
536	Other Groundfish, Trawl				
537	Other Groundfish, Fixed Gear	160	5,379	65,764	51,480
538	Other Groundfish, Net	3,006	19,625	758	
539	Crab, Trawl			40	
540	Crab, Fixed Gear	492,963	50,117	190,637	587
541	Crab, Net			365	
542	Crab, Other Gear				148
543	Shrimp, Trawl	8,032			
544	Shrimp, Fixed Gear	89,887		19,811	
545	Salmon, Trawl				
546	Salmon, Fixed Gear	17,435	6,087	10,338	
547	Salmon, Net	18,003,891	18,040		
548	HMS, Fixed Gear	28		5,946	58
549	HMS, Net		13,205		
550	CPS, Trawl				
551	CPS, Fixed Gear			5,894	
552	CPS, Net	7,316	459	18,440	
553	CPS, Other Gear				
554	Halibut, Trawl		96	224	
555	Halibut, Fixed Gear	14,731	827	225,269	46,328
556	Halibut, Net		79,352	22,218	
557	Other Species, Trawl		45	84	58
558	Other Species, Fixed Gear	744	165,103	6,818,270	34,364
559	Other Species, Net	524,956	1,607,932	39,449	1,730
560	Other Species, Other Gear			71,345	5,264,819
	Total	**19,174,704**	**1,966,268**	**7,512,522**	**5,399,571**

		Vessel Classification		
IMPLAN Code		**527**	**528**	**Total for all Vessel Classifications**
529	Whiting, At Sea			
530	Whiting, Trawl			17,431,963
531	Whiting, Fixed Gear		12	727
532	Sablefish, Trawl	323	2,810	7,398,850

533	Sablefish, Fixed Gear	122,157	424,009	15,606,247
534	Dover/Thornyhead, Trawl	467	1,973	5,555,461
535	Dover/Thornyhead, Fixed Gear	1,193	36,329	1,268,452
536	Other Groundfish, Trawl	5,084	16,031	11,335,185
537	Other Groundfish, Fixed Gear	10,211	804,012	3,682,029
538	Other Groundfish, Net	107	13,314	108,804
539	Crab, Trawl		235	3,125
540	Crab, Fixed Gear	101,143	1,705,317	143,773,854
541	Crab, Net	193	1,937	20,892
542	Crab, Other Gear	250	36,397	62,383
543	Shrimp, Trawl	16,300	26,905	7,194,972
544	Shrimp, Fixed Gear	1,168	82,518	5,057,102
545	Salmon, Trawl			38,338
546	Salmon, Fixed Gear	64,544	461,978	10,158,902
547	Salmon, Net	628,156	1,470,652	24,740,680
548	HMS, Fixed Gear	5,452	390,513	24,100,967
549	HMS, Net		4,008	151,777
550	CPS, Trawl	2		6,920
551	CPS, Fixed Gear	1,859	11,647	39,129
552	CPS, Net		285,975	14,008,503
553	CPS, Other Gear			2,282
554	Halibut, Trawl	16,092	27,270	1,791,705
555	Halibut, Fixed Gear	185,968	312,887	10,236,229
556	Halibut, Net	4,238	54,062	465,586
557	Other Species, Trawl	92,431	7,696	645,904
558	Other Species, Fixed Gear	592,652	277,637	9,217,251
559	Other Species, Net	190,355	247,098	32,691,859
560	Other Species, Other Gear	80,754,211	417,122	87,208,682
	Total	**82,794,555**	**7,120,343**	**434,004,758**

Table D-9. WA Enhanced Food Fish Tax by NAICS, Calendar Year 2006

NAICS	NAICS Title	Share of Tax
114111	FinFishing	12.6%
114112	Shellfish Fishing	1.1%
311711	Seafood Canning	12.1%
311712	Fresh and Frozen Seafood Processing	30.1%
423910	Sporting and Recreational Goods and Supplies Merchant Wholesalers	0.1%
424460	Fish and Seafood Merchant Wholesalers	30.2%
424490	Other Grocery and Related Products Merchant Wholesalers	4.2%
445220	Fish and Seafood Markets	4.6%
451110	Sporting Goods Stores	0.1%
454390	Other Direct Selling Establishments	1.3%
713930	Marinas	0.7%
999999	Miscellaneous	2.9%

Table D-10. Commercial Fishing Production Functions. ***Percentages not shown due to confidentiality restrictions.

Expenditure Categories	Mothership Catcher/ Processor	Alaska	Pacific Whiting Trawler	Large Groundfish Trawler	Small Groundfish Trawler	Sablefish Fixed Gear	Other Groundfish Fixed Gear	Migratory Liner	Pelagic Netter	Migratory Netter
	Percentage Distribution									
Captain			14.3%	18.9%	18.9%	18.2%	30.1%	20.1%	20.1%	20.1%
Crew			18.4%	20.9%	20.9%	33.6%	18.1%	20.2%	20.2%	20.2%
Fuel & lubricants			12.0%	12.4%	12.4%	4.5%	12.0%	9.3%	9.3%	9.3%
Food and crew provisions			1.4%	1.1%	1.1%	1.6%	2.8%	1.8%	1.8%	1.8%
Ice			0.1%	1.9%	1.9%	0.3%	0.7%	1.0%	1.0%	1.0%
Bait			0.4%	1.2%	1.2%	4.5%	5.6%	2.4%	2.4%	2.4%
Repair & maintenance: vessel, gear, and equipment			19.8%	18.2%	18.2%	8.0%	17.2%	15.5%	15.5%	15.5%
Insurance			***	5.7%	5.7%	2.2%	1.0%	3.8%	3.8%	3.8%
Interest and financial services			***	1.7%	1.7%	0.9%	1.0%	1.1%	1.1%	1.1%
Purchases of permits			1.0%	1.8%	1.8%	0.6%	0.5%	1.1%	1.1%	1.1%
Leasing of permits			0.0%	1.2%	1.2%	5.8%	0.1%	1.0%	1.0%	1.0%
Moorage			0.3%	0.8%	0.8%	1.0%	2.0%	1.3%	1.3%	1.3%
Landings Taxes			3.7%	4.1%	1.1%	0.9%	0.6%	2.0%	2.0%	2.0%
Other Miscellaneous			5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Proprietary income			13.9%	5.2%	8.2%	12.9%	3.4%	14.5%	14.5%	14.5%
Total			100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Expenditure Categories	Shrimper	Crabber	Salmon Troller	Salmon Netter	Other Netter	Lobster	Diver	Other >15,000	Other <15,000
	Percentage Distribution								
Captain	20.1%	17.3%	30.2%	20.1%	20.1%	20.1%	20.1%	***	10.8%
Crew	20.2%	22.7%	12.1%	20.2%	20.2%	20.2%	20.2%	***	1.9%
Fuel & lubricants	9.3%	5.7%	11.6%	9.3%	9.3%	9.3%	9.3%	***	11.1%
Food and crew provisions	1.8%	1.1%	4.0%	1.8%	1.8%	1.8%	1.8%	***	2.1%
Ice	1.0%	0.5%	1.8%	1.0%	1.0%	1.0%	1.0%	***	0.7%
Bait	2.4%	3.1%	1.4%	2.4%	2.4%	2.4%	2.4%	***	0.3%
Repair & maintenance: vessel, gear, and equipment	15.5%	12.0%	20.3%	15.5%	15.5%	15.5%	15.5%	***	9.5%
Insurance	3.8%	3.1%	2.7%	3.8%	3.8%	3.8%	3.8%	***	1.2%
Interest and financial services	1.1%	0.5%	1.4%	1.1%	1.1%	1.1%	1.1%	***	0.5%
Purchases of permits	1.1%	0.7%	1.5%	1.1%	1.1%	1.1%	1.1%	***	0.8%
Leasing of permits	1.0%	0.4%	0.0%	1.0%	1.0%	1.0%	1.0%	***	0.0%
Moorage	1.3%	0.7%	3.1%	1.3%	1.3%	1.3%	1.3%	***	3.3%
Landings Taxes	2.0%	1.0%	1.3%	2.0%	2.0%	2.0%	2.0%	***	0.7%
Other Miscellaneous	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	***	5.0%
Proprietary income	14.5%	26.2%	3.6%	14.5%	14.5%	14.5%	14.5%	***	52.1%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Table D-11. Seafood Wholesale Dealer Production Function

Expenditure Category	Seafood Wholesale Dealer
Ice	2.80%
Packaging: boxes	2.70%
Shipping	4.10%
Storage	14.70%
Advertising	4.00%
Rent	6.80%
Repair & Maintenance: building	6.90%
Vehicle	4.10%
Utilities: electric	1.37%
Utilities: gas	1.37%
Utilities: telephone	1.37%
Insurance	4.10%
Professional fees	0.70%
Building principal payment	4.00%
Interest payment: building	1.40%
Bank service charge	0.08%
Taxes	2.12%
Employee compensation	33.35%
Proprietary income	4.05%
Total	100.00%

Table D-12. IMPLAN Tables. Table reprinted nearly in entirety from Steinback and Thunberg (2006).

Table Name	Description
Industry/Commodity Codes Type Codes	Codes (Modified)
Margins Codes	Codes
*US Absorption Table *US Absorption Totals *US Byproducts Table *SACommodity Sales *SAEmployment *SAFinal Demands *SAForeign Exports *SAOutput *SAValue Added	Raw input data (Modified)
SATransfers	Raw input study area data
*Observed RPCs *RPC Methods	Raw input data (Modified)
Margins Deflators	Raw input data
General Information Model Specs Multiplier Specs	Model-building information
SARatios	Ratios for impact and multiplier calculations
IMCommodity Transactions IMEvents IMFactor Transactions IMGroups IMIndustry Transactions IMInstitutions Transactions IMMargins IMProjects	Impact report data (Empty before impact analysis)
Regional Absorption Regional Byproducts Regional Commodity Balances Regional Direct Institutional Requirements Regional Factor Balances Regional Industry Balances Regional Institution Balances Regional Institution Demand Regional IxI Regional Market Shares Regional Multipliers Induced Regional Multipliers Type I Regional SAM Balances Regional SAM Balances Aggregated Regional SAM Balances Industry Detail Regional SAM Balances IxI Regional SAM Balances IxI Industry Detail Regional Sam Distribution Regional Value Added Coefficients	Output/report data for regional I-O model (Empty before impact analysis)
rptEC Multipliers rptEmployment Multipliers rptIBT Multipliers rptOPTI Multipliers rptOutput Multipliers rptPersonal Income Multipliers rptPropInc Multipliers rptTotal VA Multipliers	Ouput reports
rptSAFinal Demands rptSAIndustry Data	Data from SAFinal Demands and SAForeign Exports (Modified) Data from SAOutput, SAEmployment & SAValue Added (Modified)
SAM Rollup	SAM report data
Tax Impacts	Tax report data
Type Code Rollup	Type code report data
CGE Account	Output data for computable general equilibrium models

Table D-13. Impact of Reduced Harvest among Sablefish Fixed Gear Vessels

Aggregated Output Impact Report (2009 dollars)

Industry	Direct	Indirect	Induced	Total
11 Ag, Forestry, Fish & Hunting	0	-12,863	-4,186	-17,049
21 Mining	0	-2,829	-2,061	-4,890
22 Utilities	0	-12,670	-9,947	-22,616
23 Construction	0	-9,481	-3,432	-12,913
31-33 Manufacturing	-756,412	-47,847	-74,074	-878,333
42 Wholesale Trade	0	-126,517	-35,489	-162,006
48-49 Transportation & Warehousing	0	-45,520	-16,217	-61,736
44-45 Retail trade	0	-22,131	-71,503	-93,635
51 Information	0	-13,633	-22,645	-36,278
52 Finance & insurance	0	-37,516	-54,589	-92,106
53 Real estate & rental	0	-25,595	-32,416	-58,011
54 Professional- scientific & tech services	0	-43,213	-29,217	-72,431
55 Management of companies	0	-47,187	-7,835	-55,022
56 Administrative & waste services	0	-18,581	-13,163	-31,743
61 Educational services	0	-240	-9,578	-9,818
62 Health & social services	0	-12	-86,372	-86,384
71 Arts- entertainment & recreation	0	-9,719	-9,098	-18,817
72 Accommodation & food services	0	-5,856	-32,900	-38,756
81 Other services	0	-10,052	-24,500	-34,553
92 Government & non NAICs	0	-8,099	-78,316	-86,415
Sablefish fixed gear	-500,000	0	0	-500,000
Bait Ship	0	-22,309	0	-22,309
Wholesale Seafood	-100,000	0	0	-100,000
Total	**-1,356,412**	**-521,870**	**-617,538**	**-2,495,820**

Table D-14. (continued)

Aggregated Value Added Impact Report (2009 dollars)

Industry	Direct	Indirect	Induced	Total
11 Ag, Forestry, Fish & Hunting	0	-2,302	-1,554	-3,856
21 Mining	0	-1,627	-1,185	-2,812
22 Utilities	0	-7,145	-6,362	-13,507
23 Construction	0	-4,493	-1,695	-6,188
31-33 Manufacturing	-154,787	-9,345	-17,619	-181,750
42 Wholesale Trade	0	-85,321	-23,933	-109,254
48-49 Transportation & Warehousing	0	-28,418	-9,040	-37,458
44-45 Retail trade	0	-14,917	-47,817	-62,734
51 Information	0	-6,793	-11,110	-17,903
52 Finance & insurance	0	-22,450	-30,940	-53,389
53 Real estate & rental	0	-16,666	-21,500	-38,166
54 Professional- scientific & tech services	0	-22,943	-16,410	-39,353
55 Management of companies	0	-28,348	-4,707	-33,054
56 Administrative & waste services	0	-11,280	-8,264	-19,544

61 Educational services	0	-140	-5,802	-5,942
62 Health & social services	0	-6	-55,027	-55,033
71 Arts- entertainment & recreation	0	-5,827	-5,664	-11,491
72 Accommodation & food services	0	-3,497	-17,367	-20,864
81 Other services	0	-5,324	-13,399	-18,723
92 Government & non NAICs	0	-4,299	-63,858	-68,158
Sablefish fixed gear	-360,311	0	0	-360,311
Bait Ship	0	-8,709	0	-8,709
Wholesale Seafood	-43,520	0	0	-43,520
Total	**-558,618**	**-289,850**	**-363,251**	**-1,211,719**

Table d-14. (continued)

Aggregated Employment Impact Report (Full and Part Time)

Industry	Direct	Indirect	Induced	Total
11 Ag, Forestry, Fish & Hunting	0	-0.3	0	-0.3
21 Mining	0	0	0	0
22 Utilities	0	0	0	0
23 Construction	0	-0.1	0	-0.1
31-33 Manufacturing	-2.4	-0.1	-0.2	-2.6
42 Wholesale Trade	0	-0.6	-0.2	-0.8
48-49 Transportation & Warehousing	0	-0.4	-0.1	-0.6
44-45 Retail trade	0	-0.3	-0.8	-1.1
51 Information	0	0	-0.1	-0.1
52 Finance & insurance	0	-0.1	-0.2	-0.4
53 Real estate & rental	0	-0.1	-0.2	-0.3
54 Professional- scientific & tech services	0	-0.3	-0.2	-0.5
55 Management of companies	0	-0.2	0	-0.2
56 Administrative & waste services	0	-0.3	-0.2	-0.5
61 Educational services	0	0	-0.2	-0.2
62 Health & social services	0	0	-0.9	-0.9
71 Arts- entertainment & recreation	0	-0.1	-0.1	-0.3
72 Accommodation & food services	0	-0.1	-0.5	-0.6
81 Other services	0	-0.1	-0.4	-0.5
92 Government & non NAICs	0	0	-0.1	-0.1
Sablefish fixed gear	-14.2	0	0	-14.2
Wholesale Seafood	-0.8	0	0	-0.8
Total	**-17.4**	**-3.1**	**-4.4**	**-25**

Table D-14. Impact of Reduced Sablefish Harvest Using Fixed Gear (Commodity Scenario

Aggregated Output Impact Report (2009 dollars)

Industry	Direct	Indirect	Induced	Total
11 Ag, Forestry, Fish & Hunting	0	-12,858	-4,174	-17,032
21 Mining	0	-3,037	-2,055	-5,092
22 Utilities	0	-12,710	-9,918	-22,628
23 Construction	0	-9,091	-3,423	-12,514
31-33 Manufacturing	-756,412	-50,524	-73,861	-880,797
42 Wholesale Trade	0	-128,903	-35,387	-164,290
48-49 Transportation & Warehousing	0	-45,498	-16,170	-61,669
44-45 Retail trade	0	-23,714	-71,298	-95,011
51 Information	0	-13,741	-22,580	-36,321
52 Finance & insurance	0	-38,496	-54,433	-92,929
53 Real estate & rental	0	-25,752	-32,322	-58,074
54 Professional- scientific & tech services	0	-43,414	-29,133	-72,548
55 Management of companies	0	-47,338	-7,812	-55,150
56 Administrative & waste services	0	-18,692	-13,125	-31,816
61 Educational services	0	-243	-9,551	-9,794
62 Health & social services	0	-12	-86,124	-86,136
71 Arts- entertainment & recreation	0	-9,757	-9,072	-18,829
72 Accommodation & food services	0	-5,887	-32,806	-38,693
81 Other services	0	-10,080	-24,430	-34,511
92 Government & non NAICs	0	-8,119	-78,092	-86,211
Pacific whiting trawler	-4,432	0	0	-4,432
Large groundfish trawler	-920	0	0	-920
Small groundfish trawler	-1,219	0	0	-1,219
Sablefish fixed gear	-253,739	0	0	-253,739
Other groundfish fixed gear	-21,177	0	0	-21,177
Pelagic netter	-1,305	0	0	-1,305
Migratory liner	-5,265	0	0	-5,265
Shrimper	-720	0	0	-720
Crabber	-182,365	0	0	-182,365
Salmon troller	-10,423	0	0	-10,423
Salmon netter	-370	0	0	-370
Lobster vessel	-565	0	0	-565
Other, more than 15K	-3,914	0	0	-3,914
Other, less than 15K	-13,585	0	0	-13,585
Bait Ship	0	-18,839	0	-18,839
Wholesale Seafood	-100,000	0	0	-100,000
Total	**-1,356,412**	**-526,706**	**-615,765**	**-2,498,883**

Table D-15 (continued)

Aggregated Value Added Impact Report (2009 dollars)

Industry	Direct	Indirect	Induced	Total
11 Ag, Forestry, Fish & Hunting	0	-2,301	-1,550	-3,850
21 Mining	0	-1,747	-1,182	-2,929
22 Utilities	0	-7,170	-6,343	-13,513
23 Construction	0	-4,312	-1,690	-6,002
31-33 Manufacturing	-154,787	-9,706	-17,568	-182,061
42 Wholesale Trade	0	-86,930	-23,864	-110,794
48-49 Transportation & Warehousing	0	-28,375	-9,014	-37,389
44-45 Retail trade	0	-15,996	-47,679	-63,676
51 Information	0	-6,846	-11,078	-17,924
52 Finance & insurance	0	-22,867	-30,851	-53,718
53 Real estate & rental	0	-16,773	-21,437	-38,210
54 Professional- scientific & tech services	0	-23,055	-16,363	-39,418
55 Management of companies	0	-28,438	-4,693	-33,131
56 Administrative & waste services	0	-11,350	-8,241	-19,591
61 Educational services	0	-142	-5,785	-5,927
62 Health & social services	0	-6	-54,869	-54,875
71 Arts- entertainment & recreation	0	-5,851	-5,648	-11,499
72 Accommodation & food services	0	-3,515	-17,317	-20,832
81 Other services	0	-5,339	-13,360	-18,699
92 Government & non NAICs	0	-4,312	-63,677	-67,988
Pacific whiting trawler	-2,265	0	0	-2,265
Large groundfish trawler	-479	0	0	-479
Small groundfish trawler	-634	0	0	-634
Sablefish fixed gear	-182,850	0	0	-182,850
Other groundfish fixed gear	-11,154	0	0	-11,154
Pelagic netter	-769	0	0	-769
Migratory liner	-3,102	0	0	-3,102
Shrimper	-424	0	0	-424
Crabber	-124,696	0	0	-124,696
Salmon troller	-5,081	0	0	-5,081
Salmon netter	-218	0	0	-218
Lobster vessel	-333	0	0	-333
Other, more than 15K	-1,479	0	0	-1,479
Other, less than 15K	-9,005	0	0	-9,005
Bait Ship	0	-7,354	0	-7,354
Wholesale Seafood	-43,520	0	0	-43,520
Total	**-540,795**	**-292,385**	**-362,209**	**-1,195,388**

Table D-15 (continued)

Aggregated Employment Impact Report (Full and Part Time)

Industry	Direct	Indirect	Induced	Total
11 Ag, Forestry, Fish & Hunting	0	-0.3	0	-0.3
21 Mining	0	0	0	0
22 Utilities	0	0	0	0
23 Construction	0	-0.1	0	-0.1
31-33 Manufacturing	-2.4	-0.1	-0.2	-2.6
42 Wholesale Trade	0	-0.6	-0.2	-0.8
48-49 Transportation & Warehousing	0	-0.4	-0.1	-0.6
44-45 Retail trade	0	-0.3	-0.8	-1.1
51 Information	0	0	-0.1	-0.1
52 Finance & insurance	0	-0.2	-0.2	-0.4
53 Real estate & rental	0	-0.1	-0.2	-0.3
54 Professional- scientific & tech services	0	-0.3	-0.2	-0.5
55 Management of companies	0	-0.2	0	-0.2
56 Administrative & waste services	0	-0.3	-0.2	-0.5
61 Educational services	0	0	-0.2	-0.2
62 Health & social services	0	0	-0.9	-0.9
71 Arts- entertainment & recreation	0	-0.1	-0.1	-0.3
72 Accommodation & food services	0	-0.1	-0.5	-0.6
81 Other services	0	-0.1	-0.4	-0.5
92 Government & non NAICs	0	0	-0.1	-0.1
Small groundfish trawler	-0.1	0	0	-0.1
Sablefish fixed gear	-7.2	0	0	-7.2
Other groundfish fixed gear	-0.7	0	0	-0.7
Migratory liner	-0.2	0	0	-0.2
Crabber	-3.8	0	0	-3.8
Salmon troller	-0.8	0	0	-0.8
Other, less than 15K	-7.1	0	0	-7.1
Wholesale Seafood	-0.8	0	0	-0.8
Total	**-23.2**	**-3.2**	**-4.4**	**-30.7**

APPENDIX A: IO-PAC Port Groupings

APPENDIX A - IO-PAC Port Groupings				
IO-PAC State	**IO-PAC Port Group**	**PCID**	**PORT NAME (PNAME)**	**AGID**
CA	Bodega Bay	BDG	BODEGA BAY	C
CA	Bodega Bay	RYS	POINT REYES	C
CA	Bodega Bay	SLT	SAUSALITO	C
CA	Bodega Bay	TML	TOMALES BAY	C
CA	Bodega Bay	OSM	OTHER SONOMA AND MARIN COUNTY OUTER COAST PORTS	C
CA	Crescent City	CRS	CRESCENT CITY	C
CA	Eureka	ERK	EUREKA	C
CA	Eureka	FLN	FIELDS LANDING	C
CA	Eureka	OHB	OTHER HUMBOLDT COUNTY PORTS	C
CA	Eureka	TRN	TRINIDAD	C
CA	Fort Bragg	ALB	ALBION	C
CA	Fort Bragg	ARE	POINT ARENA	C
CA	Fort Bragg	BRG	FORT BRAGG	C
CA	Fort Bragg	OMD	OTHER MENDOCINO COUNTY PORTS	C
CA	Los Angeles	DNA	DANA POINT	C
CA	Los Angeles	LGB	LONG BEACH	C
CA	Los Angeles	NWB	NEWPORT BEACH	C
CA	Los Angeles	OLA	OTHER LA AND ORANGE COUNTY PORTS	C
CA	Los Angeles	SP	SAN PEDRO	C
CA	Los Angeles	TRM	TERMINAL ISLAND	C
CA	Los Angeles	WLM	WILLMINGTON	C
CA	Monterey	CRZ	SANTA CRUZ	C
CA	Monterey	MNT	MONTEREY	C
CA	Monterey	MOS	MOSS LANDING	C
CA	Monterey	OCM	OTHER SANTA CRUZ AND MONTEREY COUNTY PORTS	C
CA	Morro Bay	AVL	AVILA	C
CA	Morro Bay	MRO	MORRO BAY	C
CA	Morro Bay	OSL	OTHER SAN LUIS OBISPO COUNTY PORTS	C
CA	San Diego	OCN	OCEANSIDE	C
CA	San Diego	OSD	OTHER SAN DIEGO COUNTY PORTS	C
CA	San Diego	SD	SAN DIEGO	C
CA	San Francisco	ALM	ALAMEDA	C
CA	San Francisco	BKL	BERKELEY	C
CA	San Francisco	OAK	OAKLAND	C

APPENDIX A - IO-PAC Port Groupings				
IO-PAC State	**IO-PAC Port Group**	**PCID**	**PORT NAME (PNAME)**	**AGID**
CA	San Francisco	OSF	OTHER S. F. BAY AND SAN MATEO COUNTY PORTS	C
CA	San Francisco	PRN	PRINCETON / HALF MOON BAY	C
CA	San Francisco	RCH	RICHMOND	C
CA	San Francisco	SF	SAN FRANCISCO	C
CA	Santa Barbara	HNM	PORT HUENEME	C
CA	Santa Barbara	OBV	OTHER SANTA BARBARA AND VENTURA COUNTY PORTS	C
CA	Santa Barbara	OXN	OXNARD	C
CA	Santa Barbara	SB	SANTA BARBARA	C
CA	Santa Barbara	VEN	VENTURA	C
OR	Astoria-Tillamook	AST	ASTORIA	O
OR	Astoria-Tillamook	CNB	CANNON BEACH	O
OR	Astoria-Tillamook	GSS	GEARHART - SEASIDE	O
OR	Astoria-Tillamook	NHL	NEHALEM BAY	O
OR	Astoria-Tillamook	NTR	NETARTS BAY	O
OR	Astoria-Tillamook	PCC	PACIFIC CITY	O
OR	Astoria-Tillamook	TLL	TILLAMOOK/GARIBALDI	O
OR	Brookings	BRK	BROOKINGS	
OR	Brookings	GLD	GOLD BEACH	O
OR	Brookings	ORF	PORT ORFORD	O
OR	Columbia River	CRV	PSUEDO PORT CODE FOR COLUMBIA RIVER	O
OR	Coos Bay	BDN	BANDON	O
OR	Coos Bay	COS	CHARLESTON (COOS BAY)	O
OR	Coos Bay	FLR	FLORENCE	O
OR	Coos Bay	WIN	WINCHESTER BAY	O
OR	Newport	DPO	DEPOE BAY	O
OR	Newport	NEW	NEWPORT	O
OR	Newport	WLD	WALDPORT	O
WA	North Washington Coast	LAP	LA PUSH	W
WA	North Washington Coast	NEA	NEAH BAY	W
WA	North Washington Coast	PAG	PORT ANGELES	W
WA	North Washington Coast	SEQ	SEQUIM	W
WA	North Washington Coast	TNS	PORT TOWNSEND	W
WA	Puget Sound	ANA	ANACORTES	W
WA	Puget Sound	BLL	BELLINGHAM BAY	W
WA	Puget Sound	BLN	BLAINE	W
WA	Puget Sound	EVR	EVERETT	W
WA	Puget Sound	FRI	FRIDAY HARBOR	W
WA	Puget Sound	LAC	LA CONNER	W
WA	Puget Sound	OLY	OLYMPIA	W
WA	Puget Sound	ONP	OTHER NORTH PUGET SOUND PORTS	W
WA	Puget Sound	SEA	SEATTLE	W

APPENDIX A - IO-PAC Port Groupings				
IO-PAC State	**IO-PAC Port Group**	**PCID**	**PORT NAME (PNAME)**	**AGID**
WA	Puget Sound	SHL	SHELTON	W
WA	Puget Sound	TAC	TACOMA	W
WA	South & Central WA Coast	CPL	COPALIS BEACH	W
WA	South & Central WA Coast	GRH	GRAYS HARBOR	W
WA	South & Central WA Coast	LWC	ILWACO/CHINOOK	W
WA	South & Central WA Coast	OCR	OTHER COLUMBIA RIVER PORTS	W
WA	South & Central WA Coast	WLB	WILLAPA BAY	W
WA	South & Central WA Coast	WPT	WESTPORT	W

APPENDIX B: Bridge between Expenditures and IMPLAN Pro Sectors

Factor expenditures by harvesters and seafood wholesalers were allocated to IMPLAN sectors. The following tables represent the bridge between harvester and seafood wholesaler expenditures, and IMPLAN sectors. These allocations often follow the scheme developed by Steinback and Thunberg (2006).

Harvester Expenditures

Fuel and lubricant expenses were allocated based on the IMPLAN default margin table for Sector 142 (Petroleum Refineries).

Fuel and Lubricants

IMPLAN Sector	Sector Title	Proportion
142	Petroleum Refineries	0.393794
390	Wholesale Trade	0.361077
392	Rail Transportation	0.006754
393	Water Transportation	0.005192
394	Truck Transportation	0.008658
396	Pipeline Transportation	0.004953
407	Gasoline Stations	0.219571
	Total	1.00

Food and beverage expenses were allocated based on the IMPLAN Personal Consumption Expenditure (PCE) vector 1111. This PCE vector represents the national average expenditure pattern for groceries that comes from The PCE vector represents the national average expenditure pattern for groceries. However, following the approach of Steinback and Thunberg (2005), purchases associated with the two default seafood sectors (i.e., commercial fishing and seafood product preparation and packaging) were reallocated to Sector 60 (frozen food manufacturing). This allocation is believed to better reflect likely consumption habits aboard commercial fishing vessels.

Groceries

IMPLAN Sector	Sector Title	Proportion
1	Oilseed farming	6.36E-05
2	Grain farming	0.000379
3	Vegetable and melon farming	0.022642
4	Tree nut farming	0.000749
5	Fruit farming	0.014302
6	Greenhouse and nursery production	0.000652
10	All other crop farming	0.000203
12	Poultry and egg production	0.006205
15	Forest nurseries, forest products, and timber	0.000137
26	Other nonmetallic mineral mining	1E-05
46	Dog and cat food manufacturing	0.016556
47	Other animal food manufacturing	0.002251
48	Flour milling	0.00234
49	Rice milling	0.001427

51	Wet corn milling	0.002738
52	Soybean processing	7.65E-05
54	Fats and oils refining and blending	0.004478
55	Breakfast cereal manufacturing	0.016116
56	Sugar manufacturing	0.005154
57	Confectionery manufacturing from cacao beans	0.003429
58	Confectionery manufacturing from purchased chocolate	0.015461
59	Nonchocolate confectionery manufacturing	0.01315
60	Frozen food manufacturing	0.035386
61	Fruit and vegetable canning and drying	0.051314
62	Fluid milk manufacturing	0.040036
63	Creamery butter manufacturing	0.002148
64	Cheese manufacturing	0.014711
65	Dry, condensed, and evaporated dairy products	0.008433
66	Ice cream and frozen dessert manufacturing	0.005012
67	Animal, except poultry, slaughtering	0.057514
68	Meat processed from carcasses	0.054934
70	Poultry processing	0.027721
72	Frozen cakes and other pastries manufacturing	0.005509
73	Bread and bakery product, except frozen, manufacturing	0.046437
74	Cookie and cracker manufacturing	0.016265
75	Mixes and dough made from purchased flour	0.009065
76	Dry pasta manufacturing	0.003576
77	Tortilla manufacturing	0.002269
78	Roasted nuts and peanut butter manufacturing	0.004765
79	Other snack food manufacturing	0.01767
80	Coffee and tea manufacturing	0.012974
81	Flavoring syrup and concentrate manufacturing	0.005455
82	Mayonnaise, dressing, and sauce manufacturing	0.00848
83	Spice and extract manufacturing	0.007112
84	All other food manufacturing	0.018899
85	Soft drink and ice manufacturing	0.06019
171	Other miscellaneous chemical product manufacturing	0.000167
390	Wholesale trade	0.098877
391	Air transportation	0.000487
392	Rail transportation	0.002832
393	Water transportation	0.001729
394	Truck transportation	0.013268
399	Couriers and messengers	0.001554
400	Warehousing and storage	0.000889
402	Furniture and home furnishings stores	9.66E-05
404	Building material and garden supply stores	0.001584
405	Food and beverage stores	0.196583
407	Gasoline stations	0.016591
410	General merchandise stores	0.006296
411	Miscellaneous store retailers	0.00834
500	Noncomparable imports	0.006314
	Total	1.00

Ice expenses were allocated based on the IMPLAN default margin table for Sector 85 (Soft drink and ice manufacturing).

Ice

IMPLAN Sector	Sector Title	Proportion
85	Soft drink and ice manufacturing	0.628331
390	Wholesale trade	0.10275
392	Rail transportation	0.000222
393	Water transportation	3.14E-05
394	Truck transportation	0.006453
405	Food and beverage stores	0.193154
407	Gasoline stations	0.069058
	Total	1.00

Bait expenses were allocated to a fishing bait sector that was created and added to the model. The production function for the bait sector that was created mirrors the production function in the default fishing sector.

Default Fishing

IMPLAN Sector	Sector Title	Proportion
16	Fishing	0.001894
43	Maintenance and repair of nonresidential buildings	0.102952
68	Meat processed from carcasses	0.000061
85	Soft drink and ice manufacturing	0.010734
103	Other miscellaneous textile pro	0.007470
125	Paper and paperboard mills	0.000970
126	Paperboard container manufacturing	0.000022
129	Coated and laminated paper and	0.000017
130	Coated and uncoated paper bag m	0.000212
131	Die-cut paper office supplies m	0.000028
132	Envelope manufacturing	0.000016
133	Stationery and related product	0.000067
136	Manifold business forms printing	0.000038
138	Blankbook and looseleaf binder	0.000006
142	Petroleum refineries	0.022730
145	Petroleum lubricating oil and g	0.047874
163	Soap and other detergent manufacturing	0.000744
164	Polish and other sanitation goo	0.000303
170	Photographic film and chemical	0.000008
172	Plastics packaging materials- f	0.001415
177	Plastics plumbing fixtures and	0.000044
179	Tire manufacturing	0.000120
278	AC- refrigeration- and forced a	0.000171
325	Electric lamp bulb and part man	0.000097
333	Electric power and specialty transmission	0.000407
338	Primary battery manufacturing	0.000214
350	Motor vehicle parts manufacturing	0.000715
383	Office supplies- except paper-	0.000027
390	Wholesale trade	0.051741
391	Air transportation	0.000780

392	Rail transportation	0.006179
393	Water transportation	0.008966
394	Truck transportation	0.006553
396	Pipeline transportation	0.000325
397	Scenic and sightseeing transport	0.055514
398	Postal service	0.000641
401	Motor vehicle and parts dealers	0.000350
402	Furniture and home furnishings	0.000083
403	Electronics and appliance store	0.000100
404	Building material and garden supplies	0.000153
405	Food and beverage stores	0.000257
406	Health and personal care stores	0.000149
407	Gasoline stations	0.000083
408	Clothing and clothing accessory	0.000116
409	Sporting goods- hobby- book and	0.000042
410	General merchandise stores	0.000265
411	Miscellaneous store retailers	0.000146
412	Nonstore retailers	0.000107
425	Non-depository credit intermediaries	0.000254
426	Securities- commodity contracts	0.002401
427	Insurance carriers	0.009664
430	Monetary authorities and depository institutions	0.005333
431	Real estate	0.000403
432	Automotive equipment rental and	0.000259
434	Machinery and equipment rental	0.012181
435	General and consumer goods rent	0.000055
437	Legal services	0.000292
439	Architectural and engineering s	0.000577
445	Environmental and other technical services	0.001204
447	Advertising and related service	0.000650
450	All other miscellaneous profess	0.000424
457	Investigation and security services	0.001708
459	Other support services	0.000468
478	Other amusement- gambling- and	0.010884
479	Hotels and motels- including ca	0.000023
500	Noncomparable imports	0.001524
	Total	1.00

Repair and maintenance expenses for vessel gear and equipment were allocated to IMPLAN Sector 357, which includes ship building and repairing.

Repair & Maintenance: Vessel and Engine at Boat Yard

IMPLAN Sector	Sector Title	Proportion
357	Ship Building and Repairing	1.00
	Total	1.00

Moorage expenses were allocated to IMPLAN Sector 478, which includes the activities of marinas. Marinas usually offer mooring, dockage, and haulout services for a fee.

Mooring

IMPLAN Sector	Sector Title	Proportion
478	Other Amusement, Gambling, and Recreation Industries	1.00
	Total	1.00

Insurance expenses for vessels were allocated to IMPLAN sector 427 (Insurance carriers), which includes establishments primarily engaged in underwriting and assuming the risk of insurance policies.

Insurance

IMPLAN Sector	Sector Title	Proportion
427	Insurance Carriers	1.00
	Total	1.00

Interest and Financial Services were allocated to IMPLAN sector 430 (Monetary Authorities and Depository Credit Institutions), which includes establishments primarily engaged in financial services.

Insurance

IMPLAN Sector	Sector Title	Proportion
430	Monetary Authorities and Depository Credit	1.00
	Total	1.00

Permit and license fees are allocated to value-added in indirect business taxes. These fees are paid during the normal operation of a business.

Permits and License Fees

IMPLAN Sector	Sector Title	Proportion
Value-Added	Indirect Business Taxes	1.00
	Total	1.00

Payments received by vessel owners as income are known as are classified as proprietary income.

Profits: Owner

IMPLAN Sector	Sector Title	Proportion
Value-Added	Proprietary Income	1.00
	Total	1.00

All other vessel expenditures were allocated according to proportions contained in the production function of the default commercial fishing sector in IMPLAN. This allocation scheme is identical to that developed by Steinback and Thunberg for the “Miscellaneous Trip Supplies” cost category in the NERIOM. They summed the absorption coefficients associated with the manufacturing sectors that produce the commodities used in the commercial fishing production function and allocated the commodity expenditures to the appropriate manufacturing industries. Additionally their estimates include average wholesale, transportation, and retail margins across all the manufacturing sectors since the majority of these purchases occur at the retail level.

Other vessel expenditures

IMPLAN Sector	Sector Title	Proportion
100	Curtain and Linen Mills	0.00856
103	Other Miscellaneous Textiles	0.007716
125	Paper and Paperboard Mills	0.040025
126	Paperboard Container Manufacturing	0.180838
130	Coated and Uncoated Paper Bag Manufacturing	0.02375
163	Soap and Other Detergent Manufacturing	0.047259
164	Polish and other Sanitation Good Manufacturing	0.040146
172	Plastics Packaging Materials	0.054372
177	Plastic Plumbing Fixtures and all other Plastics	0.008319
179	Tire Manufacturing	0.006631
278	Ac, Refrigeration	0.007234
286	Other Engine Equipment Manufacturing	0.074987
289	Air and Gas Compressor Manufacturing	0.004581
321	Watch, Clock, and Other Measuring and Controlling Devices	0.007475
325	Electric Lamp Bulb and Part Manufacturing	0.012176
333	Electric Power and Specialty Transformer Manufacturing	0.005184
338	Primary Battery Manufacturing	0.010247
350	Motor Vehicle Parts Manufacturing	0.0475
392	Rail Transportation	0.001
390	Wholesale Trade	0.161
404	Building Material & Gardening Supplies	0.001
405	Food and Beverage Stores	0.185
407	Gasoline Stations	0.013
410	General Merchandise Stores	0.014
411	Miscellaneous Store Retail	0.038
	Total	1.00

Tax expenditures were allocated to IMPLAN Pro's Value-Added Sector Indirect Business Taxes. This sector consists of excise taxes, property taxes, and sales taxes, but excludes income taxes paid by businesses.

Taxes

IMPLAN Sector	Sector Title	Proportion
Value-Added	Indirect Business Taxes	1.00
	Total	1.00

Wages and salaries of employees were allocated to the Value-Added Sector Employee Compensation.

Wages: Captain and Crew

IMPLAN Sector	Sector Title	Proportion
Value-Added	Employee Compensation	1.00
	Total	1.00

Vessel residuals were allocated to the Value-Added Sector Proprietary Income.

Wages: Captain and Crew

IMPLAN Sector	Sector Title	Proportion
Value-Added	Employee Compensation	1.00
	Total	1.00

Seafood Wholesale Dealer Expenditures

Wholesale seafood dealers purchase many of the same commodities and services as commercial harvesters are also purchased by wholesale seafood dealers. To avoid duplication, detailed descriptions of wholesale dealer expenditures are only provided for products and services that were not purchased by commercial harvesters.

Advertising fees were allocated to IMPLAN Pro Sector 447 Advertising and Related Services.

Advertising

IMPLAN Sector	Sector Title	Proportion
447	Advertising and Related Services	1.00
	Total	1.00

Packaging expenses were allocated using the default IMPLAN margin table for Sector 126 Paperboard Container Manufacturing.

Packaging: Boxes

IMPLAN Sector	Sector Title	Proportion
126	Paperboard Container Manufacturing	0.581083
390	Wholesale Trade	0.016356
391	Air Transportation	0.000463
392	Rail Transportation	0.026539
394	Truck Transportation	0.130381
411	Miscellaneous Store Retailers	0.245178
	Total	1.00

Rental payments were allocated to the IMPLAN sector 431 (Real Estate), which includes establishments that are primarily engaged in the renting or leasing real estate to others, including the leasing of mini warehouses and storage buildings.

Rent

IMPLAN Sector	Sector Title	Proportion
431	Real Estate	1.00
	Total	1.00

Building repair and maintenance payments were allocated to Sector 458 (Services to Buildings and Dwellings), which includes establishments primarily engaged in cleaning and maintaining building interiors, and providing landscape care and maintenance.

Repair & Maintenance: Building

IMPLAN Sector	Sector Title	Proportion
458	Services to Buildings and Dwellings	1.00
	Total	1.00

Shipping expenses were allocated to Sector 394 (Truck Transportation). The Truck Transportation Sector comprises establishments primarily engaged in providing general freight trucking.

Shipping

IMPLAN Sector	Sector Title	Proportion
394	Truck Transportation	1.00
	Total	1.00

Storage expenses were allocated to Sector 400 (Warehousing and Storage Sector), which are establishments primarily engaged in operating warehousing and storage facilities for general merchandise.

Storage

IMPLAN Sector	Sector Title	Proportion
400	Warehousing and Storage	1.00
	Total	1.00

Electrical utility expenses were allocated to sector 30 (Power Generation and Supply Sector), which comprises establishments primarily engaged in generating, transmitting, and/or distributing electric power.

Utilities: Electric

IMPLAN Sector	Sector Title	Proportion
30	Power Generation and Supply	1.00
	Total	1.00

Natural gas utility expenses were allocated to sector 31 (Natural Gas Distribution Sector), which comprises establishments primarily engaged in transmitting and distributing gas to final consumers.

Utilities: Gas

IMPLAN Sector	Sector Title	Proportion
31	Natural Gas Distribution	1.00
	Total	1.00

Telephone expenses were allocated to the sector 422 (Telecommunications), which contains establishments that are primarily engaged in operating, maintaining, and/or providing access to facilities for the transmission of voice, data, text, sound, and video.

Utilities: Telephone

IMPLAN Sector	Sector Title	Proportion
422	Telecommunications	1.00
	Total	1.00

Seafood Processor Expenditures

The default production function for Sector 71 Seafood Product Preparation and Packaging was used to allocate purchases by seafood processors. This production function includes over 140 industry sectors that sell commodities and services to processors.

Appendix E

UPDATE OF THE 2006 COMMUNITY VULNERABILITY ANALYSIS

2011-2012 GROUNDFISH HARVEST SPECIFICATIONS
DRAFT ENVIRONMENTAL IMPACT STATEMENT

Table of Contents

Tables

E.1 Introduction

The 2007-2008 Groundfish Harvest Specifications EIS included an evaluation of west coast fishing community engagement in fishing, dependence on groundfish fisheries, and socioeconomic resilience (PFMC 2006, Appendix A). Together, these criteria were used to assess each community's overall vulnerability to adverse socioeconomic impacts. The 2006 analysis was based on a review of available literature describing community vulnerability assessment methods, which provided guidance in developing the metrics specific to the assessment of community impacts related to groundfish fishery management. (Section E.7, below, excerpts the description of this methodology from the 2006 EIS.) This document describes an update to the 2006 analysis, which will be used to supplement the evaluation of socioeconomic impacts in the 2011-2012 Groundfish Harvest Specifications EIS.

This update is not a comprehensive redesign of the 2006 methodology. However, in looking at some aspects of the 2006 methodology various modifications have been implemented in the type of data used for certain indicators and the methods for classifying communities relative to the metric values. In the 2011-2012 harvest specifications EIS projected personal income impacts at the community level under different harvest specifications/management measures alternatives can then be compared to the assessment of community status derived from the updated analysis.

E.2 Geographic Resolution of the Analysis

This analysis uses somewhat different geographic units for the analysis. As with the 2006 analysis, dependence and engagement metrics are based on commercial fishery landings and recreational participation data, and resiliency metrics are based on U.S. Census Bureau and Bureau of Labor Statistics (BLS) data. The description of the 2006 analysis does not specify precisely what census data were used, but it is presumed that it was 2000 decennial census data, because only that source has the needed geographic resolution for the types of data used. These data likely come from the census long form, including Summary File 3 (SF3) tables. The estimates in these tables are based on survey data rather than a whole population enumeration. The Census Bureau has replaced the long form with the American Community Survey (ACS), which provides inter-decennial estimates on an ongoing basis (US Census Bureau 2008). The ACS uses a rolling sample frame that produces 1-year, 3-year, and 5-year estimates. The multi-year estimates incorporate single year estimates to produce data at a finer geographic resolution. The 1-year estimates release data for geographic areas with populations of 65,000 and greater; the 3-year estimates for areas with populations of 20,000 and greater, while the 5-year estimates are at the census block group level (the resolution of decennial long form data). Thus, to replicate the geographic resolution of the 2006 analysis 5-year ACS estimates would be necessary.[1] However, the first ACS 5-year estimate, 2005-2009, will only become available in latter half of 2010. For that reason the most recent 3-year estimate, 2006-2008, was used.[2] The geographic resolution of this data set only allows evaluation at a county level. (Several west coast counties have populations less than 65,000 preventing use of the most recent 1-year estimate.)

Another important difference between ACS data and decennial census long form data is the inclusion of margin of error estimates (MOEs). (Although the Census Bureau estimated error in the long form data, these estimates were not made publicly available.) An assessment of statistical significance can be derived from theses MOEs. A pair-wise test of one of the derived statistics, unemployment, suggests that when county level statistics are arrayed in ranked order, there is no statistical difference between counties adjacent to one on another in the rank order, although statistically significant differences may emerge

[1] Although not documented, it is likely the 2006 analysis used data at the level of Census Designated Places (CDPs), Zip Code Tabulation Areas (ZCTAs), or block groups since results are reported at a "city" level.
[2] ACS data may be downloaded at http://factfinder.census.gov/home/saff/main.html?_lang=en.

when comparing counties far apart in the rank order.[3] Table E-1 illustrates this for the calculated unemployment rate from ACS data. Counties are ranked by unemployment rate and each column and row is a county so that each cell represents a pairwise comparison derived from the standard errors for the statistic. If the test value is greater than the critical value of 1.645 then the difference between the two unemployment values are considered statistically significant at the 90 percent confidence interval and the cell is shaded. It can be seen that the unemployment rate for Del Norte County, which is ranked highest and thus the first column, is not statistically different from the unemployment rates for the next 10 lower ranked counties but is statistically different from 22 of the 23 counties ranked below the top 11. On the other hand, Curry and Pacific Counties (in Oregon and Washington respectively) show no significant difference in unemployment rate from any other county (of the 34 coastal counties included in the analysis), probably because of their small population size. Generally, it can be said that higher ranked counties as a group are significantly different from lower ranked counties as a group. For this reason, as discussed below, counties are put into three groups for each metric in order to assess socioeconomic vulnerability.

[3] The margin of error tends to decrease with population size of the geographic unit. Thus, two counties with large populations may be more likely to show a statistical difference in relatively similar estimates as compared to counties with small populations.

Table E-1. Pairwise comparison of counties for statistically significant difference in calculated unemployment rate.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
2	0.659																																	
3	0.781	0.416																																
4	0.818	0.517	0.067																															
5	0.862	0.724	0.123	0.049																														
6	0.805	0.464	0.273	0.240	0.224																													
7	1.203	2.019	0.885	0.826	0.924	0.117																												
8	0.933	0.646	0.435	0.401	0.390	0.114	0.037																											
9	1.227	1.707	0.898	0.844	0.911	0.171	0.139	0.023																										
10	1.244	1.527	0.901	0.850	0.897	0.218	0.232	0.077	0.102																									
11	1.484	3.369	1.562	1.518	1.784	0.399	0.873	0.255	0.554	0.348																								
12	1.544	4.244	1.760	1.721	2.088	0.450	1.130	0.307	0.715	0.467	0.181																							
13	1.647	6.143	2.095	2.067	2.621	0.546	1.641	0.406	1.027	0.696	0.625	0.534																						
14	1.668	6.768	2.170	2.145	2.747	0.566	1.768	0.427	1.098	0.747	0.742	0.695	0.264																					
15	1.651	3.114	1.813	1.775	1.998	0.597	1.249	0.465	0.942	0.717	0.573	0.483	0.245	0.189																				
16	1.761	6.521	2.375	2.356	2.977	0.666	2.062	0.531	1.351	0.963	1.135	1.181	1.091	1.112	0.126																			
17	1.765	5.952	2.351	2.330	2.904	0.673	2.004	0.539	1.343	0.968	1.108	1.123	0.947	0.907	0.151	0.064																		
18	1.802	6.859	2.484	2.469	3.129	0.707	2.232	0.574	1.471	1.058	1.327	1.431	1.519	1.654	0.253	0.344	0.220																	
19	1.542	1.753	1.327	1.290	1.330	0.619	0.867	0.503	0.743	0.632	0.479	0.420	0.295	0.268	0.162	0.116	0.102	0.056																
20	1.862	7.856	2.667	2.658	3.412	0.767	2.540	0.636	1.662	1.202	1.659	1.906	2.690	3.821	0.439	1.003	0.699	0.612	0.029															
21	1.856	5.566	2.510	2.492	3.040	0.773	2.201	0.644	1.555	1.164	1.393	1.431	1.312	1.286	0.438	0.612	0.516	0.397	0.052	0.094														
22	1.717	2.573	1.771	1.734	1.863	0.713	1.262	0.591	1.042	0.859	0.742	0.676	0.511	0.474	0.284	0.250	0.227	0.163	0.047	0.041	0.005													
23	1.965	7.782	2.900	2.897	3.682	0.876	2.865	0.750	1.938	1.436	2.061	2.366	3.037	3.496	0.767	1.719	1.366	1.424	0.192	1.151	0.507	0.196												
24	1.958	6.202	2.774	2.763	3.394	0.877	2.587	0.752	1.840	1.395	1.813	1.936	1.975	2.000	0.736	1.211	1.057	0.996	0.201	0.729	0.451	0.207	0.050											
25	1.978	7.410	2.906	2.902	3.659	0.891	2.849	0.766	1.955	1.459	2.058	2.321	2.768	3.017	0.803	1.652	1.361	1.383	0.216	1.111	0.564	0.229	0.122	0.040										
26	2.015	8.085	3.027	3.028	3.853	0.927	3.059	0.803	2.081	1.551	2.286	2.654	3.513	4.082	0.923	2.141	1.715	1.857	0.267	1.684	0.780	0.305	0.424	0.235	0.254									
27	2.075	7.766	3.141	3.144	3.957	0.992	3.190	0.872	2.222	1.680	2.454	2.796	3.399	3.693	1.102	2.295	1.938	2.051	0.365	1.882	1.061	0.444	0.840	0.567	0.663	0.482								
28	2.138	8.916	3.348	3.359	4.289	1.054	3.557	0.936	2.440	1.839	2.860	3.399	4.811	5.745	1.313	3.251	2.618	2.998	0.454	3.110	1.471	0.575	1.512	0.950	1.212	1.080	0.418							
29	2.150	9.858	3.420	3.436	4.441	1.064	3.724	0.946	2.511	1.880	3.046	3.760	6.600	10.613	1.368	4.128	3.067	3.887	0.467	4.964	1.636	0.597	1.978	1.082	1.499	1.438	0.547	0.082						
30	1.985	3.280	2.296	2.266	2.459	0.982	1.865	0.868	1.577	1.339	1.351	1.310	1.170	1.139	0.819	0.895	0.860	0.805	0.403	0.686	0.611	0.448	0.432	0.395	0.391	0.319	0.166	0.039	0.023					
31	2.278	9.827	3.710	3.733	4.780	1.198	4.117	1.086	2.846	2.165	3.508	4.241	6.285	7.648	1.756	4.521	3.648	4.308	0.665	4.770	2.260	0.882	2.776	1.771	2.319	2.340	1.463	1.274	1.559	0.279				
32	2.388	11.254	4.030	4.065	5.258	1.309	4.666	1.202	3.199	2.434	4.151	5.200	9.157	13.575	2.128	6.416	4.894	6.286	0.829	8.203	3.028	1.124	4.403	2.551	3.570	3.892	2.519	2.683	3.982	0.525	1.183			
33	2.587	###	4.411	4.451	5.607	1.522	5.055	1.424	3.643	2.845	4.581	5.382	6.973	7.631	2.657	5.694	4.958	5.528	1.140	5.798	3.600	1.555	4.346	3.205	3.911	4.010	3.172	3.211	3.607	0.990	2.259	1.674		
34	2.621	8.491	4.302	4.330	5.269	1.566	4.681	1.471	3.547	2.839	4.160	4.607	5.173	5.341	2.610	4.411	4.068	4.257	1.202	4.217	3.195	1.610	3.423	2.848	3.203	3.180	2.680	2.590	2.721	1.070	1.903	1.442	0.268	
35	2.208	2.783	2.304	2.277	2.355	1.329	1.947	1.236	1.788	1.638	1.608	1.573	1.479	1.458	1.270	1.314	1.294	1.260	0.904	1.189	1.141	0.992	1.036	1.008	1.010	0.968	0.873	0.800	0.794	0.672	0.609	0.466	0.168	0.087

Key: 1. Del Norte County, California; 2. Monterey County, California; 3. Mason County, Washington; 4. Grays Harbor County, Washington; 5. Douglas County, Oregon; 6. Curry County, Oregon; 7. Humboldt County, California; 8. Pacific County, Washington; 9. Mendocino County, California; 10. Coos County, Oregon; 11. Whatcom County, Washington; 12. Santa Cruz County, California; 13. Alameda County, California; 14. Los Angeles County, California; 15. Clallam County, Washington; 16. Pierce County, Washington; 17. Lane County, Oregon; 18. Contra Costa County, California; 19. Jefferson County, Washington; 20. San Diego County, California; 21. Thurston County, Washington; 22. Clatsop County, Oregon; 23. Ventura County, California; 24. San Luis Obispo County, California; 25. Sonoma County, California; 26. San Francisco County, California; 27. Santa Barbara County, California; 28. Snohomish County, Washington; 29. Orange County, California; 30. Lincoln County, Oregon; 31. San Mateo County, California; 32. King County, Washington; 33. Marin County, California; 34. Skagit County, Washington; 35. Tillamook County, Oregon.

Commercial landings data do not have the same limitations in that it is not sample data; in principal all commercial landings are direct measurements (although there is undoubtedly some level of unquantified measurement error). For that reason metrics based on these data can be reported at the port level. But to allow comparison with the resiliency metrics, fishery data are presented at the county level. Recreational fishery data are also estimates, but since no quantification of sample error (statistical uncertainty) is available it is not possible to determine whether differences among the values are significant.

E.3 Description of Metrics Used in the Analysis

E.3.1 Engagement and Dependence Metrics

As discussed in Section E.7, the 2006 analysis used state and Federal permit holder address information, number of vessels making landings in a port, the amount of nongroundfish and groundfish landings, and the number of processors/buyers as metrics to evaluate fishery engagement and groundfish fishery dependence. In this updated analysis the permits addresses were not used for two reasons. First, this information is more difficult to obtain. Second, it is not clear permit holder address best represents where economic activity related to the vessel is occurring, because the permit holder could reside at a different location from where economic activity related to fishery landings is occurring. The following measures of commercial fishery engagement are used, based on PacFIN data:

Total number of vessels making at least one landing by port in 2008
Total commercial ex-vessel revenue by port in 2008
Total buyers that received at least one landing by port in 2008

For recreational fisheries the following measures of engagement are used:

Number of charter vessels in each port
Total of private/rental plus charter angler trips by port[4]

Recreational fishery data were provided by the state representatives on the Groundfish Management Team.

The following measures of dependence on the groundfish fishery are used:

The number of "groundfish vessels" that made landings in 2008 as a proportion of all vessels that made at least one landing in the port in 2008. Groundfish vessels were determined by the composition of the vessel's landings. If the largest proportion of a vessel's total landings into a given port was groundfish it was counted as a groundfish vessel.[5]
Total revenue from groundfish as a proportion of total revenue from all species for the port in 2008
The number of buyers for which at least 10 percent of the fish they received in a port in 2008 was groundfish.
Total revenue from groundfish as a proportion of total revenue from groundfish for all ports in analysis in 2008

[4] In cases where reporting regions consisted of more than one county, angler trips were distributed to counties based on county populations.
[5] A vessel can be counted in more than one port if they have a different mix of landings in two or more ports. For example, a vessel could be a groundfish vessel in one port 1 and a salmon vessel another port. Although this suggests some double counting, since the metric is counting vessels within each port this should not be an issue, because a vessel can only have one primary fishery in a given port.

For recreational fisheries the following measures of groundfish dependence are used:

Private/rental plus charter groundfish trips in the port as a proportion of total trips for port
Private/rental plus charter groundfish trips in the port as a proportion of total groundfish trips for all ports in the analysis

E.3.2 Resiliency metrics

The metrics used in the analysis are described below, which are for the most part the same as those used in the 2006 analysis.[6] As noted above, these metrics are derived from ACS 3-year estimates tables and the BLS.

E.3.2.1 Industry diversity index

The Shannon-Weiner index is conventionally used in ecology to measure ecosystem diversity. However, it has also been used in socioeconomic analyses to measure industry diversification. According to Wikipedia, the Shannon-Weaver Index is one of several diversity indices used to measure diversity in categorical data. It is the information entropy of the distribution, treating species as symbols and their relative population sizes as the probability. The computation is $H = \left|\sum P_i(\ln P_i)\right|$ where P_i is the proportion of each species in a sample. In this application the "species" is an industry category in census employment data and the sample is the county. The 2006-2008 ACS Table C24030 is used to obtain the estimates. This table provides estimates of the civilian employed population 16 years and over in each industry category. The table includes 20 industry employment categories as shown in Table E-2.

Table E-2. Industry categories in ACS Table C24030.

1	Agriculture, forestry, fishing and hunting
2	Mining, quarrying, and oil and gas extraction
3	Construction
4	Manufacturing
5	Wholesale trade
6	Retail trade
7	Transportation and warehousing
8	Utilities
9	Information
10	Finance and insurance
11	Real estate and rental and leasing
12	Professional, scientific, and technical services
13	Management of companies and enterprises
14	Administrative and support and waste management services
15	Educational services
16	Health care and social assistance
17	Arts, entertainment, and recreation
18	Accommodation and food services
19	Other services, except public administration
20	Public administration

[6] The description of the 2006 analysis does specify which census tables were used, so the tables to use had to be deduced from the available descriptions.

E.3.2.2 Population Density

Population density figures are not reported in 2006 analysis although it appears that this metric was used in the communities scores (since communities could have a maximum score of 5 with one point assigned for each metric). ACS Table B0001 provides total population estimates. Land area values for each county were obtained from Wikipedia and used to compute population density values at the port group level.

E.3.2.3 Unemployment Rate

Estimates from the Bureau of Labor Statistics are used for the unemployment rate. County level data for 2008 was downloaded from the BLS website (http://www.bls.gov/data/#unemployment). The unemployment rate may also be derived from 2006-2008 ACS Table C23001. This table reports sex by age by employment status for the population 16 years and over. The unemployment rate is determined by dividing the sum of the unemployed population in each sex-age category, by the sum of the civilian population in the labor force from each sex-age category. (This approach excludes those in the armed forces and those not in the labor force.) Unemployment data from these two sources were compared in the evaluation and showed some differences as to whether a county would be rated high medium or low for this statistic. Although these census derived estimates of unemployment were not used on the resiliency scores, the MOE estimates were used to explore the issue of whether differences between counties are statistically significant, as discussed above.

E.3.2.4 Percentage of the Population Living Below the Poverty Line

Table B17001 from the 2006-2008 ACS is used to compute the percentage of the population below the poverty line. The table presents estimates of the population with income in the past 12 months below the poverty level by sex and age. The universe is the population for whom poverty status is determined. To arrive at the poverty rate the estimated number below the poverty level are summed for the age and sex categories and divided by the total population.

E.3.2.5 Isolated Cities

The 2006 analysis uses and earlier study to identify isolated cities.[7] Because of uncertainty about the definition that was used and the fact that this update reports metrics at a larger geographic scale, this metric was not used.

E.4 Method for Assigning Scores to Communities for Each Metric

This update derives scores for engagement, dependence, and resiliency differently than the 2006 analysis. In the original analysis the number of times a community fell in the top one-third of ranked communities for a metric was summed. Those with the highest frequency of falling in the top third were then identified as vulnerable. In this update communities are identified in high, low, and medium categories based on an overall score for engagement, dependence, and resiliency. (Since some communities show no groundfish landings for the dependence score a fourth category, not dependent, is added.) Counties are ranked for each metric and given a score of 1, 2, or 3 depending on their rank. These scores are then summed for

[7] The 2006 analysis states the criteria for defining geographically isolated cities as those cities located in coastal counties with a population of 1,900 or less, which were not located on a major highway and fell outside of the 35-mile buffer of cities over 20,000. However, no counties have a population of 1,900 or less. They may have meant cities with a population of 1,900 or less.

each of the three metric categories (engagement, dependence, and resiliency) and the results are again binned into three categories and assigned to the high-medium-low descriptive categories.

In the 2006 analysis commercial and recreational fishery metrics were considered separately in the scoring scheme while in this update those scores are combined to arrive at single score for fishery engagement and groundfish fishery dependence. The 2006 analysis classified vulnerable areas as those that are highly engaged in fisheries or dependent on groundfish fisheries and also least resilient. Some areas were rated "most vulnerable" if they had the highest levels of engagement or dependence and the lowest level of resiliency. Since this update uses a different scoring scheme, the assessment of vulnerability is also slightly different: As with the 2006 analysis, counties were rated vulnerable if they are highly engaged or highly dependent, and have low resiliency. But since the scores are descriptive bins (high, medium, low) rather than frequency counts (number of times in the top third), "most vulnerable" counties are identified as those that are highly engaged, highly dependent, and have low resiliency rather than based on the value of a numeric score.

E.5 Results of Evaluation

Table E-5 through Table E-7 show the metric values, rank, and resulting classification of counties by engagement, dependence, and resiliency. Table E-3 summarizes the results and, using the criteria described above, identifies counties rated vulnerable and most vulnerable. The table also reports the vulnerability ratings from the 2006 analysis for comparison. There is a good correspondence between the results, although the 2006 analysis rated a greater number of counties as vulnerable or most vulnerable. Clallam County, Washington, Clatsop County Oregon; and Monterey and Los Angeles Counties in California were rated vulnerable in the 2006 analysis but not rated vulnerable in this update. Of these, Clatsop, Monterey, and Los Angeles rated high/low in at least one metric category and Clallam rate medium in all three categories in this update.

The evaluation of socioeconomic impacts will use the port group area as the unit of analysis; the results of the income impacts model are reported at this scale, for example. Port group areas are regional entities that have been created to evaluate socioeconomic impacts of groundfish fisheries. Table E-4 lists the port group areas and shows the number of counties within the area rated vulnerable or most vulnerable out of the total number of counties in the area. As part of the impact assessment the relative change in ex-vessel revenue and personal income from status quo for a port group area under an alternative set of harvest limits and management measures can be assessed in relation to the occurrence of vulnerable rated counties in the port group area as part of the impact assessment.

Table E-3. Summary of fishery engagement, groundfish dependence, and economic resiliency scores, and vulnerability rating.

County	Engagement Rating	Dependence Rating	Resiliency Rating	Vulnerability Rating	2006 Rating
King County, Washington	Low	Not dependent	High		
Pierce County, Washington	Low	Not Dependent	High		
Skagit County, Washington	Low	Not Dependent	Medium		
Snohomish County, Washington	Low	Not Dependent	Medium		
Thurston County, Washington	Low	Not Dependent	High		
Whatcom County,	Low	Medium	Medium		

County	Engagement Rating	Dependence Rating	Resiliency Rating	Vulnerability Rating	2006 Rating
Washington					
Clallam County, Washington	Medium	Medium	Medium		Vulnerable
Jefferson County, Washington	Low	Not Dependent	Medium		
Grays Harbor County, Washington	High	Medium	Low	Vulnerable	Most Vulnerable
Pacific County, Washington	High	Low	Low	Vulnerable	Most Vulnerable
Clatsop County, Oregon	High	Medium	Medium		Vulnerable
Tillamook County, Oregon	High	Medium	Low	Vulnerable	
Lincoln County, Oregon	High	High	Low	Most Vulnerable	Most Vulnerable
Coos County, Oregon	Medium	High	Low	Vulnerable	Most Vulnerable
Douglas County, Oregon	Low	Low	Low		
Lane County, Oregon	High	Low	Medium		
Curry County, Oregon	Medium	High	Low	Vulnerable	Vulnerable
Del Norte County, California	High	High	Low	Most Vulnerable	Vulnerable
Humboldt County, California	Medium	High	Low	Vulnerable	Most Vulnerable
Mendocino County, California	High	High	Low	Most Vulnerable	Most Vulnerable
Marin County, California	Medium	Low	High		
Sonoma County, California	Medium	Medium	High		
Alameda County, California	High	Low	High		
Contra Costa County, California	Low	Low	High		
San Francisco County, California	Medium	Medium	High		
San Mateo County, California	Medium	Medium	High		
Monterey County, California	High	High	Medium		Vulnerable
Santa Cruz County, California	Medium	Medium	Medium		
San Luis Obispo County, California	High	High	Medium		
Santa Barbara County, California	High	Medium	High		
Ventura County, California	High	Medium	High		
Los Angeles County, California	High	Medium	Medium		Vulnerable
Orange County, California	High	Medium	High		
San Diego County, California	High	Medium	High		

Table E-4. Comparison of port group areas containing vulnerable counties.

Port Group Area	Number of Counties of Total in Group Rated Vulnerable or Most Vulnerable
Puget Sound, Washington	None out of 8*
North Washington Coast, Washington	None out of 2
South and Central Washington Coast	2 out of 3
Astoria, Oregon	None out of 2
Tillamook, Oregon	1 out of 1
Newport, Oregon	1 out of 1 (Most Vulnerable)
Coos Bay, Oregon	1 out of 3
Brookings, Oregon	1 out of 1
Crescent City, California	1 out of 1 (Most Vulnerable)
Eureka, California	1 out of 1
Fort Bragg, California	1 out of 1 (Most Vulnerable)
Bodega Bay, California	None out of 2
San Francisco, California	None out of 2
Monterey, California	None out of 2
Morro Bay, California	None out of 1
Santa Barbara, California	None out of 2
Los Angeles, California	None out of 2
Sand Diego, California	None out 1

*Two counties in the port group area, Mason and San Juan, were not rated. Mason was not rated because of the lack of fishery landings activity and San Juan because the population is too small to obtain 3-year ACS data.

Table E-5. Fishery engagement metrics and county ratings.

County	Total Revenue		Number of Commercial Vessels		Total Buyers		Total Recreational Trips		Number of Charter Vessels		Engagement Rating
	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank	
Whatcom	$4,408,090	20	49	2	14	11	0	0	0	0	Low
Skagit	$1,384,550	13	15	2	3	6	0	0	0	0	Low
Snohomish	$1,295	1	3	2	2	3	0	0	0	0	Low
King	$35,605	5	4	2	4	7	0	0	0	0	Low
Pierce	$38,591	6	5	2	3	5	0	0	0	0	Low
Thurston	$2,711	2	1	1	1	1	0	0	0	0	Low
Jefferson	$490,735	11	23	2	2	4	0	0	0	0	Low
Clallam	$1,945,411	14	76	2	10	9	15,400	9	15	20	Medium
Grays Harbor	$38,253,505	35	261	2	44	26	37,547	21	35	25	High
Pacific	$17,161,923	29	228	2	23	15	41,496	22	28	23	High
Klickitat	$15,080	3	5	2	1	2	0	0	0	0	Low
Clatsop	$31,722,869	33	255	2	30	19	5,545	6	13	17	High
Tillamook	$2,763,287	15	133	2	31	21	24,089	16	13	18	High
Lincoln	$32,624,821	34	300	2	71	33	51,595	24	30	24	High
Lane	$110,125	7	7	2	8	8	16,907	10	0	0	Low
Douglas	$1,069,549	12	28	2	18	12	5,024	4	9	13	Medium
Coos	$20,384,735	30	201	2	42	25	3,056	2	4	5	Medium
Curry	$7,266,993	25	152	2	29	18	27,409	18	13	19	High
Del Norte	$9,292,238	27	129	2	23	14	4,418	3	1	1	Medium
Humboldt	$11,219,829	28	139	2	48	27	19,715	12	4	6	High
Mendocino	$7,136,539	23	113	2	36	24	1,603	1	5	9	Medium
Sonoma	$3,638,528	19	91	2	32	22	8,718	7	7	10	Medium
Marin	$274,051	9	40	2	31	20	5,324	5	2	3	Low
Alameda	$113,998	8	36	2	26	16	31,522	19	15	21	High
Contra Costa	$31,149	4	14	2	14	10	21,984	15	0	0	Low
San Francisco	$6,658,290	21	194	2	66	30	17,322	11	1	2	Medium
San Mateo	$3,157,404	17	87	2	61	28	15,181	8	8	12	Medium
Santa Cruz	$390,391	10	38	2	19	13	20,734	13	4	7	Medium
Monterey	$7,579,474	26	113	2	28	17	33,254	20	4	8	High
San Luis Obispo	$2,775,024	16	133	2	35	23	21,734	14	9	14	Medium
Santa Barbara	$7,228,139	24	170	2	67	31	26,102	17	7	11	High
Ventura	$21,162,551	31	188	2	94	35	51,393	23	10	15	High
Los Angeles	$21,475,021	32	222	2	71	32	332,352	27	10	16	High
Orange	$3,421,499	18	131	2	72	34	101,587	25	2	4	High
San Diego	$6,814,849	22	162	2	63	29	102,611	26	19	22	High

Table E-6. Groundfish dependence metrics and county ratings.

County	Groundfish Vessels Percent	Rank	Groundfish Revenue Percent	Rank	Groundfish Buyers Number	Rank	Groundfish Revenue, All Ports Percent	Rank	Rec. Groundfish Trips Percent	Rank	Rec. Groundfish Trips, All ports Percent	Rank	Dependence Rating
Whatcom	42.86%	22	55.38%	27	6	10	3.918%	20	0.00%	0	0.00%	0	Medium
Skagit	0.00%	0	0.00%	0	0	0	0.000%	0	0.00%	0	0.00%	0	Not Dependent
Snohomish	0.00%	0	0.00%	0	0	0	0.000%	0	0.00%	0	0.00%	0	Not Dependent
King	0.00%	0	0.00%	0	0	0	0.000%	0	0.00%	0	0.00%	0	Not Dependent
Pierce	0.00%	0	0.00%	0	0	0	0.000%	0	0.00%	0	0.00%	0	Not Dependent
Thurston	0.00%	0	0.00%	0	0	0	0.000%	0	0.00%	0	0.00%	0	Not Dependent
Jefferson	0.00%	0	0.00%	0	0	0	0.000%	0	0.00%	0	0.00%	0	Not Dependent
Clallam	30.26%	20	45.99%	24	3	7	1.436%	14	29.58%	3	0.78%	8	Medium
Grays Harbor	7.66%	5	12.55%	11	2	5	7.701%	24	39.33%	4	2.52%	16	Medium
Pacific	5.26%	2	7.73%	9	1	3	2.130%	16	3.47%	1	0.25%	2	Low
Klickitat	0.00%	0	0.00%	0	0	0	0.000%	0	0.00%	0	0.00%	0	Not Dependent
Clatsop	15.29%	12	38.09%	22	4	8	19.389%	28	7.86%	2	0.07%	1	Medium
Tillamook	18.05%	14	6.15%	8	8	13	0.273%	7	46.21%	10	1.90%	14	Medium
Lincoln	19.00%	16	33.11%	21	12	20	17.332%	27	58.97%	17	5.20%	23	High
Lane	0.00%	0	2.63%	4	1	1	0.005%	2	48.74%	12	1.41%	12	Low
Douglas	10.71%	8	5.56%	7	1	2	0.095%	6	48.74%	11	0.42%	6	Low
Coos	23.38%	17	32.90%	20	12	19	10.761%	26	48.74%	13	0.25%	3	High
Curry	55.92%	25	54.27%	26	13	21	6.329%	23	82.35%	22	3.86%	21	High
Del Norte	25.58%	19	27.43%	19	7	12	4.090%	21	79.28%	20	0.60%	7	High
Humboldt	31.65%	21	45.32%	23	14	24	8.159%	25	79.28%	21	2.67%	17	High
Mendocino	46.90%	23	47.96%	25	15	25	5.493%	22	93.16%	27	0.26%	4	High
Sonoma	7.69%	6	8.35%	10	10	14	0.487%	10	93.16%	26	1.39%	11	Medium
Marin	0.00%	0	0.92%	1	2	4	0.004%	1	44.43%	6	0.40%	5	Low
Alameda	2.78%	1	5.53%	6	5	9	0.010%	3	44.43%	7	2.39%	15	Low
Contra Costa	14.29%	10	22.05%	18	3	6	0.011%	4	44.43%	8	1.67%	13	Low
San Francisco	14.43%	11	21.82%	17	16	27	2.332%	18	44.43%	9	1.32%	10	Medium

County	Groundfish Vessels Percent	Rank	Groundfish Revenue Percent	Rank	Groundfish Buyers Number	Rank	Groundfish Revenue, All Ports Percent	Rank	Rec. Groundfish Trips Percent	Rank	Rec. Groundfish Trips, All ports Percent	Rank	Dependence Rating
San Mateo	16.09%	13	14.74%	14	18	28	0.747%	12	44.43%	5	1.15%	9	Medium
Santa Cruz	23.68%	18	12.64%	12	12	17	0.079%	5	83.86%	25	2.97%	18	Medium
Monterey	47.79%	24	18.66%	15	16	26	2.270%	17	83.86%	23	4.77%	22	High
San Luis Obispo	67.67%	26	70.75%	28	13	22	3.150%	19	83.86%	24	3.12%	19	High
Santa Barbara	7.65%	4	3.05%	5	7	11	0.353%	8	71.93%	19	3.21%	20	Medium
Ventura	7.98%	7	1.46%	3	14	23	0.497%	11	71.93%	18	6.32%	24	Medium
Los Angeles	5.86%	3	1.23%	2	11	16	0.423%	9	55.71%	15	31.65%	27	Medium
Orange	18.32%	15	19.30%	16	12	18	1.060%	13	55.71%	16	9.67%	25	Medium
San Diego	14.20%	9	13.42%	13	10	15	1.467%	15	55.71%	14	9.77%	26	Medium

Table E-7. Resiliency metrics and county ratings.

County	Pop. Density	Rank	Industry Diversity	Rank	Poverty Rate	Rank	Unemployment Rate	Rank	Resiliency Rating
King County, Washington	802.45	7	2.691	12	9.5%	6	4.6%	1	High
Pierce County, Washington	712.84	8	2.678	16	11.3%	12	5.5%	13	High
Skagit County, Washington	60.42	21	2.684	14	12.3%	17	5.5%	13	Medium
Snohomish County, Washington	306.74	13	2.644	25	7.8%	3	5.4%	9	Medium
Thurston County, Washington	308.44	12	2.607	30	10.1%	9	4.9%	4	High
Whatcom County, Washington	76.83	18	2.685	13	15.2%	25	4.9%	4	Medium
Clallam County, Washington	26.33	27	2.702	8	14.2%	22	6.8%	23	Medium
Jefferson County, Washington	13.39	33	2.577	33	13.5%	19	5.4%	9	Medium
Grays Harbor County, Washington	31.96	25	2.604	31	15.2%	26	7.4%	28	Low
Pacific County, Washington	17.44	32	2.646	24	17.0%	31	7.3%	26	Low
Clatsop County, Oregon	34.30	24	2.579	32	12.2%	16	5.2%	6	Medium
Tillamook County, Oregon	22.02	30	2.644	26	17.6%	32	5.4%	9	Low
Lincoln County, Oregon	38.32	22	2.615	29	16.8%	30	6.5%	21	Low
Coos County, Oregon	35.17	23	2.664	20	15.1%	24	8.2%	31	Medium
Douglas County, Oregon	20.25	31	2.647	23	14.0%	21	9.8%	34	Low
Lane County, Oregon	72.62	19	2.648	22	15.7%	28	6.7%	22	Medium
Curry County, Oregon	10.93	34	2.631	27	15.3%	27	8.0%	30	Low
Del Norte County, California	23.47	28	2.449	34	20.3%	34	8.7%	33	Low
Humboldt County, California	31.81	26	2.672	18	18.4%	33	7.2%	25	Low
Mendocino County, California	22.22	29	2.664	21	16.8%	29	6.8%	23	Low
Marin County, California	298.29	14	2.666	19	7.1%	2	4.7%	2	High
Sonoma County, California	262.06	15	2.701	9	10.0%	8	5.7%	15	High
Alameda County, California	1774.87	4	2.672	17	10.8%	10	6.2%	18	High
Contra Costa County, California	1267.70	5	2.705	6	8.8%	5	6.2%	18	High

San Francisco County, California	3440.41	1	2.616	28	11.0%	11	5.2%	6	High
San Mateo County, California	949.70	6	2.703	7	6.7%	1	4.8%	3	High
Monterey County, California	107.56	16	2.699	11	11.5%	13	8.4%	32	Medium
Santa Cruz County, California	360.32	10	2.700	10	12.0%	15	7.3%	26	Medium
San Luis Obispo County, California	72.52	20	2.718	3	12.9%	18	5.7%	15	Medium
Santa Barbara County, California	106.26	17	2.729	2	13.5%	20	5.4%	9	High
Ventura County, California	359.52	11	2.758	1	8.7%	4	6.2%	18	High
Los Angeles County, California	2069.05	3	2.710	5	15.1%	23	7.5%	29	Medium
Orange County, California	3149.78	2	2.683	15	9.5%	7	5.3%	8	High
San Diego County, California	655.31	9	2.715	4	11.7%	14	6.0%	17	High

Note: Rank order for each metric is 1 = highest resiliency.

Table E-8. Port group areas, counties and PacFIN ports.

State	Port Group Area	County	PCID	PacFIN Port Name
Washington	Puget Sound	Whatcom	BLN	Blaine
		Whatcom	BLL	Bellingham Bay
		San Juan	FRI	Friday Harbor
		Skagit	ANA	Anacortes
		Skagit	LAC	La Conner
		Snohomish	ONP	Other North Puget Sound Ports
		Snohomish	EVR	Everett
		King	SEA	Seattle
		Pierce	TAC	Tacoma
		Thurston	OLY	Olympia
		Mason	SHL	Shelton
	North Washington Coast	Jefferson	TNS	Port Townsend
		Clallam	SEQ	Sequim
		Clallam	PAG	Port Angeles
		Clallam	NEA	Neah Bay
		Clallam	LAP	La Push
	South & Central WA Coast	Grays Harbor	CPL	Copalis Beach
		Grays Harbor	GRH	Grays Harbor
		Grays Harbor	WPT	Westport
		Pacific	WLB	Willapa Bay
		Pacific	LWC	Ilwaco/chinook
		Klickitat	OCR	Other Columbia River Ports
			OWC	
Oregon	Columbia River	Multnomah	CRV	Psuedo Port Code for Columbia R.
	Astoria-Tillamook	Clatsop	AST	Astoria
		Clatsop	GSS	Gearhart - Seaside
		Clatsop	CNB	Cannon Beach

State	Port Group Area	County	PCID	PacFIN Port Name
		Tillamook	NHL	Nehalem Bay
		Tillamook	TLL	Tillamook / Garibaldi
		Tillamook	NTR	Netarts Bay
		Tillamook	PCC	Pacific City
	Newport	Lincoln	SRV	Salmon River
		Lincoln	SLZ	Siletz Bay
		Lincoln	DPO	Depoe Bay
		Lincoln	NEW	Newport
		Lincoln	WLD	Waldport
		Lincoln	YAC	Yachats
	Coos Bay	Lane	FLR	Florence
		Douglas	WIN	Winchester Bay
		Coos	COS	Coos Bay
		Coos	BDN	Bandon
	Brookings	Curry	ORF	Port Orford
		Curry	GLD	Gold Beach
		Curry	BRK	Brookings
California	Crescent City	Del Norte	CRS	Crescent City
		Del Norte	ODN	Other Del Norte County Ports
	Eureka	Humboldt	ERK	Eureka (Includes Fields Landing)
		Humboldt	FLN	Fields Landing
		Humboldt	TRN	Trinidad
		Humboldt	OHB	Other Humboldt County Ports
	Fort Bragg	Mendocino	BRG	Fort Bragg
		Mendocino	ALB	Albion
		Mendocino	ARE	Arena
		Mendocino	OMD	Other Mendocino County Ports
	Bodega Bay	Sonoma	BDG	Bodega Bay
	San Francisco	Marin	BOL	Bolinas
		Marin	TML	Tomales Bay

State	Port Group Area	County	PCID	PacFIN Port Name
		Marin	RYS	Point Reyes
		Marin	OSM	Other Son. and Mar. Co. Outer Coast Ports
		Marin	SLT	Sausalito
		Alameda	OAK	Oakland
		Alameda	ALM	Alameda
		Alameda	BKL	Berkely
		Contra Costa	RCH	Richmond
		San Francisco	SF	San Francisco
		San Mateo	PRN	Princeton
		San Francisco	SFA	San Francisco Ara
		San Francisco	OSF	Other S.F. Bay and S.M. Co. Ports
	Monterey	Santa Cruz	CRZ	Santa Cruz
		Monterey	MOS	Moss Landing
		Monterey	MNT	Monterey
		Monterey	OCM	Other S.C. and Mon. Co. Ports
	Morro Bay	San Luis Obispo	MRO	Morro Bay
		San Luis Obispo	AVL	Avila
		San Luis Obispo	OSL	Other S.L..O. Co. Ports
	Santa Barbara	Santa Barbara	SB	Santa Barbara
		Santa Barbara	SBA	Santa Barbara Area
		Ventura	HNM	Port Hueneme
		Ventura	OXN	Oxnard
		Ventura	VEN	Ventura
		Ventura	OBV	Other S.B. and Ven. Co. Ports
	Los Angeles	Los Angeles	TRM	Terminal Island
		Los Angeles	SPA	San Pedro Area
		Los Angeles	SP	San Pedro
		Los Angeles	WLM	Willmington
		Los Angeles	LGB	Longbeach
		Orange	NWB	Newport Beach

State	Port Group Area	County	PCID	PacFIN Port Name
		Orange	DNA	Dana Point
		Orange	OLA	Other LA and Orange Co. Ports
			OCA	
	San Diego	San Diego	SD	San Diego
		San Diego	OCN	Oceanside
		San Diego	SDA	San Diego Area
		San Diego	OSD	Other S.D. Co. Ports

E.6 References

PFMC. 2006. Final environmental impact statement for the proposed groundfish acceptable biological catch and optimum yield specifications and management measures: 2007-2008 Pacific coast groundfish fishery and Amendment 16-4: Rebuilding plans for seven depleted Pacific coast groundfish species. Portland, OR: Pacific Fishery Management Council. Oct. 2006.

US Census Bureau. 2008. A compass for understanding and using American Community Survey data; What Federal agencies need to know. Department of Commerce, Economics and Statistics Administration. Dec. 2008.

E.7 Description of Methodology Used in the 2006 Vulnerability Analysis (Source: PFMC 2006, Appendix A)

Methodology for Determining Engagement and Dependence in the Commercial and Recreational Fisheries

Characterization of community engagement in fishing requires consideration of geographic use on the Pacific fish resource in general while a description of community dependence requires consideration of geographic use of the Pacific groundfish resource specifically. The following indicators are used as proxies for overall community engagement in the Pacific coast commercial fishery:

- Number of federal and state fishing permits as a percentage of each state's total number of permits (based on owner mailing address).
- Number of commercial fishing vessels (based on owner mailing address).
- Revenue from fish landings as a share of coastwide revenue from fishing landings
- Number of processors/buyers.

Port/city and county level data was available for each of the above indicators. Data for 2005 is used because it is the most recent year data is available for and because a using a single year is the most simplified way to conduct the analysis (which was a deemed necessary due to time constraints).

The following indicators are used as proxies for overall community engagement and dependence in the Pacific coast recreational fishery:

Number of charter vessels as a percentage of each states total number of charter vessels.

- Number of private/rental angler trips as a percentage of each state's total number of private/rental angler trips.
- Number of private/rental groundfish angler trips as a percentage of each state's total number of private/rental groundfish angler trips.
- Number of party/charter trips as a percentage of each state's total number of party/charter trips.
- Number of party/charter groundfish trips as a percentage of each state's total number of party/charter groundfish trips.

Port/city level data was available for Oregon and Washington. Region level data was available for California. Data for 2005 is used for the reasons given above.

- The following indicators are used as proxies for community dependence on the Pacific coast groundfish fishery specifically:
- Number of federal and state groundfish permits as a percentage of each state's total number of groundfish permits (based on owner mailing address).[8]
- Groundfish revenue as a percentage of total community fisheries revenue.
- Groundfish revenue as a percentage of total groundfish revenue coastwide.

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[8] Permits were characterized as "groundfish" permits if they were one of the following types: federal LE groundfish permit with a trawl or fixed gear endorsement, CA deeper nearshore species fishery permit, CA nearshore fishery bycatch permit, CA nearshore north central trap endorsement permit, CA nearshore north central fishery permit, CA nearshore north fishery permit, CA nearshore south central fishery permit, CA nearshore south central trap endorsement permit, CA nearshore south fishery permit, CA nearshore south trap endorsement permit, OR rockfish nearshore endorsement permit, OR rockfish permit, WA coastal hagfish permit, WA Puget Sound whiting trawl permit.

Port/city and county level data was available for each of the above indicators. Region level data was available for California. Data for 2005 is used for the reasons given above.

These sets of indicators were chosen based largely on: 1) the kind indicators seen in the literature and 2) data availability. Most of the data was obtained from PacFIN and state fishery management agencies. Other data, not included in this analysis, was available on a port group level (income from commercial and recreational groundfish fishing as a share of total personal income, number of persons employed by entities involved in commercial and recreational groundfish and other fishing or groundfish and other processing operations as a percentage of the total number of employed persons). This data has been included and discussed in other parts of the environmental impact statement (EIS).

To describe the relative community engagement in and dependence on the Pacific fishery resource, first, indicators represented by values were assigned to each community (port/city/county/region) within each category (Overall Community Engagement in the Pacific Coast Commercial Fishery, Overall Community Engagement and Dependence in the Pacific Coast Recreational Fishery, Community Dependence on the Pacific Coast Groundfish Fishery). Second, the communities were ranked from highest indicator value to lowest indicator value for each indicator. Third, the top one-third of communities was identified for each indicator. Fourth, the number of times a community was listed in the top one-third for each indicator was tallied. The communities that were tallied one or more times in the category of overall community engagement and/or dependence in the Pacific coast commercial fishery and/or overall community engagement and dependence in the Pacific coast recreational fishery were labeled as relatively "highly engaged" or "highly dependent" for each category.

Methodology for Determining Resilience

The purpose of gauging resiliency by community is to determine which communities are least able to adapt to a decrease in harvest as a result of a change in regulations. In some of the papers reviewed, the authors assume that the relationship between diversity and resiliency in social and economic systems is similar to that in the ecological literature. That is, a system with higher diversity is less affected by change than a system with lower diversity and the more diverse system therefore has higher resiliency. Socioeconomic systems (communities in this case) with higher resiliency are defined here as those that adapt quickly as indicated by rebounding measures of socioeconomic well-being. We assume that communities with high resiliency have access to diverse employment opportunities, higher employment rates, lower numbers of people living below the poverty line, are not located in isolated cities, and have the necessary municipal/county infrastructure to enable a rebound from a decrease in catch limits. That is, it is assumed that if the local fishing sector within a community with high resiliency experiences a major downturn, unemployment rates will rise only briefly until displaced people find other employment. It is assumed that communities with low resiliency have more lingering negative impacts, such as unemployment or out-migration rates that remain high for many years.

The theoretical basis for gauging resiliency rests on the concept of social well-being, which is sometimes defined as a composite of four factors: economic resiliency, social and cultural diversity (population size, mix of skills), civic infrastructure (leadership, preparedness for change), and amenity infrastructure (attractiveness of the area) (McCool and others 1997). For this analysis, indicators were chosen with these factors in mind. The following indicators were used as proxies for describing resiliency:

- Industry diversity index.[9]

[9] The industry diversity index was used to attempt to characterize the diversity of employment in the community. It was assumed that a community with more types of industries, the more resilient the community may be to negative impacts to the fishing industry. The index was used to identify communities with very little employment in

- Unemployment rate.
- Percentage of the population living below the poverty line.
- Isolated cities.[10]
- Population density.[11]

City and county level data was available for each of the above indicators except isolated city which was only analyzed on the city level. The most recent data available was used (2002 and 2003).

The above indicators were chosen based on: 1) similar indicators used in the literature and 2) data availability. Almost all of the indicator data was gathered from U.S. Census data. While several other indicators, such as educational attainment and income, could have been added to the analysis, the indicators used were deemed most relevant. Theoretically, many of the indicators used are likely correlated with educational attainment and income.

To describe relative community resilience, first, indicators represented by values were assigned to each community (port/city/county). Second, the communities were ranked from least resilient to most resilient based on the value for each indicator. Third, the top one-third of communities was listed for each indicator. Fourth, the number of times a community was listed in the top one-third for each indicator was tallied. The communities that were tallied one or more times were labeled as relatively "low resilience," for purposes of this analysis.

Methodology for Identifying "Vulnerable Areas"

"Vulnerable areas" are defined in this analysis as those communities that are both "highly engaged" or "highly dependent" and have relatively "low resilience". If a community appears in the "highly engaged" or "highly dependent" list and the "low resilience" list, then the community is listed as a "vulnerable area" for the purposes of this analysis. However, it is important to note that various deficiencies in the data make the analysis results somewhat unreliable for the purposes of definitively identifying communities that are most highly engaged, most dependent, and least resilient. For example, the analysis does not incorporate measures of employment and income to supply industries (shipyards, cold storage, processing). Therefore, the results of this analysis must be considered with other information provided in the chapter and appendices.

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industries other than fishing. The index was calculated using all nineteen major industry categories used in the Census. Numbers of persons employed in each industry category was gathered for each port and for each coastal county. The Shannon-Weiner index was used to measure industry diversification. This index was originally used to measure species diversity in an ecosystem. However, it has also been used in socioeconomic analyses to measure industry diversification. The greater number of employees and the more even the distribution of employees across industries both increase the index (see Tables A.4-18 and A.4-19 for diversity index results).

[10] Identification of isolated cities was made by Langdon-Pollack (2004). The analysis defined geographically isolated cities as those cities located in coastal counties with a population of 1,900 or less, were not located on a major highway and fell outside of the 35-mile buffer of cities over 20,000. The isolated cities in Washington include: Neah Bay, La Push, Tahola, Moclips, Copalis Beach, Ocean City, Markham, Junction City, Cohassett Beach, Grayland, Tokeland, Ocean Park, and Naselle. The isolated cities in Oregon include: Oceanside, Cape Mears, Netarts, and Powers. California did not have any geographically isolated cities.

[11] A proxy for municipal infrastructure.

Appendix F
HISTORICAL LANDINGS AND REVENUE IN GROUNDFISH FISHERIES

2011-2012 GROUNDFISH HARVEST SPECIFICATIONS
DRAFT ENVIRONMENTAL IMPACT STATEMENT

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Tables

Figures

A.1 Introduction

This appendix contains tabular data and figures showing landings of groundfish and other species and associated ex-vessel revenue by fishery, season, month, and port. Other tables show fishery participation measured by numbers of vessels making landings and vessel length. The data underlying these tables were obtained through a request to the Pacific Fishery Information Network (PacFIN) for customized output from their database. The data source is organized around vessel-level monthly summaries of landings for the period 1998-2009. As part of the request, PacFIN staff coded the data by fishery sectors, which are commonly used in groundfish management. Vessels are generally assigned to these sectors based on their regulatory status; in particular, whether the vessel is registered to a Federal groundfish limited access permit, and the specific endorsement on that permit. Since not all vessels landing groundfish possess a Federal groundfish limited access permit, some fishery sectors comprise vessels identified based on the composition of their landings. The following criteria were used to identify 12 fishery sectors:

1. Whiting catcher-processor sector: PARGRP=C. AGID =N. Gear Group is TWL. DRVID=PROC
2. Whiting mothership sector: PARGRP=C. AGID =N. Gear Group is TWL. DRVID<>PROC
3. Shoreside whiting sector: PARGRP=C. AGID = O, C or W. whiting is at least 50% of landing by weight. Gear Group is TWL. Valid trawl endorsement.[1]
4. Shoreside nonwhiting trawl sector: PARGRP=C. AGID = O, C or W. whiting is less than 50% of landing by weight. groundfish (sp.mgrp) is at least 50% of landing by weight. Groundfish (sp.mgrp) RWT > California halibut RWT; pink shrimp, ridgbeback prawn, or spot prawn (PHSP, RPRW, SPRW) RWT < 100 lbs, Gear Group is TWL. Valid trawl endorsement.
5. Limited entry fixed gear sector: PARGRP=C. AGID = O, C or W. groundfish (sp.mgrp)is at least 50% of landing by weight. Gear Group is HKL or POT. Valid longline endorsement or pot gear endorsement.
6. Open access fixed gear sector: PARGRP=C. AGID = O, C or W. groundfish (sp.mgrp)is at least 50% of landing by weight. Gear Group is HKL or POT. No valid endorsement for gear used.
7. Incidentally-caught groundfish (including exempted trawl): PARGRP=C. area. AGID = O, C or W. groundfish (sp.mgrp) RWT is > 0.
8. Commercial nongroundfish sector: PARGRP=C. AGID = O, C or W. groundfish (sp.mgrp) RWT is = 0.
9. Treaty mothership whiting sector: PARGRP=I. AGID =N. whiting is at least 50% of catch by weight. Gear Group is TWL. PROC is a mothership.
10. Treaty shoreside whiting sector: PARGRP=I. AGID = O, C or W. whiting is at least 50% of landing by weight. Gear Group is TWL.
11. Treaty Shoreside nonwhiting groundfish sector: PARGRP=I. AGID = O, C or W. whiting is less than 50% of landing by weight. groundfish RWT is > 0.
12. Treaty Nongroundfish sector: PARGRP=I. AGID = O, C or W. groundfish (sp.mgrp) RWT is = 0.

The data set only includes catch from a PFMC area as designated in PacFIN. Research and exempted fishing permit (EFP) landings recorded in the PaFIN database were not excluded from the requested data set.

Several different groupings of groundfish and other species were developed to categorize species level records from PacFIN. These groupings are intended to reflect species and species groups that have some

[1] All computations based on 50% of landings by weight are calculated "per landing" or "per trip" (may be more than one fish ticket) based on grouping records by agid, drvid and, tdate (agency, vessel, day).

relevance from a regulatory or revenue standpoint. Tables presenting landings by fishery sector include a category "other non-FMP groundfish." These are species assigned to the groundfish "management group" category in PacFIN but are not necessarily specified in the Pacific Council's Groundfish FMP. Landings in this category are attributed to the following species: deepsea sole, fantail sole, Greenland turbot, hornyhead turbot, unspecified skates, unspecified turbots, walleye pollock, and yellowfin sole.

A.2 Landings and Revenue by Species and Species Groups

Table F-1. Landings (commercial and tribal, at sea and shoreside) by species group (mt), 1998-2009

Year	Coastal Pelagic Species	Crab	Groundfish	Highly Migratory Species	Salmon	Shellfish	Shrimp	Other
1998	75,276.67	12,387.83	276,775.11	16,335.89	1,863.47	56.65	5,661.77	7,842.08
1999	171,378.59	16,190.52	268,694.80	11,878.39	2,740.35	44.76	14,225.07	9,634.33
2000	225,877.68	13,568.32	244,939.92	11,005.50	3,729.84	113.56	16,305.51	10,097.02
2001	196,006.85	11,857.61	205,008.70	12,726.92	3,375.18	93.09	18,646.79	9,178.65
2002	182,851.18	16,115.25	161,368.72	10,833.82	5,118.06	168.25	26,245.66	9,678.37
2003	125,389.02	34,018.88	170,881.79	17,648.80	6,038.73	108.31	14,594.30	8,017.54
2004	143,457.91	28,537.15	240,171.80	15,190.34	5,674.74	190.56	9,687.39	9,394.94
2005	157,890.77	25,097.47	287,563.99	10,051.40	4,318.47	112.69	11,403.86	8,987.14
2006	159,805.08	35,707.23	291,429.35	13,511.45	1,197.12	137.31	8,913.54	7,889.16
2007	195,044.82	20,721.11	244,157.70	12,518.56	1,456.85	147.51	11,603.99	8,719.90
2008	145,501.59	17,372.62	279,402.34	11,610.64	282.60	176.56	15,834.70	10,356.40
2009	170,851.95	23,427.63	154,886.41	13,280.95	504.74	239.52	14,951.50	9,614.84
Average, 2005-2009	*165,818.84*	*24,465.21*	*251,487.96*	*12,194.60*	*1,551.96*	*162.72*	*12,541.52*	*9,113.49*

Table F-2. Ex-vessel revenue (commercial and tribal, at sea and shoreside) by species group in current (2009) dollars, $1,000s, 1998-2009.

Year	Coastal Pelagic Species	Crab	Groundfish	Highly Migratory Species	Salmon	Shellfish	Shrimp	Other
1998	$12,667	$61,254	$79,652	$32,890	$7,307	$90	$17,622	$24,704
1999	$54,235	$86,125	$87,240	$29,822	$12,212	$62	$25,315	$30,490
2000	$51,689	$77,707	$93,093	$28,198	$17,169	$198	$25,297	$33,137
2001	$39,141	$63,956	$72,207	$29,291	$12,765	$161	$20,249	$28,761
2002	$38,755	$70,558	$63,895	$20,437	$17,007	$380	$25,395	$27,751
2003	$40,841	$136,559	$71,164	$32,723	$24,401	$157	$13,323	$24,592
2004	$36,342	$115,750	$68,635	$33,225	$34,699	$527	$12,353	$24,837
2005	$46,849	$91,265	$77,844	$25,081	$26,206	$305	$15,293	$22,664
2006	$42,849	$137,822	$81,600	$28,307	$10,692	$378	$11,508	$23,249
2007	$45,972	$107,620	$79,294	$25,997	$13,076	$369	$15,686	$22,359
2008	$45,001	$90,811	$113,159	$31,293	$1,990	$493	$23,357	$27,527
2009	$72,602	$104,168	$73,793	$30,166	$2,828	$676	$15,028	$25,714
Average, 2005-2009	*$50,655*	*$106,337*	*$85,138*	*$28,169*	*$10,959*	*$444*	*$16,174*	*$24,302*

Table F-3. Groundfish landings (commercial and tribal, at sea and shoreside) by species or species group (mt), 1998-2009.

Species or group	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Lingcod	347.36	355.34	144.80	155.22	204.57	164.54	177.85	204.87	262.20	272.32	288.79	234.01
P. Cod	412.10	279.32	278.42	323.09	751.33	1,249.82	1,402.65	850.75	369.13	88.51	38.24	241.83
P. Whiting	232,404.88	224,385.75	206,568.45	173,742.92	130,458.95	141,948.21	213,477.64	260,122.47	266,954.24	217,685.13	248,443.16	121,576.10
Sablefish	4,420.67	6,649.66	6,339.84	5,657.89	3,825.00	5,452.83	5,783.55	6,223.12	6,199.56	5,243.33	5,873.14	7,180.92
Pacific Ocean Perch	147.67	90.08	29.77	20.52	7.02	2.81	20.69	2.60	2.64	1.00	0.40	2.64
Shortbelly Rockfish	19.87	8.02	20.27	32.52	0.69	0.74	0.09	2.69	11.59	0.02	0.06	0.05
Widow Rockfish	4,198.78	4,105.40	4,056.86	1,967.56	428.02	41.39	75.62	189.85	207.73	237.76	233.50	173.68
Canary Rockfish	1,184.10	667.76	60.55	44.88	53.19	10.16	15.61	13.08	15.23	14.18	13.03	14.15
Chilipepper Rockfish	1,415.63	953.64	460.86	475.78	172.05	19.03	67.51	64.24	48.57	55.53	103.95	241.83
Bocaccio	236.18	111.64	31.84	35.85	26.21	8.59	16.02	9.90	5.51	7.95	8.66	6.97
Splitnose Rockfish	1,524.66	270.80	145.49	135.48	76.17	168.38	190.64	112.19	125.97	91.99	85.81	57.84
Yellowtail Rockfish	3,340.58	3,436.00	3,572.20	1,955.87	1,219.79	451.13	615.60	868.07	473.22	360.91	453.63	717.27
Sh spine Thornyhead	1,237.75	822.22	845.43	548.34	779.11	829.60	762.80	661.43	703.15	1,008.97	1,423.70	1,531.78
Longspine Thornyhead	2,238.16	1,783.57	1,479.86	1,178.01	1,890.78	1,546.27	697.25	646.16	750.40	809.26	1,256.28	1,166.17
Other Thornyheads	48.90	38.87	70.03	47.59	56.31	39.67	25.85	9.88	4.32	4.24	1.97	2.14
Cowcod	18.57	11.75	1.22	0.77	0.09	0.03	0.02	0.04		0.39		0.06
Darkblotched Rockfish	947.19	360.20	260.66	172.40	112.31	83.89	189.71	97.22	106.25	143.08	116.02	137.58
Yelloweye Rockfish	65.75	91.87	11.22	10.53	3.48	1.42	1.64	1.53	1.33	2.33	1.55	0.87
Black Rockfish	291.34	177.11	153.67	245.66	220.36	173.73	185.21	172.93	156.32	185.13	180.96	224.01
Nearshore Rockfish	349.97	274.28	189.33	197.85	155.28	88.90	103.89	111.00	110.66	113.99	130.59	103.43
Shelf Rockfish	849.41	297.79	91.10	113.85	84.69	37.75	43.84	52.13	50.01	41.26	34.39	32.37
Slope Rockfish	1,287.59	423.29	583.09	457.12	610.65	515.31	558.66	380.81	346.44	348.05	436.42	458.61
Other Rockfish	749.43	461.89	66.56	21.81	2.80	2.21	4.23	3.62	4.37	13.66	1.09	1.07
Pacific Ocean Perch	496.33	408.61	112.93	243.16	143.56	130.51	100.07	59.68	68.92	130.39	90.33	92.62
Ca Scorpionfish	50.35	38.08	17.75	19.02	12.84	5.06	4.41	4.89	2.39	3.32	3.43	3.34
Cabezon	201.91	149.74	145.87	118.01	95.48	65.97	76.65	59.18	49.38	46.61	47.43	47.30
Dover Sole	8,022.16	9,140.41	8,781.02	6,891.69	6,301.06	7,355.82	6,745.46	6,901.96	5,967.30	9,278.76	11,217.81	11,750.38
English Sole	1,138.57	911.34	769.11	992.72	1,175.20	930.27	952.23	928.24	925.71	689.19	362.43	357.06
Petrale Sole	1,460.83	1,496.36	1,892.50	1,844.46	1,796.26	2,068.80	1,961.57	2,733.35	2,609.73	2,252.27	2,219.24	1,765.53
Arrowtooth Flounder	3,169.03	5,290.12	3,286.25	2,467.60	2,089.79	2,330.57	2,329.91	2,242.87	1,920.81	2,264.19	2,673.26	3,846.32
Starry Flounder	52.98	22.14	25.24	7.20	18.58	41.12	79.85	53.46	66.70	21.04	13.03	20.31
Other Flatfish	1,643.66	1,988.92	1,600.99	1,724.92	1,715.44	1,538.54	1,313.02	1,183.37	1,145.80	949.27	796.67	949.18
Kelp Greenling	16.18	37.49	40.80	38.06	60.64	24.78	24.72	22.01	15.47	19.21	22.52	21.10
Spiny Dogfish	780.87	983.15	767.28	797.05	1,175.00	719.36	1,033.49	823.39	486.17	579.98	1,308.92	426.40
California Halibut	545.71	604.09	390.70	414.00	433.47	380.60	457.09	421.04	326.21	178.40	217.09	284.00
Longnose Skate	0.01	0.11					0.46	0.64	0.11	0.77	0.11	804.82
Other Groundfish	2,005.69	2,100.51	2,021.46	1,691.17	1,080.24	1,616.88	910.70	1,120.21	1,260.66	1,192.59	1,521.80	682.55

Table F-4. Groundfish ex-vessel revenue (commercial and tribal, at sea and shoreside) by species or species group in current (2009) dollars, $1,000s, 1998-2009.

Species or Group	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Lingcod	$730	$791	$427	$467	$617	$479	$490	$501	$608	$682	$743	$601
P. Cod	$510	$333	$357	$432	$998	$1,656	$1,608	$947	$429	$111	$55	$253
P. Whiting	$17,288	$23,101	$25,934	$16,827	$17,452	$20,613	$24,279	$31,057	$34,285	$33,043	$57,881	$14,165
Sablefish	$14,535	$21,503	$25,051	$21,173	$13,927	$21,283	$18,954	$22,000	$24,065	$21,327	$27,316	$34,252
Pacific Ocean Perch	$159	$100	$34	$24	$8	$3	$23	$3	$3	$1	$0	$3
Shortbelly Rockfish	$12	$2	$9	$28	$0	$1	$0	$3	$0	$0	$0	$0
Widow Rockfish	$4,150	$4,281	$4,713	$2,197	$417	$46	$75	$135	$124	$161	$154	$140
Canary Rockfish	$1,784	$1,016	$113	$84	$65	$13	$17	$15	$18	$22	$12	$14
Chilipepper Rockfish	$1,675	$1,207	$738	$695	$232	$22	$82	$76	$66	$99	$191	$330
Bocaccio	$318	$165	$57	$62	$42	$11	$32	$22	$18	$22	$21	$17
Splitnose Rockfish	$1,080	$205	$142	$116	$71	$129	$164	$93	$89	$83	$75	$50
Yellowtail Rockfish	$3,139	$2,866	$3,869	$2,263	$1,457	$538	$692	$907	$461	$296	$424	$751
Shortspine Thornyhead	$2,919	$2,549	$2,548	$1,643	$2,629	$2,617	$2,168	$2,103	$2,327	$2,643	$3,542	$3,323
Longspine Thornyhead	$4,034	$3,759	$3,758	$2,985	$4,265	$2,568	$845	$780	$1,060	$972	$1,290	$887
Other Thornyheads	$211	$99	$244	$257	$157	$63	$180	$26	$22	$25	$16	$7
Cowcod	$33	$23	$4	$1	$0	$0	$0	$0	$0	$1	$0	$1
Darkblotched Rockfish	$1,006	$354	$299	$196	$127	$93	$218	$102	$111	$157	$135	$159
Yelloweye Rockfish	$175	$292	$45	$52	$7	$3	$4	$4	$3	$8	$4	$2
Black Rockfish	$406	$316	$378	$581	$647	$558	$604	$590	$622	$768	$755	$910
Nearshore Rockfish	$2,169	$2,247	$2,305	$2,387	$1,930	$1,170	$1,396	$1,457	$1,506	$1,652	$1,764	$1,461
Shelf Rockfish	$1,413	$588	$292	$256	$176	$89	$165	$167	$181	$183	$159	$137
Slope Rockfish	$1,688	$484	$815	$678	$947	$903	$856	$518	$525	$475	$689	$699
Other Rockfish	$1,030	$740	$97	$62	$15	$7	$13	$8	$15	$43	$6	$5
Pacific Ocean Perch	$520	$420	$128	$262	$166	$144	$115	$67	$74	$122	$93	$81
California Scorpionfish	$244	$257	$127	$148	$91	$37	$36	$36	$19	$26	$26	$30
Cabezon	$1,700	$1,407	$1,616	$1,207	$965	$711	$797	$611	$538	$505	$504	$455
Dover Sole	$7,704	$8,351	$8,439	$6,629	$5,992	$6,888	$6,048	$6,035	$5,125	$7,853	$9,274	$8,635
English Sole	$1,125	$851	$743	$959	$1,076	$830	$815	$727	$693	$503	$267	$246
Petrale Sole	$3,898	$3,955	$5,210	$4,920	$4,300	$5,231	$4,908	$5,981	$6,100	$5,095	$4,993	$3,547
Arrowtooth Flounder	$915	$1,447	$1,037	$784	$592	$647	$628	$564	$481	$513	$590	$831
Starry Flounder	$57	$23	$27	$8	$22	$51	$96	$75	$72	$24	$15	$24
Other Flatfish	$1,647	$1,954	$1,778	$2,019	$1,996	$1,768	$1,385	$1,208	$1,073	$829	$691	$804
Kelp Greenling	$139	$385	$467	$406	$535	$266	$266	$251	$180	$206	$259	$224
Spiny Dogfish	$191	$280	$314	$266	$412	$222	$220	$242	$212	$209	$329	$129
California Halibut	$3,595	$4,146	$3,014	$3,256	$3,366	$2,909	$3,500	$3,115	$2,868	$1,898	$2,325	$2,562
Longnose Skate	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$333
Other Groundfish	$1,047	$866	$977	$878	$469	$764	$381	$464	$496	$633	$889	$285

Table F-5. Groundfish landings (commercial and tribal, at sea and shoreside) by gear type (mt), 1998-2009.

Year	Dredge	Hook and Line	Net	Pot/Trap	Troll	Trawl	Shrimp Trawl	Miscellaneous	Total
1998		4,642.66	385.30	544.42	276.77	270,541.92	382.09	1.95	276,775.11
1999		4,621.75	137.98	820.10	91.76	262,600.33	422.63	0.25	268,694.80
2000		4,101.06	92.09	936.90	33.32	239,464.55	311.02	0.98	244,939.92
2001		3,676.72	85.26	732.46	35.11	200,238.32	240.39	0.44	205,008.70
2002	0.63	3,182.33	72.18	519.16	23.08	157,480.04	88.37	2.93	161,368.09
2003		3,494.79	79.15	840.91	23.46	166,411.75	31.11	0.62	170,881.79
2004	-	3,691.94	64.55	849.56	38.47	235,498.86	26.78	1.64	240,171.80
2005		3,920.69	55.69	1,022.25	41.27	282,506.12	15.58	2.39	287,563.99
2006		3,651.48	62.49	1,077.83	38.77	286,579.64	19.07	0.07	291,429.35
2007		3,144.88	46.36	712.94	22.45	240,206.16	24.27	0.64	244,157.70
2008		3,575.11	33.47	702.88	14.64	275,061.79	14.34	0.11	279,402.34
2009		4,355.39	12.40	890.16	13.14	149,598.73	16.22	0.37	154,886.41
Average, 2005-2009	*-*	*3,729.51*	*42.08*	*881.21*	*26.05*	*246,790.49*	*17.90*	*0.72*	*251,487.96*

Table F-6. Groundfish ex-vessel revenue (commercial and tribal, at sea and shoreside) by gear type in current (2009) dollars, $1,000s, 1998-2009.

Year	Dredge	Hook and Line	Net	Pot/Trap	Troll	Trawl	Shrimp Trawl	Miscellaneous	Total
1998	$-	$14,633	$548	$2,277	$389	$61,260	$542	$2	$79,652
1999	$-	$17,615	$223	$3,426	$153	$65,238	$583	$2	$87,240
2000	$-	$18,418	$146	$4,894	$81	$68,963	$581	$9	$93,093
2001	$-	$16,200	$152	$3,453	$73	$51,965	$357	$6	$72,207
2002	$2	$13,162	$126	$2,535	$54	$47,819	$168	$30	$63,895
2003	$-	$15,194	$130	$4,083	$51	$51,617	$79	$10	$71,164
2004	$0	$15,008	$139	$3,311	$73	$50,033	$67	$3	$68,635
2005	$-	$16,531	$91	$4,096	$83	$56,972	$65	$7	$77,844
2006	$-	$16,729	$122	$4,724	$75	$59,893	$56	$1	$81,600
2007	$-	$15,293	$102	$3,197	$67	$60,578	$48	$9	$79,294
2008	$-	$18,090	$57	$3,778	$34	$91,173	$24	$3	$113,159
2009	$-	$22,794	$14	$4,718	$18	$46,224	$23	$3	$73,793
Average, 2005-2009	*$-*	*$17,887*	*$77*	*$4,103*	*$55*	*$62,968*	*$43*	*$4*	*$85,138*

A.3 Landing and Revenue by Nonwhiting Fishery Sectors

Table F-7. Nonwhiting limited entry trawl landings by groundish species or species group (mt), 2005-2009.

Species / Group	2005	2006	2007	2008	2009	*Average*
Lingcod	75.42	118.00	119.91	107.52	108.12	*105.79*
P. Cod	723.39	330.31	43.08	11.46	91.02	*239.85*
P. Whiting	18.77	2.57	3.28	0.50	0.34	*5.09*
Sablefish	2,317.59	2,468.73	2,429.99	2,873.16	3,009.75	*2,619.84*
Rockfish	507.78	524.78	577.98	602.10	749.43	*592.41*
Thornyheads	1,135.75	1,261.87	1,604.97	2,438.80	2,458.16	*1,779.91*
Arrowtooth Flounder	2,075.08	1,714.20	2,025.04	2,634.39	3,822.88	*2,454.32*
Dover Sole	6,753.57	5,743.74	8,955.96	10,976.68	11,611.69	*8,808.33*
English Sole	859.26	867.74	621.51	326.03	264.60	*587.83*
Petrale Sole	2,701.47	2,581.68	2,206.95	2,174.46	1,694.67	*2,271.85*
Other Flatfish	1,106.27	1,098.50	883.64	740.37	887.88	*943.33*
Cabezon	0.09	0.03	0.02	0.02	0.02	*0.04*
Spiny Dogfish	126.32	85.03	56.88	68.78	87.32	*84.87*
Other Groundfish	98.40	92.86	92.03	66.79	893.96	*248.81*
Other Non-FMP Groundfish	901.32	1,023.27	941.89	1,286.15	468.24	*924.17*

Table F-8. Nonwhiting limited entry trawl ex-vessel revenue by groundish species or species group in current (2009) dollars, $1,000s, 2005-2009.

Species / Group	2005	2006	2007	2008	2009	*Average*
Lingcod	$116	$179	$206	$169	$175	*$169*
P. Cod	$809	$381	$54	$15	$94	*$270*
P. Whiting	$2	$0	$0	$1	$0	*$1*
Sablefish	$6,134	$7,553	$8,097	$11,448	$12,433	*$9,133*
Rockfish	$550	$568	$716	$819	$929	*$716*
Thornyheads	$1,666	$2,052	$2,187	$3,149	$2,588	*$2,328*
Arrowtooth Flounder	$522	$437	$460	$583	$826	*$566*
Dover Sole	$5,909	$4,933	$7,580	$9,069	$8,524	*$7,203*
English Sole	$668	$646	$448	$238	$177	*$435*
Petrale Sole	$5,903	$6,031	$4,984	$4,883	$3,375	*$5,035*
Other Flatfish	$1,074	$968	$740	$619	$733	*$827*
Cabezon	$0	$0	$0	$0	$0	*$0*
Spiny Dogfish	$61	$35	$27	$58	$73	*$51*
Other Groundfish	$34	$26	$27	$22	$357	*$93*
Other Non-FMP Groundfish	$326	$362	$498	$767	$192	*$429*

Table F-9. Limited entry fixed gear landings by groundish species or species group (mt), 2005-2009.

Species / Group	2005	2006	2007	2008	2009	*Average*
Lingcod	14.46	17.39	14.7	20.77	15.82	*16.63*
P. Cod	1.92	0.27	0.05	0.05	1.15	*0.69*
P. Whiting	0.5	0.23	0.57	0.17	0.37	*0.37*
Sablefish	2,222.27	2,210.21	1,780.95	1,844.8	2,412.69	*2,094.18*
Rockfish	115.22	136.68	112.97	131.28	171.57	*133.54*
Thornyheads	161.29	172.29	173.93	199.41	199.3	*181.24*
Arrowtooth Flounder	3.24	2.54	2.81	3.44	4.37	*3.28*
Dover Sole	2.21	1.22	0.95	1.55	2.6	*1.71*
English Sole		0				-
Petrale Sole	0.28	0.17	0.14	0.3	0.08	*0.19*
Other Flatfish	0.37	0.01	0.18	1.27	0.49	*0.46*
Cabezon	1.87	1.84	3.93	8.98	7.11	*4.75*
Spiny Dogfish	229.82	131.04	195.95	180.87	23.79	*152.29*
Other Groundfish	28.91	22	29.93	39.42	25.76	*29.20*
Other Non-FMP Groundfish	14.73	15.39	17.3	28.36	26.14	*20.38*

Table F-10. Limited entry fixed gear ex-vessel revenue by groundish species or species group in current (2009) dollars, $1,000s, 2005-2009.

Species / Group	2005	2006	2007	2008	2009	*Average*
Lingcod	$32	$42	$42	$61	$46	*$44*
P. Cod	$2	$0	$0	$0	$1	*$1*
P. Whiting	$3	$1	$2	$2	$0	*$2*
Sablefish	$9,800	$10,519	$8,732	$10,159	$13,454	*$10,533*
Rockfish	$268	$329	$324	$404	$405	*$346*
Thornyheads	$1,201	$1,308	$1,373	$1,622	$1,525	*$1,406*
Arrowtooth Flounder	$1	$1	$1	$1	$1	*$1*
Dover Sole	$2	$1	$1	$2	$3	*$2*
English Sole	$-	$0	$-	$-	$-	*$0*
Petrale Sole	$1	$0	$0	$1	$0	*$0*
Other Flatfish	$1	$0	$0	$5	$3	*$2*
Cabezon	$16	$15	$29	$60	$48	*$34*
Spiny Dogfish	$125	$71	$109	$90	$9	*$81*
Other Groundfish	$31	$24	$34	$40	$36	*$33*
Other Non-FMP Groundfish	$6	$5	$7	$13	$12	*$9*

Table F-11. Open access fixed gear gear landings by groundish species or species group (mt), 2005-2009.

Species / Group	2005	2006	2007	2008	2009	*Average*
Lingcod	66.27	65.29	69.28	75.07	56.99	*66.58*
P. Cod	0.50	0.11	-	0.02	0.04	*0.13*
P. Whiting			-	-	-	-
Sablefish	902.59	796.36	460.89	602.06	1,043.86	*761.15*
Rockfish	318.25	303.76	325.74	331.00	371.94	*330.14*
Thornyheads	1.18	1.83	1.34	1.07	6.73	*2.43*
Arrowtooth Flounder	0.35	0.48	0.38	2.09	1.15	*0.89*
Dover Sole	0.26	0.38	1.17	0.51	0.65	*0.59*
English Sole				0.01		*0.01*
Petrale Sole	-	0.11	0.02	0.03	0.01	*0.03*
Other Flatfish	1.45	2.16	2.43	2.01	1.72	*1.95*
Cabezon	56.39	45.89	41.39	37.29	39.31	*44.05*
Spiny Dogfish	3.34	60.04	1.77	11.12	5.07	*16.27*
Other Groundfish	61.22	31.01	30.96	43.27	28.50	*38.99*
Other Non-FMP Groundfish	5.43	5.11	3.61	10.18	3.46	*5.56*

Table F-12. Open access fixed gear ex-vessel revenue by groundish species or species group in current (2009) dollars, $1,000s, 2005-2009.

Species / Group	2005	2006	2007	2008	2009	*Average*
Lingcod	$264	$275	$299	$354	$278	*$294*
P. Cod	$1	$0	$0	$0	$0	*$0*
P. Whiting	$-	$-	$0	$0	$0	*$0*
Sablefish	$3,160	$3,007	$1,787	$2,771	$4,640	*$3,073*
Rockfish	$2,143	$2,244	$2,484	$2,535	$2,471	*$2,375*
Thornyheads	$9	$15	$10	$11	$53	*$20*
Arrowtooth Flounder	$0	$0	$0	$1	$0	*$0*
Dover Sole	$1	$1	$5	$1	$1	*$2*
English Sole	$-	$-	$-	$0	$-	*$0*
Petrale Sole	$0	$0	$0	$0	$0	*$0*
Other Flatfish	$6	$16	$18	$14	$10	*$13*
Cabezon	$584	$503	$460	$427	$394	*$473*
Spiny Dogfish	$2	$33	$2	$5	$2	*$9*
Other Groundfish	$264	$183	$201	$252	$208	*$222*
Other Non-FMP Groundfish	$2	$2	$2	$6	$2	*$3*

Table F-13. Incidentally caught groundfish landings by groundish species or species group, including by exempted trawl gear (mt), 2005-2009.

Species / Group	2005	2006	2007	2008	2009	*Average*
Lingcod	9.73	7.82	9.89	5.02	2.99	*7.09*
P. Cod	0.07	2.02	0.02	0.03	1.96	*0.82*
P. Whiting	52.94	0.31	2.86	27.26	0	*16.67*
Sablefish	43.53	42.26	43.15	24.02	25.72	*35.74*
Rockfish	35.71	30.78	23.39	8.53	7.64	*21.21*
Thornyheads	1.06	0.08	0.85	0.08	4.54	*1.32*
Arrowtooth Flounder	1.72	1.69	5.24	0.42	1.22	*2.06*
Dover Sole	0.63	0.62	17.16	0.12	4.75	*4.66*
English Sole	3.03	16.05	1.11	0.82	0.93	*4.39*
Petrale Sole	1.98	1.45	0.21	0.48	1.37	*1.10*
Other Flatfish	68.6	49.63	33.46	20.19	32.94	*40.96*
Cabezon	0.83	1.62	1.27	1.14	0.86	*1.14*
Spiny Dogfish	7.46	38.5	0.21	14.96	1.29	*12.48*
Other Groundfish	34.25	33.64	25.31	9.37	7.07	*21.93*
Other Non-FMP Groundfish	10.68	11.24	13.07	9.24	10.02	*10.85*

Table F-14. Incidentally caught groundfish ex-vessel revenue by groundish species or species group, current (2009) dollars, $1,000s, 2005-2009.

Species / Group	2005	2006	2007	2008	2009	*Average*
Lingcod	$34	$28	$42	$23	$13	*$28*
P. Cod	$0	$2	$0	$0	$2	*$1*
P. Whiting	$6	$0	$1	$5	$-	*$3*
Sablefish	$182	$196	$191	$126	$142	*$168*
Rockfish	$128	$110	$107	$60	$47	*$90*
Thornyheads	$6	$0	$2	$0	$8	*$3*
Arrowtooth Flounder	$1	$1	$1	$0	$0	*$1*
Dover Sole	$1	$1	$16	$0	$4	*$4*
English Sole	$8	$15	$5	$2	$1	*$6*
Petrale Sole	$6	$4	$1	$1	$4	*$3*
Other Flatfish	$150	$115	$55	$32	$50	*$80*
Cabezon	$12	$21	$16	$17	$12	*$15*
Spiny Dogfish	$4	$29	$0	$12	$0	*$9*
Other Groundfish	$49	$54	$41	$16	$11	*$34*
Other Non-FMP Groundfish	$8	$7	$9	$8	$6	*$8*

Table F-15. Treaty nonwhiting groundfish sector landings (mt), 2005-2009.

Species / Group	2005	2006	2007	2008	2009	*Average*
Lingcod	29.79	44.22	46.34	67.66	44.86	*46.57*
P. Cod	123.7	35.51	45.35	26.44	147.07	*75.61*
Sablefish	699.67	668.56	516.3	526.25	639.55	*610.07*
Rockfish	594.44	190.26	64.51	228.28	529.52	*321.40*
Thornyheads	10.88	21.24	38.35	36.06	30.69	*27.44*
Arrowtooth Flounder	158.03	194.44	223.35	19.96	8.32	*120.82*
Dover Sole	144.91	221.29	303.36	238.19	130.53	*207.66*
English Sole	65.89	41.92	66.52	35.57	91.36	*60.25*
Petrale Sole	29.61	26.27	44.93	43.97	69.4	*42.84*
Other Flatfish	48.03	59.69	48.91	43.08	45.36	*49.01*
Spiny Dogfish	2.79		25.42	89.06	25.73	*35.75*
Other Non-FMP Groundfish	34.28	39.04	57.1	52.74	44.92	*45.62*

Table F-16. Treaty nonwhiting groundfish sector ex-vessel revenue by groundish species or species group, current (2009) dollars, $1,000s, 2005-2009.

Species / Group	2005	2006	2007	2008	2009	*Average*
Lingcod	$48	$76	$84	$125	$85	*$84*
P. Cod	$134	$44	$56	$40	$157	*$86*
Sablefish	$2,657	$2,764	$2,497	$2,805	$3,576	*$2,860*
Rockfish	$678	$213	$73	$277	$632	*$375*
Thornyheads	$17	$33	$66	$58	$43	*$44*
Arrowtooth Flounder	$39	$41	$50	$4	$1	*$27*
Dover Sole	$122	$188	$251	$201	$103	*$173*
English Sole	$51	$32	$50	$27	$68	*$46*
Petrale Sole	$72	$65	$109	$107	$168	*$104*
Other Flatfish	$41	$45	$38	$34	$31	*$38*
Spiny Dogfish	$1	$-	$12	$37	$10	*$12*
Other Non-FMP Groundfish	$11	$13	$21	$26	$19	*$18*

Table F-17. Groundfish landings (mt) by nonwhiting sector, 2005-2009.

Sector	2005	2006	2007	2008	2009
Shoreside nonwhiting trawl sector	19,400.48	17,913.31	20,563.13	24,307.21	26,148.08
Limited entry fixed sector	2,797.09	2,711.28	2,334.36	2,460.67	2,891.24
Open access fixed gear sector	1,417.23	1,312.53	938.98	1,115.73	1,559.43
Incidentally caught groundfish, including with exempted trawl	272.22	237.71	177.20	121.68	103.30
Treaty Shoreside nonwhiting groundfish sector	1,942.02	1,542.44	1,480.44	1,407.26	1,807.31

Table F-18. Ex-vessel revenue from groundfish by nonwhiting sector in current (2009) dollars, $1,000s, 2005-2009

Sector	2005	2006	2007	2008	2009	Average
Shoreside nonwhiting trawl sector	$23,773	$24,170	$26,025	$31,839	$30,475	$27,256
Limited entry fixed sector	$11,488	$12,317	$10,654	$12,460	$15,544	$12,492
Open access fixed gear sector	$6,435	$6,279	$5,267	$6,376	$8,060	$6,483
Incidentally caught groundfish, including with exempted trawl	$595	$583	$489	$304	$301	$455
Treaty Shoreside nonwhiting groundfish sector	$3,873	$3,516	$3,307	$3,740	$4,893	$3,866

A.4 Landings and Revenue by Whiting Sectors

Table F-19. Landings of Pacific whiting (mt) by whiting sectors, 1998-2009.

Year	Catcher-Processor Sector	Mothership Sector	Shoreside Whiting Sector	Treaty Mothership Sector	Treaty Shoreside Whiting Sector
1998	70,372.98	49,666.87	87,708.70	24,507.90	
1999	67,672.40	47,405.34	83,444.82	25,836.82	
2000	67,803.75	46,657.51	85,818.78	6,252.38	
2001	58,628.13	35,622.42	73,386.75	6,080.01	
2002	36,341.82	26,593.56	45,503.91	21,815.53	
2003	41,214.79	26,021.76	51,182.71	19,376.23	4,078.88
2004	69,411.65	24,102.20	89,641.00	23,459.44	6,848.30
2005	78,890.25	48,596.74	97,558.87	23,582.09	11,422.31
2006	78,864.74	55,355.20	97,266.92	5,568.00	29,896.27
2007	73,265.69	47,810.53	73,277.15	5,167.00	18,158.05
2008	108,240.47	57,497.87	50,760.35	14,944.48	16,972.06
2009	34,800.68	24,091.44	40,293.88	13,460.53	8,928.86

Table F-20. Ex-vessel revenue, current (2009) dollars, $1,000s, from Pacific whiting by whiting sectors, 1998-2009.

Year	Catcher-Processor Sector	Mothership Sector	Shoreside Whiting Sector	Treaty Mothership Sector	Treaty Shoreside Whiting Sector
1998	$5,082	$4,242	$6,072	$1,868	-
1999	$6,773	$4,426	$8,613	$3,283	-
2000	$8,036	$7,413	$9,791	$688	-
2001	$6,080	$3,176	$6,920	$647	-
2002	$5,749	$3,739	$5,367	$2,569	-
2003	$6,264	$5,731	$5,887	$2,228	$490
2004	$10,914	$2,972	$7,894	$1,990	$506
2005	$9,343	$5,641	$11,805	$2,924	$1,331
2006	$9,985	$6,793	$13,227	$735	$3,544
2007	$10,856	$6,984	$11,630	$822	$2,749
2008	$24,056	$15,174	$11,659	$3,383	$3,600
2009	$3,947	$2,673	$5,306	$1,230	$1,007

Table F-21. Landings of nonwhiting species (mt) by whiting sectors, 2008-2009.

Species/ Group	Whiting catcher processors sector		Whiting mothership sector		Shoreside whiting sector		Treaty mothership whiting sector		Treaty shoreside whiting sector	
	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009
Lingcod	0.58	0.01	2.96	0.6	3.27	0.78	2.02	1.88	3.92	1.96
P. Cod	0		0.05		0.18	0	0.01	0.51	0	0.08
Sablefish	1.3	0.17	0.35	0.01	0.17	49.14	0.76	0.02	0.27	0.01
Rockfish	217.12	19.88	133.02	189.42	150.73	210.59	41.71	10.01	50.05	8.39
Thornyheads	5.69	0.43	0.17		0.13	0.12	0	0.12	0.54	0
Flatfish	4.1	0.38	1.28	1.41	1.55	3.83	2.01	1.5	5.26	2.24
Other Groundfish	489.4	28.28	24.22	6.88	59.12	20.82	158.57	128.24	213.75	99.67
Other Non-FMP Groundfish			0		0.25	0.13			0.05	14.15

Table F-22. Ex-vessel revenue from nonwhiting species by whiting sectors, $1,000s, 2008-2009.

Species / Group	Whiting catcher processors sector		Whiting mothership sector		Shoreside whiting sector		Treaty mothership whiting sector		Treaty shoreside whiting sector	
	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009
Lingcod	$1	$0	$2	$1	$2	$1	-	$0	$6	$3
P. Cod	$0	-	$0	-	$0	$0	-	-	$0	$0
Sablefish	$5	$1	$1	$0	$0	$7	$0	$0	$1	$0
Rockfish	$153	$11	$61	$134	$102	$143	$48	$11	$46	$7
Thornyheads	$7	$0	$0	-	$0	$0	$0	$0	$1	$0
Flatfish	$1	$0	$0	$0	$0	$1	-	-	$1	$1
Other Groundfish	$37	$0	$2	$1	$3	$1	-	-	$85	$33
Other Non-FMP Groundfish	-	-	-	-	$0	$0	-	-	$0	$2

A.5 Landings and Revenue by Month

Table F-23. Average landings (mt) per 2-month period by nonwhiting sectors, 2005-2009.

Sector	Jan-Feb.	Mar-Apr	May-Jun	Jul-Aug	Sep-Oct	Nov-Dec
Shoreside Nonwhiting Trawl	3,637.56	3,672.64	3,918.69	3,988.75	3,788.83	2,659.96
Limited Entry Fixed Gear	101.90	261.88	678.20	759.48	718.41	119.06
Open Access Fixed Gear	101.82	142.69	266.89	280.65	289.08	187.65
Incidentally Caught	25.58	23.40	37.23	48.43	37.08	10.70
Treaty Shoreside Nonwhiting Groundfish	68.71	427.75	362.38	304.72	299.57	172.77

Table F-24. Average ex-vessel revenue per 2-month period by nonwhiting sectors, $1,000s, 2005-2009.

Sector	Jan-Feb	Mar-Apr	May-Jun	Jul-Aug	Sep-Oct	Nov-Dec
Shoreside Nonwhiting Trawl	$4,507	$3,962	$4,621	$5,006	$4,771	$3,587
Limited Entry Fixed Gear	$401	$1,018	$3,084	$3,634	$3,394	$582
Open Access Fixed Gear	$531	$553	$1,423	$1,480	$1,449	$846
Incidentally Caught	$55	$40	$111	$149	$52	$29
Treaty Shoreside Nonwhiting Groundfish	$69	$1,289	$732	$532	$743	$380

Table F-25. Average landings monthly landings (mt) by whiting sectors, 2005-2009.

Sector	April	May	June	July	August	September	October	November	December
Whiting catcher processors	0.00	18,987.99	15,392.85	4,662.40	4,918.70	7,845.93	10,607.70	8,545.44	4,107.07
Whiting motherships	0.00	24,322.48	12,601.96	1,639.67	2,986.31	969.75	2,468.55	1,844.66	0.00
Shoreside whiting	927.73	2,735.87	21,008.15	31,134.92	12,215.49	0.00	3,358.61	602.78	198.32
Treaty mothership	0.00	0.00	2,559.13	2,685.69	752.60	1,276.05	3,025.17	1,869.00	630.04
Treaty shoreside whiting	0.00	531.87	1,226.55	1,255.41	2,674.95	4,670.91	4,232.49	1,865.96	756.34

Table F-26. Average monthly ex-vessel revenue by whiting sectors, $1,000s, 2005-2009.

Sector	April	May	June	July	August	September	October	November	December
Whiting catcher processors	-	$2,556	$2,627	$577	$837	$919	$1,855	$1,386	$626
Whiting motherships	-	$3,222	$2,148	$518	$579	$112	$463	$272	-
Shoreside whiting	$109	$428	$2,862	$4,157	$2,069	-	$763	$119	$35
Treaty mothership	-	-	$284	$331	$89	$300	$510	$261	$22
Treaty shoreside whiting	-	$61	$125	$158	$367	$710	$648	$266	$105

Table F-27. Average groundfish landings (mt) per 2-month period by species or species group, all sectors, including tribal, 2005-2009.

	Jan-Feb	Mar-Apr	May-Jun	Jul-Aug	Sep-Oct	Nov-Dec
Lingcod	14.45	18.10	71.04	73.38	54.89	20.57
P. Cod	22.83	39.79	135.10	87.46	20.32	12.20
P. Whiting	0.09	923.36	98,818.93	64,653.76	38,376.57	20,183.51
Sablefish	367.32	889.46	1,293.33	1,473.53	1,453.19	667.18
Rockfish	170.23	211.78	612.73	436.84	329.84	197.93
Thornyheads	273.60	310.88	383.70	349.61	411.67	266.51
Arrowtooth Flounder	363.94	478.19	570.60	544.47	391.93	240.36
Dover Sole	1,383.32	1,887.43	1,457.09	1,426.15	1,641.30	1,227.95
English Sole	97.37	63.63	137.10	186.05	126.45	41.93
Petrale Sole	876.71	233.86	322.19	356.28	235.03	291.96
Other Flatfish	119.49	121.87	230.20	292.45	193.99	78.92
Cabezon	6.94	4.00	13.85	10.35	11.85	2.98
Spiny Dogfish	47.65	84.78	174.75	87.03	108.23	222.53
Other Groundfish	21.84	68.08	74.40	81.98	66.46	28.07
Other Non-FMP Groundfish	169.80	120.86	335.23	248.81	166.42	87.16

Table F-28. Average groundfish ex-vessel revenue, $1,000s, per 2-month period by species or species group, all sectors, including tribal, 2005-2009.

	Jan-Feb	Mar-Apr	May-Jun	Jul-Aug	Sep-Oct	Nov-Dec
Lingcod	$22	$31	$184	$179	$148	$44
P. Cod	$25	$44	$142	$92	$23	$13
P. Whiting	$0	$105	$14,080	$9,521	$6,242	$3,045
Sablefish	$1,255	$3,431	$5,399	$6,236	$6,196	$2,533
Rockfish	$418	$365	$1,061	$1,011	$850	$452
Thornyheads	$540	$552	$678	$647	$730	$551
Arrowtooth Flounder	$82	$107	$126	$124	$87	$53
Dover Sole	$1,103	$1,485	$1,169	$1,161	$1,319	$946
English Sole	$70	$48	$97	$131	$89	$31
Petrale Sole	$1,708	$497	$746	$819	$543	$641
Other Flatfish	$110	$108	$209	$261	$167	$68
Cabezon	$78	$31	$145	$101	$119	$31
Spiny Dogfish	$24	$43	$59	$19	$38	$33
Other Groundfish	$48	$66	$84	$80	$65	$28
Other Non-FMP Groundfish	$80	$56	$105	$101	$74	$48

A.6 Landings and Revenue by Port

Table F-29. Landings by species or species group (mt) by port group in Washington and Oregon, 2008.

	Puget Sound	North Washington Coast	South & Central WA Coast	**Washington Total**	Astoria	Tillamook	Newport	Coos Bay	Brookings	**Oregon Total**
Lingcod	4.4	3.7	10.7	**18.8**	43.0	6.8	17.9	25.7	30.5	**123.8**
P. Cod	0.0	3.1	2.0	**5.1**	6.5	0.0	0.3	0.0		**6.8**
P. Whiting			17,962.9	**17,962.9**	10,355.1		15,473.6	2,051.7	0.0	**27,880.4**
Sablefish	311.4	135.0	346.8	**793.2**	933.1	2.6	969.0	659.4	394.2	**2,958.2**
Rockfish	25.4	11.2	103.5	**140.0**	140.2	22.6	93.4	34.3	112.6	**403.1**
Thornyheads	31.3	3.9	25.2	**60.4**	635.0	0.6	351.1	345.5	131.9	**1,464.1**
Arrowtooth Flounder	253.2	3.9	187.4	**444.5**	1,712.2		221.8	211.6	7.7	**2,153.3**
Dover Sole	351.8	6.8	360.3	**719.0**	3,333.5	2.7	1,475.9	1,735.6	717.3	**7,265.1**
English Sole	0.3	5.9	29.4	**35.6**	109.2	0.3	11.6	29.6	4.2	**154.9**
Petrale Sole	56.4	2.0	74.6	**132.9**	473.6	1.5	146.4	351.6	144.8	**1,118.0**
Other Flatfish	6.1	1.2	17.8	**25.1**	198.3	0.3	47.8	127.2	50.7	**424.3**
Cabezon				**0.0**	0.0	3.3	0.0	0.4	21.3	**25.1**
Spiny Dogfish	70.5	119.7	58.5	**248.7**	39.7		0.1	0.0	1.8	**41.5**
Other Groundfish			0.0	**0.0**	0.9	0.1	0.2	28.4	25.4	**55.0**
Pacific Halibut	13.6	14.2	20.1	**48.0**	14.1	1.3	72.2	17.0	5.7	**110.3**
California Halibut				**0.0**	0.0					**0.0**
CPS			6,540.4	**6,540.4**	22,991.3		317.0	3.3		**23,311.5**
HMS	133.5	6.6	6,585.1	**6,725.2**	1,214.1	107.2	1,476.1	1,214.1	20.7	**4,032.1**
Salmon	1.1	22.1	52.0	**75.1**	22.7	10.3	1.5	0.6	4.1	**39.2**
Crab	404.3	184.7	4,862.6	**5,451.5**	1,451.6	395.7	2,546.9	1,433.2	473.0	**6,300.4**
Pink Shrimp			2,853.2	**2,853.2**	3,308.5	206.5	3,804.1	3,637.1	619.5	**11,575.8**
Ridgeback Prawn				**0.0**						**0.0**
Spotted Prawn				**0.0**						**0.0**
Shrimp	0.2		21.2	**21.4**		6.4	3.8	4.5	0.2	**15.0**
Shellfish			93.3	**93.3**	8.1	65.9	0.7	6.9	0.7	**82.3**
Other Nongroundfish	0.0	0.1	966.1	**966.2**	210.5	3.7	479.8	515.2	195.7	**1,405.0**
Other Non-FMP Groundfish	27.5	15.2	102.6	**145.3**	460.9	0.3	264.6	249.3	28.0	**1,003.1**
Total	1,691.0	539.3	41,275.7	**43,506.0**	47,662.1	838.0	27,775.7	12,682.2	2,990.1	**91,948.1**

Table F-30. Landings by species or species group (mt) by port group in California, 2008.

	Crescent City	Eureka	Fort Bragg	Bodega Bay	San Francisco (excl. Bodega Bay)	Monterey	Morro Bay	Santa Barbara	Los Angeles	San Diego	**California Total**	Coastwide Total
Lingcod	12.3	16.3	17.0	2.9	8.5	4.6	7.5	0.7	0.7	0.1	**70.6**	213.2
P. Cod		0.0									**0.0**	11.9
P. Whiting	3,334.3	1,609.6		0.0	0.5			0.0	0.2	0.0	**4,944.6**	50,787.9
Sablefish	136.2	491.4	403.0	5.3	140.9	197.5	156.0	7.0	37.7	18.0	**1,593.0**	5,344.5
Rockfish	138.8	46.4	143.9	17.5	85.9	102.7	115.4	15.4	17.3	17.8	**701.2**	1,244.3
Thornyheads	112.8	401.8	232.6	0.2	92.4	84.8	13.8	23.9	73.1	82.8	**1,118.2**	2,642.6
Arrowtooth Flounder	5.7	37.6	1.2	0.0					0.0		**44.5**	2,642.3
Dover Sole	463.2	1,491.5	645.3	3.4	330.2	25.7	35.5	0.1	0.1		**2,995.0**	10,979.1
English Sole	0.6	66.0	24.5	8.6	33.9	2.9	0.2	0.4	0.0		**137.1**	327.6
Petrale Sole	36.3	338.5	204.3	74.9	200.2	28.2	42.1	0.5			**924.8**	2,175.8
Other Flatfish	32.2	113.6	18.9	0.9	118.6	7.1	9.6	10.0	5.0	0.0	**316.0**	765.4
Cabezon	2.3	0.1	3.2	0.0	0.4	2.5	10.9	3.1	0.3	0.3	**23.1**	48.2
Spiny Dogfish	0.1	0.1	26.7			2.8		14.9	0.0		**44.6**	334.8
Other Groundfish	0.4	6.5	4.1	0.0	2.8	80.9	0.9	2.0	4.8	2.5	**104.8**	159.8
Pacific Halibut											**0.0**	158.3
California Halibut		0.6		2.0	92.9	4.4	6.1	75.4	26.0	10.2	**217.5**	217.5
CPS		0.1			565.4	38,693.2		20,666.2	54,069.5	0.2	**113,994.7**	143,846.6
HMS	69.1	36.2	3.2	1.0	38.3	52.6	76.1	104.3	128.4	343.3	**852.5**	11,609.9
Salmon	0.4	0.3									**0.6**	115.0
Crab	1,119.5	1,043.0	313.9	498.1	858.6	56.7	38.9	422.4	78.2	43.2	**4,472.5**	16,224.4
Pink Shrimp	633.9	311.5									**945.5**	15,374.5
Ridgeback Prawn							0.7	231.5	1.4		**233.6**	233.6
Spotted Prawn						14.3	4.0	44.0	46.1	22.2	**130.6**	130.6
Shrimp	38.6				20.8			0.0		0.1	**59.5**	95.9
Shellfish			0.8						0.1	0.1	**1.0**	176.6
Other Nongroundfish	15.8	573.4	1,228.4	29.8	650.5	188.4	93.8	3,511.0	1,627.5	677.4	**8,595.9**	10,967.1
Other Non-FMP Groundfish	8.8	118.7	33.0	4.5	12.4	0.9	0.7	1.5	5.8		**186.4**	1,334.7
Total	6,161.2	6,703.1	3,304.1	649.0	3,253.2	39,550.1	612.2	25,134.4	56,122.4	1,218.3	**142,708.0**	278,162.1

Table F-31. Landings by species or species group (mt) by port group in Washington and Oregon, 2009.

	Puget Sound	North Washington Coast	South & Central WA Coast	**Washington Total**	Astoria	Tillamook	Newport	Coos Bay	Brookings	**Oregon Total**
Lingcod	10.1	5.3	8.9	**24.4**	38.0	5.2	20.9	16.4	24.8	**105.3**
P. Cod	20.8	22.9	0.3	**43.9**	50.2		0.3	0.0		**50.5**
P. Whiting			9,945.6	**9,945.6**	13,995.6		12,952.6	1,608.1		**28,556.4**
Sablefish	304.3	172.0	453.5	**929.9**	921.2	3.6	1,152.6	691.9	532.4	**3,301.8**
Rockfish	33.8	26.3	168.5	**228.5**	183.0	25.7	128.4	40.6	138.3	**516.0**
Thornyheads	34.8	4.7	87.8	**127.3**	549.1	1.4	458.6	385.0	123.1	**1,517.2**
Arrowtooth Flounder	496.6		450.3	**946.9**	2,345.7	3.5	316.3	164.3	11.7	**2,841.5**
Dover Sole	489.2	6.4	501.8	**997.3**	3,260.2	7.3	1,626.3	1,846.4	716.4	**7,456.6**
English Sole	5.0	6.8	9.6	**21.4**	96.5	1.9	34.8	34.6	3.5	**171.2**
Petrale Sole	77.5	9.4	68.4	**155.3**	397.9	3.8	255.5	277.9	77.4	**1,012.6**
Other Flatfish	12.7	3.1	19.8	**35.6**	355.3	6.7	59.0	173.2	36.6	**630.8**
Cabezon				**0.0**	0.0	2.3	0.6	1.7	25.2	**29.8**
Spiny Dogfish	2.5	24.9	7.4	**34.8**	52.2		1.8	1.7	1.9	**57.6**
Other Groundfish			0.1	**0.1**	262.2	0.2	220.8	210.4	46.6	**740.2**
Pacific Halibut	2.9	8.0	14.1	**24.9**	8.8	0.0	52.3	19.4	5.9	**86.4**
California Halibut				**0.0**						**0.0**
CPS			8,810.3	**8,810.3**	21,574.7		1.0	0.1		**21,575.8**
HMS	172.5	14.2	7,185.0	**7,371.7**	1,210.6	102.0	2,275.4	947.5	38.2	**4,573.7**
Salmon	1.2	65.8	111.7	**178.7**	28.7	24.8	18.6	2.4	2.5	**76.9**
Crab	352.4	47.7	4,041.7	**4,441.8**	2,005.7	457.5	2,991.6	2,901.5	1,559.3	**9,915.5**
Pink Shrimp			3,180.0	**3,180.0**	2,098.5	2.3	2,989.5	4,460.6	497.7	**10,048.6**
Ridgeback Prawn				**0.0**						**0.0**
Spotted Prawn				**0.0**						**0.0**
Shrimp	1.1		59.0	**60.0**		11.1	11.8	6.5	0.6	**30.0**
Shellfish			113.3	**113.3**	37.2	74.8	0.8	13.1		**125.9**
Other Nongroundfish	92.3	0.1	503.7	**596.2**	28.3	6.2	171.6	230.6	336.2	**772.8**
Other Non-FMP Groundfish	70.4	16.9	68.6	**155.9**	155.1	0.7	118.2	62.4	5.5	**341.9**
Total	2,180.0	434.5	35,809.4	**38,423.9**	49,654.6	740.9	25,859.6	14,096.4	4,183.5	**94,535.0**

Table F-32. Landings by species or species group (mt) by port group in California, 2009.

	Crescent City	Eureka	Fort Bragg	Bodega Bay	San Francisco (excl. Bodega Bay)	Monterey	Morro Bay	Santa Barbara	Los Angeles	San Diego	**California Total**	Coastwide Total
Lingcod	7.8	8.9	22.1	1.6	4.7	2.8	7.6	0.6	0.3	0.1	**56.5**	186.1
P. Cod											**0.0**	94.5
P. Whiting	1,484.0	307.9				0.3		0.1	0.0		**1,792.2**	40,294.1
Sablefish	218.0	477.8	523.4	26.1	140.1	160.0	653.3	47.6	45.1	18.4	**2,309.9**	6,541.5
Rockfish	97.7	37.3	243.9	15.9	98.7	106.0	133.7	35.3	7.5	12.4	**788.5**	1,533.0
Thornyheads	141.3	352.9	203.2	1.1	68.6	72.5	19.3	26.5	76.4	65.0	**1,026.9**	2,671.4
Arrowtooth Flounder	4.2	40.7	0.4		0.1						**45.4**	3,833.8
Dover Sole	588.6	1,584.0	707.8	5.4	248.6	11.6	20.1	0.2	0.1		**3,166.4**	11,620.2
English Sole	4.8	30.9	12.6	2.1	16.7	6.4	0.0	0.1			**73.6**	266.2
Petrale Sole	46.1	154.0	159.9	23.8	92.2	33.9	18.9	0.0	0.0	0.0	**528.9**	1,696.8
Other Flatfish	48.6	57.0	18.0	3.9	95.2	12.3	8.1	8.7	6.3	0.0	**258.2**	924.6
Cabezon	1.8	0.1	3.3	0.1	0.2	2.5	7.0	3.0	0.2	0.4	**18.4**	48.2
Spiny Dogfish	0.1	0.0	26.9		0.4	18.3		0.1			**45.8**	138.2
Other Groundfish	18.8	110.0	20.6	1.4	7.9	49.6	3.2	1.5	0.8	2.9	**216.8**	957.1
Pacific Halibut	0.0	0.0									**0.0**	111.4
California Halibut		0.1		11.0	134.6	3.9	8.5	105.5	11.6	9.1	**284.3**	284.3
CPS			0.1		1,006.4	26,180.8	161.7	62,178.0	48,252.2	0.0	**137,779.3**	168,165.4
HMS	100.0	106.2	11.1	8.3	127.2	48.2	68.5	70.0	541.9	253.7	**1,335.0**	13,280.4
Salmon	0.6	0.0						0.0			**0.6**	256.3
Crab	3,331.9	2,355.6	100.4	166.1	899.3	75.0	17.9	489.5	60.2	48.4	**7,544.3**	21,901.5
Pink Shrimp	1,103.8	79.7			0.0	0.0					**1,183.5**	14,412.1
Ridgeback Prawn					0.2		15.6	210.3	8.9		**234.9**	234.9
Spotted Prawn				0.1	2.1	11.4	4.1	42.5	45.2	20.8	**126.2**	126.2
Shrimp	45.6	0.2			41.4	0.8		0.0	0.2	0.1	**88.3**	178.3
Shellfish		0.0							0.0	0.3	**0.4**	239.5
Other Nongroundfish	12.4	390.1	1,679.9	212.2	476.6	132.7	255.9	3,608.4	2,824.6	635.9	**10,228.6**	11,597.6
Other Non-FMP Groundfish		0.5	0.0		0.3	0.0	1.4	2.1	6.6		**10.8**	508.6
Total	7,255.9	6,094.0	3,733.8	479.1	3,461.4	26,929.0	1,404.9	66,829.7	51,888.1	1,067.6	**169,143.6**	302,102.5

Table F-33. Ex-vessel revenue ($1,000s) by species or species group by port group in Washington and Oregon in 2008.

	Puget Sound	North Washington Coast	South & Central WA Coast	**Washington Total**	Astoria	Tillamook	Newport	Coos Bay	Brookings	**Oregon Total**
Lingcod	$6.5	$6.8	$14.1	**$27.4**	$59.8	$32.1	$73.8	$56.9	$116.3	**$338.8**
P. Cod	$0.0	$4.8	$2.1	**$6.9**	$7.4	$0.0	$0.3	$0.0		**$7.7**
P. Whiting			$3,677.0	**$3,677.0**	$2,408.6		$3,758.2	$663.1	$0.0	**$6,829.8**
Sablefish	$1,847.7	$786.4	$1,734.3	**$4,368.5**	$4,041.6	$11.1	$4,684.5	$3,157.1	$1,842.2	**$13,736.6**
Rockfish	$27.3	$13.9	$81.8	**$123.0**	$144.5	$85.4	$105.5	$39.1	$449.4	**$823.9**
Thornyheads	$41.2	$6.0	$36.4	**$83.7**	$770.8	$0.7	$443.9	$393.4	$176.9	**$1,785.7**
Arrowtooth Flounder	$55.3	$0.7	$40.9	**$96.9**	$379.2		$48.0	$45.0	$1.8	**$473.9**
Dover Sole	$285.2	$5.7	$288.5	**$579.4**	$2,729.7	$2.3	$1,180.4	$1,369.1	$593.4	**$5,874.9**
English Sole	$0.2	$4.5	$20.2	**$24.8**	$73.6	$0.2	$7.8	$18.3	$2.8	**$102.7**
Petrale Sole	$122.5	$4.5	$160.9	**$287.9**	$1,040.6	$3.6	$296.9	$713.8	$317.7	**$2,372.6**
Other Flatfish	$4.9	$0.8	$14.5	**$20.2**	$165.8	$0.3	$35.7	$99.3	$36.0	**$337.0**
Cabezon				**$-**	$0.0	$33.1	$0.1	$1.7	$154.1	**$189.1**
Spiny Dogfish	$39.3	$54.1	$3.1	**$96.6**	$32.8				$0.3	**$33.1**
Other Groundfish				**$-**	$0.2	$0.8	$0.1	$6.8	$236.5	**$244.4**
Pacific Halibut	$108.0	$99.1	$142.9	**$349.9**	$114.4	$9.8	$583.3	$153.7	$43.9	**$905.1**
California Halibut				**$-**	$0.0					**$0.0**
CPS			$1,363.0	**$1,363.0**	$5,658.9		$71.1	$0.3		**$5,730.2**
HMS	$367.0	$17.3	$16,840.9	**$17,225.3**	$3,291.3	$251.8	$3,912.2	$3,198.3	$60.8	**$10,714.3**
Salmon	$9.8	$204.2	$438.5	**$652.4**	$223.0	$121.2			$51.1	**$395.4**
Crab	$2,944.3	$1,220.9	$26,585.6	**$30,750.8**	$6,410.7	$1,911.8	$12,120.2	$6,453.1	$2,272.5	**$29,168.2**
PINK SHRIMP			$3,294.6	**$3,294.6**	$3,927.8	$246.9	$4,736.5	$4,295.9	$730.3	**$13,937.4**
Ridgeback Prawn				**$-**						**$-**
Spotted Prawn				**$-**						**$-**
Shrimp	$0.4		$115.3	**$115.7**		$29.1	$25.0	$59.6	$4.5	**$118.1**
Shellfish			$355.8	**$355.8**	$42.5	$74.9	$0.9	$12.0	$2.4	**$132.7**
Other Nongroundfish	$0.0	$0.1	$558.5	**$558.6**	$13.9	$2.2	$404.4	$651.0	$157.6	**$1,229.1**
Other Non-FMP Groundfish	$11.2	$6.4	$52.3	**$69.8**	$228.4	$0.1	$165.5	$204.8	$16.6	**$615.4**
Total	$5,870.8	$2,436.1	$55,821.3	**$64,128.3**	$31,765.4	$2,817.6	$32,654.2	$21,592.1	$7,267.0	**$96,096.3**

Table F-34. Ex-vessel revenue ($1,000s) by species or species group by port group in California in 2008.

	Crescent City	Eureka	Fort Bragg	Bodega Bay	San Francisco (excl. Bodega Bay)	Monterey	Morro Bay	Santa Barbara	Los Angeles	San Diego	**California Total**	Coastwide Total
Lingcod	$51.3	$37.2	$44.4	$8.9	$33.4	$17.1	$36.2	$5.0	$5.0	$0.5	**$239.1**	$605.3
P. Cod		$0.0									**$0.0**	$14.7
P. Whiting	$726.9	$351.3		$0.0	$1.2			$0.1	$1.9	$0.0	**$1,081.4**	$11,588.2
Sablefish	$491.4	$1,942.8	$1,574.8	$29.4	$538.1	$743.8	$572.3	$37.7	$179.5	$123.4	**$6,233.1**	$24,338.1
Rockfish	$566.9	$75.6	$335.4	$73.4	$264.0	$263.0	$998.7	$206.7	$98.5	$65.0	**$2,947.2**	$3,894.1
Thornyheads	$186.5	$464.9	$291.0	$0.2	$148.3	$255.7	$19.0	$195.9	$602.1	$716.3	**$2,879.8**	$4,749.2
Arrowtooth Flounder	$1.3	$8.4	$0.3	$0.0							**$9.9**	$580.8
Dover Sole	$398.0	$1,269.2	$553.5	$2.6	$283.4	$17.0	$31.9	$0.3	$0.4		**$2,556.3**	$9,010.6
English Sole	$0.4	$46.7	$19.6	$6.9	$32.6	$2.9	$0.2	$1.4	$0.0		**$110.7**	$238.3
Petrale Sole	$76.4	$732.0	$508.4	$180.2	$493.8	$71.9	$127.6	$1.4			**$2,191.7**	$4,852.2
Other Flatfish	$23.9	$89.2	$15.3	$0.7	$123.6	$10.1	$12.5	$11.6	$21.6	$0.0	**$308.4**	$665.6
Cabezon	$17.6	$0.4	$38.6	$0.3	$4.5	$36.3	$153.5	$52.3	$3.6	$3.9	**$311.1**	$500.2
Spiny Dogfish		$0.0	$22.9			$1.5		$12.0	$0.0		**$36.4**	$166.1
Other Groundfish	$3.3	$1.4	$4.2	$0.2	$4.3	$44.1	$10.6	$3.4	$6.7	$5.2	**$83.3**	$327.7
Pacific Halibut											**$-**	$1,255.1
California Halibut		$2.5		$23.2	$886.0	$43.8	$68.6	$884.0	$292.8	$108.4	**$2,309.4**	$2,309.4
CPS		$0.0			$123.7	$5,371.8		$14,324.4	$16,516.8	$0.4	**$36,337.2**	$43,430.4
HMS	$152.1	$105.3	$16.0	$2.8	$107.5	$154.0	$257.7	$325.7	$598.6	$1,420.8	**$3,140.5**	$31,080.1
Salmon	$3.3	$2.4									**$5.7**	$1,053.5
Crab	$5,484.4	$5,168.0	$1,867.3	$3,470.7	$6,135.7	$409.4	$168.6	$1,212.0	$239.0	$108.9	**$24,264.1**	$84,183.1
PINK SHRIMP	$732.9	$361.8									**$1,094.7**	$18,326.7
Ridgeback Prawn							$2.6	$861.3	$5.7		**$869.6**	$869.6
Spotted Prawn						$390.1	$111.3	$1,176.3	$1,098.0	$433.7	**$3,209.4**	$3,209.4
Shrimp	$361.9				$195.1			$0.2		$1.9	**$559.1**	$792.9
Shellfish			$1.3						$0.1	$0.2	**$1.6**	$490.0
Other Nongroundfish	$15.2	$643.5	$1,829.2	$51.1	$639.7	$136.8	$213.6	$9,076.9	$5,222.4	$3,829.1	**$21,657.3**	$23,445.1
Non-FMP Groundfish	$4.9	$65.1	$14.6	$3.0	$6.8	$0.8	$1.0	$2.2	$4.9		**$103.3**	$788.5
Total	$9,298.3	$11,367.9	$7,136.6	$3,853.7	$10,021.8	$7,970.1	$2,785.7	$28,390.9	$24,897.7	$6,817.7	**$112,540.2**	$272,764.8

Table F-35. Ex-vessel revenue ($1,000s) by species or species group by port group in Washington and Oregon in 2009.

	Puget Sound	North Washington Coast	South & Central WA Coast	**Washington Total**	Astoria	Tillamook	Newport	Coos Bay	Brookings	**Oregon Total**
Lingcod	$14.7	$9.6	$12.0	**$36**	$55.2	$25.9	$78.1	$33.1	$98.7	**$291**
P. Cod	$21.2	$25.8	$0.3	**$47**	$48.9		$0.4	$0.0		**$49**
P. Whiting			$1,326.5	**$1,327**	$1,974.3		$1,546.9	$261.7		**$3,783**
Sablefish	$1,852.7	$1,013.4	$2,147.6	**$5,014**	$3,980.2	$14.6	$5,846.9	$3,389.3	$2,663.5	**$15,894**
Rockfish	$32.4	$25.7	$117.5	**$176**	$180.6	$98.1	$155.6	$52.7	$573.5	**$1,060**
Thornyheads	$39.9	$7.2	$75.8	**$123**	$508.6	$1.4	$474.7	$324.8	$129.7	**$1,439**
Arrowtooth Flounder	$107.7		$94.0	**$202**	$511.0	$0.8	$67.5	$34.8	$2.6	**$617**
Dover Sole	$357.3	$4.9	$316.4	**$679**	$2,408.6	$4.7	$1,147.0	$1,221.4	$510.5	**$5,292**
English Sole	$3.5	$5.1	$6.4	**$15**	$60.7	$1.3	$21.5	$20.8	$2.2	**$106**
Petrale Sole	$146.1	$22.8	$128.3	**$297**	$774.2	$7.5	$502.7	$515.6	$144.0	**$1,944**
Other Flatfish	$10.2	$2.0	$13.8	**$26**	$303.9	$10.0	$43.3	$125.6	$25.8	**$509**
Cabezon				**$-**	$0.0	$22.0	$2.5	$11.4	$187.0	**$223**
Spiny Dogfish	$1.0	$9.9	$0.7	**$12**	$33.1			$0.0	$0.4	**$34**
Other Groundfish				**$-**	$89.3	$1.3	$119.9	$76.3	$209.7	**$497**
Pacific Halibut	$16.6	$40.1	$73.6	**$130**	$56.3	$0.1	$321.1	$124.2	$31.3	**$533**
California Halibut				**$-**						**$-**
CPS			$1,765.4	**$1,765**	$5,304.0					**$5,304**
HMS	$430.5	$35.4	$16,010.6	**$16,477**	$2,740.7	$216.0	$5,072.0	$2,067.7	$94.5	**$10,191**
Salmon	$9.2	$428.8	$1,041.3	**$1,479**	$103.3	$101.2	$95.6	$13.3	$30.1	**$343**
Crab	$2,448.1	$313.3	$19,310.9	**$22,072**	$8,376.6	$2,144.2	$13,235.9	$12,192.1	$6,464.2	**$42,413**
PINK SHRIMP			$2,157.1	**$2,157**	$1,449.5	$1.5	$2,026.2	$3,012.1	$323.2	**$6,813**
Ridgeback Prawn				**$-**						**$-**
Spotted Prawn				**$-**						**$-**
Shrimp	$7.7		$381.5	**$389**		$40.7	$62.1	$67.1	$11.4	**$181**
Shellfish			$406.8	**$407**	$163.4	$84.3	$0.8	$18.8		**$267**
Other Nongroundfish	$149.5	$0.1	$784.5	**$934**	$9.7	$7.8	$143.0	$294.3	$338.5	**$793**
Non-FMP Groundfish	$26.3	$5.9	$24.7	**$57**	$60.7	$0.2	$61.6	$22.9	$1.5	**$147**
Total	$5,674.6	$1,950.0	$46,195.8	**$53,820**	$29,192.8	$2,783.6	$31,025.2	$23,879.9	$11,842.2	**$98,724**

Table F-36. Ex-vessel revenue ($1,000s) by species or species group by port group in California in 2009.

	Crescent City	Eureka	Fort Bragg	Bodega Bay	San Francisco (excl. Bodega Bay)	Monterey	Morro Bay	Santa Barbara	Los Angeles	San Diego	**California Total**	Coastwide Total
Lingcod	$28	$22	$56	$5	$21	$10	$37	$4	$2	$1	**$186**	$514
P. Cod											**$-**	$97
P. Whiting	$164	$34				$0		$0	$0		**$198**	$5,307
Sablefish	$984	$2,058	$2,356	$128	$584	$622	$2,462	$196	$260	$118	**$9,767**	$30,676
Rockfish	$393	$75	$427	$56	$228	$264	$958	$266	$52	$39	**$2,759**	$3,995
Thornyheads	$197	$401	$232	$1	$94	$211	$86	$222	$630	$536	**$2,612**	$4,174
Arrowtooth Flounder	$1	$9	$0		$0						**$10**	$829
Dover Sole	$467	$1,280	$581	$3	$204	$7	$18	$1	$1		**$2,562**	$8,533
English Sole	$3	$22	$9	$2	$15	$6	$0	$0			**$57**	$178
Petrale Sole	$85	$293	$364	$56	$209	$79	$53	$0	$0	$0	**$1,138**	$3,379
Other Flatfish	$41	$44	$15	$5	$95	$18	$13	$12	$17	$0	**$260**	$795
Cabezon	$14	$1	$40	$1	$2	$35	$90	$43	$2	$5	**$232**	$455
Spiny Dogfish	$0		$25		$0	$14		$0			**$39**	$84
Other Groundfish	$9	$36	$12	$1	$7	$29	$12	$3	$1	$6	**$115**	$612
Pacific Halibut	$0	$0									**$0**	$664
California Halibut		$1		$102	$1,176	$34	$89	$956	$119	$86	**$2,562**	$2,562
CPS			$0		$255	$4,539	$110	$35,944	$22,668	$0	**$63,516**	$70,585
HMS	$213	$295	$48	$19	$459	$134	$250	$169	$874	$1,038	**$3,499**	$30,166
Salmon	$5	$0						$0			**$6**	$1,828
Crab	$13,845	$9,815	$658	$1,032	$4,823	$480	$68	$1,439	$169	$109	**$32,437**	$96,922
PINK SHRIMP	$730	$53			$0	$0					**$783**	$9,753
Ridgeback Prawn					$1		$61	$864	$39		**$965**	$965
Spotted Prawn				$2	$60	$304	$108	$999	$1,047	$408	**$2,929**	$2,929
Shrimp	$402	$0			$391	$11		$0	$3	$4	**$811**	$1,382
Shellfish		$0							$0	$0	**$1**	$675
Other Nongroundfish	$14	$455	$2,575	$314	$346	$69	$498	$8,406	$5,699	$3,686	**$22,061**	$23,789
Non-FMP Groundfish		$0	$0		$0	$0	$2	$2	$4		**$9**	$213
Total	$17,598	$14,893	$7,399	$1,727	$8,970	$6,866	$4,914	$49,526	$31,587	$6,034	**$149,514**	$302,058

Table F-37. Landings (mt) by sector and port group, 2008.

Port Group	Shoreside Whiting Trawl	Shoreside Nonwhiting Trawl	Limited Entry Fixed Gear	Open Access Fixed Gear	Incidentally Caught Groundfish	Grand Total
Puget Sound		823.1	314.2		X	X
North Washington Coast		X	251.2	29.8	X	311.7
South & Central WA Coast	18,082.3	873.5	277.5	27.7	20.6	19,281.6
Astoria	10,371.1	7,911.1	140.6	15.5	2.7	18,441.1
Tillamook		X		33.3	0.5	X
Newport	15,491.8	3,143.8	371.2	43.3	23.4	19,073.5
Coos Bay	X	3,540.0	180.4	74.1	3.4	X
Brookings		1,279.9	162.5	227.0	1.1	1,670.5
Crescent City	3,358.2	754.0	64.0	106.9	0.8	4,283.9
Eureka	1,620.8	2,921.0	123.0	73.0	0.2	4,738.0
Fort Bragg		1,534.4	111.1	111.5	0.8	1,757.8
Bodega Bay		X	X	2.3	X	118.1
San Francisco*		943.3	33.4	35.3	14.7	1,026.7
Monterey		X	143.5	110.3	1.1	X
Morro Bay		168.9	X	190.2	2.8	X
Santa Barbara		X	32.0	15.3	31.7	X
Los Angeles			113.0	17.7	14.5	145.2
San Diego			104.8	12.8	4.0	121.6
Total	X	24,323.2	2,462.7	1,126.1	123.5	79,012.1

*excluding Bodega Bay
X- excluded for data confidentiality

Table F-38. Landings (mt) by sector and port group, 2009.

Port Group	Shoreside Whiting Trawl	Shoreside Nonwhiting Trawl	Limited Entry Fixed Gear	Open Access Fixed Gear	Incidentally Caught Groundfish	Grand Total
Puget Sound		1,295.5	257.4		X	X
North Washington Coast		X	220.2	23.1	1.7	X
South & Central WA Coast	10,090.9	1,346.2	308.6	41.0	3.8	11,790.6
Astoria	14,085.8	8,406.4	148.3	16.5	5.1	22,662.2
Tillamook		X		34.5	0.2	X
Newport	12,993.0	3,774.6	525.1	42.4	11.8	17,347.0
Coos Bay	X	3,619.1	191.4	85.2	6.5	X
Brookings		1,201.1	263.5	276.9	1.8	1,743.3
Crescent City	1,489.4	982.5	108.0	81.4	0.4	2,661.7
Eureka	X	2,678.7	101.8	73.0	X	3,162.0
Fort Bragg		1,684.1	154.6	102.9	0.6	1,942.3
Bodega Bay		X	X	17.2	3.8	81.4
San Francisco*		648.5	59.9	36.3	29.0	773.7
Monterey		X	108.2	71.3	0.7	X
Morro Bay		X	202.0	568.8	2.1	X
Santa Barbara			35.6	74.2	15.9	125.7
Los Angeles			117.7	12.9	12.7	143.2
San Diego			82.1	13.3	3.8	99.2
Total	40,580.1	26,164.7	X	1,571.1	104.7	71,314.5

*excluding Bodega Bay
X- excluded for data confidentiality

Table F-39. Ex-vessel revenue ($1,000s) by sector and port group, 2008.

Port Group	Shoreside Whiting Trawl	Shoreside Nonwhiting Trawl	Limited Entry Fixed Gear	Open Access Fixed Gear	Incidentally Caught Groundfish	Grand Total
Puget Sound		$1,001.0	$1,435.1		X	X
North Washington Coast		X	$757.1	$90.2	X	X
South & Central WA Coast	$3,728.7	$836.6	$1,390.4	$133.5	$36.9	$6,126.1
Astoria	$2,422.5	$8,785.4	$797.4	$67.9	$9.7	$12,082.9
Tillamook		X		$155.5	$1.7	X
Newport	$3,782.2	$4,651.1	$2,103.7	$218.6	$45.1	$10,800.7
Coos Bay	X	$4,640.5	$1,082.4	$366.7	$15.0	X
Brookings		$1,876.6	$821.3	$1,240.5	$5.5	$3,944.0
Crescent City	$728.3	$977.1	$299.2	$541.4	$2.7	$2,548.7
Eureka	$362.4	$3,949.6	$481.1	$291.0	$0.3	$5,084.3
Fort Bragg		$2,286.2	$544.0	$585.5	$7.1	$3,422.8
Bodega Bay		X	X	$37.1	X	$305.8
San Francisco*		$1,479.4	$130.2	$279.3	$45.0	$1,933.9
Monterey		X	$480.0	$468.3	$6.4	X
Morro Bay		$350.5	X	$1,485.6	$16.3	X
Santa Barbara		X	$245.2	$226.8	$56.8	X
Los Angeles			$806.4	$85.3	$32.6	$924.2
San Diego			$839.9	$59.3	$15.1	$914.3
Total	X	$31,622.5	$12,375.0	$6,332.5	$301.8	$62,319.5

*excluding Bodega Bay
X- excluded for data confidentiality

Table F-40. Ex-vessel revenue ($1,000s) by sector and port group, 2009.

Port Group	Shoreside Whiting Trawl	Shoreside Nonwhiting Trawl	Limited Entry Fixed Gear	Open Access Fixed Gear	Incidentally Caught Groundfish	Grand Total
Puget Sound		$1,130.7	$1,474.9		X	X
North Washington Coast		X	$963.5	$97.3	$2.1	X
South & Central WA Coast	$1,408.2	$1,146.7	$1,490.0	$202.9	$16.3	$4,264.1
Astoria	$2,011.2	$8,052.8	$825.4	$83.1	$16.8	$10,989.2
Tillamook		X		$152.9	$0.7	$187.8
Newport	$1,574.3	$5,106.3	$3,103.0	$222.5	$62.7	$10,068.7
Coos Bay	X	$4,166.1	$1,204.1	$423.7	$32.5	X
Brookings		$1,618.3	$1,438.5	$1,483.1	$9.2	$4,549.1
Crescent City	$167.5	$1,321.0	$532.4	$365.4	$1.6	$2,387.9
Eureka	X	$3,500.0	$427.9	$192.6	X	$4,154.6
Fort Bragg		$2,626.2	$880.3	$607.0	$4.0	$4,117.6
Bodega Bay		X	X	$101.2	$6.4	$257.1
San Francisco*		$899.4	$263.1	$252.5	$43.9	$1,459.0
Monterey		X	$406.7	$376.9	$4.2	X
Morro Bay		X	$709.8	$2,802.9	$8.7	X
Santa Barbara			$259.1	$440.8	$49.8	$749.7
Los Angeles			$858.0	$91.7	$20.6	$970.3
San Diego			$645.3	$43.3	$14.4	$702.9
Total	$5,459.0	$30,475.0	X	$8,059.9	$301.4	$59,838.9

*excluding Bodega Bay
X- excluded for data confidentiality

A.7 Participation

Table F-41. Number of vessels making at least one groundfish landing each year by Port Group and Sector, 2005-2006.

Port Group	Limited Entry Fixed Gear	Open Access Fixed Gear	Nonwhiting Trawl	Incidentally Caught Groundfish	Shoreside Whiting Trawl
			2005		
Puget Sound	18	5	6	3	0
North Washington Coast	12	26	7	13	0
South & Central WA Coast	16	51	4	35	9
Astoria	9	32	29	18	5
Tillamook	0	42	1	35	0
Newport	13	20	22	89	12
Coos Bay	11	73	19	84	2
Brookings	9	89	7	38	0
Crescent City	6	28	5	9	2
Eureka	6	30	14	6	3
Fort Bragg	2	65	10	10	0
Bodega Bay	1	13	0	12	0
San Francisco (excl Bodega Bay)	6	41	17	54	0
Monterey	8	62	9	58	1
Morro Bay	0	78	9	25	0
Santa Barbara	9	32	0	52	0
Los Angeles	28	26	0	47	0
San Diego	18	13	0	19	0
Total Vessels	126	678	123	552	29
			2006		
Puget Sound	20	5	6	3	0
North Washington Coast	15	23	4	17	0
South & Central WA Coast	14	73	5	36	15
Astoria	5	25	32	34	11
Tillamook	0	46	1	23	0
Newport	16	47	23	78	10
Coos Bay	8	75	19	30	3
Brookings	9	90	9	20	0
Crescent City	7	33	7	15	2
Eureka	8	33	17	3	4
Fort Bragg	2	63	9	14	0
Bodega Bay	1	13	2	15	0
San Francisco (excl Bodega Bay)	6	58	16	46	0
Monterey	12	56	9	34	0
Morro Bay	4	105	4	34	0
Santa Barbara	11	49	0	65	0
Los Angeles	24	27	0	40	0
San Diego	18	14	0	30	0
Total Vessels	132	774	122	481	37

Table F-42. Number of vessels making at least one groundfish landing each year by Port Group and Sector, 2007-2008.

Port Group	Limited Entry Fixed Gear	Open Access Fixed Gear	Nonwhiting Trawl	Incidentally Caught Groundfish	Shoreside Whiting Trawl
			2007		
Puget Sound	20	3	6	5	0
North Washington Coast	13	24	2	11	0
South & Central WA Coast	10	38	8	20	14
Astoria	6	15	32	21	10
Tillamook	0	38	1	25	0
Newport	15	39	22	75	14
Coos Bay	13	53	23	60	3
Brookings	11	90	8	29	0
Crescent City	6	27	7	17	3
Eureka	8	34	18	4	4
Fort Bragg	4	58	8	11	0
Bodega Bay	1	14	2	10	0
San Francisco (excl. Bodega Bay)	4	56	16	33	0
Monterey	9	57	5	23	0
Morro Bay	1	110	6	18	0
Santa Barbara	8	45	0	56	0
Los Angeles	28	28	0	50	0
San Diego	17	18	0	26	0
Total Vessels	136	707	121	468	39
			2008		
Puget Sound	16	0	4	2	0
North Washington Coast	9	13	3	3	0
South & Central WA Coast	14	32	7	22	10
Astoria	5	10	31	10	15
Tillamook	0	33	2	5	0
Newport	16	50	24	36	15
Coos Bay	11	53	21	13	3
Brookings	12	85	9	12	0
Crescent City	6	24	10	11	5
Eureka	9	35	14	5	5
Fort Bragg	6	53	7	9	0
Bodega Bay	2	10	1	3	0
San Francisco*	5	49	16	20	0
Monterey	8	68	3	14	0
Morro Bay	2	95	4	25	0
Santa Barbara	8	38	1	49	0
Los Angeles	19	24	0	39	0
San Diego	19	15	0	28	0
Total Vessels	135	663	120	284	37

*excluding Bodega Bay

Table F-43. Number of vessels making at least one groundfish landing each year by Port Group and Sector, 2005-2009.

Port Group	Limited Entry Fixed Gear	Open Access Fixed Gear	Nonwhiting Trawl	Incidentally Caught Groundfish	Shoreside Whiting Trawl
			2009		
Puget Sound	16	0	5	3	0
North Washington Coast	8	14	1	9	0
South & Central WA Coast	16	34	7	18	9
Astoria	7	14	33	20	12
Tillamook	0	34	2	9	0
Newport	19	59	26	28	11
Coos Bay	13	48	23	25	3
Brookings	16	88	10	14	0
Crescent City	7	18	7	11	5
Eureka	8	33	12	2	2
Fort Bragg	5	48	7	4	0
Bodega Bay	2	12	2	6	0
San Francisco*	6	57	8	28	0
Monterey	9	64	3	17	0
Morro Bay	8	113	1	19	0
Santa Barbara	5	47	0	50	0
Los Angeles	17	23	0	29	0
San Diego	16	13	0	17	0
Total Vessels	139	670	117	291	34

*excluding Bodega Bay

Table F-44. Average annual number of commercial vessels making groundfish deliveries by sector and length category, 2005-2009.

Sector	Vessel Length Categories (feet)								
	< 40	40 - 50	50 - 60	60 - 70	70 - 150	> 150	Unspecified	All Lengths	Sector Totals
Commercial whiting CPs				0.2		7.0	0.4		7.6
Commercial mothership whiting CVs				0.4	17.8		0.8		19.0
Commercial shoreside whiting			1.0	5.0	29.6				35.6
Commercial shoreside non-whiting trawl	1.6	14.8	33.6	28.8	44.8				123.6
Commercial shoreside LE fixed gear	62.2	39.6	18.8	10.0	4.8				135.4
Commercial shoreside OA fixed gear	528.0	126.4	23.6	7.0	3.0	0.2	0.6		688.8
Commercial incidental groundfish	243.4	117.2	25.4	7.2	8.0		0.8		402.0
Commercial non-groundfish									
Length Class Totals	695.6	233.4	83.6	48.2	71.6	7.2	2.0	1,133.8	

Table F-45. Average annual number of vessels making groundfish deliveries by port group and length category, 2005-2009.

	Vessel Length Categories (feet)								
Port Group	< 40	40 - 50	50 - 60	60 - 70	70 - 150	> 150	Unspecified	All Lengths	Port Group Totals
Puget Sound	2.0	9.0	5.2	5.6	6.0				27.8
North Washington Coast	16.0	18.8	4.8	1.0	0.6	0.2			41.4
South & Central WA Coast	17.2	33.8	9.4	4.4	12.8		0.4		78.0
Astoria	11.2	12.2	11.2	12.8	22.0				69.4
Tillamook	41.6	6.2	1.6	0.8	0.4				50.6
Newport	40.0	31.2	16.6	7.6	19.0				114.4
Coos Bay	43.4	34.4	12.8	11.2	10.0		0.2		112.0
Brookings	97.8	6.0	2.4	0.4	6.4				113.0
Crescent City	23.2	8.2	6.0	0.8	4.6				42.8
Eureka	27.2	15.2	4.6	3.6	6.0		0.2		56.8
Fort Bragg	46.4	15.0	8.2	0.8	1.2				71.6
Bodega Bay	17.6	2.4	0.6						20.6
San Francisco (excl. Bodega Bay)	52.2	17.2	5.2	3.6	5.2		0.6		84.0
Monterey	68.8	12.2	3.0	1.6	2.4		0.2		88.2
Morro Bay	86.8	17.2	5.0	1.4	2.2		0.4		113.0
Santa Barbara	67.2	15.2	2.0	0.6	0.4		0.2		85.6
Los Angeles	58.2	11.2	3.6	0.6	1.8		0.6		76.0
San Diego	40.4	6.8	0.4						47.6
At- Sea Sectors				0.6	17.8	7.0	1.2		26.6
Length Class Totals	695.6	233.4	83.6	48.2	71.6	7.2	2.0	1,133.8	1,133.8

A.8 Figures

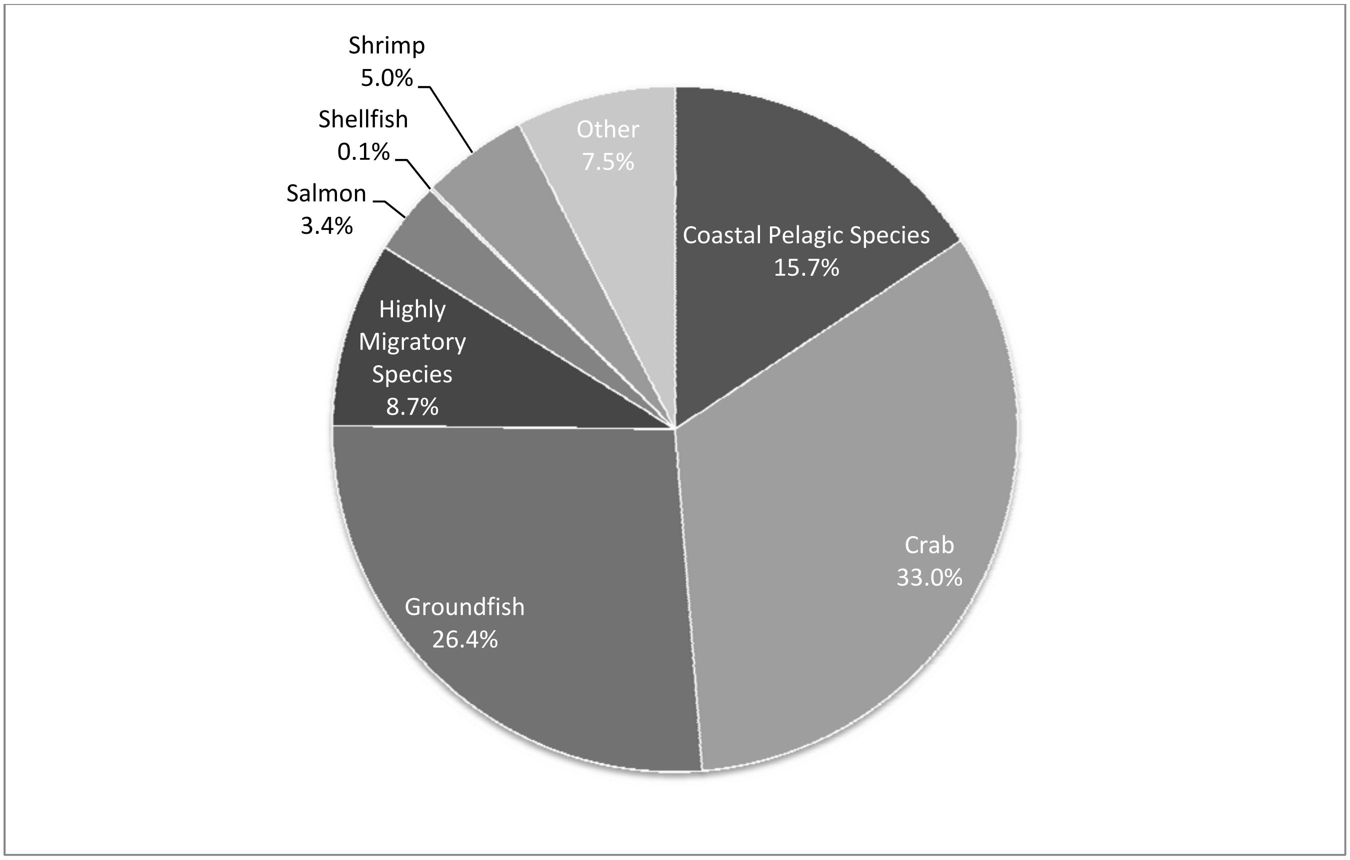

Figure F-1. Average ex-vessel revenue by management group (commercial and tribal, at sea and shoreside) in current (2009) dollars as a percent of total, 2005-2009.

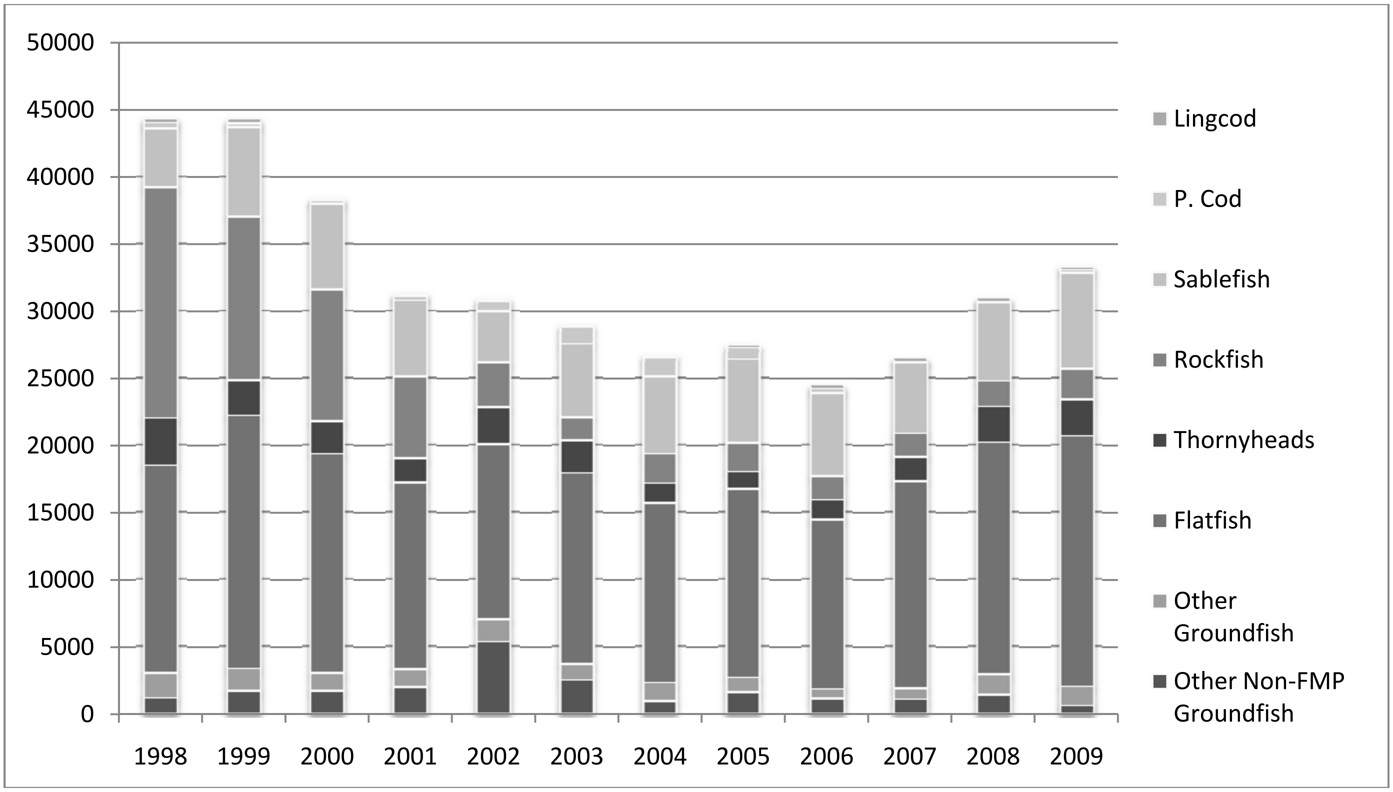

Figure F-2. Nonwhiting groundfish landings (mt), 1998-2009.

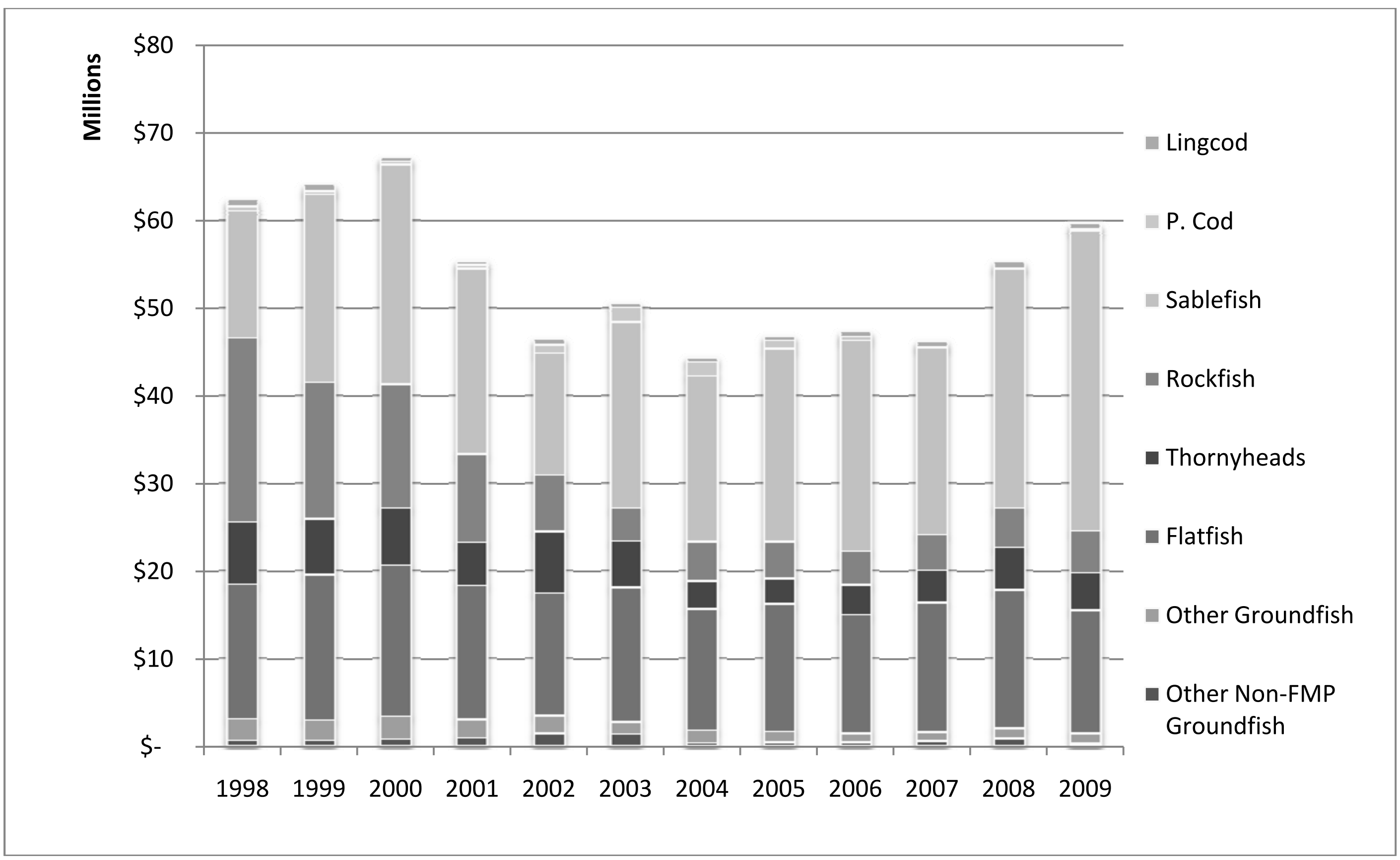

Figure F-3. Nonwhiting groundfish ex-vessel revenue in current (2009) dollars, 1998-2009.

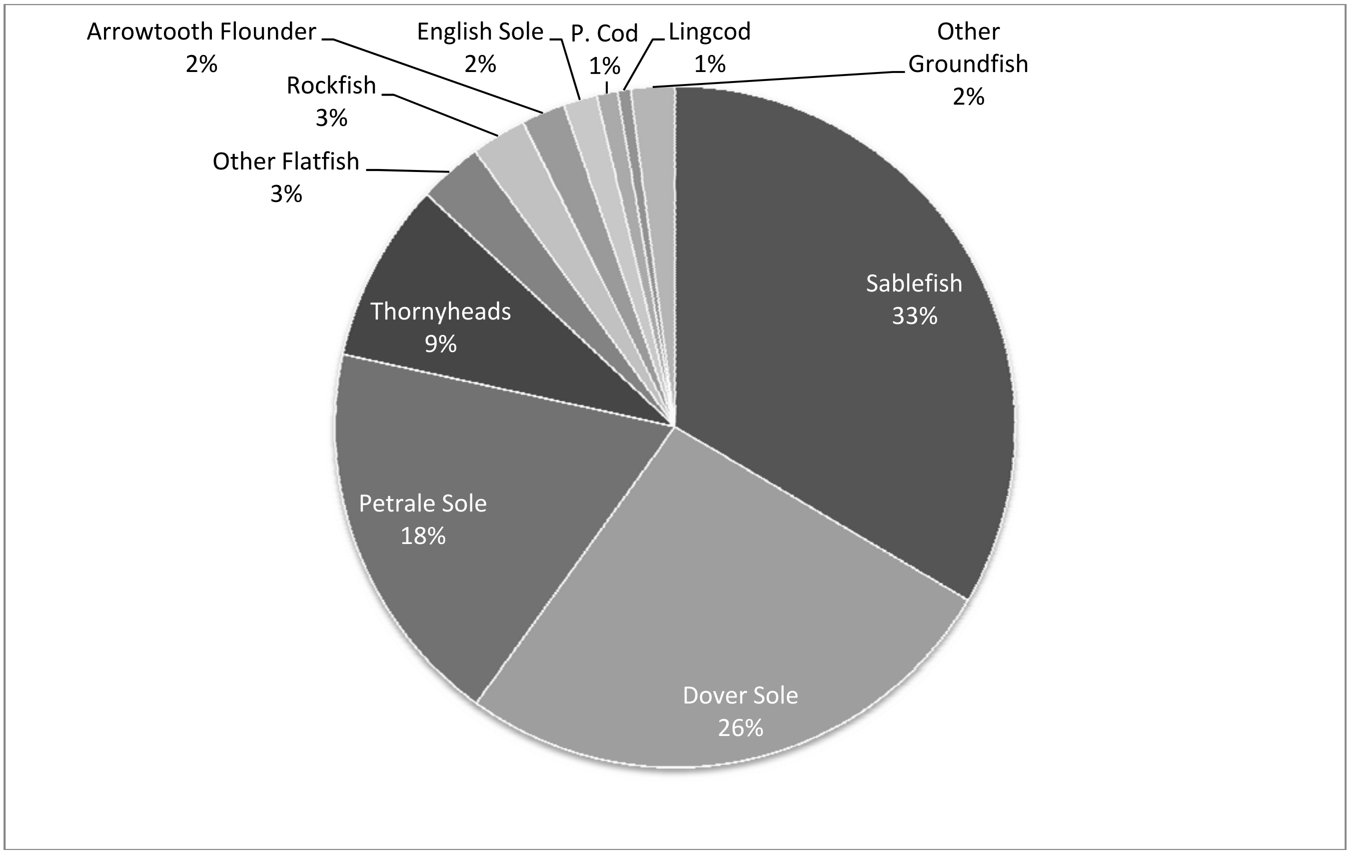

Figure F-4. Composition of limited entry nonwhiting trawl ex-vessel revenue, average 2005-2009.

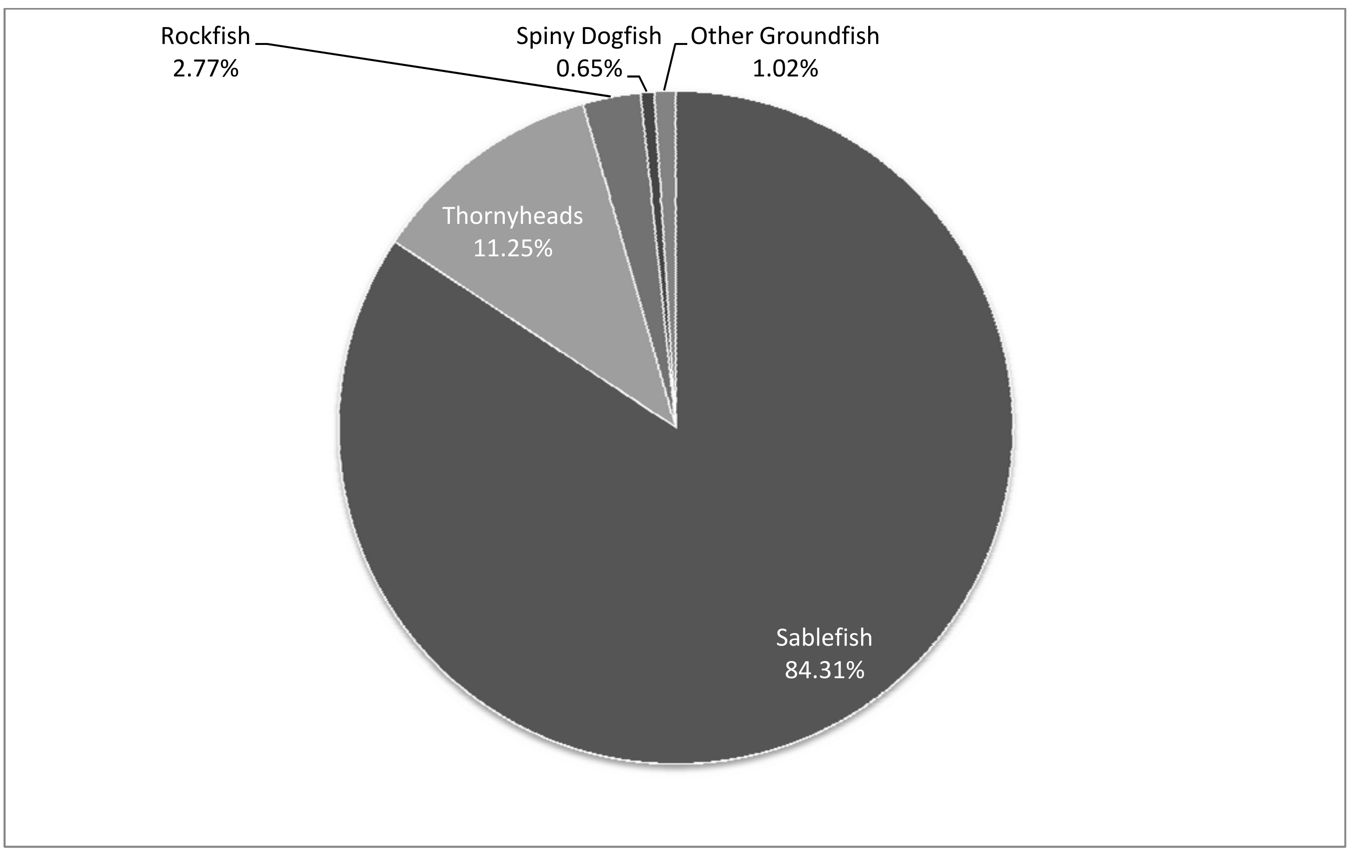

Figure F-5. Composition of limited entry fixed gear ex-vessel revenue, average 2005-2009.

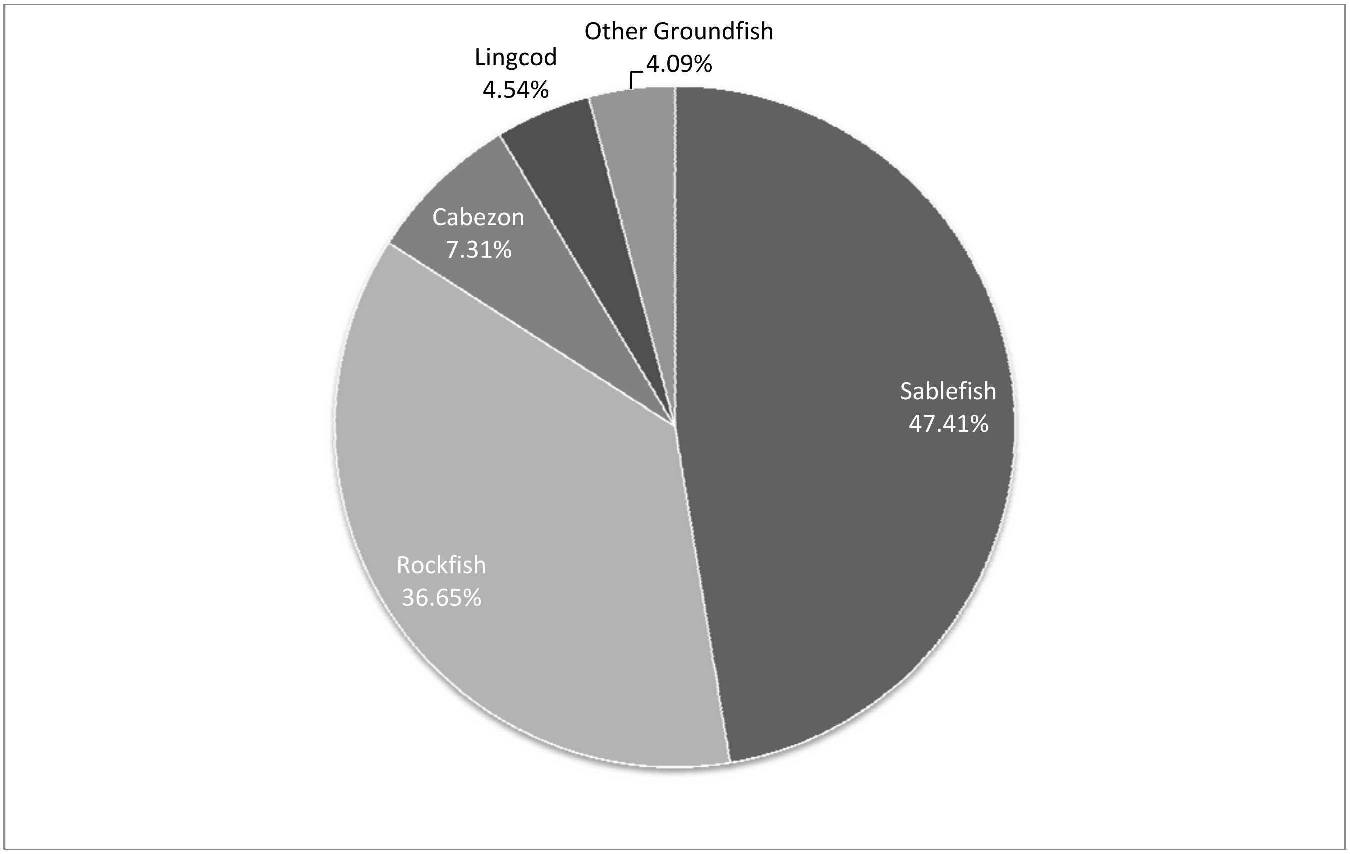

Figure F-6. Composition of open access fixed gear ex-vessel revenue, average 2005-2009.

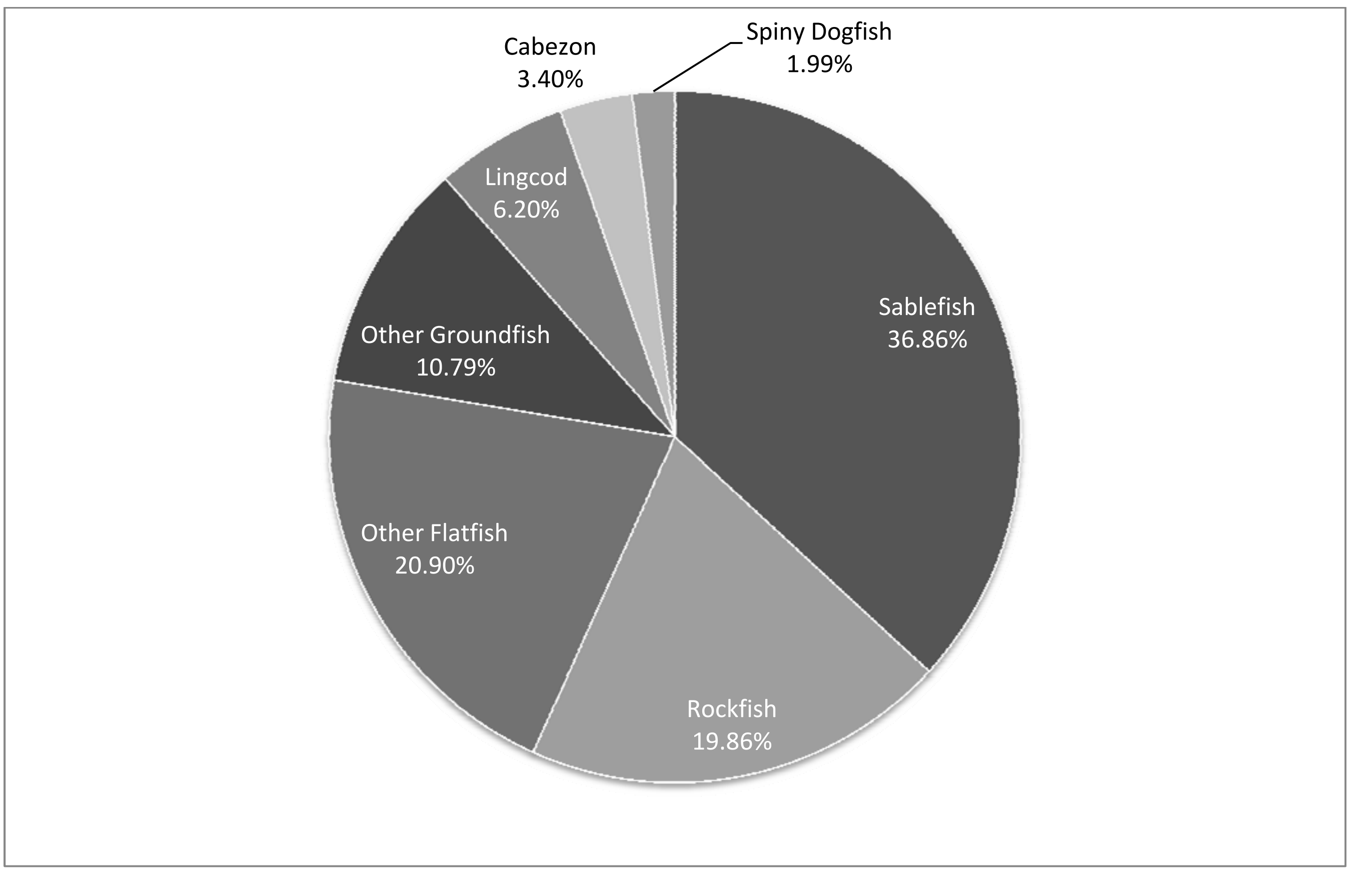

Figure F-7. Composition of incidentally caught groundfish ex-vessel revenue, average 2005-2009.

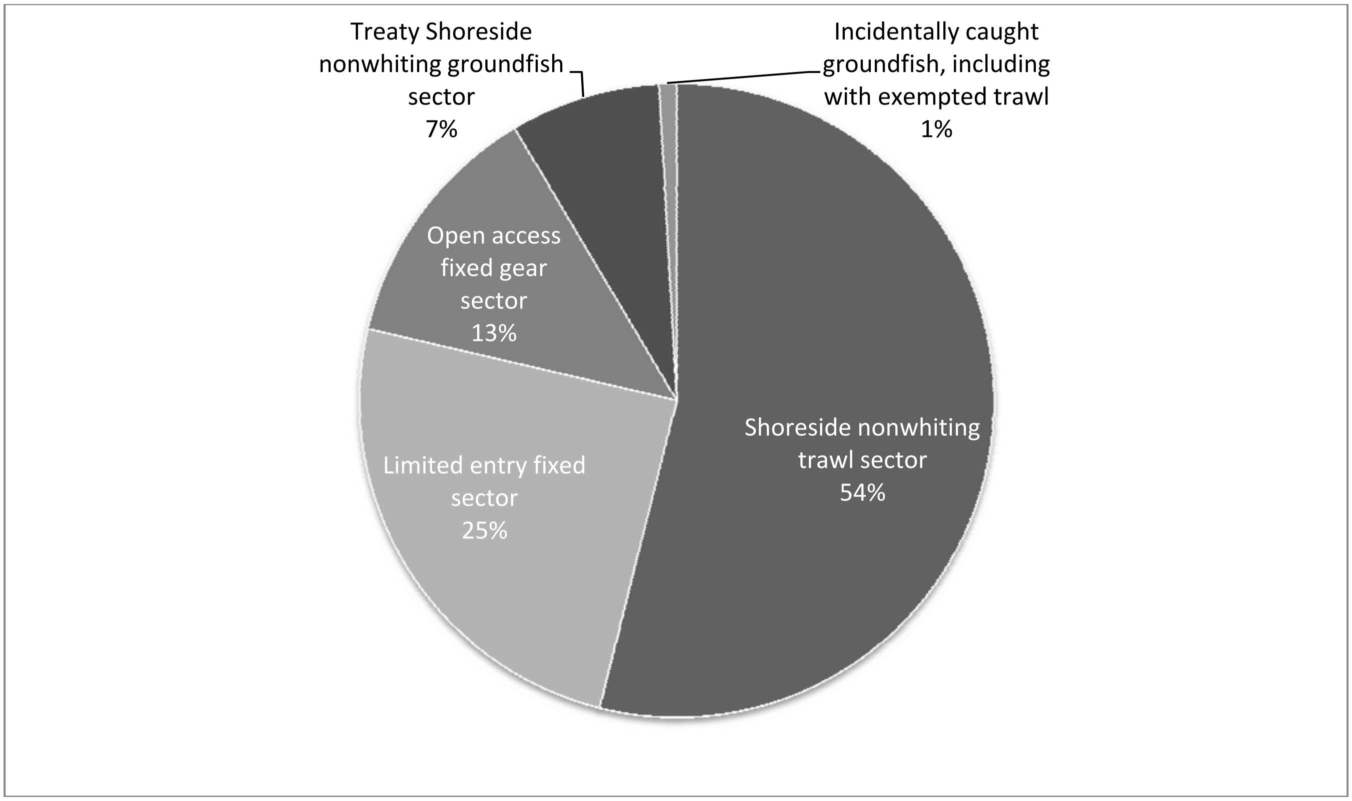

Figure F-8.Groundfish ex-vessel revenue, proportion by nonwhiting sectors, 2005-2009.

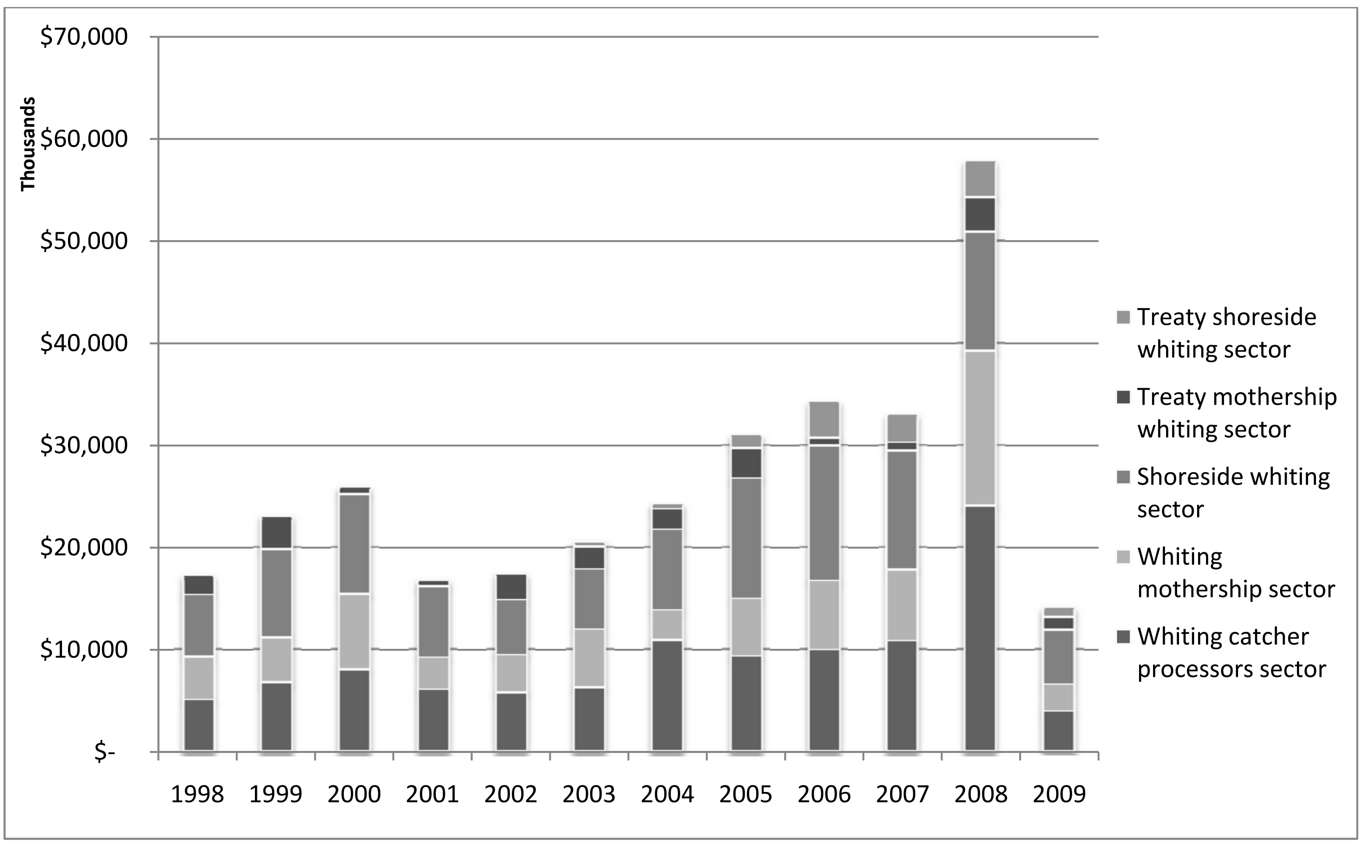

Figure F-9. Whiting ex-vessel revenue (mt) by whiting sectors, current (2009) dollars, 1998-2009.

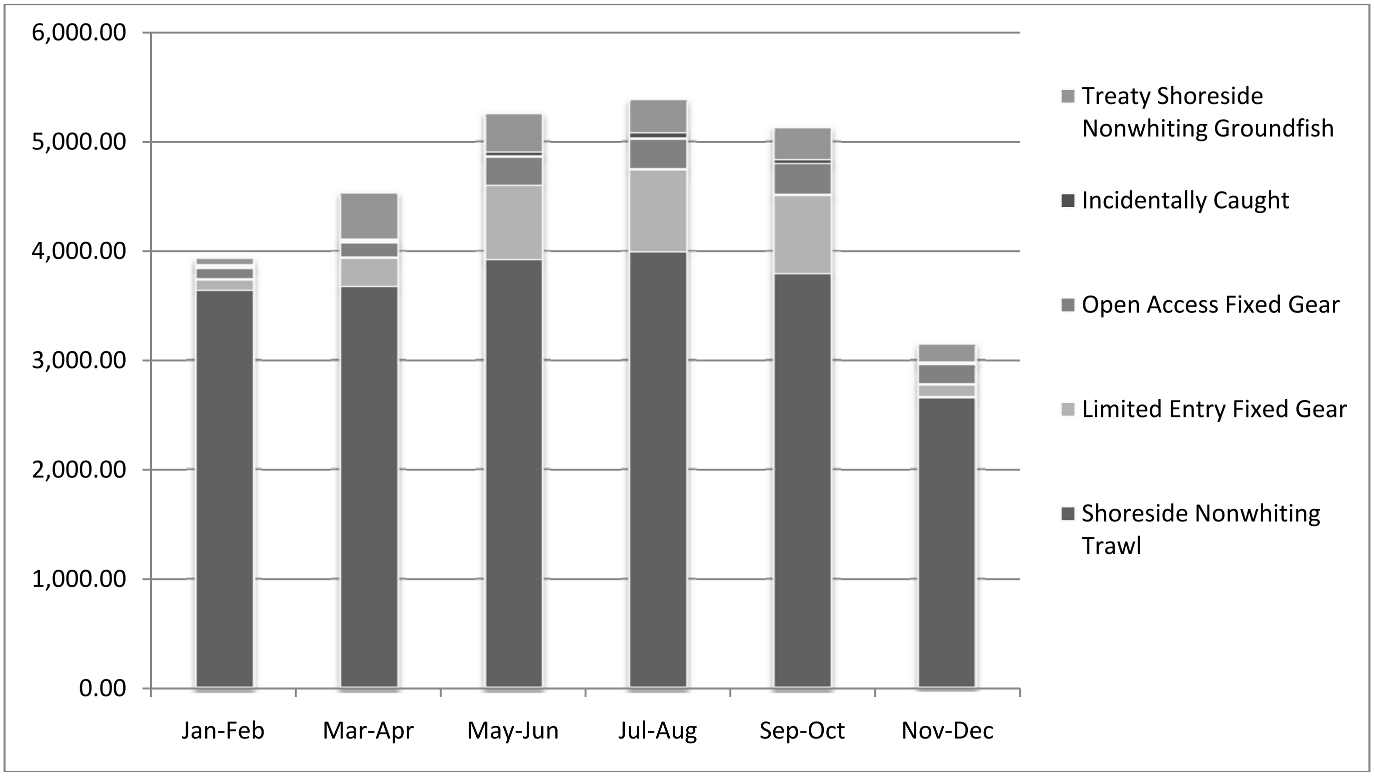

Figure F-10. Average landings per 2-month period by nonwhiting sectors, 2005-2009.

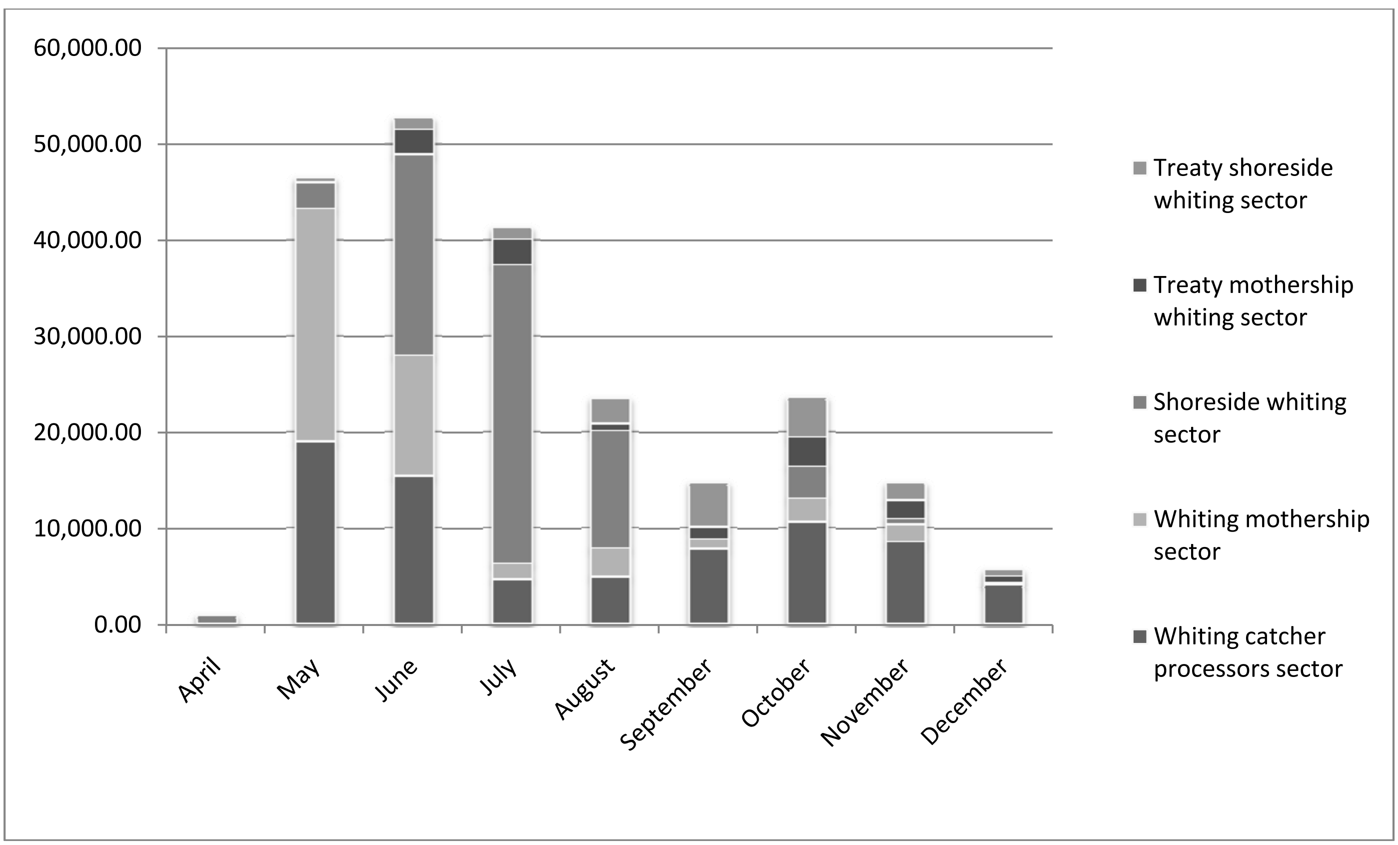

Figure F-11. Average monthly landings (mt) by whiting sectors, 2005-2009.

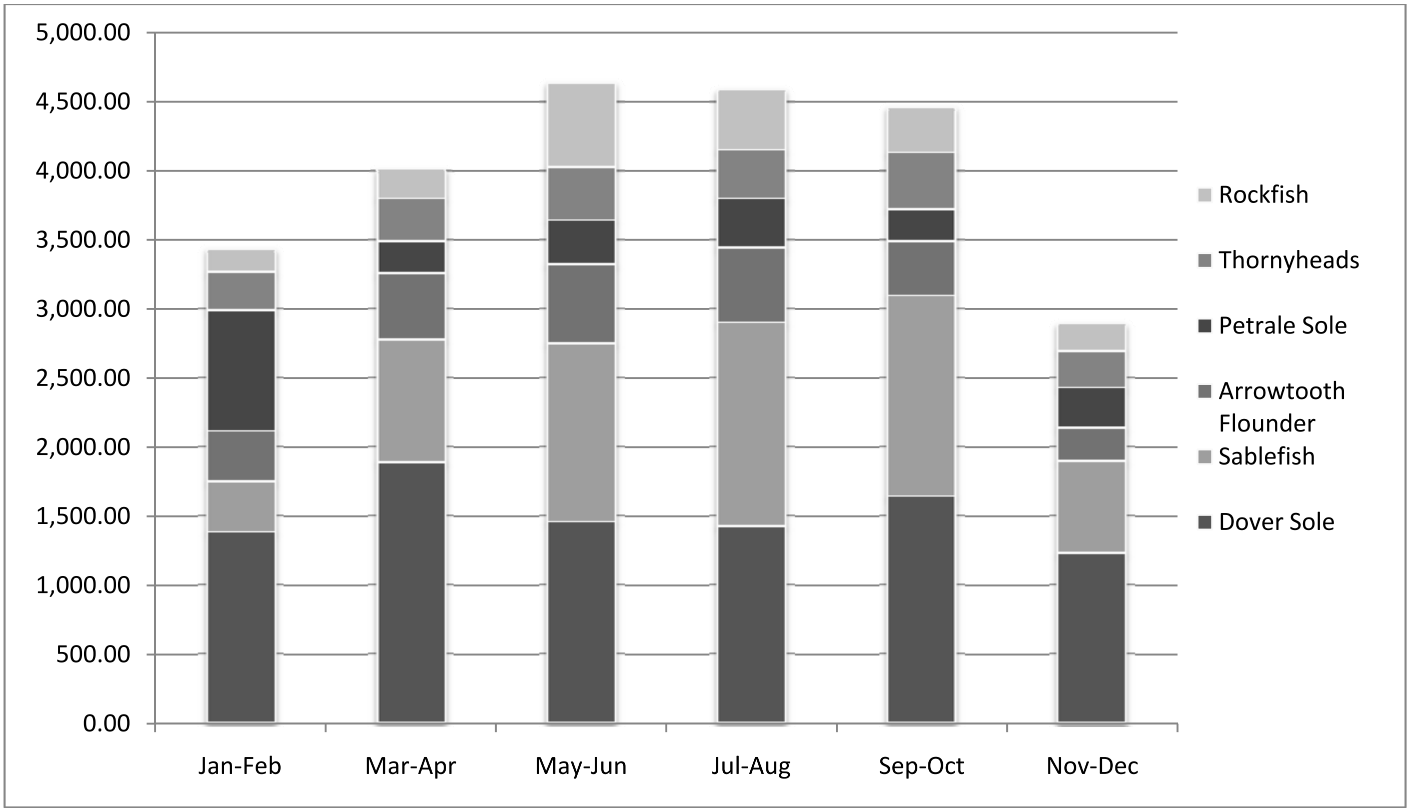

Figure F-12. Average landings (mt) per 2-month period of selected groundfish species, 2005-2009.

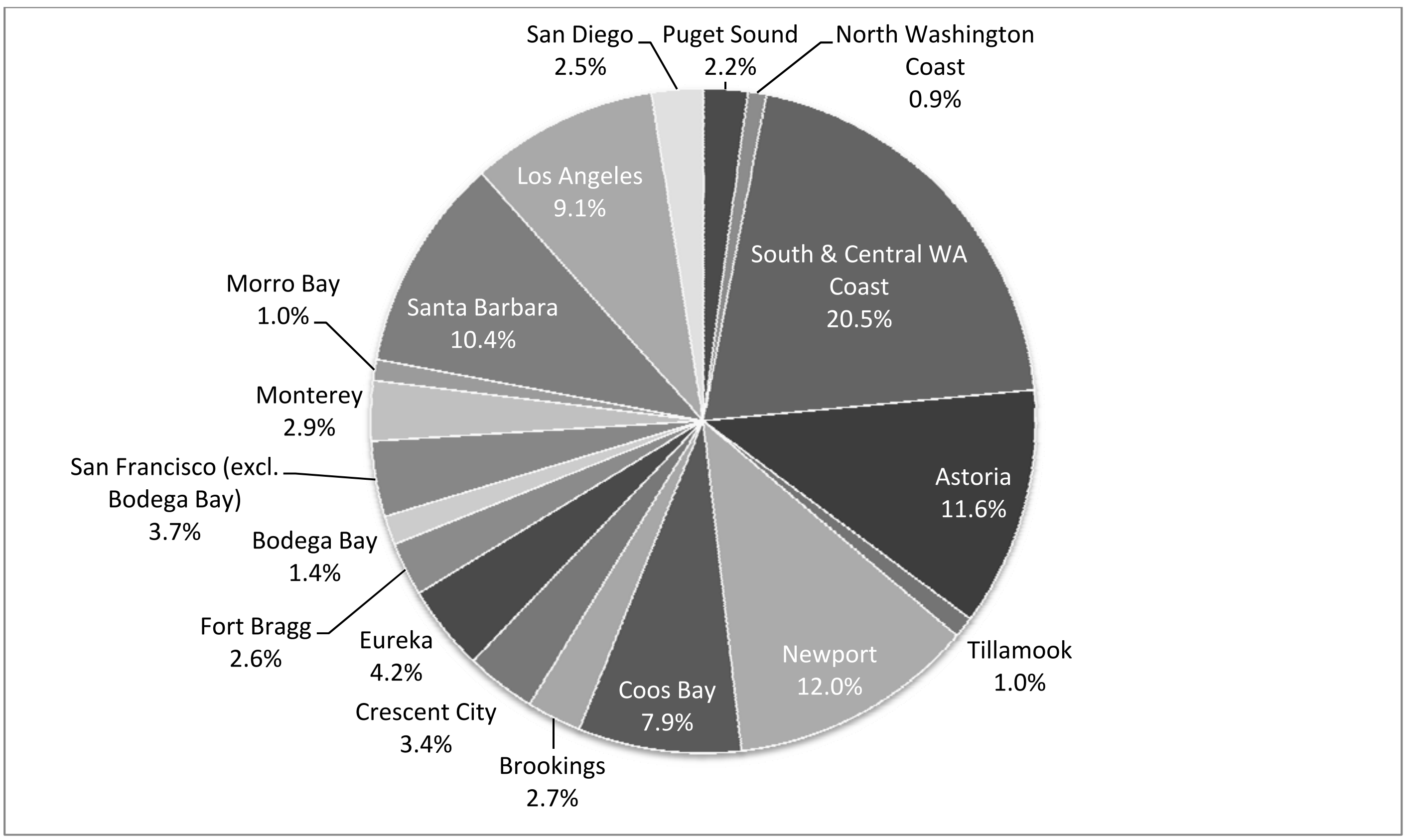

Figure F-13. Ex-vessel revenue in 2009 by port group, for all species.

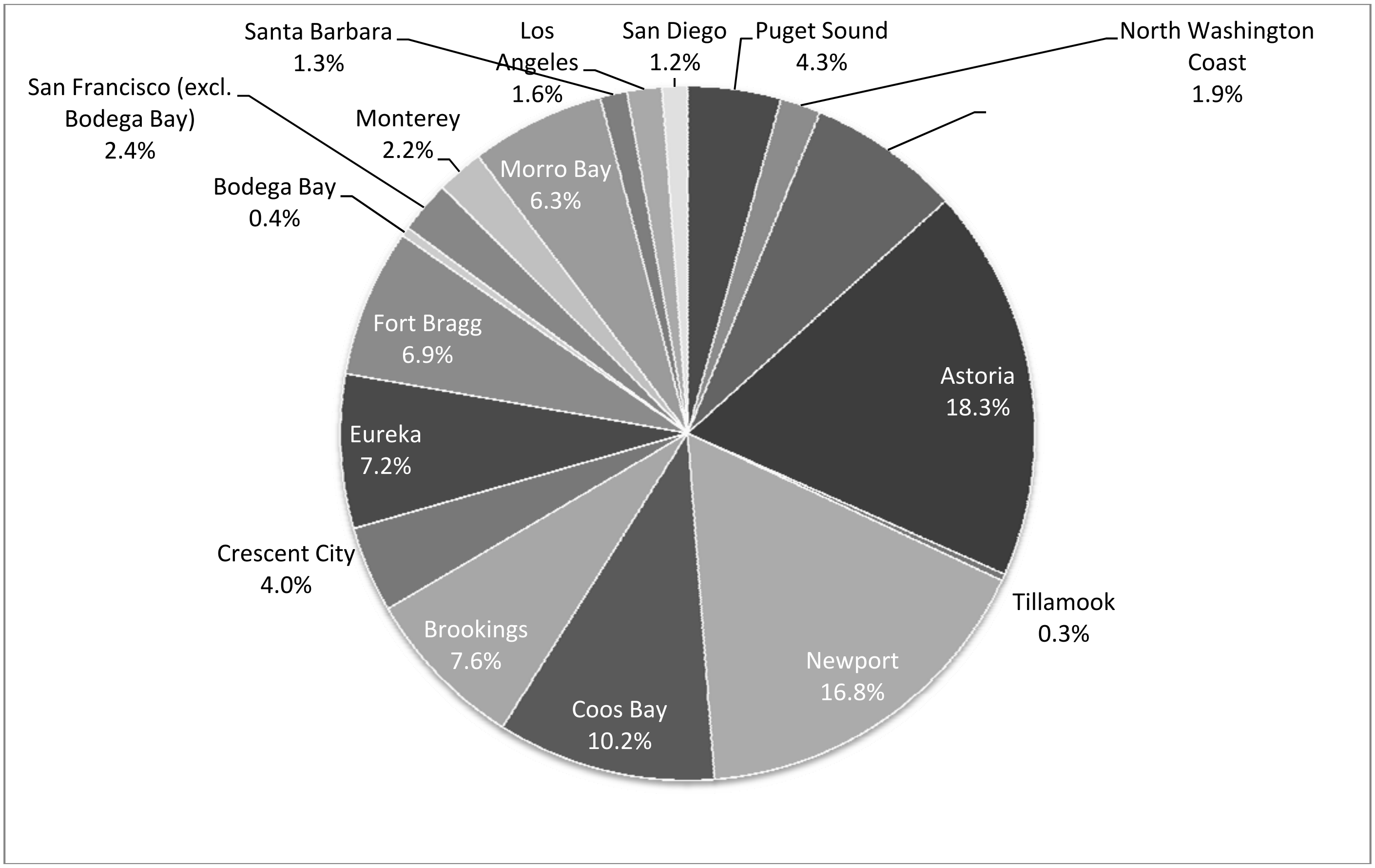

Figure F-14. Ex-vessel revenue in 2009 by port group, for groundfish species.

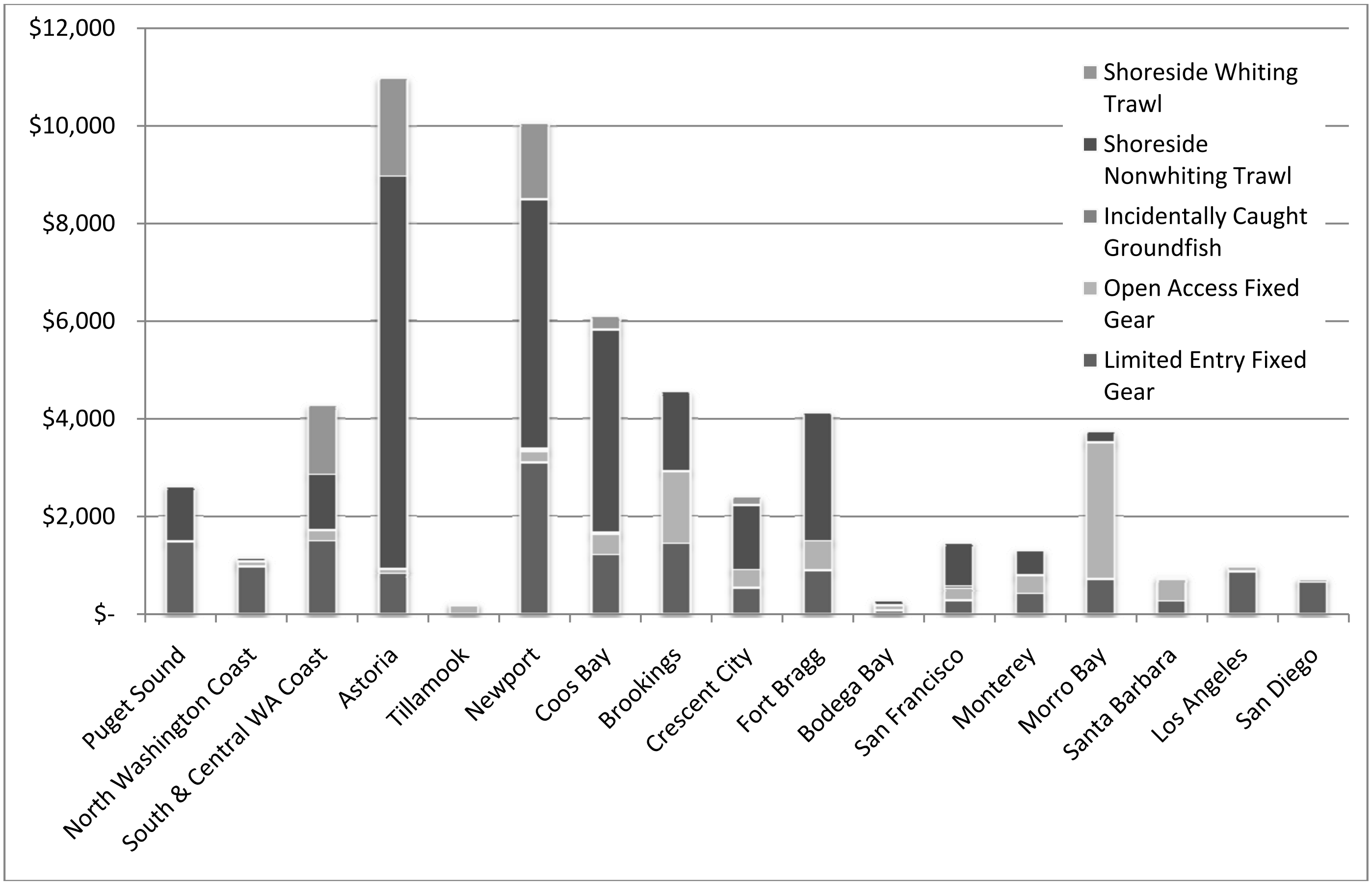

Figure F-15. Ex-vessel revenue ($1,000s) in 2009 by sector and port group.

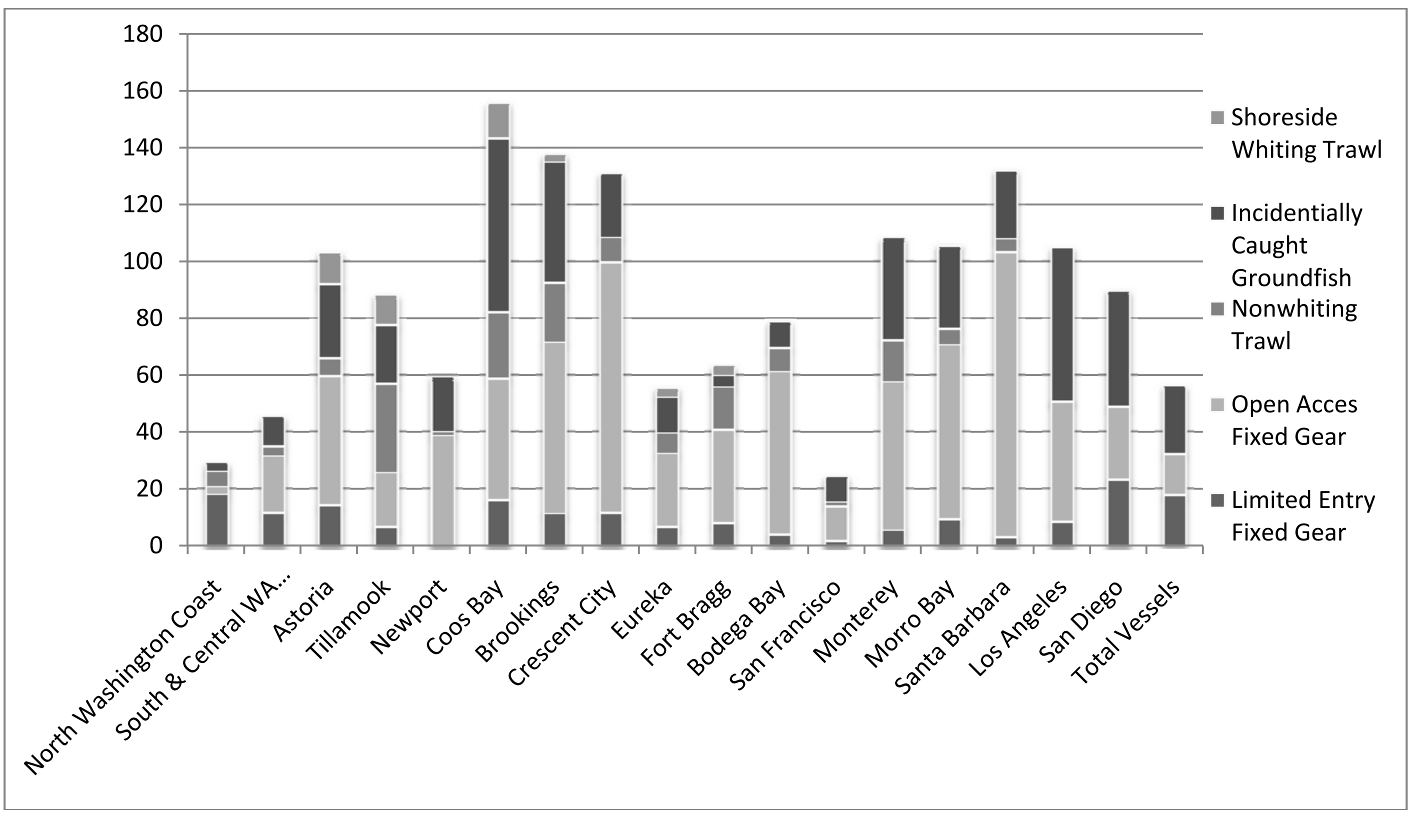

Figure F-16. Average number of vessels making landings by sector and port group, 2005-2009.

Appendix G
ANALYSIS OF LONG-TERM BENEFITS OF ALTERNATIVE REBUILDING STRATEGIES FOR YELLOWEYE AND CANARY ROCKFISH

2011-2012 GROUNDFISH HARVEST SPECIFICATIONS
DRAFT ENVIRONMENTAL IMPACT STATEMENT

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Tables

A.1 Introduction

In an attempt to assess the implied non-market and non-use (NMNU) values associated with the choice among alternative rebuilding schedules for overfished species, the present value (PV) of projected catch streams for yelloweye and canary rockfish was examined under the current range of rebuilding scenarios. For simplicity no attempt was made to explicitly value landings of the commercial and recreational target species that could be "leveraged" under the varying overfished species ACLs. For this analysis, the key difference between the rebuilding scenarios is the timing of when the projected catch levels occur.

The analysis compares how the choice of discount rate (i.e., the societal value associated with when a benefit is received) affects which scenario maximizes PV, and for any given discount rate how the scenario that maximizes PV compares with the PV under the fastest rebuilding alternative (i.e., zero harvest until rebuilt, or F=0). For a given discount rate, examining the ratio of PVs for any two rebuilding scenarios gives an indication of what the implied difference in NMNU values must be in order to choose the faster of the two rebuilding scenarios. Two time horizons were also examined based on the relative rebuilding times for each species: a "short-term horizon" (20 years for canary; 50 years for yelloweye), and a "long-term horizon" (50 years for canary; 90 years for yelloweye). As a general rule of thumb, the longer the time horizon or the lower the discount rate the more competitive the slower rebuilding alternatives become.

A.2 Discount Rates

Discount rates are a measure of a society's rate of time preference: the higher the discount rate, the greater the level of impatience for receiving a benefit now versus in the future. Discount rates exceeding about 10% imply a fairly high level of impatience. A discount rate of zero implies complete indifference between whether a benefit is received now or in the future. Negative discount rates imply that a benefit is actually considered more valuable received in the future than received today, as might be true of a bequest intended for future generations. A negative discount rate might therefore be used to compare the future value of benefit streams where a societal premium is placed on "intergenerational equity" (i.e., leaving something of value for future generations). Since discount rates are somewhat analgous to interest rates, and money received now has greater value than the same amount received in the future, a positive discount rate is generally used to analyze most present value situations.

Table G-1 through Table G-4 show present values of projected catch streams for selected yelloweye and canary rebuilding scenarios under the two different time horizons and discount rates ranging from -20% to +20%. The median catch streams were taken directly from the most current set of rebuilding model runs for yelloweye and canary. Under each scenario median catch is assumed to default to MSY (56.4 mt for yelloweye; 959 mt for canary) at Ttarget and each year thereafter. Each table includes two scenarios that were not explicitly designed to rebuild: "40:10 Harvest policy" and "ABC harvest rate SPR=50%". While these are not counted as "rebuilding scenarios", they are shown in order to compare PV under the rebuilding scenarios with that under the scenario that provides the "Overall Maximum" PV, rebuilding considerations aside.

In the tables, shading identifies the rebuilding scenario having the highest PV for each discount rate. The second to last column in each table shows the value of the rebuilding scenario with the highest PV, and the last column shows the value of the scenario having the highest PV overall, irrespective of rebuilding considerations.

A.3 Results

In Table G-1, the short-term (50 yr) time horizon for yelloweye:

For discount rates less than -5%, “F=0” has highest PV among rebuilding scenarios.

For all discount rates greater than -5% "SPR achieving 50% probability recovery by 16-4 Tmax" has the highest PV.

When the discount rate=0, PV of the MAX PV scenario " SPR achieving 50% probability recovery by 16-4 Tmax " is 78% greater than “F=0”.

When discount rate=+3%, PV of the MAX PV scenario " SPR achieving 50% probability recovery by 16-4 Tmax " is more than 3 times greater than “F=0”.

For discount rates greater than +20%, “F=0” has PV=0.

For discount rates greater than -20% (i.e., all discount rates shown), "ABC harvest rate SPR = 50%" has the Maximum Overall PV (i.e., non-rebuilding).

Table G-2 shows the long-term (90 yr) time horizon for yelloweye. The same patterns shown in Table G-1 generally hold, except that “F=0” now has the highest PV when the discount rate equals zero.

For all discount rates less than or equal to zero, “F=0” has highest PV among rebuilding scenarios.

For discount rates greater than zero, "SPR achieving 50% probability recovery by 16-4 Tmax" has the highest PV.

When the discount rate=0, PV of the MAX PV scenario “F=0” is 0.3% greater than the PV of the next best scenario "2010 OY = 14 mt, constant catch = 20 mt".

When discount rate=+3%, PV of the MAX PV scenario " SPR achieving 50% probability recovery by 16-4 Tmax " is 72% greater than PV of “F=0”.

For discount rates greater than +20%, “F=0” has PV=0.

For all discount rates greater than -3%, “ABC harvest rate SPR = 50%” has the Maximum Overall PV (i.e., non-rebuilding).

Table G-3 provides the following insights regarding the short-term (20 yr) time horizon for canary:

For discount rates less than -9%, “F=0” has the highest PV among rebuilding scenarios.

For discount rates greater than -9% "SPR achieving 50% probability recovery by 2046" has the highest PV.

When discount rate=0, PV of the MAX PV scenario "SPR achieving 50% probability recovery by 2046" is 51% greater than “F=0”.

When discount rate=+3%, PV of MAX PV scenario "SPR achieving 50% probability recovery by 2046" is 82% greater than “F=0”.

For discount rates greater than -20%, "ABC harvest rate SPR=50%" has the Maximum Overall PV (rebuilds by Ttarget = 2180).

Table G-4 shows the long-term (50 yr) time horizon for canary. The same patterns shown in Table G-3 generally hold, except that “SPR that achieves 50% probability recovery by 2031” now has the highest PV when the discount rate equals zero.

For discount rates less than 0%, “F=0” has highest PV among rebuilding scenarios.

For discount rate=0, "SPR achieves 50% probability recovery by 2031" has the highest PV.

When discount rate=0, PV of the MAX PV scenario "SPR achieves 50% probability recovery by 2031" is 0.14% greater than “F=0”.

For discount rate greater than 0, "SPR achieves 50% probability recovery by 2046" has the highest PV.

When discount rate=+3%, PV of the MAX PV scenario “SPR achieves 50% probability recovery by 2046" is 8.8% greater than “F=0”.

For discount rates greater than or equal to 0, "ABC harvest rate SPR=50%" has the Maximum Overall PV (rebuilds by Ttarget = 2180).

A.4 Discussion of Results

Negative discount rates favor deferring harvest into the future; so for negative discount rates the F=0 scenario generally has higher PV than any scenario where the current harvest level is greater than zero. Negative discount rates imply a societal preference favoring future generations over current ones. However interpreting negative discount rates is problematic, as utilization of the resource by current stakeholders, communities and consumers is extremely undervalued.

Positive discount rates convey the concept of “impatience”, i.e., a preference for obtaining something now rather than in the future, exemplified by, for example, the charging of interest for borrowed funds. Generally the higher the uncertainty of repayment (i.e., the greater the risk) the higher the interest rate that is charged.

A zero discount rate implies a neutral bias in terms of intergenerational equity, so the value of benefits received in the future is considered on par with benefits received today. A zero discount rate may be used to compare streams of benefits where current use and intergenerational equity concerns are more or less equally valued.

Under the shorter-term time horizons and zero discount rate, the present value of the highest PV rebuilding scenario for canary is at least 51% higher than the PV of the F=0 scenario. For yelloweye the corresponding ratio is 78%. These results imply that in order for F=0 to have higher present value to society than the highest PV rebuilding scenario, the total of all NMNU values (e.g., ecosystem services, option, existence, and bequest values) associated with allowing canary to rebuild completely before it can be harvested must be at least 51% of the market value of all the fishing opportunities that would be accommodated by the level of canary harvest allowed under the rebuilding scenario with highest PV. For yelloweye, total NMNU values must be at least 78% of the market value of the fishery that would be accommodated under the rebuilding scenario with highest PV.

With a fairly modest discount rate of +3%, the rebuilding scenario with the highest PV is 82% greater than F=0 for canary, and more than three times greater than F=0 for yelloweye. When the two non-rebuilding scenarios are included, the gap in PV between the F>0 and F=0 scenarios widens.

The rebuilding scenarios for yelloweye and canary represented by the 2011-12 groundfish management alternatives do not maximize PV. However under the shorter-term (50 year) time horizon for yelloweye and zero discount rate, the PV of the FPA rebuilding scenario is 67% greater than F=0. Under the longer-term (90 year) time horizon for yelloweye, PV under the FPA is less than under F=0 unless the discount rate is positive. When the discount rate equals +3% the PV under the FPA is 64% greater than PV under F=0.

For canary under the short-term (20 year) time horizon, the F=0 rebuilding scenario has higher PV than under the alternatives unless the discount rate is positive. The preferred alternative has lower PV than F=0 for discount rates below +5%. Under the longer-term (50 year) time horizon, PV under the FPA for canary is less than PV for F=0 unless the discount rate is positive. When the discount rate equals +3% the PV under the FPA is only 1% greater than PV for F=0.

A.5 Implications for Management

Among the range of rebuilding scenarios examined neither F=0 nor the FPA maximizes PV for either yelloweye or canary. Under the short-term time horizon for canary, F=0 shows higher PV than the FPA for discount rates up to +5%. Under the longer-term time horizon, the FPA generally shows higher PV than F=0 for discount rates greater than zero. For yelloweye, the FPA always has higher PV than F=0 for discount rates greater than zero; and the gap is always much greater than the difference between FPA and F=0 for canary.

These results imply that while it seems unlikely that total NMNU values for yelloweye could balance the use values achievable under the rebuilding scenarios that allow some harvest of yelloweye, it may be relatively more likely that NMNU values could balance use values for canary since the differences between PVs under the use and non-use rebuilding scenarios are much narrower for canary than for yelloweye. However in a mixed-stock fishery, management is interlinked, so measures designed to rebuild certain stocks more quickly will negate efforts to allow more liberal harvest of other stocks, and vice versa. The choice of FPA for canary reflects the pervasiveness of canary bycatch affecting virtually every west coast groundfish fishery. This aggregation of affected stakeholder interests creates a relatively high preference for near-term benefits over potential longer-term benefits arising from zero harvest policies.

Table G-1. Present value (PV) of Yelloweye median catch assuming constant price and 50 yr time horizon: 2011-2060

		F=0	SPR that achieves 50% prob. recovery by 2056	SPR that achieves 50% prob. recovery by 2065	SPR from 2010 OY of 17 mt	SPR achs 50% prob. recovery by 2007 TTARGET	SPR = 71.9%	SPR achs 50% prob. recovery by 16-4 Tmax	40:10 Harvest policy	ABC harvest rate SPR = 50%	MAX Rebuilding PV	MAX Overall PV
Alternative:				Alt 1	Alt 2	No Action, Alt 3	FPA					
Ttarget:		2047	2056	2065	2077	2084	2087	2096	NA	NA		
2011 ACL:		0	8	13	17	20	20	22	34	48		
Discount Rates	-20%	18,889,329	14,851,099	7,650,717	9,687,940	10,582,583	10,892,182	11,528,460	16,249,354	17,193,875	18,889,329	18,889,329
	-10%	84,399	59,569	40,391	51,395	56,282	57,980	61,484	87,623	94,498	84,399	94,498
	-5%	7,511	5,528	4,734	6,064	6,663	6,872	7,307	10,561	11,700	7,511	11,700
	-3%	2,993	2,371	2,275	2,926	3,222	3,325	3,541	5,160	5,815	3,541	5,815
	+0%	790	780	891	1,155	1,277	1,320	1,410	2,083	2,423	1,410	2,423
	+3%	220	322	428	560	621	643	689	1,033	1,243	689	1,243
	+5%	96	204	292	383	427	442	475	716	880	475	880
	+10%	13	94	147	195	218	227	244	373	477	244	477
	+20%	0	43	70	93	105	109	118	181	240	118	240

Table G-2. Present value (PV) of Yelloweye median catch assuming constant price and 90 yr time horizon: 2011-2100

		F=0	SPR that achieves 50% prob. recovery by 2056	SPR that achieves 50% prob. recovery by 2065	SPR from 2010 OY of 17 mt	SPR achs 50% prob. recovery by 2007 TTARGET	SPR = 71.9%	SPR achs 50% prob. recovery by 16-4 Tmax	40:10 Harvest policy	ABC harvest rate SPR = 50%	MAX Rebuilding PV	MAX Overall PV
Alternative:				Alt 1	Alt 2	No Action, Alt 3	FPA					
Ttarget:		2047	2056	2065	2077	2084	2087	2096	NA	NA		
2011 ACL:		0	8	13	17	20	20	22	34	48		
Discount Rates	-20%	148,644,122,020	148,640,083,790	148,616,085,127	148,328,620,080	147,370,441,985	146,322,598,827	134,147,158,074	134,950,572,964	130,562,338,166	148,644,122,020	148,644,122,020
	-10%	7,378,741	7,353,910	7,300,872	7,126,531	6,911,519	6,772,412	6,034,786	6,659,697	6,500,988	7,378,741	7,378,741
	-5%	106,924	104,941	102,176	96,909	92,952	90,939	82,998	99,321	98,974	106,924	106,924
	-3%	23,526	22,904	22,148	20,962	20,251	19,918	18,683	23,402	23,835	23,526	23,835
	+0%	3,046	3,036	3,014	2,993	3,007	3,012	2,998	4,071	4,402	3,046	4,402
	+3%	517	620	697	782	832	851	890	1,292	1,503	890	1,503
	+5%	181	289	366	443	484	499	531	790	954	531	954
	+10%	18	99	151	198	221	230	247	377	481	247	481
	+20%	0	43	70	93	105	109	118	181	240	118	240

Table G-3. Present value (PV) of Canary median catch assuming constant price and 20 yr time horizon: 2011-2030

		F=0	SPR from 2010 OY = 44	SPR from 2010 OY of 85 mt	SPR = 88.7%	SPR from 2010 OY of 105 mt	SPR that achieves 50% prob. recovery by 2031	SPR that achieves 50% prob. recovery by 2007 TMAX	achieves 50% prob. recovery by 2046	40:10 Harvest policy	ABC harvest rate SPR = 50%	MAX Rebuilding PV	MAX Overall PV
Alternative:			**Alt 1**	**Alt 2**	**No Action, Alt 3, FPA**								
Ttarget:		2024	2025	2026	2027	2027	2031	2041	2046	2111	2180		
2011 ACL:		0	49	94	102	116	253	381	415	493	614		
Discount Rates	**-20%**	328,679	314,754	298,961	272,555	276,166	167,171	227,718	241,687	288,637	306,302	328,679	328,679
	-10%	41,152	39,276	37,450	33,612	34,487	26,567	36,629	39,006	46,350	50,446	41,152	50,446
	-5%	16,140	15,573	15,096	13,545	14,037	12,646	17,582	18,765	22,227	24,608	18,765	24,608
	-3%	11,288	10,984	10,765	9,678	10,078	9,712	13,552	14,479	17,128	19,102	14,479	19,102
	+0%	6,713	6,657	6,668	6,030	6,329	6,764	9,494	10,159	11,994	13,527	10,159	13,527
	+3%	4,069	4,150	4,280	3,906	4,136	4,901	6,918	7,414	8,739	9,965	7,414	9,965
	+5%	2,943	3,078	3,251	2,990	3,187	4,036	5,719	6,135	7,224	8,295	6,135	8,295
	+10%	1,352	1,548	1,761	1,661	1,799	2,650	3,790	4,075	4,789	5,588	4,075	5,588
	+20%	323	515	706	705	785	1,427	2,069	2,234	2,620	3,130	2,234	3,130

Table G-4. Present value (PV) of Canary median catch assuming constant price and 50 yr time horizon: 2011-2060

		F=0	SPR from 2010 OY = 44	2007 SPR from 2010 OY of 105 mt	SPR from 2010 OY of 85 mt	SPR = 88.7%	SPR that achieves 50% prob. recovery by 2031	SPR that achieves 50% prob. recovery by 2007 TMAX	SPR that achieves 50% prob. recovery by 2046	40:10 Harvest policy	ABC harvest rate SPR = 50%	MAX Rebuilding PV	MAX Overall PV
Alternative:			**Alt 1**	**Alt 2**	**No Action, Alt 3, FPA**								
Ttarget:		2024	2025	2026	2026	2027	2031	2041	2046	2111	2180		
2011 ACL:		0	49	69	94	102	253	381	415	493	614		
Discount Rates	**-20%**	335,874,086	335,860,161	335,839,358	335,844,368	335,817,962	335,712,578	334,532,166	332,368,185	295,792,035	286,784,343	335,874,086	335,874,086
	-10%	1,823,044	1,821,167	1,818,001	1,819,341	1,815,503	1,808,459	1,764,740	1,726,421	1,591,321	1,553,127	1,823,044	1,823,044
	-5%	211,906	211,339	210,081	210,862	209,312	208,412	200,151	194,902	189,392	187,784	211,906	211,906
	-3%	99,095	98,792	97,929	98,572	97,486	97,519	93,631	91,420	91,545	91,880	99,095	99,095
	+0%	35,483	35,427	34,947	35,438	34,800	35,534	34,706	34,283	36,081	37,159	35,534	37,159
	+3%	14,476	14,557	14,304	14,688	14,313	15,308	15,638	15,752	17,345	18,437	15,752	18,437
	+5%	8,499	8,634	8,478	8,807	8,546	9,592	10,232	10,458	11,782	12,793	10,458	12,793
	+10%	2,696	2,891	2,870	3,105	3,005	3,994	4,804	5,057	5,872	6,662	5,057	6,662
	+20%	448	640	693	831	830	1,552	2,154	2,318	2,718	3,228	2,318	3,228