UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
PROGRAM PLANNING AND INTEGRATION
Silver Spring, Maryland 20910

NOV - 5 2004

Dear Reviewer:

In accordance with provisions of the National Environmental Policy Act of 1969, we enclose for your review the Final Environmental Impact Statement (FEIS) for Proposed Acceptable Biological Catch and Optimum Yield Specifications and Management Measures for the 2005-2006 Pacific Coast Groundfish Fishery.

The proposed action establishes harvest levels, or optimum yield values, based on the acceptable biological catch for stocks and stock complexes managed under the Pacific Coast Groundfish Fishery Management Plan (FMP) for 2005 and 2006. (Separate optimum yield values are established for each year .) The proposed action also establishes harvest guidelines for groundfish species, species groups, and geographic subunits, which are caught in a variety of fisheries occurring off the coasts of Washington, Oregon, and California. Allocations to tribal fisheries off Washington State are also identified. Management measures considered for commercial fisheries include two-month cumulative landing limits for species, species groups, and geographic subunits for limited entry trawl and fixed gear sectors, and fisheries not license limited under the FMP , and gear restrictions to reduce bycatch of overfished species and reduce habitat impacts. Management measures considered for recreational fisheries include bag limits, size limits, and fishing seasons, which vary by state. In addition, area closures based on depth and intended to reduce bycatch of overfished species apply to both commercial and recreational fisheries that are likely to catch these species. These closures vary by geographic area and time of year.

Additional copies of the FEIS may be obtained from the Pacific Fishery Management Council, 7700 NE Ambassador Place, Suite 200, Portland, Oregon 97220-1384. The document is also accessible through the Pacific Fishery Management Council's website at http://www.pcouncil.org/nepa/nepatrack.html.

Comments or questions on this document submitted during the 30-day review period for the FEIS must be received by December 13, 2004. Written comments should be submitted by mail to D. Robert Lohn, Regional Administrator, National Marine Fisheries Service Northwest Region, 7600 Sand Point Way NE, BIN C15700, Seattle, WA 98115-0070, telephone: (206) 526-6150. Comments may be submitted by facsimile (fax) to (206) 526-6736. Electronic comments may be submitted by e-mail to gf05-06spexnwr@noaa.gov, include in the comment subject line the following document identifier: Comment on 2005-2006 Groundfish Harvest Specifications FEIS. A copy of your comments should be submitted to me by mail to the NOAA Strategic Planning Office (PPI/SP), SSMC3, Room 15603, 1315 East-West Highway, Silver Spring, Maryland 20910; by fax to 301-713-0585; or by e-mail to nepa.comments@noaa.gov.

NMFS is not required to respond to comments received as a result of the issuance of the FEIS. However, comments received will be reviewed and considered for their impact on the issuance of a record of decision (ROD). The ROD will be made available publicly following final agency action.

Sincerely,

for Susan A. Kennedy
Acting NEPA Coordinator

Enclosure

PROPOSED ACCEPTABLE BIOLOGICAL CATCH AND OPTIMUM YIELD SPECIFICATIONS AND MANAGEMENT MEASURES

FOR THE

2005-2006 PACIFIC COAST GROUNDFISH FISHERY

FINAL ENVIRONMENTAL IMPACT STATEMENT INCLUDING REGULATORY IMPACT REVIEW AND INITIAL REGULATORY FLEXIBILITY ANALYSIS

PREPARED BY
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COVER SHEET
2005-2006 GROUNDFISH SPECIFICATIONS AND MANAGEMENT MEASURES ENVIRONMENTAL IMPACT STATEMENT

Proposed Action:	Specify harvest levels (acceptable biological catch and optimum yield values) for species and species complexes in the fishery management unit and establish management measures to constrain total fishing mortality to these specifications for the calendar years 2005-2006.
Type of Statement:	Final Environmental Impact Statement

For Further Information Contact:

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Abstract:

The *Pacific Coast Groundfish Fishery Management Plan* establishes a framework authorizing the range and type of measures that may be used to manage groundfish fisheries, enumerates 18 objectives that management measures must satisfy (organized under three broad goals), and describes more specific criteria for determining the level of harvest that will provide the greatest overall benefit to the nation, or optimum yield. Fisheries subject to management measures include limited entry trawl fisheries, limited entry fixed gear (pot and longline) fisheries, and a variety of other fisheries catching groundfish, either as target species or incidentally, but not license limited under the management framework established in the Groundfish Fishery Management Plan. Allocations to tribal fisheries off Washington State are also identified. Eight groundfish species are considered overfished and measures to prevent overfishing and rebuild these overfished stocks are a central element of this action. The proposed action establishes harvest guidelines for groundfish species, species groups, and geographic subunits. In order to constrain fisheries to these harvest guidelines, management measures for commercial and recreational fisheries are identified. Management measures considered for commercial fisheries include two-month cumulative landing limits for species, species groups, and geographic subunits for limited entry trawl and fixed gear sectors, and fisheries not license limited under the *Pacific Coast Groundfish Fishery Management Plan*, and gear restrictions to reduce bycatch of overfished species and reduce habitat impacts. Management measures considered for recreational fisheries include bag limits, size limits, and fishing seasons; which vary by state. In addition, area closures based on depth and intended to reduce bycatch of species apply to both commercial and recreational fisheries that are likely to catch these species. These closures vary by geographic area and time of year.

Comments due by: December 13, 2004.

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ES.1 INTRODUCTION

This document provides background information about, and analysis of, harvest specifications and management measures for fisheries covered by the *Pacific Coast Groundfish Fishery Management Plan* (FMP) and developed by the Pacific Fishery Management Council (hereafter, the Council) in collaboration with the National Marine Fisheries Service (NMFS). These measures 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. According to NEPA (Sec. 102(2)(C)), any "major federal action significantly affecting the quality of the human environment" must be evaluated in an EIS. Based on a preliminary determination by Council and NMFS staff, implementing harvest specifications and management measures for the 2005-2006 biennial period may have significant impacts. Therefore, rather than preparing an environmental assessment (EA), which provides "sufficient evidence and analysis for determining whether to prepare an environmental impact statement," NMFS and the Council have decided to proceed directly to preparation of an EIS. This document is organized so that it contains the analyses required under NEPA, the Regulatory Flexibility Act (RFA), and Executive Order (EO) 12866, which mandates an analysis similar to the RFA. For the sake of brevity, this document is referred to as an EIS, although it contains required elements of an Initial Regulatory Flexibility Analysis (IRFA) pursuant to the RFA and a Regulatory Impact Review (RIR) pursuant to EO 12866.

Environmental impact analyses have four essential components: a description of the purpose and need for the proposed action, a set of alternatives that represent different ways of accomplishing the proposed action, a description of the human environment affected by the proposed action, and an evaluation of the predicted direct, indirect, and cumulative impacts of the alternatives.[1/] (The human environment is interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment, 40 CFR 1508.14.) These elements allow the decision maker to look at different approaches to accomplishing a stated goal and understand the likely consequences of each choice or alternative. EISs are commonly organized around four chapters covering each of these topics. This EIS is organized differently; Chapters 1 and 2 cover the purpose and need and describe the alternatives, but the next six chapters focus on parts of the human environment potentially affected by the proposed action. Each of these chapters describes both the baseline environment potentially affected by the proposed action and the predicted impacts of each of the alternatives. Based on this structure, the document is organized in 15 chapters:

- Chapter 1 discusses the reasons for federal regulation of West Coast groundfish fisheries in 2005-2006. This description of purpose and need defines the scope of the subsequent analysis.

- Chapter 2 outlines different alternatives that have been considered to address the purpose and need. The Council will choose among these alternatives as their preferred alternative, which is recommended to NMFS for adoption as a plan amendment.

- Chapter 3 describes **West Coast marine ecosystems and essential fish habitat (EFH)** potentially affected by the proposed action and discloses the predicted impacts of the alternatives on that segment of the physical and biological environment.

1/ Federal regulations at 40 CFR 1502 detail the required contents of an EIS. Although there are several additional components, this list is of the core elements.

- Chapter 4 describes the **groundfish fishery management unit species** affected by the proposed action and discloses the predicted impacts of the alternatives on that segment of the biological environment.

- Chapter 5 describes **other, nongroundfish species** affected by the proposed action and discloses the predicted impacts of the alternatives on that segment of the biological environment.

- Chapter 6 describes **protected species** potentially affected by the proposed action and discloses the predicted impacts of the alternatives on that segment of the biological environment.

- Chapter 7 describes the **public sector and fisheries management regime** and how the different alternatives would affect these institutions.

- Chapter 8 describes the **socioeconomic environment**, which includes commercial and recreational fisheries and coastal communities in the action area, and how they would be affected by the different alternatives.

- Chapter 9 addresses additional requirements of NEPA and implementing regulations, including the identification of any measures that will be implemented to mitigate significant impacts of the proposed action.

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

- Chapter 11 provides information on those laws and EOs, in addition to the MSA and NEPA, that an amendment must be consistent with, and how this action has satisfied those mandates.

- Chapters 12 through 15 include required supporting information: the list of preparers, who received copies of the document, a glossary and acronym list, and the bibliography.

- Appendix A is a comprehensive description of the affected environment and supports the descriptions included in Chapters 3 through 8. Additional appendices provide further background.

- Appendix B is a scoping document for the proposed Arrowtooth Flounder - Rockfish Conservation Area (AT-RCA) Trawl Fishing Program.

- Appendix C describes widow rockfish bycatch area management.

- Appendix D describes the fisheries income impact modeling methodology used by Council staff.

- Appendix E contains copies of comment letters on the DEIS and responses to those comments by the Council/NMFS.

ES.2 Purpose and Need for the Proposed Action

The proposed action falls within the management framework described in the Groundfish FMP, which enumerates 18 objectives that management measures must satisfy (organized under three broad goals), describes more specific criteria for determining the level of harvest that will provide the greatest overall benefit to the Nation (defined as optimum yield), and authorizes the range and type of measures that may be used to achieve optimum yield. The management regime described in the Groundfish FMP is itself consistent with 10 National Standards described in the MSA. Harvest specifications (OYs) and management measures must be consistent with the goals, objectives, and management framework described in the Groundfish FMP.

ES.2.1 The Proposed Action

The Council's/NMFS' *proposed action*, evaluated in this document, is to specify acceptable biological catch (ABC) and OY values for species and species complexes in the fishery management unit and establish management measures to constrain total fishing mortality to these specifications. These specifications and management measures will be established for calendar years 2005 and 2006, although they are considered within the context of past management and long-term sustainability of managed fish stocks. Separate harvest specifications are established for 2005 and 2006; management measures are intended to keep total fishing mortality during each year within the OY established for that year. Specifications include new harvest levels for species with new stock assessments and projected harvest levels for species with stock assessments completed in prior years. Long-term management programs, such as capacity reduction programs, are not developed as part of the annual management process, but in separate Council deliberations, which are outside the scope of this EIS. Management measures may be modified during the biennial period, so total fishing mortality is constrained to the OYs identified in the preferred alternative. The environmental impact of any such changes in management measures is expected to fall within the range of impacts evaluated in this EIS. Federally-managed Pacific groundfish fisheries occurring off the coasts of Washington, Oregon, and California (WOC) establish the geographic context for the proposed action.

ES.2.2 Need (Problems for Resolution)

The proposed action is needed to constrain commercial and recreational harvests in 2005 and 2006 to levels that will ensure groundfish stocks are maintained at, or restored to, sizes and structures that will produce the highest net benefit to the nation, while balancing environmental and social values.

ES.2.3 Purpose of the Proposed Action

The purpose of this action is to ensure Pacific Coast groundfish subject to federal management are harvested at OY during 2005 and 2006 and in a manner consistent with the aforementioned Groundfish FMP and National Standards Guidelines (NSGs, 50 CFR 600 Subpart D), using routine management tools available to the specifications and management measures process (FMP at 6.2.1, 50 CFR 660.323(b)). Chapter 10 of this EIS describes how the proposed action (preferred alternative) is consistent with the FMP and MSA.

ES.3 The Biennial Groundfish Harvest Level and Management Measures Specification Process

The groundfish FMP lists three overall goals to guide the management process:

1. Conservation - prevent overfishing by managing for appropriate harvest levels and prevent any net loss of habitat of living marine resources.
2. Economics - maximize the value of the groundfish resource as a whole.
3. Utilization - achieve the maximum biological yield of the overall groundfish fishery, promote year-round availability of quality seafood to the consumer, and promote recreational fishing opportunities.

A variety of management measures have been employed to achieve these goals, including gear restrictions, a license limitation program, time/area closures, the specification of OYs or other harvest limitations for some species, seasons, and trip/cumulative landing limits, which are limitations on the amount of certain species that may be caught, retained, and landed by any vessel. The Groundfish FMP allows harvest guidelines and quotas to be re-specified on a periodic basis. Harvest guidelines are specified numerical harvest objectives which are treated as targets but not absolute limitations. Therefore, a fishery does not have to be closed if its harvest guideline is reached, although the Council and NMFS may choose to do so. All recent numerical harvest specifications, including OY values, have been harvest guidelines. A quota is defined as a specified numerical harvest objective, the attainment (or expected attainment) of which causes closure of the fishery for that species or species group. The main use of harvest guidelines and quotas, recently, has been to designate allocations and sub-components of a specified OY.

In accordance with the Groundfish FMP, since 1990 the Council has annually set Pacific Coast groundfish harvest specifications (acceptable and sustainable harvest amounts) and management measures designed to achieve those harvest specifications, with harvest specifications and management measures in effect for the calendar year, January 1 to December 31 The current action reflects a notable change in this management cycle, with a shift to a biennial management cycle, as implemented by Amendment 17 to the Groundfish FMP, which was approved on August 20, 2003. Thus, 2004 is the last year under the annual process, and 2005–2006 begins biennial management. Under the biennial management cycle, harvest specifications and management measures are established for the two-year period in advance of the biennium. Separate ABCs and OYs are established for each calendar year in the two-year cycle. Council decision making for this action occurs over three meetings, culminating in June of the year preceding the biennium. For the 2005-2006 biennium, the Council identified a preliminary range of ABCs and OYs at their November 2003 meeting; at their April 2004 meeting they selected a preferred set of ABCs and OYs and a preliminary range of management measures; and at their June 2004 meeting they finalized the full package of harvest specifications and management measures, choosing preferred management measure alternatives. In addition to allowing more careful consideration of management proposals, this process addresses an issue raised by the court ruling in *Natural Resources Defense Council* v. *Evans*, 2001 168 F. Supp. 2d 1149 (N.D. Cal. 2001). The court found that NMFS was not allowing sufficient time for public notice and comment on the regulations before they were implemented at the beginning of the new year. The biennial process allows more time to complete full notice-and-comment rulemaking before the January 1 start date.

ES.4 Determining the Scope of the Analysis

On October 15, 2003 (68 FR 59358), 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 2005-2006 ABC and OY 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; it also enumerated a preliminary list of potentially significant impacts that could result from implementing the proposed action. A public scoping period, ending on November 14, 2003, was announced in the NOI. A public scoping meeting was held on November 2 in Del Mar, California, to gather oral comments on the scope of the EIS. In addition, written comments were accepted through the end of the scoping period.

In addition to the formally-announced public scoping period, the Council process, which is based on stakeholder involvement, allows for public participation and public comment on fishery management proposals during Council, subcommittee, and advisory body meetings. 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. The Ad Hoc Allocation Committee, a subpanel of the whole Council, provides advice on allocating harvest opportunity among the various fishery sectors. These opportunities all constitute the broadly-defined Council scoping process, not all of which focuses on the scope and content of NEPA analysis.

The Council and its advisory bodies considered 2005-2006 specifications and management measures at several meetings. As noted above, the Council took action at four meetings in November 2003, March 2004, April 2004, and June 2004. The Ad Hoc Allocation Committee of the Council met on March 24 and 25 and May 27, 2004, to review the range of harvest specifications and provide guidance on allocation of harvest opportunity among different fishery sectors for 2005-2006. When the Council considers groundfish management at their meetings, the GMT and GAP provide advice and guidance on the development of harvest specifications and management measures. The GMT also meets outside of Council meetings to develop management recommendations. For the 2005-2006 harvest specifications process, they met in October 2003, and February, May, and June 2004. All these meetings are open to the public and are duly noticed.

In addition, although not part of the formal scoping process, both the Oregon and California state fish and game departments hold public hearings to solicit input on the formulation of management measures. Comments made at these hearings were summarized and made available to the Council in advance of their June 2004 meeting.

Section 1.4.3 summarizes comments received during the scoping process.

ES.5 Alternatives Considered by the Council

In contrast to the EISs prepared for the 2003 and 2004 seasons, this EIS treats the choice of ABCs and OYs as a separate decisional step from the development of management alternatives. The OYs for 15 stocks or stock complexes differ among the three harvest specification action alternatives. OYs for the remaining stocks are the same across all the action alternatives. (The No Action Alternative represents the status quo, or re-application of 2004 harvest specifications, OYs for additional stocks are different under No Action in comparison to the action alternatives.) The differences among the harvest specification action alternatives reflect policy decisions based on various factors, such as scientific uncertainty in stock assessments (e.g., lingcod, cabezon, sablefish), the recent adoption of rebuilding plans (bocaccio, cowcod, widow rockfish, yelloweye rockfish), and whether to apply a precautionary reduction for unassessed stocks (Pacific cod, Other Flatfish, and Other Fish), among other factors. In the 2003 and 2004 harvest specification EISs, a single set of alternatives was analyzed; each alternative included both the ABCs/OYs and the management measures projected to constrain total fishing mortality to these different harvest specifications. The biennial process highlights the procedural separation between choosing a preferred set of harvest specifications and developing management measures. Therefore, the choice of harvest specifications and the development of management measures are separated into two sets of alternatives, which form the basis of the impact analysis. The second set of alternatives contain different combinations of management measures, and each one of these management measure alternatives (except for No Action) is intended to constrain fishing mortality at or below the Council-preferred OY levels determined by the choice among the first set of alternatives. (The action alternatives were crafted before performing the detailed analysis necessary to determine total fishing mortality for each stock. Therefore, one or more of the action alternatives may be projected to exceed the Council-preferred OY for one or more stocks. However, the Council-preferred Alternative, chosen at the June Council meeting, must be projected to keep total fishing mortality for all stocks within their respective OYs.) This approach also makes it easier to compare alternative management measures to one standard: the Council-preferred ABC/OY levels chosen from the first set of alternatives.

ES.5.1 Harvest Level Alternatives

Various factors contribute to differences in OYs for 2005 and 2006 in comparison to 2004. Information from new stock assessments on stock structure and productivity can lead to significant changes in proposed harvest levels. In the absence of a new assessment, a species' OY is set using the most recent assessment along with any adjustments based on expected stock performance. Only lingcod and cabezon have been newly assessed since 2004 harvest specifications were set (Cope, *et al.* 2004; Jagielo, *et al.* 2004). Previous assessments, including six conducted in 2003, are used for other species. OYs for overfished species must be consistent with adopted rebuilding plans. As noted above, the Council has adopted rebuilding plans for all currently overfished species, which determine the range of OYs that may be considered for these stocks. Since lingcod is an overfished species, the new stock assessment is accompanied by an updated rebuilding analysis, which computes the OY based on targets adopted by the Council. Separate harvest control rules (F rates) are identified in the Groundfish FMP for the northern and southern lingcod stocks, although the stock is managed on a coastwide basis. According to the FMP, if the Council recommends changing the value of either of two rebuilding parameters published in federal regulations—the target year and the harvest control rule—such a change must be done through full notice-and-comment rulemaking and supported by "commensurate analysis." This EIS and the notice-and-comment rulemaking process associated with the biennial process support the Council's recommended change in the lingcod harvest control rule, based on the most recent stock assessment and rebuilding analysis. Cabezon has been assessed for the first time; previously it was managed as part of the Other Fish stock complex but will now be managed according to its own ABC/OY. Finally, adjustments have been made to the OYs for Pacific cod and the Other Flatfish and Other Fish complexes. Because these are unassessed stocks, their ABCs and OYs are set based on past landings; the harvest specifications have been adjusted downward, consistent with Council and GMT guidance. A Council-preferred ABC/OY is not identified for Pacific whiting in this EIS because of the nature of the fishery and related assessment schedule. This stock is assessed annually, and the next assessment will be completed by March 2005, in time for the April 1 start of this fishery. Since this seasonal fishery is managed by quota, crafting of complex management measures is unnecessary. However, bycatch of widow rockfish, an overfished species with a relatively low OY that co-occurs with Pacific whiting, is a management issue in this fishery. Reducing widow rockfish bycatch influences the choice of OY for the target species. The range of whiting OYs evaluated in this EIS captures the range of potential values expected from that assessment. Section 2.1 describes the basis for 2005-2006 harvest specifications in detail.

There are five harvest level alternatives:

<u>No Action Alternative</u>: Reimpose the ABCs/OYs established in 2004 for 2005 and 2006. OY values for 19 stocks differ from the Council OY Alternative (counting cowcod stocks north and south of 36º N latitude separately). The ABC/OY values for lingcod and cabezon are not based on the most recent stock assessments for these species. (The first cabezon stock assessment was completed for use in the 2005-2006 management cycle. Under the No Action Alternative, this species is managed under the Other Fish category because of the lack of a stock assessment.) For other assessed species, the No Action OYs are not computed by projecting forward from the most recent stock assessment. For most of these assessed stocks, this results in OYs for 2005-2006 slightly smaller than under the action alternatives. For sablefish, black rockfish (Oregon-California portion of the OY), and yellowtail rockfish, the No Action OYs are higher. OYs for Pacific cod and Other Fish are higher because the 50% precautionary reduction recommended in Council guidance for unassessed or stocks with minimal data is not applied. The OYs for bocaccio, cowcod, widow rockfish, and yelloweye rockfish are not based on rebuilding plans adopted by the Council in April 2004, although interim targets for widow and yelloweye rockfish are the same as those adopted by the Council. However, as with other assessed stocks, forward projections have not been applied in computing OYs for these species, making them slightly lower than under the Council OY Alternative. The No Action Alternative includes an OY for Pacific whiting, which the Council recommended in March 2004 in advance of the April opening of this

fishery. The Council OY alternative does not identify a whiting OY, recognizing that it will be chosen in March 2005 (for the 2005 fishery) and March 2006 (for the 2006 fishery). The differences between No Action and Council OYs can be summarized as follows:

- Not based on most recent stock assessment: lingcod and cabezon (two stocks)

- Forward projection or other adjustment based on new information not applied to compute OY: sablefish, Pacific ocean perch, canary rockfish (but no functional difference), yellowtail rockfish, shortspine thornyhead, darkblotched rockfish, black rockfish (Oregon-California harvest guideline only), and Dover sole (eight stocks).

- Not based on rebuilding plans adopted in April 2004: widow rockfish (No Action interim targets the same), bocaccio, cowcod (counted as two stocks), and yelloweye rockfish (No Action interim target the same) (five stocks).

- Precautionary reduction for unassessed stocks not applied: Pacific cod, Other Flatfish, and Other Fish (three stocks/stock complexes). Under the Council OY Alternative, in addition to the precautionary reduction, the Other Flatfish OY is based on an estimate of total fishing mortality rather than landed catch.

- Identifies the Pacific whiting OY.

<u>Low OY Alternative</u>: Applies the most precautionary OYs, based on uncertainty in stock assessments and/or possible precautionary reductions. This alternative differs from the Council OY for 12 stocks/stock complexes. In addition to greater precautionary reductions based on stock assessment uncertainties or technical guidance, the OYs differ for the three of the four overfished species for which the Council adopted rebuilding plans in April 2004—bocaccio, widow rockfish, and yelloweye rockfish. Although the adoption of these plans and associated targets was a separate action, for the purposes of analysis the range of alternatives considered in that action is represented in these harvest level alternatives. The rebuilding strategy chosen by the Council for cowcod is the same one represented in this alternative, resulting in the same OYs for the two cowcod stocks. This alternative also identifies a Pacific whiting OY for the purposes of analysis while the Council OY alternative does not (as discussed above).

<u>Medium OY Alternative</u>: Applies OYs intermediate to Low OY and High OY alternatives and mostly the same as in the Council OY Alternative. This alternative differs from the Council OY for four stocks (lingcod, Pacific whiting, canary rockfish, and yelloweye rockfish). For four other stocks (cowcod north/south, Other Flatfish, and Other Fish) no OY is identified under this alternative because only endpoints in a range—represented in the Low OY and High OY alternatives—are structured in the alternatives.

<u>High OY Alternative</u>: Applies the least precautionary OYs. Differs from the Council OY Alternative for 14 OYs.

<u>Council OY Alternative</u>: Similar to Medium OY Alternative with intermediate level of precaution. Key differences in the OYs contained in this alternative are for lingcod, canary rockfish, Pacific cod, Other Flatfish, and Other Fish. The lingcod OY represents a change in the harvest control rule in the rebuilding plan, based on the new stock assessment. It differs from the Medium OY Alternative only in that the lower 2006 OY is also adopted 2005. The canary rockfish OY varies depending on catch sharing between commercial and recreational sectors (due to the effect of difference in the size of fish caught in these fisheries). The OY under this alternative is based on projected catch sharing rather than an assumed split used for the sake of analysis. Pacific cod, Other Flatfish and Other Fish OYs apply the precautionary 50%

reduction, which has not been used previously. As noted, no Pacific whiting OY is identified in this alternative; it will be chosen in March 2005, based on the most recent stock assessment.

Tables 2-1a and 2-1b present the ABC and OY values under the harvest specification alternatives.

ES.5.2 Management Measure Alternatives

The description of the alternatives in Chapter 2 is organized around major fishery sectors: limited entry trawl, limited entry fixed gear, open access, tribal, and recreational. The same format is used here.

ES.5.2.1 Limited Entry Trawl

No Action Alternative. This alternative represents the status quo, or management measures put in place in 2004 as modified inseason through July. Limited entry trawl trip limits and trawl Rockfish Conservation Area (RCA) boundaries are listed in Tables 2-14 and 2-15. North of the management line at 40º10' N latitude (near Cape Mendocino, California) the shoreward boundary varies between 60 fathoms (fm) and 75 fm, depending on cumulative limit period. In the south this boundary varies between 75 fm and 100 fm. The seaward boundary is 150 fm in all periods and areas except the first two periods north of Cape Mendocino where it was 200 fm. Projected limited entry trawl catches for major target species and overfished species are listed in Table 2-16. In contrast to the action alternatives, this alternative is based on 2004 ABC/OY values, or the status quo harvest level alternative. Projected catches of target and overfished species under this alternative are intermediate to Alternatives 1 and 2. Under this alternative differential cumulative trip limits are applied to vessels using small or large footrope gear. Only vessels using small footrope gear, which prevents fishing in rocky areas favored by some overfished species, may fish shoreward of the RCA. Smaller cumulative limits apply to vessels using small footrope gear. North of Cape Mendocino, vessels are held to these lower limits for the entirety of each two-month cumulative limit period, even if the vessel also employs large footrope gear during the period, which would otherwise qualify for higher limits. This is meant to encourage vessels to fish seaward of the RCA, where bycatch of overfished species with very low OYs—canary rockfish in particular—is lower. South of Cape Mendocino, differential trip limits also apply, but use of small footrope during a two-month period does not obligate the vessel to the lower landing limits even if it switches to large footrope gear; any landings made with that gear count toward the higher trip limit.

The Pacific whiting fishery, a seasonal fishery beginning on April 1 and ending when the OY is caught or market conditions dictate (usually in September or October), is an important component of the overall groundfish fishery. Target species management is relatively straightforward since it is quota-based and regularly monitored. Bycatch of widow rockfish, a co-occurring, overfished species has become a major management issue and potential constraint on target species catches in recent years. The whiting fishery catches the largest proportion of the widow rockfish OY and, therefore, can potentially affect fishing opportunity in other sectors if the remaining portion of the OY is insufficient to allow for normal bycatch in other sectors. For this reason, the Council generally sets the whiting OY by considering the resulting widow bycatch implications so as to ensure that other sectors would not otherwise be constrained. Canary rockfish bycatch is also a concern. This sector, which is well organized into at-sea (mothership and catcher-processor) and shore-based components, has been using a variety of voluntary and self-policed strategies to minimize bycatch. One-hundred percent observer coverage for the at-sea sector and full retention combined with dockside sampling for the shore-based segment facilitates compliance monitoring. In response to the elevated catches of canary rockfish in the 2004 fishery, the Council requested that NMFS develop an emergency rule that allows an individual sector of the primary whiting fishery to be closed if the canary rockfish impacts are projected to reach 7.3 metric tons (mt). Therefore, NMFS intends to publish an emergency rule that establishes routine management measure authority, under the Groundfish FMP, to close the Pacific whiting primary season fisheries by sector before the sector's whiting allocation is reached, to minimize impacts on overfished species. The intended effect of the emergency action is to provide for a fast response time if there is concern that the incidental catch of an overfished species is likely to result in the OY for that species being exceeded.

Action Alternative 1. Alternatives 1 through 3 were developed based on constraining canary rockfish bycatch to different levels of the OY; because the canary rockfish OY is only 47 mt in 2005 and 2006 (Tables 2-1a and 2-1b), and this species is caught across a range of fisheries, managing bycatch has a big influence on fishing opportunity. This alternative is the most precautionary in terms of the proportion of the OYs for canary rockfish and other overfished species that projections show would be caught. Limited entry trawl fisheries would catch 17% of the canary rockfish OY, and all groundfish fisheries taken together would catch 91% of the OY. Trip limits, RCA boundaries, and projected catches for this alternative are shown in Table 2-17. The shoreward boundary of the trawl RCA varies by between 60 fm and 75 fm, depending on period and area; the seaward boundary is 150 fm in all areas and periods. The area enclosed by the trawl RCA under this alternative is, on average, the largest of all the alternatives. As a result of cumulative trip limits, closed areas, and other measures, the lowest target species catches are projected under this alternative. As with all the action alternatives, an ongoing exempted fishing permit (EFP) covering selective flatfish trawl would be transitioned into the regular management regime. Modified bottom trawl gear that reduces bycatch of overfished rockfish species while maintaining or increasing catch efficiency for target flatfish species has been tested in all three West Coast states under EFPs. (The modified trawl nets use a cutback headrope, which allows species that swim upward when disturbed—such as some rockfish species—to evade the net entrance. Bottom-hugging species like flatfish are still caught.) Sufficient testing has occurred in Oregon waters to transition this modified gear configuration into the regulatory regime for fisheries north of 40º10' N latitude. Selective flatfish trawl is required shoreward of the RCA in this region. Testing under an EFP continues south of 40º10' N latitude. The selective flatfish trawl qualifies as small footrope gear, and the area and differential cumulative limit requirements described above continue to apply. Bycatch caps are established for this fishery accompanied by 100% observer coverage. The Pacific whiting OY is set at half the levels projected from the most recent stock assessment (Helser, *et al.* 2004); projected widow rockfish bycatch would be 52% of the OY in 2005 (Table 2-10), easily accommodating bycatch in other fishery sectors.

Action Alternative 2. This alternative is structured around an intermediate canary rockfish bycatch of 9.9 mt by the trawl fishery. Catches for all sectors are projected to be 48 mt, exceeding the canary rockfish OY (Table 2-11).[2/] The shoreward boundary of the trawl RCA varies between 75 fm and 100 fm, depending on season; the seaward boundary is 150 fm. The total area enclosed by the trawl RCA is about two-thirds of that enclosed under Alternative 1. Table 2-18 shows cumulative trip limits and projected catches of target and overfished species by the limited entry trawl sector. Selective flatfish trawl gear is required shoreward of the RCA, but unlike Action Alternative 1, the fishery would proceed without bycatch caps or 100% observer coverage. Bycatch in this fishery would be monitored under the normal observer coverage rate under the federal groundfish observer program, which was about 16% in 2002-2003. The Pacific whiting fishery is modeled using the OYs projected from the most recent stock assessment. Projected bycatch of widow rockfish in the whiting fishery is 302 mt in 2005, which by itself exceeds that year's OY of 285 mt. Adding in bycatch from other sectors would result in an overage of 24%. Additional, mandatory

2/ The value of the canary rockfish OY partly depends on the proportion of landings made in commercial and recreational sectors, because of the different size selectivity in these two sectors. Since commercial fisheries would take a larger proportion of the OY under this alternative, the OY would likely be different than that selected by the Council, which applies to the Preferred Alternative. However, these variations are small, and it is still likely that the OY would be exceeded under this alternative.

precautionary measures could be implemented in the whiting fishery to reduce bycatch, possibly preventing the OY being exceeded with this target species harvest level. These measures are not part of the proposed action, however, and the bycatch implications cannot be modeled at this time. Such measures may be analyzed in a subsequent environmental impact assessment related to Council action for the 2005 Pacific whiting fishery.

Action Alternative 3. This alternative is very similar to Alternative 2, but structured with a higher canary rockfish bycatch of 10.6 mt by non-whiting limited entry trawl fisheries in 2005. Canary rockfish catch in all sectors is projected at 53 mt for 2005, which would exceed the OY by 13%. The trawl RCA configuration is the same under this alternative as under Alternative 2. Trip limits for species caught on the continental slope, such as sablefish and thornyheads, are almost identical; continental shelf flatfish limits are in some cases considerably higher (Table 2-19). The same gear requirements—selective flatfish trawl shoreward of the RCA north of 40º10' N latitude—and differential trip limits would also apply. The Pacific whiting fishery is modeled using an OY double that in the most recent stock assessment. Projected bycatch of widow rockfish for 2005 would be 616 mt for this sector, or more than double the OY (Table 2-12). Bycatch of widow rockfish in the non-whiting trawl sector is very modest, however, at 1.4 mt in 2005.

Council-preferred Alternative. This alternative was developed using updated, lower bycatch rates for the selective flatfish trawl fishery. This allows cumulative trip limits and RCA boundaries to be less restrictive under this alternative, while projected overfished species catches in 2005 are slightly higher than the other alternatives. Target species catches, in contrast, are substantially higher; in the case of Dover sole, projected 2005 catches are only slightly below the OY. The RCA, on average, would enclose the smallest area under this alternative. Canary rockfish catches in the non-whiting trawl sector are projected to be 8 mt. Across all sectors, about 95% of the OY, or 44.3 mt, is projected to be caught. The selective flatfish trawl gear requirement described above is implemented under this alternative (without the caps and full observer coverage proposed under Alternative 1), along with differential cumulative limits. Under this alternative, the Council will select a Pacific whiting OY for the 2005 fishery in March 2005 (and March 2006 for the 2006 fishery) based on new annual stock assessments. Information on bycatch in the 2004 whiting fishery will also be used in this decision. For the proposed action evaluated in this EIS, "placeholder" values for canary and widow rockfish bycatch in the whiting fishery are established. These are 7.3 mt and 244.3 mt respectively. These figures could act essentially as bycatch caps, with various mandatory measures, and even a fishery closure, being applied to prevent these bycatch levels from being exceeded. Other connected actions, not part of this proposed action, but potentially implemented during the biennial management cycle, include the extension of the selective flatfish gear requirement to trawl fisheries south of 40º10' N latitude and converting another EFP trawl fishery, targeting arrowtooth flounder, to regulations. (See Appendix B to this EIS for a description of this EFP fishery.)

ES.5.2.2 Limited Entry Fixed and Open Access Fisheries

Most of the management measures for the limited entry fixed gear sector and open access fisheries are the same as No Action, or status quo as of July 2004, under Alternatives 1 through 3.[3/] Cumulative trip limits

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3/ The seasonal primary sablefish fishery prosecuted by limited entry fixed gear vessels is managed according to a permit endorsement, "stacking" of multiple permits on a single vessel, and cumulative landing limit "tiers" based on the permits stacked on a vessel. (see Section 1.2.4 in Appendix A for a more detailed description of this management regime.) Vessels qualify for one of three tiers based on permits held and may land the amount of sablefish associated with that tier limit for each permit held. (A vessel may stack up to three permits.) At the start of the 2004 fishing year the landing limits associated with each tier were mis-specified due to a calculation error. Council action at the June 2004 and tier limits are the same as status quo. These alternatives differ in the location of the nontrawl/open access RCA coastwide seaward boundary: 150 fm under Alternative 1, 125 fm under Alternative 2, and 100 fm under Alternative 3. The seaward boundary under No Action is 100 fm north of 40º10' N latitude and 150 fm in the south. Bycatch information for these sectors is more limited than for the trawl fishery, and no total catch projection model has yet been developed, except for the primary sablefish fishery. Therefore, total catch mortality for overfished species is assumed to be the same across all the alternatives for the limited entry fixed gear and open access sectors (see Table 2-5 and Tables 2-10 through 2-13).

The Council-preferred Alternative continues the same RCA boundaries as under status quo, except for a minor change applying to exempted trawl vessels in the open access sector south of 40º10' N latitude. Cumulative trip limits for limited entry fixed gear and open access are the same as status quo (No Action); sablefish tier limits are adjusted slightly based on OY projections from the most recent stock assessment.

ES.5.2.3 Tribal Fisheries

Washington coast tribes have treaty rights to fish for groundfish in their usual and accustomed grounds. They develop a package of management measures, which are put forward by the tribal representative on the Council and evaluated along with proposed measures for other sectors. The tribal proposal is the same as No Action except for an increase in the lingcod harvest guideline to between 50 mt and 100 mt, an increase in the cumulative trip limit for yellowtail rockfish, and an increase in the trip limit for petrale sole, both caught in trawl fisheries prosecuted by the Makah tribe. Tribal management measures under No Action include an allocation of sablefish, a harvest guideline for black rockfish, trip limits for various species caught in bottom trawl and midwater fisheries, and an allocation of Pacific whiting based on a standing “sliding scale” formula. (Section 2.2.4.4 describes tribal management measures.) In addition, the Makah tribe proposes a new pollock test fishery that, if successful, would support targeting this species during the 2005 Pacific whiting fishery in which this tribe participates. The only difference between the action alternatives is Alternatives 1 establishes the lingcod harvest guideline as a range between 50 mt and 100 mt while Alternative 2 would set the lingcod harvest guideline at 50 mt, and Alternative 3 would set it at 100 mt.

The Council-preferred Alternative adopts the tribal proposal as put forward, with the lingcod harvest guideline established as 50 mt to 100 mt. This represents an increase from the 25 mt 2004 harvest guideline. However, the tribes would not continue to target lingcod if the bycatch of other overfished species is higher than anticipated.

ES.5.2.4 Recreational Fisheries

Recreational fisheries are managed by the states using bag limits, seasons and closed areas. Washington and Oregon did not propose any changes from 2004 management measures (No Action). No Action management measures in these two states are:

<u>Washington</u>: Recreational fishery open year round for groundfish except lingcod, which is open from the Saturday closest to March 15 (March 13 in 2004) through the Sunday closest to October 15 (October 17 in 2004). The recreational groundfish bag limit is 15 fish per day including rockfish and lingcod. Of the 15 recreational groundfish allowed to be landed per day, only 10 may be rockfish, with no retention of canary or yelloweye rockfish, and there is a sublimit of two lingcod with a 24-inch minimum size during the open lingcod season. There is a “C-shaped” Yelloweye Rockfish Conservation Area (YRCA), which was established where recreational groundfish and recreational halibut fishing is prohibited. Based on inseason

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meeting corrected this error; the alternatives are based on these corrected values.

monitoring, recreational fisheries inside the 30 fm contour would be closed inseason if canary or yelloweye rockfish harvest guidelines were projected to be attained. Other inseason depth restriction apply only in specific high bycatch areas.

Oregon: Recreational groundfish fishery is open year round with no depth restrictions except during June through September when the fishery is open only inside 40 fm. Catches are also managed using a 10 marine fish daily-bag-limit including rockfish, greenling (*Hexagrammos* spp.), cabezon, and other groundfish species, but excluding salmon, lingcod, perch species, sturgeon, sanddabs, striped bass, tuna, and baitfish. There is no retention of canary and yelloweye rockfish. Anglers may keep two lingcod with a 24-inch minimum size and one Pacific halibut with a 32-inch minimum size when the halibut season is open. Additionally, there is a minimum size limit of 16 inches for cabezon and a 10 inches minimum size limit for greenling species. To minimize canary or yelloweye rockfish impacts, the same inseason closure described for Washington, would also be applied in Oregon waters. Although not part of the proposed action analyzed in this EIS, Oregon Department of Fish and Wildlife is evaluating additional management measures involving specific closed areas and rockfish catch-and-release techniques (to reduce bycatch mortality) that could be implemented inseason.

California: A range of measures, varying among the action alternatives, is evaluated in this EIS for California recreational fisheries. Key provisions are summarized in the following table.

Management Measure	No Action	Alternative 1	Alternative 2	Alternative 3	Council-preferred
Rockfish-greenling-cabezon complex daily bag limit and sublimits	10 fish 3 cabezon (15" min.) 2 greenling (12" min.)	5 fish 1 bocaccio (10" min.) 1 cabezon (15" min.) 1 greenling (12" min.)	10 fish 1 bocaccio (10" min.) 2 cabezon (15" min.) 1 greenling (12" min.)	10 fish 1 bocaccio (10" min.) 3 cabezon (15" min.) 2 greenling (12" min.)	10 fish 2 bocaccio (10" min.) 3 cabezon (15" min.) 2 greenling (12" min.)
Lingcod, April-October season*	1 fish, 30" min.	1 fish, 28" min.	2 fish, 26" min.	2 fish, 24" min.	2 fish, 24" min. (April-November season)
Scorpionfish	5 fish, 10" min., January-February and July-December season	Same as No Action	Same as No Action	Same as No Action	Same as No Action
Seasonal closure exemptions (see Sec. 2.2.4.7 for details)	Shore-based anglers Shore-based divers	Shore-based anglers Shore-based divers	Shore-based anglers Shore-based and boat-based divers	Shore-based anglers Shore-based and boat-based divers	Shore-based anglers Shore-based and boat-based divers

*In addition to any other groundfish closures.

California has also implemented regional management measures in rockfish/lingcod management areas (RLMAs). Specific measures in addition to those summarized above, under No Action, are as follows:

Southern RLMA (U.S./Mexico Border to Point Conception at 34°27' N latitude)

- Groundfish open March through December inside 60 fm (closed January through February).
- California scorpionfish can only be retained during March, April, November, and December.

Central RLMA (Point Conception to Cape Mendocino at 40°10' N latitude)

- Groundfish open January, February, and September through December inside 30 fm; and May through August inside 20 fm (closed March through April).

Northern RLMA (Cape Mendocino to the California/Oregon Border)

- If canary or yelloweye rockfish harvest guidelines are projected to be attained inseason, CDFG would restrict the recreational groundfish fishery to the area inside a management line at approximately 30 fm. An inseason depth restriction would apply only in specific high bycatch areas.

Specific measures in addition to those summarized above, under Action Alternatives 1 through 3, are as follows:

Southern RLMA

- Groundfish other than California scorpionfish, but including select nongroundfish species (California sheephead and ocean whitefish) open May through September inside 40 fm (closed January through April and October through December).
- California scorpionfish can only be retained during March, April, and July through September inside 40 fm (closed January, February, May, June, and October through December).

Central RLMA

- Groundfish including California scorpionfish, and including select nongroundfish species (California sheephead and ocean whitefish) open in June inside 40 fm; and July through October inside 20 fm (closed January through May and November through December).
- For 2005-2006, a new management line at Pigeon Point (37°11' N latitude) is proposed for use inseason, in addition to current management lines already available. This line is proposed to provide federal consistency with the California Nearshore FMP, which defines two RLMA regions in central California (from Point Conception to Cape Mendocino) with a division at Pigeon Point. The management line at Pigeon Point provides a division within the Central RLMA and results in a North-Central and South-Central RLMA. While this alternative combines the two areas in this EIS analysis, there might be different regulations adopted inseason for the North-Central and South-Central RLMAs.

Northern RLMA

- Groundfish and ocean whitefish open in July through October inside 40 fm (closed January through June and November through December).

Under the Council-preferred Alternative, the Central RLMA is subdivided. While the CDFG and Council propose beginning the 2005 California recreational season with the same regulations from Cape Mendocino to Lopez Point (36º 00' N latitude), there may be inseason adjustments during 2005 and 2006 to divide the area at Pigeon Point. Depth and season closures are as follows:

Southern RLMA

- Groundfish open other than California scorpionfish, but including select nongroundfish species (California sheephead and ocean whitefish) March through June 30-60 fm and July through September inside 40 fm (closed January through February and October through December).

- California scorpionfish open October and November inside 40 fm, December inside 20 fm (closed January through September).

South Central RLMA (Point Conception to Point Lopez)

- Groundfish including select nongroundfish species (California sheephead and ocean whitefish) open May through September 20-40 fm (closed January through April and October through December).

North Central RLMA (Point Lopez to Cape Mendocino)

- Groundfish including select nongroundfish species (California sheephead and ocean whitefish) open July through November inside 20 fm (closed January through June and December).

- Designate a new management line at Pigeon Point (37°11' N latitude) for use inseason to make federal regulations consistent with the California Nearshore FMP.

Northern RLMA

- Groundfish and ocean whitefish open July through October inside 40 fm (closed January through June and November through December).

The Council-preferred Alternative also includes these California recreational management measures:

- Status quo regulations unless otherwise specified.
- Regulations apply to groundfish (with sanddab fishery exception) and associated state-managed species (rock greenling, California sheephead, and ocean whitefish).
- The sport fishery for sanddabs, using gear specified in federal and state regulations (size #2 hooks or smaller), is exempt from the season closures and depth restrictions placed on other federally-managed groundfish.
- Retention of "other flatfish" is allowed when fishing with size #2 hooks or smaller for Pacific sanddabs.

ES.6 Impacts of the Alternatives

Table ES-1 describes the harvest level alternatives. Table ES-2 summarizes the impacts of the management measure alternatives.

ES.6.1 Impacts of the Harvest Level Alternatives

Harvest level alternatives are evaluated qualitatively based on a description of the stock assessment uncertainties and other adjustments considered by the Council. The description of the alternatives, above, notes that they represent a range in the level of precaution applied in the face of uncertainties about the true status of a given stock or stock complex. Choice of a particular set of OYs determines, in broad terms, the likely impacts to other environmental components. Once OYs are chosen, management measures must be crafted to constrain total fishing mortality for each stock or stock complex within the given set of OYs. Choosing the Low OY Alternative, for example, would entail crafting management measures resulting in substantially lower landings. (Given the OY of zero for widow rockfish under this alternative, many groundfish fisheries would likely have to be closed, resulting in significant adverse socioeconomic impacts.)

ES.6.2 Impacts on Essential Fish Habitat and the Ecosystem

Currently there is insufficient information to fully predict the impacts of the management measure alternatives on EFH and marine ecosystems. Information on the distribution of fishing effort across different habitat types, and information on how habitat types are differentially affected, would be needed to make those predictions. Ecosystem effects correlate more closely with species-specific removals, but to the degree there are spatial differences in stock structure or ecological function, similar information would be needed. Data on the spatial distribution of fishing effort is currently limited, and models have not yet been developed to predict how a given set of management measures would affect such a distribution. Given these limitations, a simple proxy, projected catches by the limited entry trawl sector is used. These projections are made at a gross spatial level: north and south of the management area boundary at 40º 10' N latitude and shoreward and seaward of the trawl RCA. The total area enclosed by the trawl RCA, which varies among the alternatives, is a second measure that can be used to evaluate the relative impacts on EFH. Fishing effort is limited or prohibited in the RCA, especially by bottom tending mobile gear, which available evidence shows has the greatest impact on EFH.

Using the two metrics described above, the relative impacts of the alternatives on EFH and marine ecosystems are summarized:

<u>The No Action Alternative</u>. This alternative has the second-largest trawl RCA among the alternatives, although very close to Alternative 1. Looking at projected catches for all areas (the right-hand column in Table 3-2), the level of effort is likely to be equivalent to Alternatives 2 and 3. Projected catches seaward of the RCA are slightly higher than Alternatives 1 and 2, which may indicate a lower level of effort in these areas in comparison to those two alternatives. The No Action Alternative is predicted to have a greater impact on EFH and marine ecosystems than Alternative 1 and an impact equivalent to Alternatives 2 and 3.

<u>Alternative 1</u>. This alternative has the largest trawl RCA among the alternatives. It is also projected to result in the lowest catches among the alternatives overall and in each area except for seaward of the RCA in the north. Generally, seaward of the RCA Alternatives 1, 2, and 3 have very similar projected catches, which may indicate a similar level of impact on habitats in those areas. Alternative 1 is predicted to have the least impact on EFH and marine ecosystems of the alternatives.

<u>Alternative 2</u>. This alternative and Alternative 3 have the same size trawl RCA, which is two-thirds the size of the RCA under Alternative 1. They also have similar levels of projected catch. Projected catch under Alternatives 2 and 3 in areas seaward of the RCA is similar to or slightly lower than projected catch under Alternative 1 and No Action, especially in the north. Shoreward of the RCA, projected catch is higher than under No Action and Alternative 1. Alternatives 2 and 3 are predicted to affect EFH and marine ecosystems to the same degree, which is greater than Alternative 1 or No Action.

<u>Alternative 3</u>. This alternative is predicted to have an effect indistinguishable form Alternative 2, as discussed above.

<u>The Council-preferred Alternative</u>. This alternative has the smallest RCA of all the alternatives. Projected catches are substantially higher shoreward of the RCA in the northern region: almost double the No Action alternatives and more than three times Alternative 1. Projected catches in the shoreward area in the southern region are less than under No Action but greater than the other action alternatives. As with all the alternatives, only small footrope gear is allowed shoreward of the RCA (selective flatfish gear is a modification of the small footrope gear category), which may mitigate impacts to EFH because this type of gear cannot be used in areas with rocky substrate. Although intended to reduce catches of overfished rockfish species occurring in this habitat type, this requirement also prevents trawling in rock areas, which

may support more sensitive habitat containing habitat-forming benthic organisms such as corals and sponges. Overall, it is predicted this alternative will have the greatest impact on EFH and the ecosystem because projected target species catch, acting as a proxy for fishing effort, is highest under this alternative.

Cumulative impacts. External factors that are likely to combine with effects of the proposed action to produce cumulative impacts are described in Section 3.4. There is insufficient information to determine if the relative magnitude of cumulative effects under the different alternatives will differ from the relative magnitude of direct and indirect effects. It is likely, however, that external factors would affect EFH and marine ecosystems in the same degree under all of the alternatives. Therefore, those alternatives producing greater direct and indirect impacts would be expected to result in greater cumulative impacts.

ES.6.3 Impacts on Groundfish and Other Fish Species

The direct impact of the proposed action is to regulate how much fishing mortality on each stock or stock complex is likely to occur. This must be predicted across the various regulatory sectors—limited entry trawl, limited entry fixed gear, open access fisheries, tribal fisheries, and recreational fisheries—which are regulated through management measures on a biennial cycle. Information available to predict fishing mortality varies by these sectors. Monitoring and models to predict landings are most developed for the limited entry trawl sector, which accounts for the largest proportion of groundfish landings. Catch estimates for the limited entry fixed gear and open access sectors are more ad hoc, based on the correlation between management measures applied in the past and landings. For recreational fisheries, state management agencies have developed models and methodologies to predict catches for a given set of management measures.

Predicted catch or bycatch mortality of overfished species is of particular importance, since these species act as constraining stocks by indirectly determining catch levels that can be sustained for target species. For the 2005 and 2006 management cycle, predicted bycatch of canary rockfish, widow rockfish, and yelloweye rockfish has been a main consideration in structuring management measures. Of these species, canary rockfish is probably most constraining, both because of the low rebuilding OY established for this species and the fact that it is caught in a range of fisheries from Washington to central California waters. Management measure alternatives are largely structured around constraining canary rockfish catches by the limited entry trawl sector to different precautionary levels below the OY. Widow rockfish bycatch is an issue primarily in the Pacific whiting fishery sector. As discussed above, placeholder values for total widow and canary rockfish fishing mortality by this sector have been identified and will serve as de facto bycatch caps for management purposes.

Direct impacts of the groundfish fishery on nongroundfish species are negligible and generally accounted for in the management of other fisheries. Incidental groundfish catch in nongroundfish fisheries may be considered a cumulative impact on groundfish, contributing to total fishing mortality. These catches are modest or moderate and for overfished species are part of the bycatch accounting measures used to evaluate the alternatives (see Table 2-5 and Tables 2-10 through 2-13). Catch of target groundfish species in nongroundfish fisheries is a negligible component of total fishing mortality.

The impacts of the alternatives are summarized as follows:

No Action Alternative. Management measures under this alternative are intended to constrain fishing mortality to the levels established for 2004 and would not necessarily correlate with the OYs established for 2005 and 2006. However, projected bycatch mortality of overfished species in 2004 does not exceed the OYs established for 2005 and 2006. Target species catch projections in the trawl fishery, for which estimates are available, are lower than for the Council-preferred Alternative and also below the OYs established for

2005 and 2006. Overfishing, defined as exceeding the OYs established for 2005 and 2006, would not be expected to occur under this alternative. Therefore, significant adverse impacts to target and overfished groundfish species are not predicted for this alternative. Impacts, defined as total fishing mortality, are intermediate to Alternative 1 and 2.

Alternative 1. This is the most precautionary alternative. Projected bycatch mortality for overfished species is below OYs established for these species. Catches of target species are lowest of all alternatives and not predicted to exceed OYs, based on projections for the limited entry trawl fishery and other available information. Therefore, this alternative is not predicted to result in significant adverse impacts to target and overfished groundfish species.

Alternative 2. Projected bycatch mortality of widow rockfish would exceed the OY under this alternative. This is largely due to assumed bycatch in the Pacific whiting fishery, which under this alternative is calculated from the last stock assessment for the purposes of analysis. As noted above, the actual Pacific whiting OY for 2005 and 2006 will be chosen in March of each year based on the latest annual stock assessment. The projected canary rockfish bycatch mortality is 48 mt, which exceeds the 46.8 mt OY adopted under the Council OY Alternative. However, the canary rockfish OY is a product of the proportion of catch taken by the commercial versus recreational sectors. Under the default 39%:61% recreational:commercial split, the OY would be 48 mt. The Council OY is based on an even split between the sectors. An OY determined from the actual split between these sectors under this alternative has not been computed. It is possible that mitigation measures, such as additional bycatch reduction measures in the Pacific whiting fishery and de facto sector-wide bycatch caps for canary and widow rockfish (as under the Council-preferred Alternative), could prevent OYs from being exceeded under this alternative. For these reasons, this alternative results in conditionally significant adverse impacts.

Alternative 3. This alternative is similar to Alternative 2 in that the OYs for canary and widow rockfish would be exceeded because of the larger Pacific whiting OY and more liberal management measures applied under this alternative. Because of the magnitude of the projected overages it is less likely that mitigation measures would effectively reduce total bycatch mortality for these species below the OY. Therefore, significant adverse impacts are highly likely under this alternative.

Council-preferred Alternative. Under this alternative OYs for overfished species and target species are not expected to be exceeded. Projected catches of target species rely on the use of selective flatfish trawl gear and are highest under this alternative, resulting in the greatest impact to these stocks. The placeholder values, or de facto bycatch caps, for canary and yelloweye rockfish are crucial to keeping total fishing mortality for these stocks under their OYs. This alternative is not projected to have significant adverse impacts, although it has the highest level of non-significant impacts in terms of target species catches. Preventing adverse significant impacts is conditioned on future action in choosing the OY for Pacific whiting and any mitigation needed to prevent OYs for overfished species from being exceeded due to catches in this fishery.

ES.6.4 Impacts on Protected Species

Protected species fall under three overlapping categories, reflecting four mandates: the Endangered Species Act of 1973 (ESA), the Marine Mammal Protection Act of 1972 (MMPA), the Migratory Bird Treaty Act (MBTA), and EO 13186. Chapter 5 in Appendix A describes species which occur off the West Coast and are protected under these mandates.

Presumably, effects on protected species correlate with changes in the level of fishing effort. Increased fishing effort could lead to an increase in interactions between fishing vessels and protected species, while a decrease in fishing effort would have the opposite effect. Thus, changes in fishing effort could be one way to evaluate the relative effects of the alternatives. However, as discussed in Chapter 3, in connection with habitat and ecosystem impacts, there are limited data available on the distribution, intensity, and duration of fishing effort associated with the groundfish fisheries. Furthermore, different gear types would affect protected species differently, so the relative level of fishing effort by gear type would have to be accounted for. Even if such data were available, this distribution and intensity level of fishing effort would have to be correlated with the distribution of protected species. Finally, the effects of resulting interactions (aside from observed mortality) need to be better understood. Given these limitations, the different alternatives, which represent different harvest levels, are used as proxies for fishing effort in order to assess the relative potential effects of the alternatives on protected species.

The impact of the alternatives on protected species are as follows:

No Action Alternative. Under the No Action Alternative, harvest levels for 2005-2006 represent the mid-range of harvest levels proposed for 2005-2006. Using harvest levels as an estimate of fishing effort, the intensity and duration of fishing activities would represent the mid-range of fishing effort proposed for 2005-2006. The greater the intensity and duration of fishing activities during 2005-2006, the greater the likelihood of interactions between groundfish fisheries and protected species. The No Action Alternative also represents the mid-range of management measures proposed for 2005-2006. Gear specific RCAs, areas closed to fishing for groundfish, would be in place under the No Action Alternative. In areas and during seasons with RCAs, the potential for interactions between groundfish fisheries and protected species would be minimized. Under the No Action Alternative, differential trawl trip limits encourage a shift in trawling to areas seaward of the RCA. This effort shift should benefit protected species found in nearshore areas, while increasing the likelihood of interactions between groundfish fisheries and protected species that occur in offshore areas. Under the No Action Alternative, fishing effort by the fixed gear and recreational fleets should be comparable to levels predicted under the Action Alternatives 2 and 3. The incidental take of salmon species in the Pacific whiting fishery is already regulated under a Biological Opinion (BO); therefore, any increase in incidental salmon take would be dealt with through that process. There is no evidence that Pacific Coast groundfish fisheries interact with sea turtles. Additionally, there is no expectation that take limits established in other relevant BOs, or potential biological removal thresholds under the MMPA would be exceeded as a result of the No Action Alternative.

Alternative 1. Action Alternative 1 constrains fishing effort and the distribution of fishing effort more than any other alternative. Fishing effort would be minimized to reduce the harvest of canary rockfish, an overfished species. RCAs would be most expansive under this alternative, which may encourage a shift in fishing effort to areas shoreward and seaward of the RCA. It is unknown whether large RCAs would decrease potential interactions between groundfish fisheries and protected species or simply increase interactions outside the boundaries of the RCAs. One substantial change from the No Action Alternative would be the trawl fleet's use of selective flatfish gear in the area between the U.S./border with Canada and $40^{0}10'$ N latitude and shoreward of 100 fm. It is unknown how this gear will affect the bycatch of marine mammals or seabirds, but the proposed 100% observer coverage on these vessels could help generate information on the interactions between the trawl fishery and protected species.

Alternative 2. Because the harvest levels and management measures under Action Alternative 2 represent the mid-range of those projected for 2005-2006, the potential interactions between groundfish fisheries and protected species under the Action Alternative 2 should be similar to those under the No Action Alternative. Under Action Alternative 2, the trawl fleet fishing in the area between the U.S./border with Canada and $40^{0}10'$ N latitude and shoreward of 100 fm would be required to use selective flatfish gear. It is unknown how this gear will affect the bycatch of marine mammals or seabirds, but with only 10% observer coverage less information about the interactions between the trawl fishery and protected species will be generated than under Action Alternative 1.

Alternative 3. Harvest levels projected for 2005-2006 are the higher under Action Alternative 3 than under No Action and Alternatives 1 and 2; similarly, management measures are generally less restrictive than under all other alternatives. Therefore, interactions between groundfish fisheries and protected species have the potential to be highest under this alternative. Much like Action Alternative 2, the use of selective flatfish gear will be required for those vessels trawling in the area between the U.S./border with Canada and $40^{0}10'$ N latitude and shoreward of 100 fm and approximately 10% of vessel with observer coverage. In general, RCAs are less extensive under this alternative than under No Action and Alternatives 1 and 2.

The Council-preferred Alternative. The Council-preferred Alternative is projected to have the highest harvest levels of all the alternatives in 2005-2006. It has the smallest trawl RCA of all the alternatives (see Table 3-1) and generally higher trawl trip limits. The fixed gear and open access RCA does not differ from the No Action Alternative. To the degree that higher harvest limits correlate with greater fishing effort, there is a greater likelihood under this alternative for interactions between protected species and groundfish vessels. If these interactions result in a higher incidental take, then this alternative would have the greatest impact on protected species in comparison to the other alternatives.

Based on data collected by the West Coast Groundfish Observer Program (WCGOP), significant differences in the impacts on protected species between action alternatives proposed for 2005-2006 are not predicted. There is little information on interactions between recreational groundfish vessels and protected species; however, significant differences between recreational alternatives are not predicted. Under any of the action alternatives, there is no expectation that take limits established in relevant BOs, or potential biological removal thresholds under the MMPA would be exceeded as a consequence of the proposed action.

ES.6.5 Impacts on the Management Regime

Broadly, the fishery management regime faces two key tasks in meeting the goal of constraining short-term total fishing so that MSY is achieved over the long term. First, resource status must be effectively monitored. Accurately determining total fishing mortality has been the most problematic monitoring task in the West Coast groundfish management regime. Unmonitored bycatch, especially of overfished species, can frustrate effective management. Second, managers must assure that resource users comply with regulations. This involves both enforcement activities, to ensure high levels of compliance, and compliance monitoring to get an accurate picture of the efficacy of regulations. The overall complexity of the management regime is an important factor in both monitoring and enforcement. More complex measures can make these activities more costly. This adds to public costs, either through increases in government spending or management failure due to inadequate monitoring and enforcement, which increases the risk that maximum sustainable yield (MSY) will not be achieved. Therefore, the alternatives can be evaluated in terms of their likely effect on the complexity of the management regime. Factors contributing to management complexity are:

- Implementing at-sea observer programs, such as the WCGOP.
- Collecting biological data using fishery catches, which can become difficult as harvests are reduced.
- Monitoring and enforcing full retention, which requires vessels to land all fish caught.
- Monitoring and enforcing bycatch caps.
- Establishing region-specific management measures.

- Monitoring and enforcing closed areas, such as the RCA.
- Modifying existing measures or implementing new measures inseason during the management cycle. Potential changes include implementing closed areas in the Pacific whiting fishery, bringing additional EFP fisheries under the regulatory regime and expanding the VMS program to more vessels than currently covered.

The impact of the alternatives on the management regime are as follows:

No Action Alternative. Impacts are similar to those associated with Action Alternative 1, but generally less than the action alternatives. Factors contributing to management efficacy and complexity under this alternative are: implementing measures to reduce canary rockfish fishing mortality, regional management measures, and large RCAs. Monitoring and enforcement problems are mitigated by the implementation of VMS.

The action alternatives have similar effects on the management regime and generally increase management complexity in comparison to No Action. However, it is not possible to distinguish between the action alternatives in terms of their relative impact on the management regime. Differences from No Action contributing to management complexity include implementation of the selective flatfish trawl gear requirement north of 40º10' N latitude and the implementation of area-specific management concepts. The buffer between constraining species' OYs—canary rockfish in particular—and projected catches varies among the alternatives; Alternative 1 has the largest buffer while Alternative 3 has the smallest. A larger buffer could reduce the likelihood of inseason management changes necessitated if harvest projections are too low, and there is a risk OYs will be exceeded. Measures under each alternative requiring increased monitoring enforcement and increasing overall complexity include:

Alternative 1: the largest RCA, 100% observer coverage and bycatch caps required for the selective flatfish trawl fishery.

Alternatives 2 and 3: bycatch reduction measures in the Pacific whiting fishery, including area management, establishing a whiting RCA, and "penalty box" measures.

Council-preferred Alternative: regional management areas for recreational harvest of lingcod, canary rockfish, and yelloweye rockfish, de facto bycatch caps for the Pacific whiting fishery, depth-based closed areas for recreational fisheries.

ES.6.6 Impacts on the Socioeconomic Environment

Change in projected income impacts associated with commercial and recreational fisheries is used as a bottom-line indicator of overall impacts on the West Coast socioeconomic environment under the 2005-2006 management alternatives. For commercial fishing and shoreside processing activities, income impacts under No Action are projected to be $649 million. Projected commercial fishery income impacts fall by $2 million under Alternative 1, increase by $1.5 million under Alternative 2, increase by $2.5 million under Alternative 3, and increase by $3 million under the Council-preferred Alternative. Since there is no difference in proposed recreational fishery management measures for the Washington and Oregon, and very little difference between the alternatives for California, income impacts resulting from recreational fishing activities projected under the action alternatives are the same as under No Action ($235.5 million).

The management alternatives are all based on the Council OY harvest alternative. Income impacts under the other harvest alternatives were not explicitly projected. But in general, impacts under the Council OY alternative are very close to what they would have been under the Medium OY, and slightly higher than under the No Action harvest alternative. Impacts of these three harvest alternatives are higher than what they would have been under the Low OY harvest alternative, and lower than what they would have been under the High OY harvest alternative.

ES.6.7 Environmentally Preferable Alternatives and Rationale for the Preferred Alternatives

The Low OY harvest alternative and management measure Alternative 1 are the environmentally preferable alternatives as defined at 40 CFR 1502.(b).

For the harvest level alternatives, the Council OY Alternative is consistent with adopted rebuilding plans and establishes OYs which are generally intermediate in the range of likely values suggested by uncertainties about stock status (and reflected in stock assessments for assessed stocks).

For the management measure alternatives, the Council-preferred Alternative allows higher catches of target species than is projected to occur under the other alternatives while preventing overfishing. Total catch of overfished species, while higher than the other alternatives, except for canary and widow rockfish, is still below the respective OYs. Except for canary, widow, and yelloweye rockfish, projected fishing mortality is less than half of the OYs. Target species catch is projected to be 25% above the catch occurring under Alternative 1; most of this increase occurs shoreward of the RCA. This produces greater short-term beneficial impacts while not jeopardizing long-term sustainability.

TABLE ES-1. Comparison of harvest level alternatives. (Page 1 of 1)

No Action (2004 OYs)	Low OY Alternative	Medium OY Alternative	High OY Alternative	Council OY Alternative
• OYs not based on new stock assessments (lingcod & cabezon), forward projections from recent stock assessments, or rebuilding plans adopted by Amendment 16-3. • For other stocks, except yellowtail rockfish, OYs within Low OY-High OY range. • New precautionary reductions for Pacific cod, other flatfish, and “other fish” complexes not applied.	Most precautionary alternative, assumes least long-term risk for highest short-term cost. Significantly adverse socioeconomic impacts likely.	Same as Council OY alternative except lingcod, canary rockfish, and yelloweye rockfish OYs are higher; OYs for four other stocks not identified in this alternative. (see Section 2.1 for explanations). Slightly less precautionary than Council OY Alternative.	Least precautionary alternative, assumes most long-term risk for greatest short-term benefit.	As with Medium OY Alternative, adopts OYs with intermediate level of precaution. Lingcod and yelloweye rockfish OYs apply the lower OY value of 2005/2006 to both years. Canary rockfish OY based on actual commercial-recreational catch sharing. Defers choice of Pacific whiting OY pending new stock assessment and bycatch information from 2004 season.

TABLE ES-2. Summary of impacts of management measure alternatives. (Page 1 of 2)

	No Action Alternative	Alternative 1	Alternative 2	Alternative 3	Council-preferred Alternative
EFH and Ecosystem	Second largest RCA, fishing effort similar to Alts 2 & 3, likely second least impact	Largest RCA, least fishing effort, likely least impact	RCA area smaller than Alt 1, intermediate fishing effort, impacts likely greater than No Action & Alt 1	Same RCA area as Alt 2, intermediate fishing effort, impacts likely equal Alt 2	Smallest RCA, highest fishing effort, likely greatest impact
Groundfish Species					
Overfished species	Rebuilding OYs not exceeded, but not all projected harvests consistent with adopted 2005-2006 OYs	Rebuilding OYs not exceeded, most precautionary alternative	Canary and widow rockfish rebuilding OYs exceeded, without mitigation overfishing occurs	Canary and widow rockfish rebuilding OYs exceeded, without mitigation overfishing occurs, least precautionary	Rebuilding OYs not exceeded if whiting fishery canary & widow rockfish “caps” not exceeded, modestly precautionary
Target species	OYs not exceeded, but not all projected harvests consistent with 2005-2006 OYs, harvest levels similar to Alt 1	OYs not exceeded, lowest harvest levels	OYs not exceeded, intermediate harvest levels	OYs not exceeded, intermediate harvest levels	OYs not exceeded, highest harvest levels
Non-groundfish Species	Alternatives indistinguishable, no significant impacts to nongroundfish species				
Protected Species	Fishing effort similar to Alts 2 & 3, likely second least impact	Least fishing effort, likely least impact	Intermediate fishing effort, impacts likely greater than No Action & Alt 1	Impacts likely equal Alt 2	Highest fishing effort, likely greatest impact, but ESA, MMPA threshold not exceeded
Management Regime (Public sector)	Least impact to management regime in terms of monitoring and enforcement requirements, regulatory complexity	Action alternatives indistinguishable in terms of impacts; factors contributing to complexity include implementation of selective flatfish trawl gear requirement, whiting bycatch reduction measures, area management			

TABLE ES-2. Summary of impacts of management measure alternatives. (Page 2 of 2)

	No Action Alternative	Alternative 1	Alternative 2	Alternative 3	Council-preferred Alternative
Fisheries Impacts					
LE Trawl ($ mil exvessel)	$36.4	$33.6	$35.5	$36.0	$37.0
LE FG Sablefish ($ mil exvessel)	$9.8	$9.8	$9.7	$9.8	$9.8
Other Groundfish ($ mil exvessel)	$23.4	$25.9	$26.2	$26.2	$25.2
Tribal ($ mil exvessel)	$6.9	$8.1	$8.2	$8.3	$8.3
Recreational Impacts (‘000 trips)	4,309	4,309	4,309	4,309	4,309
Buyers and Processors ($ mil exvessel groundfish)	$86.3	$86.0	$88.1	$88.8	$88.8
General Public (relative change in net benefits)	0	+	+	-	-
Communities ($ mil income impacts)	$648.8	$646.8	$650.3	$651.4	$651.8

1.0 INTRODUCTION

1.1 How This Document is Organized

This document provides background information about, and analysis of, harvest specifications and management measures for fisheries covered by the *Pacific Coast Groundfish Fishery Management Plan* (FMP) and developed by the Pacific Fishery Management Council (hereafter, the Council) in collaboration with the National Marine Fisheries Service (NMFS). These measures 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. According to NEPA (Sec. 102(2)(C)), any "major federal action significantly affecting the quality of the human environment" must be evaluated in an EIS. Based on a preliminary determination by Council and NMFS staff, implementing harvest specifications and management measures for the 2005-2006 biennial period may have significant impacts. Therefore, rather than preparing an environmental assessment (EA), which provides "sufficient evidence and analysis for determining whether to prepare an environmental impact statement," NMFS and the Council have decided to proceed directly to preparation of an EIS. This document is organized so that it contains the analyses required under NEPA, the Regulatory Flexibility Act (RFA), and Executive Order (EO) 12866, which mandates an analysis similar to the RFA. For the sake of brevity, this document is referred to as an EIS, although it contains required elements of an Initial Regulatory Flexibility Analysis (IRFA) pursuant to the RFA and a Regulatory Impact Review (RIR) pursuant to EO 12866.

Federal regulations (40 CFR 1502.9) require agencies to prepare and circulate a draft EIS (DEIS), which "must fulfill and satisfy to the fullest extent possible the requirements established for final statements in Section 102(2)(C) of the Act" (i.e., NEPA). Federal regulations (40 CFR 1506.10(c)) and agency guidelines (NOAA Administrative Order 216-6. 5.01.b.1(i)) stipulate a minimum 45-day public comment period on the DEIS. At the end of this period a final EIS (FEIS) is prepared, responding to comments and revising the document accordingly. After the EIS is completed, a 30-day "cooling off" period ensues before the responsible official may sign a record of decision (ROD) and implement the proposed action.

Environmental impact analyses have four essential components: a description of the purpose and need for the proposed action, a set of alternatives that represent different ways of accomplishing the proposed action, a description of the human environment affected by the proposed action, and an evaluation of the predicted direct, indirect, and cumulative impacts of the alternatives.[1/] (The human environment is interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment, 40 CFR 1508.14.) These elements allow the decision maker to look at different approaches to accomplishing a stated goal and understand the likely consequences of each choice or alternative. EISs are commonly organized around four chapters covering each of these topics. This EIS is organized differently; Chapters 1 and 2 cover the purpose and need and describe the alternatives, but the next six chapters focus on parts of the human environment potentially affected by the proposed action. Each of these chapters describes both the baseline environment potentially affected by the proposed action and the predicted impacts of each of the alternatives. Based on this structure, the document is organized in 15 chapters:

1/ Federal regulations at 40 CFR 1502 detail the required contents of an EIS. Although there are several additional components, this list is of the core elements.

- The rest of this chapter, Chapter 1, discusses the reasons for federal regulation of West Coast groundfish fisheries in 2005-2006. This description of purpose and need defines the scope of the subsequent analysis.

- Chapter 2 outlines different alternatives that have been considered to address the purpose and need. The Council will choose among these alternatives as their preferred alternative, which is recommended to NMFS for adoption as a plan amendment.

- Chapter 3 describes **West Coast marine ecosystems and essential fish habitat (EFH)** potentially affected by the proposed action and discloses the predicted impacts of the alternatives on that segment of the physical and biological environment.

- Chapter 4 describes the **groundfish fishery management unit species** affected by the proposed action and discloses the predicted impacts of the alternatives on that segment of the biological environment.

- Chapter 5 describes **other, nongroundfish species** affected by the proposed action and discloses the predicted impacts of the alternatives on that segment of the biological environment.

- Chapter 6 describes **protected species** potentially affected by the proposed action and discloses the predicted impacts of the alternatives on that segment of the biological environment.

- Chapter 7 describes the **public sector and fisheries management regime** and how the different alternatives would affect these institutions.

- Chapter 8 describes the **socioeconomic environment**, which includes commercial and recreational fisheries and coastal communities in the action area and how they would be affected by the different alternatives.

- Chapter 9 addresses additional requirements of NEPA and implementing regulations, including the identification of any measures that will be implemented to mitigate significant impacts of the proposed action.

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

- Chapter 11 provides information on those laws and EOs, in addition to the MSA and NEPA, that an action must be consistent with, and how this action has satisfied those mandates.

- Chapters 12 through 15 include required supporting information: the list of preparers, who received copies of the document, a glossary and acronym list, and the bibliography.

- Appendix A is a comprehensive description of the affected environment and supports the descriptions included in Chapters 3 through 8.

- Appendix B is a scoping document for the proposed Arrowtooth Flounder - Rockfish Conservation Area Trawl Fishing Program.

- Appendix C describes widow rockfish bycatch area management.

- Appendix D describes the fisheries income impact modeling methodology used by Council staff.

- Appendix E contains copies of comment letters on the DEIS and responses to those comments by the Council/NMFS.

1.2 Purpose and Need for the Proposed Action

The proposed action falls within the management framework described in the Groundfish FMP, which enumerates 18 objectives that management measures must satisfy (organized under three broad goals), describes more specific criteria for determining the level of harvest that will provide the greatest overall benefit to the Nation (defined as optimum yield [OY]), and authorizes the range and type of measures that may be used to achieve OY. The management regime described in the Groundfish FMP is itself consistent with 10 National Standards described in the MSA. Harvest specifications (OYs) and management measures must be consistent with the goals, objectives, and management framework described in the Groundfish FMP.

1.2.1 The Proposed Action

The Council's/NMFS' *proposed action*, evaluated in this document, is to specify acceptable biological catch (ABC) and OY values for species and species complexes in the fishery management unit and to establish management measures to constrain total fishing mortality to these specifications. These specifications and management measures will be established for calendar years 2005 and 2006, although they are considered within the context of past management and long-term sustainability of managed fish stocks. Separate harvest specifications are established for 2005 and 2006; management measures are intended to keep total fishing mortality during each year within the OY established for that year. Specifications include new harvest levels for species with new stock assessments and projected harvest levels for species with stock assessments completed in prior years. Long-term management programs, such as capacity reduction programs, are not developed as part of the annual management process, but in separate Council deliberations, which are outside the scope of this EIS. Management measures may be modified during the biennial period, so total fishing mortality is constrained to the OYs identified in the preferred alternative. The environmental impacts of any such changes in management measures are expected to fall within the range of impacts evaluated in this EIS. Federally-managed Pacific groundfish fisheries occurring off the coasts of Washington, Oregon, and California (WOC) establish the geographic context for the proposed action.

1.2.2 Need (Problems for Resolution)

The proposed action is needed to constrain commercial and recreational harvests in 2005 and 2006 to levels that will ensure groundfish stocks are maintained at, or restored to, sizes and structures that will produce the highest net benefit to the nation, while balancing environmental and social values.

1.2.3 Purpose of the Proposed Action

The purpose of this action is to ensure Pacific Coast groundfish subject to federal management are harvested at OY during 2005 and 2006 and in a manner consistent with the aforementioned Groundfish FMP and National Standards Guidelines (NSGs) (50 CFR 600 Subpart D), using routine management tools available to the specifications and management measures process (FMP at 6.2.1, 50 CFR 660.323(b)). Chapter 10 of this EIS describes how the proposed action (preferred alternative) is consistent with the FMP and MSA.

1.3 Background

1.3.1 Background to Purpose and Need

Marine fish are "common pool" resources with access and use stemming from the public trust doctrine. It is difficult to exclude people from using a common pool resource because of the physical characteristics of these resources (Ostrom 1990). (Fish are a relatively mobile, "fugitive" resource, making it impossible for any one individual to precisely know their location or control their distribution.) A fish stock is also "subtractable," meaning that exploitation by any one person diminishes the total amount available to others. Under the common law public trust doctrine, resources in ocean areas under U.S. jurisdiction are believed to be held in trust by government to satisfy a broadly-defined public interest (Committee to Review Individual Fishing Quotas 1999). This doctrine also makes a legally defensible exclusive property right to fishery resources difficult or impossible (at least before fish are harvested). The MSA, originally enacted in 1976 as part of the extension of jurisdiction to the 200-mile EEZ (and most recently amended in 1996), establishes the goals, standards, responsibilities, and processes needed to address the characteristics of the fishery resource. A paramount purpose is to "conserve and manage the fishery resources found off the coasts of the United States" (§2(b)(1)). This Act delegates management responsibility to the U.S. Secretary of Commerce (Secretary) who, with the aid of eight regional fishery management councils and through the NMFS, implements measures to ensure the conservation and management goals of the MSA and fulfills the trust responsibility. Councils develop FMPs describing how particular species and fisheries will be managed. The Council was assigned stewardship responsibilities for the fish resources in the EEZ off the Pacific Coast (see Figure 1-6 in Appendix A) and first approved the Groundfish FMP in 1982.[2/]

Chapter 6 in the Groundfish FMP describes the management measures the Council may recommend NMFS use and the process of establishing and adjusting such measures. Various biological reference points and information on fishery performance are used to determine, on an annual basis, the OY for particular species or species groups (see Section 2.4 in Appendix A for a description of these reference points). The Groundfish FMP also describes "points of concern" and socioeconomic frameworks, which help managers determine whether and what types of management measures are needed. Section 6.2 of the Groundfish FMP describes the deliberative process the Council must follow and the parallel process NMFS uses to translate Council recommendations into regulations. NEPA-mandated environmental impact assessment is a central component of this process.

1.3.2 Background to Groundfish Management and the Specifications Process

The Groundfish FMP lists three overall goals to guide the management process:

1. Conservation - prevent overfishing by managing for appropriate harvest levels and prevent any net loss of habitat of living marine resources.
2. Economics - maximize the value of the groundfish resource as a whole.
3. Utilization - achieve the maximum biological yield of the overall groundfish fishery, promote year-round availability of quality seafood to the consumer, and promote recreational fishing opportunities.

A variety of management measures have been employed to achieve these goals, including gear restrictions, a license limitation program, time/area closures, the specification of OYs or other harvest limitations for

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2/ The Groundfish FMP has been amended 16 times to date (counting Amendments 16-1 and 16-2 as separate amendments).

some species, seasons, and trip/cumulative landing limits, which are limitations on the amount of certain species that may be caught, retained, and landed by any vessel. The Groundfish FMP allows harvest guidelines and quotas to be re-specified on a periodic basis. Harvest guidelines are specified numerical harvest objectives which are treated as targets but not absolute limitations. Therefore, a fishery does not have to be closed if its harvest guideline is reached, although the Council and NMFS may choose to do so. All recent numerical harvest specifications, including OY values, have been harvest guidelines. A quota is defined as a specified numerical harvest objective, the attainment (or expected attainment) of which causes closure of the fishery for that species or species group. The main use of harvest guidelines and quotas, recently, has been to designate allocations and sub-components of a specified OY.

In accordance with the Groundfish FMP, since 1990 the Council has annually set Pacific Coast groundfish harvest specifications (acceptable and sustainable harvest amounts) and management measures designed to achieve those harvest specifications, with harvest specifications and management measures in effect for the calendar year January 1 to December 31. The current action reflects a notable change in this management cycle, with a shift to a biennial management cycle, as implemented by Amendment 17 to the Groundfish FMP, which was approved on August 20, 2003. Thus, 2004 is the last year under the annual process, and 2005–2006 begins biennial management. Under the biennial management cycle, harvest specifications and management measures are established for the two-year period in advance of the biennium. Separate ABCs and OYs are established for each calendar year in the two-year cycle. Council decision making for this action occurs over three meetings, culminating in June of the year preceding the biennium. For the 2005-2006 biennium, the Council identified a preliminary range of ABCs and OYs at their November 2003 meeting; at their April 2004 meeting they selected a preferred set of ABCs and OYs and a preliminary range of management measures; and at their June 2004 meeting they finalized the full package of harvest specifications and management measures, choosing preferred management measure alternatives. In addition to allowing more careful consideration of management proposals, this process addresses an issue raised by the court ruling in *Natural Resources Defense Council* (NRDC) v. *Evans*, 2001 168 F. Supp. 2d 1149 (N.D. Cal. 2001). The court found that NMFS was not allowing sufficient time for public notice and comment on the regulations before they were implemented at the beginning of the new year. The biennial process allows more time to complete full notice-and-comment rulemaking before the January 1 start date.

Of the more than 80 groundfish species managed under the FMP, only about 20 are assessed for stock size and status on a regular basis.[3/] Assessments are scheduled for stocks on a three-year rotating basis, although the actual schedule may vary due to the availability of scientists to conduct the assessments and the role a stock plays in structuring management measures. Thus, when the Council recommends a new set of harvest specifications in a given year, normally only specifications for those species with new assessments, or past assessments containing an OY projection for the coming year, are changed from the previous year's value. In addition, eight groundfish species are currently declared overfished by the Secretary, pursuant to provisions in the MSA.[4/] Based on stock assessments, scientists have conducted rebuilding analyses for these

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3/ Target species, and in recent years overfished species, are given the highest priority for full stock assessment. Incidentally-caught species, species only identifiable as part of a stock complex, and species caught in small numbers, typically fall in assessment Category 2 or 3, as defined in the Groundfish FMP. These species are managed based on historical landings.

4/ Tables 2-2 and 2-3 in Appendix A list the overfished species and associated rebuilding parameters. Currently overfished species are: bocaccio (*Sebastes levis*), cowcod (*S. levis*), canary rockfish (*S. pinninger*), darkblotched rockfish (*S. crameri*), Pacific ocean perch (POP) (*S. alutus*), widow rockfish (*S. entomalas*), yelloweye rockfish (*S. ruberimus*), and lingcod (*Ophidon elongates*). NMFS declared Pacific whiting (*Merluccius productus*) overfished on April 15, 2002 (67 FR 18117). However, the most (continued...)

species in order to determine suitable harvest levels consistent with the rebuilding framework established by the MSA and the Groundfish FMP, as amended by Amendment 16-1, and rebuilding plans adopted by Amendments 16-2 and 16-3. These amendments are described in the next section. For overfished species, the rebuilding analysis represents an additional analytical step used to determine an OY. OYs for unassessed stocks are based on more limited data, such as catch history, and for this reason are not usually changed year to year.

Various factors contribute to differences in OYs for 2005 and 2006 in comparison to 2004. Information from new stock assessments on stock structure and productivity can lead to significant changes in proposed harvest levels. In the absence of a new assessment, a species' OY is set using the most recent assessment along with any adjustments based on expected stock performance. Only lingcod and cabezon have been newly assessed since 2004 harvest specifications were set (Cope, *et al.* 2004; Jagielo, *et al.* 2004). Previous assessments, including six conducted in 2003, are used for other species. OYs for overfished species must be consistent with adopted rebuilding plans. As noted above, the Council has adopted rebuilding plans for all currently overfished species, which determine the range of OYs that may be considered for these stocks. Since lingcod is an overfished species, the new stock assessment is accompanied by an updated rebuilding analysis, which computes the OY based on targets adopted by the Council. Separate harvest control rules (F rates) are identified in the Groundfish FMP for the northern and southern lingcod stocks. Cabezon has been assessed for the first time; previously it was managed as part of the Other Fish stock complex, but will now be managed according to its own ABC/OY. Finally, adjustments have been made to the OYs for Pacific cod and the Other Flatfish and Other Fish complexes. Because these are unassessed stocks, their ABCs and OYs are set based on past landings; the harvest specifications have been adjusted downward, consistent with Council and GMT guidance. A Council-preferred ABC/OY is not identified for Pacific whiting in this EIS because of the nature of the fishery and related assessment schedule. This stock is assessed annually, and the next assessment will be completed by March 2005, in time for the April 1 start of this fishery. Since this seasonal fishery is managed by quota, crafting of complex management measures is unnecessary. However, bycatch of widow rockfish, an overfished species with a relatively low OY, is a management issue in this fishery, influencing the choice of OY for the target species. The range of whiting OYs evaluated in this EIS captures the range of potential values expected from that assessment. Section 2.1 describes the basis for 2005-2006 harvest specifications in detail.

In contrast to the EISs prepared for the 2003 and 2004 seasons, this EIS treats the choice of ABCs and OYs as a separate decisional step from the development of management alternatives. The OYs for 15 stocks or stock complexes differ among the three harvest specification action alternatives. OYs for the remaining stocks are the same across all the action alternatives. (The No Action Alternative represents the status quo, or re-application of 2004 harvest specifications. OYs for additional stocks are different under No Action in comparison to the action alternatives.) The differences among the harvest specification action alternatives reflect policy decisions based on various factors, such as scientific uncertainty in stock assessments (e.g., lingcod, cabezon, sablefish), the recent adoption of rebuilding plans (bocaccio, cowcod, widow rockfish, yelloweye rockfish), and whether to apply a precautionary reduction for unassessed stocks (Pacific cod, Other Flatfish, and Other Fish), among other factors. In the 2003 and 2004 harvest specification EISs, a single set of alternatives was analyzed; each alternative included both the ABCs/OYs and the management

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4/ (...continued)
recent whiting stock assessment (Helser, *et al.* 2004), incorporating new data from the 2003 hydro-acoustic survey, estimates current biomass between 47% and 51% of unfished biomass; the stock is, therefore, not currently overfished. Furthermore, because the 1999 year class was larger than previously estimated, estimates of the 2001 biomass in the current stock assessment range from 27% to 33% of unfished biomass, indicating the stock approached, but never fell below, the $B_{25\%}$ minimum stock size threshold (Whiting STAR Panel 2004). On April 30, 2004, NMFS announced that Pacific whiting is no longer considered an overfished stock (69 FR 23667).

measures projected to constrain total fishing mortality to these different harvest specifications. The biennial process highlights the procedural separation between choosing a preferred set of harvest specifications and developing management measures. Therefore, the choice of harvest specifications and the development of management measures are separated into two sets of alternatives, which form the basis of the impact analysis. The second set of alternatives contains different combinations of management measures, and each one of these management measure alternatives (except for No Action) is intended to constrain fishing mortality at or below the Council-preferred OY levels determined by the choice among the first set of alternatives. (The action alternatives were crafted before performing the detailed analysis necessary to determine total fishing mortality for each stock. Therefore, one or more of the action alternatives may be projected to exceed the Council-preferred OY for one or more stocks. However, the Council-preferred Alternative, chosen at the June Council meeting, must be projected to keep total fishing mortality for all stocks within their respective OYs.) This approach also makes it easier to compare alternative management measures to one standard: the Council-preferred ABC/OY levels chosen from the first set of alternatives.

In order to rebuild overfished groundfish species while satisfying the Groundfish FMP's resource utilization goal, Council policy is to use management measures that discourage or prevent targeting of these species. The Council has also recommended management policies to reduce the incidental catch of overfished species taken in fisheries targeting healthier stocks. In 2002 the Council began using an analysis of the incidental catch rates of particular overfished species taken in trawl fisheries targeting healthy stocks.[5/] Then, in setting management measures for the year, the Council recommended trip limit combinations that allowed higher landings of healthy stocks in months and seasons when those healthy stocks co-occur less frequently with overfished stocks. Since that time, a "trawl bycatch model" has been developed by NMFS (Hastie 2001; Hastie [2003]), which is used to project total fishing mortality in the limited entry groundfish trawl fishery for key species, based on a given set of management measures.[6/] In late 2002, the Council also implemented large closed areas for commercial groundfish fisheries, which are intended to prohibit fishing in depth ranges where certain overfished species are most abundant. These Rockfish Conservation Areas (RCAs) were a key feature of 2003 management, and continue to be so today. Observer data from the first year of the West Coast Groundfish Observer Program (WCGOP) (August 2001 through August 2002) also became available in early 2003. Although still relatively limited, the Council directed that these data should be used to estimate total fishing mortality beginning in mid-2003. The trawl bycatch model has been continually updated, both to evaluate the effect of different closed area configurations on total fishing mortality and to incorporate updated bycatch rates based on observer data (Hastie 2003). A second year of trawl sector observer data became available in early 2004 (September 2002 through August 2003). The first two years of observer data and bycatch modeling for the primary sablefish fishery were also available in early 2004; this fishery is prosecuted by limited entry fixed gear vessels (Hastie 2004).

An important mandate that the proposed action must meet is to base management on "the best available science," the second National Standard specified in the MSA. Regular stock assessments for target species in groundfish fisheries, whenever possible, are an example of the application of this requirement. Managers are improving the quality of data and analysis to support assessment and catch accounting.

5/ Incidental catch includes retained catch of non-target species and discards. The MSA defines bycatch as "fish which are harvested in a fishery, but which are not sold or kept for personal use . . ." Bycatch, under the MSA definition, accords with discards, as the term is used here.

6/ The number of trawl vessels targeting Pacific Coast groundfish is limited by a licensing program established in the Groundfish FMP. Although only one of several fishery sectors catching groundfish, a large proportion of total groundfish landings is attributable to this sector. Accurately predicting total catch mortality in this sector is, therefore, crucial in determining how well a given set of management measures will constrain fishing to OYs.

1.3.3 Key Management Issues in 2005 and 2006

Although the main issues considered in 2003 and 2004 again play a role in the development of management measures for 2005-2006, several new issues are relevant to the proposed action. Foremost, the use of a biennial management cycle for the first time requires changes in Council/NMFS decision-making procedures and the sequencing of management information. It could also affect the frequency and magnitude of inseason changes to management measures in unforseen ways.

Certain overfished species will continue to constrain harvest opportunities for healthier stocks. In response, various combinations of sector-specific trip limits and closed area configurations will be a central management feature. The availability of a second year's worth of observer data, available in early 2004, requires both adjustments in the bycatch rates used in modeling projected total fishing mortality and refinement of the models used to project bycatch. Although preventing overfishing and rebuilding overfished stocks is a paramount concern, management measures are intended to allow fishers to access healthy stocks by reducing bycatch rates. This addresses a competing goal in the Groundfish FMP to maximize the value of the groundfish resource. Striking this balance between conservation of and direct social benefit from groundfish is another way to understand the purpose of this action.

Inseason management of California recreational fisheries to constrain mortality of overfished groundfish occupied the Council in 2004 and plays an important role in the formulation of management measures for the 2005-2006 period. To date, the information on California recreational fishing has been primarily derived from the NMFS Marine Recreational Fisheries Statistical Survey (MRFSS). These data were not intended and are not well-suited for use in management decision-making. A new system, the California Recreational Fisheries Survey (CRFS), intended to provide more accurate and reliable information, has been put in place. Data from this survey is becoming available during the biennial cycle and could affect preseason or inseason recreational harvest projections.

Regionalizing recreational fisheries management is a related issue. Although differing state regulations and the geographic distribution of groundfish stocks caught by recreational anglers has signaled some degree of regionalization in the past, the Council, along with the states, is now considering more explicit regional allocations in the form of harvest guidelines or targets. The concern that a given sector or region could harvest a disproportionate share of the very low coastwide OYs for certain overfished groundfish, such as canary rockfish, has sparked this discussion.

In response to the elevated catches of canary rockfish in the 2004 at-sea Pacific whiting fishery, the Council requested that NMFS develop an emergency rule that allows an individual sector of the primary whiting fishery to be closed if the canary rockfish impacts are projected to reach 7.3 mt before the end of the 2004 fishery. Therefore, NMFS intends to publish an emergency rule that establishes routine management measure authority, under the Groundfish FMP, to close the Pacific whiting primary season fisheries by sector before the sector's whiting allocation is reached, to minimize impacts on overfished species. The intended effect of the emergency action is to provide for a fast response time if there is concern that the incidental catch of an overfished species is likely to result in the OY for that species being exceeded. These provisions are including the Council-preferred Alternative for 2005 and 2006.

Exempted Fishing Permits (EFPs) have been used successfully to test new gear and fishing strategies outside of the normal regulatory framework for groundfish management. Fishers in all three states, under the auspices of state management agencies, have been testing modified bottom trawl gear that reduces bycatch of overfished rockfish species while maintaining or increasing catch efficiency for target flatfish species. (The modified trawl nets use a cutback headrope, which allows some species, including some rockfish species, to swim upward when disturbed evading the net entrance. Bottom-hugging species like flatfish are still caught.) Sufficient testing has occurred in Oregon waters to transition this modified gear configuration into the regulatory regime for fisheries north of the management line at 40º10' N latitude. (near Cape Mendocino, California). The regime under the preferred alternative would require the use of this gear shoreward of the RCA, while permitting higher landing limits for target species because of the lower bycatch rates. Trawlers in California are currently testing this gear under an EFP submitted by that state. If test results, are similar to northern efforts, this regime may be extended south of 40º10' N latitude. NMFS has authorized several other EFPs, which at a future date could be brought under the normal regulatory regime in a similar fashion.

1.3.4 Changes to the FMP Affecting Annual Management

Although the Groundfish FMP was first implemented over 20 years ago, changes in the fishery and the MSA have resulted in substantial modification through plan amendments. Three recent amendments (numbered 11 through 13), which in part respond to new requirements imposed by the 1996 Sustainable Fisheries Act (SFA) reauthorizing and amending the MSA, have affected the framework for specifying harvest levels and management measures. Amendments 11 and 12 were adopted in order to make the Groundfish FMP consistent with MSA National Standard 1: *Conservation and management measures shall prevent overfishing while achieving on a continuing basis, the optimum yield from each fishery for the United States fishing industry*.

Approved in 1999, Amendment 11 establishes a default OY policy that reduces the numerical OY of any stock believed to be below its precautionary threshold, which is defined as smaller than 40% of its pristine (unfished) abundance (denoted B_0) unless better information is available.[7/] A groundfish stock is defined as overfished if its abundance is less than 25% of its unfished abundance ($B_{25\%}$). The procedures and criteria for determining OYs for Pacific groundfish are detailed in Section 4.1.

Amendment 12, although partially remanded by court order, established procedures to rebuild overfished stocks. In response to the remand, the Council developed Amendment 16, which has been adopted in several different parts. Amendment 16-1 to the Groundfish FMP established the framework for rebuilding overfished stocks, including the adoption and reviewing of rebuilding plans. It was approved by NMFS in November 2003 and the final rule establishing rebuilding parameters in federal regulations was published on February 26, 2004. Under this framework, key targets that will guide the rebuilding process are specified in the FMP and federal regulations. If these target values need to be changed, new values are published in regulations and are subject to notice-and-comment rulemaking. The rulemaking process associated with harvest specifications, along with supporting NEPA documentation, is now the normal mechanism used to implement changes to rebuilding parameters. This was the case in the 2004 harvest specifications, which implemented changes to the harvest control rules for darkblotched rockfish and Pacific ocean perch in response to information from new stock assessments. The impacts of these changes were evaluated in the supporting EIS (PFMC 2004b). Amendment 16-2 adopted rebuilding plans consistent with the Amendment 16-1 framework for canary rockfish, darkblotched rockfish, lingcod, and POP. It was approved by NMFS in January 2004, and the final rule was published on April 13, 2004 (69 FR 19347 with an effective date of May 13, 2004). By court order, the ROD, for Amendment 16-3, adopting rebuilding plans for bocaccio, cowcod, widow rockfish, and yelloweye rockfish, must be signed by September 15, 2004. The DEIS for this action was published on April 2, 2004. The FEIS was made available on July, 23 2004. Harvest specifications established for 2005 and 2006 are consistent with the rebuilding targets established by these

7/ Sometimes spawning stock biomass is used instead of total stock biomass, and sometimes spawning potential is used. Where there is insufficient information to develop a numerical OY, the Groundfish FMP still allows establishment of a non-numerical OY.

amendments. Based on the new stock assessment mentioned above, the lingcod harvest control rule (harvest rate) described in Amendment 16-2 will be modified as part of 2005-2006 biennial specifications process. This change is described and evaluated in this EIS.

Amendment 13 was developed in response to SFA requirements to address bycatch and bycatch accounting. (It also added to the list of routine management measures that are part of the Groundfish FMP framework. This allows more effective management of overfished species and bycatch.) This amendment addresses MSA National Standard 9: *Conservation and management measures shall, to the extent practicable (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize mortality of such bycatch*. Bycatch (fish discarded at sea for regulatory or economic reasons) has emerged as a difficult problem in groundfish management. In order to manage for overfished stocks, it is necessary to estimate total catch, rather than only the catch landed at the dock. At the same time, reductions in cumulative landing limits can increase the amount of fish discarded, since these limits are based on landed catch rather than total catch. (Until the recent development of an observer program, it has been difficult to effectively monitor discards, confounding the ability to accurately estimate total catch.) NMFS published a Bycatch Mitigation Program Draft Programmatic EIS on February 20, 2004 (NMFS 2004c). The Council identified a preferred alternative at their April 2004 meeting, which will be included in the Final Programmatic EIS (FPEIS). Once the FPEIS is finalized, the Council will undertake an FMP amendment to implement the goals, program direction, and bycatch reduction measures recommended by the FPEIS.

Amendment 17 implemented biennial management, and was described in the preceding section.

1.4 Scoping Summary

1.4.1 Background to Scoping

According to the NEPA, the public and other agencies must be involved in the decision-making process for agency actions. "Scoping" is an important part of this process. Scoping is designed to provide interested citizens, government officials, and tribes an opportunity to help define the range of issues and alternatives that should be evaluated in the EIS. NEPA regulations stress that agencies should provide public notice of NEPA-related proceedings and hold public hearings whenever appropriate during EIS development (40 CFR 1506.6).

The scoping process is designed to ensure all significant issues are properly identified and fully addressed during the course of the EIS process. The main objectives of the scoping process are to provide stakeholders with a basic understanding of the proposed action; explain where to find additional information about the project; provide a framework for the public to ask questions, raise concerns, identify issues, and recommend options other than those being considered by the agency conducting the scoping; and ensure those concerns are included within the scope of the EIS.

1.4.2 Council and Agency NEPA Scoping

On October 15, 2003 (68 FR 59358), 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 2005-2006 ABC and OY 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; it also enumerated a preliminary list of potentially significant impacts that could result from implementing the proposed action. A public scoping period, ending on November 14, 2003, was announced in the NOI. A public scoping meeting was held on November 2 in Del Mar, California, to gather oral comments on the scope of the EIS. In addition, written comments were accepted through the end of the scoping period.

In addition to the formally-announced public scoping period, the Council process, which is based on stakeholder involvement, allows for public participation and public comment on fishery management proposals during Council, subcommittee, and advisory body meetings. 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. The Ad Hoc Allocation Committee, a subpanel of the whole Council, provides advice on allocating harvest opportunity among the various fishery sectors. These opportunities all constitute the broadly-defined Council scoping process, not all of which focuses on the scope and content of NEPA analysis.

The Council and its advisory bodies considered 2005-2006 specifications and management measures at several meetings. As noted above, the Council took action at four meetings in November 2003, March 2004, April 2004, and June 2004. The Ad Hoc Allocation Committee of the Council met on March 24 and 25 and May 27, 2004, to review the range of harvest specifications and provide guidance on allocation of harvest opportunity among different fishery sectors for 2005-2006. When the Council considers groundfish management at their meetings, the GMT and GAP provide advice and guidance on the development of harvest specifications and management measures. The GMT also meets outside of Council meetings to develop management recommendations. For the 2005-2006 harvest specifications process, they met in October 2003, and February, May, and June 2004. All these meetings are open to the public and are duly noticed.

In addition, although not part of the formal scoping process, both the Oregon and California state fish and game departments hold public hearings to solicit input on the formulation of management measures. Comments made at these hearings were summarized and made available to the Council in advance of their June 2004 meeting.

1.4.3 Summary of Comments Received

The Council received emails, letters, and oral comments from 17 people. Based on their affiliation these commentors can be categorized as follows:

Affiliation	Number of commentors
Commercial fishing	2
Recreational fishing	4
Government agency	5
Environmental advocacy group	3
Other affiliation	3
Total	17

The number of times an issue is raised during the scoping process provides an indication of the issues that commentors are most concerned about. Scoping also helps agencies eliminate from detailed study issues that are not significant (40 CFR 1501.4(g)).

Table 1-1 summarizes and categorizes the scoping comments. Sixty-six individual comments were extracted from the written and oral statements received. These comments are listed under six broad categories relating to the analysis in this EIS. They are then further sub-categorized according to more specific issues. The comments and how they are addressed in this EIS are summarized as follows:

1. **Harvest level comments** are sub-categorized according to **allocation**, **OYs**, and **rebuilding overfished species**. Many of the comments under the OY and rebuilding categories recommend setting harvest levels conservatively for overfished species, evaluating different rebuilding strategies in the EIS, and implementing mechanisms to deal with over-harvest (exceeding the OY). It should be noted that the Council has adopted rebuilding plans for all currently overfished groundfish species. The strategic rebuilding parameters in these plans dictate the OYs for these species. The Council has changed the harvest control rule for selected stocks, based on information in new stock assessments. However, this has been done to achieve rebuilding with probabilities equal to or greater than those identified in the rebuilding plans. As noted above, the Council is changing the harvest control rule for lingcod in response to the new stock assessment. This change will be discussed and evaluated in this EIS; however, rebuilding strategies for the other overfished species are not revisited and evaluated here. Comments on over-harvest refer to the effects of harvests in one sector on fishing opportunity for other sectors (as an allocation issue) and how to respond to overages in one year by adjusting future harvest levels. Chapter 2, describing harvest level alternatives, and Chapter 4, evaluating impacts to fish stocks, discuss these issues.

2. **Management measure comments** are sub-categorized under **rebuilding overfished species, closed areas**, and **trip limits**, along with three more general comments. Rebuilding comments emphasize the need to implement management measures that ensure rebuilding of overfished species. Closed area comments discuss the use and configuration of RCAs and the effect of these closures on smaller vessels. The other comments recommend evaluating the efficacy of management measures for controlling total fishing mortality and propose a range of management measures to reduce bycatch, habitat, and ecosystem impacts. Chapter 2 describes the range of management measures considered in the alternatives. Their effects on different components of the human environment are discussed in Chapters 3 through 8, as appropriate.

3. **Monitoring and enforcement comments** are sub-categorized under **bycatch**, **enforcement**, and **observers and monitoring**. The bycatch comments emphasize the need to accurately account for this source of fishing mortality. As noted earlier in this chapter, accounting for total fishing mortality is an important component of the groundfish fishery management regime. Some of the bycatch-related comments are outside the scope of this action. For example, updating or amending the Groundfish FMP, to specify gathering bycatch-related information, is not part of the harvest specifications process. By the same token, a comprehensive treatment of bycatch and bycatch reduction is the subject of the bycatch mitigation PEIS referenced in Section 1.3.4. The bycatch PEIS also evaluates a range of bycatch reduction measures that are beyond the scope of the harvest specifications process because, for example, they would require an FMP amendment to implement. This harvest specifications EIS discusses bycatch reduction within the context of management measures proposed for 2005-2006. Commentors also recommended evaluating various monitoring techniques, including observer coverage, and logbook and electronic data collection. Bycatch estimation is currently based on combining information from the WCGOP, logbook information, and landings data to model total projected fishing mortality. This EIS discusses and evaluates these methods. Comments on enforcement stress its importance as a complement to monitoring in preventing harvest limits from being exceeded. These issues are discussed and evaluated in Chapter 7 of this EIS.

4. **Ecosystem and habitat impacts comments** are sub-categorized under **ecosystems**, **gears and other techniques**, and **habitat**. One comment recommends evaluating a wide range of measures for reducing

habitat impacts. Management measures considered under the harvest specifications process are primarily designed to constrain total fishing mortality with other effects considered secondarily. In addition, some measures, such a further reducing fishing capacity (e.g., retiring fishing vessels participating in the groundfish fishery) and developing a network of no-take marine protected areas (MPAs) are outside the scope of the proposed action. NMFS is currently preparing an EIS to comprehensively evaluate designation and protection of EFH as mandated by the MSA; this EIS will take up many of the broader habitat protection measures proposed in these comments. In addition, the bycatch mitigation PEIS also considers some of these measures in the bycatch reduction context. These analyses may result in the implementation of more comprehensive habitat protection measures over a longer period than that for the development of management measures for the harvest specifications process. Chapter 3 in this EIS describes and evaluates impacts of biennial management measures on habitat and ecosystems.

5. **Socioeconomic impacts comments** are sub-categorized under **communities**, **small vessels**, **processors**, **recreational fishing**, and **year-round fishery**. These comments address different aspects of the socioeconomic environment, including fishery sectors and fishing communities. Several comments emphasize the economic problems caused by the need to restrict groundfish fishing, by implementing the RCAs for example. One commentor recommends evaluating the objective of sustaining a year-round fishery. Recreational fishing-related comments recommend evaluating the value of that sector in comparison to the commercial sector. Socioeconomic impacts are described and evaluated in Chapter 8 of this EIS.

6. Comments on other **analytical issues** are sub-categorized under **communication**, and **cumulative effects**. There are also three more general comments in this category. In preparing this EIS, Council and NMFS staff address the analytical requirements identified in NEPA regulations and guidance while striving to present the information in a clear, readable format.

1.4.4 Criteria Used to Evaluate the Impacts of the Proposed Action

The proposed action will be evaluated based on projected impacts to the components of the human environment listed below. For each of these components the criteria used for measuring direct, indirect, and cumulative impacts are described. These criteria were developed by Council and NMFS staff, based on scoping comments and Council and advisory body discussions.

Habitat and Ecosystem (Chapter 3)

The combined and cumulative effects of proposed management measures are considered. Impacts to habitat and ecosystem would correlate with the level and type of fishing activity. Increased fishing activity, particularly bottom trawling, would result in greater impacts to habitat in comparison to a decrease in fishing. However, data on the distribution and intensity of fishing effort is currently unavailable. In addition, the correlation between fishing and impacts to habitat is not sufficiently detailed to specify the effects on habitats and ecosystems. For these reasons, the alternatives are evaluated qualitatively in terms of relative impacts.

Groundfish, Including Overfished Species (Chapter 4)

The fishery management unit (stocks managed under the FMP) may be subdivided into three categories for the purposes of evaluating impacts: overfished species, species subject to precautionary management, and species believed to be at or above B_{MSY}. A goal of the management framework is to maintain stocks at B_{MSY}; for stocks below that abundance threshold, harvests must be limited in order to allow the stock, over time, to reach that size. The management framework takes a precautionary approach by requiring increasing reductions in harvest levels the more stock size falls below B_{MSY}. If a stock falls below the minimum stock size threshold (MSST) defining an overfished stock (which for groundfish is 25% of unfished biomass) a different framework applies: for a given harvest rate, managers identify a time frame for recovery and assess the likelihood of recovery during that time period. Fishing mortality, or the removal of stock biomass, in 2005-2006 is the direct effect of the proposed action. From the standpoint of impact assessment, this has relatively little utility; fishery management depends on the cumulative effects of past management (which partly determines current biomass) and focuses on the future effect of current fishing mortality. One criterion for evaluating alternatives, therefore, is their likelihood of satisfying the B_{MSY} management goal. Rebuilding plans for overfished species—which dictate the OYs that can be established for these stocks—provide a quantification of this likelihood, the probability of stock recovery within a given time period. For stocks above MSST the evaluation must rely on a more qualitative discussion of the types of risk associated with a given harvest level. Any harvest level that constitutes overfishing, a rate that exceeds F_{MSY} or its proxy, represents a clear threshold for significance. (F_{MSY} is shorthand for the fishing mortality rate that will maintain the stock at maximum sustainable yield [MSY] biomass. The true value for this rate is not known for groundfish species. Instead, proxy values are used.) The MSA does not allow the Council to knowingly authorize overfishing (that is, a harvest rate that keeps stock size below B_{MSY}). Therefore, the alternatives must be assessed for overfishing risk—failing to maintain stocks at B_{MSY} over the long term and on a continuing basis—which would represent a significant impact.

As discussed earlier in this chapter, once the Council identifies a preferred set of OYs, management measure alternatives are formulated, and the resulting projected catch (or total fishing mortality, including bycatch) is estimated. The management measures are evaluated in terms of their projected success in constraining total fishing mortality of each stock or stock complex to a level at or below the OYs. If management measures are not adequately constraining, further adjustments need to be made until projected catch of each stock or stock complex falls below the OYs. Thus, the impact of management measures represents another level of the same analytical question: what is the likelihood that *actual* harvests (as opposed to the potential harvest levels represented by OYs) will satisfy the goal of maintaining stocks at B_{MSY}? Because the intent is to manage within OYs, the degree to which management measures sufficiently constrain fishing mortality, including any further precautionary reductions from the OY for a given species, represents the impact to be evaluated. The level of bycatch resulting from a given suite of management measures is an important aspect of this evaluation. From a biological perspective, the amount of bycatch is immaterial as long as total fishing mortality is sufficiently constrained (assuming that discarding fish into the marine environment does not by itself result in significant impacts).[8/] However, bycatch mortality is much more difficult to monitor and assess than landed catch mortality. Thus, as bycatch increases, there is a greater risk that total fishing mortality will be under-estimated. As harvest limits for certain species are reduced, there is greater incentive for fishermen to discard fish, so they may continue fishing for other species with higher limits. Alternatives, therefore, must be evaluated for their bycatch-producing effect.

Nongroundfish Species (Chapter 5)

Vessels fishing for groundfish may also catch nongroundfish species. Many of these species come under other state or federal management regulations. Harvest limits and separate entry requirements for vessels targeting those species may be established. Incidental catch by groundfish vessels contributes toward total

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8/ It is important to recognize that bycatch may represent a social cost. Marketable fish may be discarded, due to regulatory restrictions, decreasing potential revenue. Even if fish are discarded because there is no market for them, or because production costs exceed potential revenues, a social cost may be incurred. This cost represents foregone opportunities, environmental services provided by the living fish, the value society attaches to the mere existence of the fish, and other values not adequately captured in prices.

fishing mortality for these species. Impacts may be evaluated in terms of this incidental harvest in relation to any harvest limit established for the incidentally-caught species under other state or federal management regimes.

Protected Species (Chapter 6)

A range of species other than federally-managed fish are protected under the Endangered Species Act (ESA), Marine Mammal Protection Act (MMPA), and the Migratory Bird Treaty Act (MBTA). Groundfish fisheries may interact with these species, causing mortality or otherwise harming them. Different protected species are affected by a variety of gear types. For example, ESA-listed salmon stocks are caught in midwater trawl fisheries targeting Pacific whiting, and longline fisheries may hook seabirds during gear deployment. As with habitat, alternatives that allow more fishing effort may result in greater impacts to protected species in comparison to alternatives that result in less fishing effort. Significant impacts would occur if standards established pursuant to the relevant laws were exceeded. Current estimates of protected species takes suggest that these standards are not being exceeded.

The Management Regime (Chapter 7)

As noted above, management measures will be implemented to ensure total fishing mortality remains at levels necessary to achieve OYs. The impacts of the alternatives are evaluated in terms of the types of management measures that may be used. More complicated, controversial, and difficult-to-enforce management measures would impose greater costs in comparison to less complex measures. Impacts to the management regime can also be evaluated in terms of the data needed to both support and evaluate potential management measures. Management measures that are more dependent on precise total catch monitoring will require a higher level of direct observation than is currently in place. Increasing observer coverage would entail more costs.

Socioeconomic Impacts (Chapter 8)

Socioeconomic impacts are evaluated across a range of sectors as follows:

Commercial fishery impacts are compared in terms of changes in expected landings, and where possible, exvessel revenue. These socioeconomic impacts are inversely related to biological impacts. Alternatives that limit harvest more, and thereby reduce landings, also reduce exvessel revenue; alternatives that allow higher harvest levels result in comparatively higher exvessel revenue.

Recreational fishery impacts are evaluated based on the change in fishing opportunity as measured by the number of fishing trips that might occur under each alternative.

Tribal fishery impacts are qualitatively evaluated based on the degree of change in groundfish landings compared to historical landings. As with all socioeconomic impacts, alternatives with a lower harvest limit are more likely to negatively affect tribal allocations than those that allow a higher harvest limit.

Impacts on buyers and processors correlate closely with changes in landings and associated exvessel revenue. (Exvessel revenue is derived from purchases by this sector.) Alternatives can, thereby, be qualitatively evaluated in a similar fashion. Lower harvest limits would reduce the amount of fish that could be purchased relative to higher harvest limits.

Impacts of the alternatives on markets, such as retail outlets and restaurants, can be qualitatively evaluated in terms of the substitutability of other fish products for those that might become unavailable (or become too expensive) as a result of harvest limits. Some groundfish products might be easily substituted, while others—such as live fish sales—may not be.

Fishing community impacts represent the aggregate of the socioeconomic impacts described above. Alternatives can be evaluated by comparing the alternatives in terms of changes in personal income resulting from changes in groundfish landings. Given the range of these species and how vessels targeting them are distributed by port, there will be geographic differences in community impacts. This evaluation compares these differences, based on the different harvest levels expected under the management measure alternatives. Consistent with EO 12898, Environmental Justice, disproportionate adverse impacts to low income and minority populations are also evaluated.

TABLE 1-1. Summary of scoping comments received on 2005-2006 Annual Specifications. (Page 1 of 3)

1. Harvest Levels

Allocation

- Catches in one fishery sector can exceed the OY for the entire fishing industry coastwide. If reporting in one sector has a long time lag, it leads to problems because restrictions are then required on all sectors to compensate.
- If soft allocations continue, implement hard bycatch caps by sector.

OYs

- Why are black rockfish OYs lower in 2005-2006 than in 2004?
- Management strategies should fall into two classes: rebuilding species with biomass values below a MSST back to MSY consistent with the MSA, and achieving OY on a continuing basis for the remaining species.
- For species with biomass values well below MSST (less than or equal to half of MSST), set the fishing mortality rate as close to zero as possible - especially for bocaccio, cowcod, and canary rockfish.
- Consider management options that address any mortality limit overages, such as upgrading current data collection systems to accurately track mortality inseason, deducting any overages from the following year's allowable mortality limit, or setting management measures that are aimed to achieve mortality limits that are safely below annual limits, so that any inseason adjustments will allow further fishing opportunities if annual mortality limits have not been met.
- An OY or process for determining an annual OY should be detailed in developing 2005-2006 catch specifications.
- The EIS should provide a range of options for managing (non-overfished) species at OY with varying probabilities of success for obtaining the target. OY values and proxies recommended by technical guidance should be included in the range of alternatives with accompanying analysis of both short- and long-term environmental and economic impacts.

Rebuilding overfished species

- Discuss rebuilding issues. Analyze a range of rebuilding periods and the consequences of using different harvest levels and rebuilding periods for overfished species.
- For the nine overfished species, provide a range of alternatives for rebuilding time periods that are as short as possible.
- Provide a range of alternatives for probability values associated with successfully rebuilding the species within the maximum allowable and target time period, including a recommended 90% probability level.
- Include a full range of management strategies for returning depleted species to healthy levels and managing non-depleted species at OY.
- Establish a rebuilding control rule that guides rebuilding, so the occurrence of a strong year class does not create a management response where short-term yields are increased in response to a strong recruitment event.
- Do not exceed annual mortality limits established to rebuilding overfished populations.
- Consider zero mortality levels for rebuilding cowcod, bocaccio, and canary rockfish.
- Present a range of rebuilding strategy and probability alternatives for successfully achieving rebuilding within allowable timeframes with accompanying analysis of direct, indirect, and cumulative environmental impacts.
- The range of alternatives must include a target rebuilding time set in relation to achieving T_{MAX} with a 90% probability with a target date as the mid-point between T_{MIN} and T_{MAX} serving as the upper bounds of the rebuilding timeframe.
- Include both short and long-term economic and ecological implications in the rebuilding analysis.
- Discuss in detail the management of overfished species over the last several years, including whether mortality levels have exceeded OYs and the environmental consequences of such exceedences.

2. Management Measures

Rebuilding overfished species

- Consider management measures designed to return depleted species back to healthy levels and manage non-depleted species at OY, including capacity reduction, total mortality caps, measures that reduce bycatch of managed and prey species, and measures that reduce fishing impacts on marine habitats.
- The EIS must explore a full range of management measures necessary to ensure a high probability of successfully rebuilding depleted species within the rebuilding target time.

Closed areas

- Spatial management is based on depth, not bottom substrate, etc. This arbitrarily takes away fishing areas for communities that have fished selectively. With vessel monitoring systems (VMS), scientists could overlay species distribution with historic fishing grounds and develop more complex spatial management has less impact on fishing communities.
- Discuss the value of area closures for protecting groundfish species and habitat, especially overfished species, and fully consider a range of closure alternatives.
- When RCA closed 50-200 fathoms (FM) to, small northern Washington vessels lost 3/4 of remaining fishing area; there is not enough fishing area left for small vessels to survive.
- Small fishing boats are limited by where they can fish, due to their size.

Trip limits

- Discuss the environmental consequences (including bycatch) of small trip limits.

Other management issues

- Discuss the ability of current management methods to constrain mortality to levels established in annual specifications and analyze management measures that would be more effective in controlling level of fishing harvest.
- Analyze management measures that will rebuild depleted populations by limiting total mortality to levels consistent with proposed rebuilding targets; that will achieve OY on a continuing basis for those species with a biomass level above MSST; that will minimize incidental catch of a depleted species' prey species; and that will reduce impacts of fishing gears on the marine environment, including an analysis of the past, present, and reasonably foreseeable adverse impacts of fishing and non-fishing operations on habitats used by depleted species.
- Consider management measures designed to reduce bycatch of managed and prey species including capacity reduction, bycatch caps on a fleetwide, sector-wide or vessel-by-vessel basis; the use of a network of no-take marine protected areas; gear modifications; trip or bag limits; and a system for accurately counting bycatch and bycatch mortality.

3. Monitoring and Enforcement

Bycatch

- When accounting for total mortality, look at the reasons for discard rates (obtained from observer data). Discards could be occurring due to market conditions or processor requirements. Such knowledge could inform the management system.
- Discuss bycatch issues fully, including full analyses of the amount and sources of bycatch (especially of overfished species); the effects of bycatch; and the effects of current management techniques and allocations on bycatch. Include an analysis of potential bycatch reduction techniques and determine whether they can be used in managing the species.
- Require logbook data to include not only landed fish, but discards at sea.
- Review current sources of data for fishing-related mortality in all fisheries, and update the Groundfish FMP to specify the pertinent data necessary to identify catch types and amounts, areas where fish are caught, time of fishing, and other information needed to obtain the data necessary for proper application of the proposed 2005-2006 management regime.

Enforcement

- Make decisions that are best for fishery management, then tell enforcement what to do. Now, management is constrained by what enforcement says is feasible. The EIS should include an analysis of why certain measures can't be taken due to enforcement limitations.
- Ensure areas closed to certain gear types or methods of fishing are adequately enforced.
- Discuss NMFS' ability to enforce harvest limits in 2005 and 2006, given current fishery management techniques.

Observers and monitoring

- Use electronic data collection in as many sectors as possible - not just the trawl fleet.
- Fully discuss observer coverage issues, including adequacy of coverage for assessing bycatch and for enforcement.
- Establish an accounting system that accurately measures appropriate catches (including landed catch and bycatch) relative to limits of all species.
- Establish a system which measures the depths at which species are caught.
- Consider data collection and enforcement measures necessary to better manage the groundfish fishery.
- Use CRFS data, not MRFSS, for recreational fishing.

4. Ecosystem and Habitat Impacts

Ecosystems

- Describe and evaluate ecosystem impacts and linkages. Analyze ecosystem effects on the smallest scale possible.

Gears and techniques

- Discuss the environmental impacts of different fishing gears and techniques, including impacts on habitat.

Habitat

- Consider management measures designed to reduce the adverse impacts of fishing operations on EFH, including capacity reduction, bycatch caps and accounting of bycatch, a network of no-take MPAs, gear modifications or prohibitions, and area closures by gear types.
- Analyze effects of fishing effort shift (caused by current management scheme) to determine the resulting real and potential habitat impacts and methods to reduce these impacts.

5. Socioeconomic Impacts

Communities

- If a small trawl fishery in northern Washington cannot survive, this will have negative impact on communities.
- Evaluate impacts on individual communities, not just fishery sectors.
- MSA says that fisheries must be sustainable for fish and fishermen; take this into account.

Small vessels

- Small boats in northern Washington have suffered many setbacks already. They can only fish nearshore, are limited by weather, and contend with closures due to cable crossings, etc.
- Take into account small family-owned boats that fish in northern Washington State.

Processors

- The RCA isn't hurting communities as far as trawlers are concerned; the problem is that processors don't want to buy the types of fish that can be caught cleanly. Processor limits force fishermen to discard target species.
- Look at fish processing as part of the system and whether this system maintains the viability of processors.
- The Council seems to only consider the economic value of processors.

Recreational fishing

- Economic value of recreational fishing (per fish) is greater than for commercial fishing.
- Look at the sociocultural value of recreational fishery resources.
- Analyze the cost of limiting the recreational sector when there is overlap between recreational and commercial sectors.
- Look more at social impacts of recreational fisheries management, including culture of recreational fishing and the relationship to tourism.

Year-round fishery

- Discuss efforts to encourage a year-round trawl fishery; the environmental consequences of such a fishery; and alternatives to a year-round fishery.
- Previous economic analyses have underestimated the economic costs of limiting catches in the January-February and November-February periods when petrale sole catch is not limited by management measures.

6. Analytical Issues

Communication

- Find a better way to understand and express impacts. Present the results of analyses in graphical format, so it is easier to understand.

Cumulative Effects

- The cumulative effects analysis should be used as a way to look at alternatives from the EFH and bycatch program EIS in this EIS.
- Fully discuss cumulative impacts.
- Fully discuss the effect of other fisheries (such as state-managed fisheries and nongroundfish fisheries) on groundfish fisheries in federal waters.
- Look at alternative systems that would provide more benefits to fishermen.
- Create linkages between the different analyses currently being prepared (EFH EIS, bycatch EIS, rebuildling plans). There is considerable overlap. Is there a way to bring these together into this EIS? Include a programmatic section that describes the linkages.

Other Analytical Issues

- Use modern tools to understand the fisheries, like the Ecotrust Groundfish Fleet Restructuring Project. (Update the project with new information).
- Use the Groundfish Information and Analysis System (GIAS) built by Ecotrust to consider different restructuring options in line with the Council's strategic plan. The project is being updated and could be helpful.
- Fully analyze the current status of managed groundfish, especially those known or suspected to be overfished.

2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

The Council adopted preferred alternatives for 2005-2006 groundfish harvest levels and a range of management measure alternatives. In general, alternative management specifications address measures designed to reduce total mortality of overfished groundfish stocks and are analyzed for their potential effect on groundfish habitats, groundfish stocks and other marine resources, and the socioeconomic infrastructure of the West Coast fishery and fishing-dependent coastal communities. The Council recommended its proposed action at its June 2004 meeting in Foster City, California.

2.1 Alternative Harvest Levels

New harvest levels for 2005-2006 are being considered for some groundfish stocks and stock complexes (Tables 2-1a and 2-1b). Alternative groundfish harvest levels contemplated for a change from status quo (2004 specifications) are based on new stock assessments (i.e., cabezon and lingcod), based on projections from the most recent assessment (i.e., bocaccio, black rockfish, canary rockfish, cowcod, darkblotched rockfish, Dover sole, sablefish, shortspine thornyheads, widow rockfish, yelloweye rockfish, and yellowtail rockfish), based on the potential application of precautionary harvest reductions for stocks and stock complexes that have not been formally assessed (i.e., Pacific cod, Other Fish, and Other Flatfish), or based on the need to analyze a range of potential bycatch effects prior to the next formal assessment (i.e., Pacific whiting). The rationale for ranging alternative harvest levels is described in this section for those stocks with harvest levels different than status quo.

Alternative harvest levels are quantitatively analyzed in Chapter 4 where effects of this action on groundfish species are addressed. However, a more qualitative treatment of alternative harvest levels is provided in the other chapters where habitat and socioeconomic effects are analyzed. All the analytical chapters will quantitatively analyze effects of alternative management measures for their effectiveness in staying within the Council-preferred harvest levels (Council OY specifications).

2.1.1 Stocks With New Assessments

2.1.1.1 Cabezon (in Waters off California)

The first assessment of cabezon (*Scorpaenichthys marmoratus*) on the West Coast was done last year (Cope, *et al.* 2004) and formally approved by the Council for use in 2005-2006 management decision making in March 2004. While cabezon are distributed coastwide along the West Coast, this assessment concentrated on the southern portion of the stock in waters off California because it was determined that the available data for the northern portion of the stock was insufficient for population evaluation. The predicted spawning output of the southern cabezon stock was 34.7% of the stock's initial, unfished biomass. While this is above the MSST of $B_{25\%}$, it is below the target level of spawning output that is predicted to support MSY of $B_{40\%}$ (or B_{MSY}). Therefore, according to the groundfish harvest policies in California and in federal regulations, a precautionary reduction of the ABC is appropriate to achieve B_{MSY}. Two precautionary harvest policies are considered in this EIS: the Council's 40-10 rule and the 60-20 rule as specified in California's Nearshore FMP (see Section 4.3.1.1). Dr. Andre Punt, one of the contributing assessment authors, provided cabezon harvest projections for the southern portion of the stock under these two precautionary harvest policies, the ABC rule, and two harvest control rules ($F_{45\%}$ and $F_{50\%}$) (Table 2-2). The range of alternative harvest levels analyzed covers the broadest range of projected harvest levels given these varying harvest rates and policies.

The California Fish and Game Commission (CFGC) recommended using the proxy F_{MSY} harvest rate of $F_{45\%}$ (i.e., the harvest rate predicted to build the stock's biomass to B_{MSY}) to set the ABC and the 60-20 precautionary harvest policy to set the OY. Additionally, the CFGC recommended using the 2005-2007 average OY projected using these harvest policies and control rules to establish the 2005 and 2006 cabezon OY. The Council agreed to these recommendations and set a cabezon OY of 69 metric ton (mt) for 2005-2006 as their preferred harvest level (Council OY in Tables 2-1a and 2-1b).

2.1.1.2 Lingcod

A new lingcod (*Ophiodon elongatus*) assessment was done last year (Jagielo, *et al.* 2004) and formally approved by the Council for use in 2005-2006 management decision making in March 2004. This assessment updated the previous coastwide lingcod assessment (Jagielo, *et al.* 2000). As in the last assessment, separate age-structured assessment models were constructed for northern areas (Columbia and U.S.-Vancouver International North Pacific Fishery Commission [INPFC] areas) and southern areas (Conception, Monterey, and Eureka INPFC areas). Results from these two models were combined to obtain coastwide estimates of spawning biomass, the depletion level, and other relevant assessment outputs.

This assessment indicates the lingcod stock has achieved its rebuilding objective of $B_{40\%}$ in the north (actually 28% above $B_{40\%}$), but was at $B_{31\%}$ in the south. However, the adopted lingcod rebuilding plan specifies a coastwide rebuilding objective. The Council's Scientific and Statistical Committee (SSC), working in concert with the lead assessment author, recalculated the coastwide lingcod stock status in March 2004 using actual 2003 harvests (the assessment, which was completed during 2003, assumed harvest would be equal to the specified OY in 2003). Their calculations indicated the spawning biomass at the start of 2004 was within 99.3% of B_{MSY} (or $B_{40\%}$) on a coastwide basis (Table 2-3). Therefore, the Council could not recommend to NMFS that the stock should be declared rebuilt.

The range of alternative lingcod harvest levels analyzed for 2005-2006 is based on the new assessment. The Low OY Alternative applies the harvest control rule specified in the lingcod rebuilding plan (F = 0.0531 in the north and F = 0.0610 in the south) that was adopted as part of FMP Amendment 16-2 (PFMC 2003b) to the new north and south estimates of spawning biomass. The Medium OY Alternative applies the new estimated harvest control rules to new biomass estimates and assumes a rebuilding probability (P_{MAX} or the probability of rebuilding in the maximum allowable time according to the NSGs) of 70%. The High OY Alternative assumes new biomass and harvest control rule estimates with a P_{MAX} of 60%. The preferred Council OY Alternative is to use the Medium OY Alternative ABC projected for 2005 and 2006, but the OY projected for 2006 (2,414 mt, which is projected to be lower than 2005; Tables 2-1a and 2-1b) for both years. Implicit in this action is a regulatory amendment of the harvest control rule adopted in the rebuilding plan, which comports with the process and standards criteria for rebuilding plans adopted under FMP Amendment 16-1 (PFMC 2003a).

2.1.2 Stocks With New Harvest Levels Projected From Recent Assessments

2.1.2.1 Bocaccio (in Waters off California South of 40°10' N Latitude)

The range of 2005-2006 harvest specifications for bocaccio is based on the most recent stock assessment (MacCall 2003b) and rebuilding analysis (MacCall 2003a). The range of harvest specifications attempts to analyze varying rebuilding probabilities and model uncertainties in the assessment and rebuilding analysis. Model uncertainties compelled the Stock Assessment Review (STAR) Panel (Helser, *et al.* 2003) and the SSC to recommend consideration of the Stock Assessment Team (STATc) base model and the competing STARb1 and STARb2 models. The Council also limited the range of rebuilding probabilities considered for detailed analysis of rebuilding plans under FMP Amendment 16-3 (PFMC 2004a) to comply with P_{MAX} values ranging from 60% to 90%. Therefore, the range of bocaccio harvest specifications analyzed in this

EIS represents the full range of plausible assessment model outputs and the P_{MAX} range of 60% to 90%. The Low OY specifications comport to the STARb2 model with a rebuilding probability of 90%. The Medium OY specifications are derived using the STATc base model with a rebuilding probability of 70% and the High OY specifications are structured using the STARb1 model with a rebuilding probability of 60%.

The Council adopted a bocaccio rebuilding plan during their final action on FMP Amendment 16-3 in April 2004. The adopted rebuilding plan parameters were determined using the STAT base model, since the assessment author recommended this model as the most plausible. The adopted rebuilding plan has a 70% rebuilding probability, a target rebuilding year of 2023, and a harvest control rule specifying a constant harvest rate (F) of 0.0498. The harvest specifications in accord with the bocaccio rebuilding plan are ABCs of 566 mt and 549 mt for 2005 and 2006, respectively, and OYs of 307 mt and 309 mt for 2005 and 2006, respectively (Tables 2-1a and 2-1b).

2.1.2.2 Black Rockfish (in Waters off Oregon and California)

A new black rockfish assessment was done for the portion of the coastwide stock occurring off the coasts of Oregon and California (Ralston and Dick 2003). Previous assessments were done for the portion of the stock occurring off the coasts of Oregon north of Cape Falcon and Washington. Alternative harvest levels in the assessment for the portion of the black rockfish stock occurring off Oregon and California were ranged to capture the major uncertainty of historical landings prior to 1978. Black rockfish catches prior to 1945 were assumed to be zero in the assessment. Many gaps in historical landings of black rockfish since 1945 were evident, and these landings were reconstructed using a variety of data sources. The base model assumed cumulative landings of black rockfish from all fisheries was 17,100 mt from 1945 to 1977. The projected 2005-2006 harvest specifications for black rockfish in the waters off Oregon and California used this base case catch scenario. The OY equals the ABC, since the stock is predicted to be above B_{MSY} (estimated to be 49% of B_0). The projected 2005 and 2006 ABCs/OYs for black rockfish are 753 mt and 736 mt, respectively.

2.1.2.3 Canary Rockfish

Alternative canary rockfish harvest levels are based on projections from the 2002 rebuilding analysis (Methot and Piner 2002a) and the Council's adoption of a canary rockfish rebuilding plan as part of FMP Amendment 16-2, which specifies rebuilding targets consistent with a P_{MAX} of 60% (the target rebuilding year [T_{TARGET}] specified in FMP Amendment 16-2 is 2074, and the harvest control rule (F) is 0.0220). Although canary rockfish were not assessed in 2003 or 2004, alternative harvest levels are analyzed because OY values depend on recreational and commercial catch sharing. This is because the recreational fishery tends to take smaller canary rockfish than the commercial fishery, and therefore, has a greater “per ton” impact on canary rockfish rebuilding than the commercial fishery. That is, as the recreational share of the available canary rockfish harvest increases, the OY decreases. The Low OY canary rockfish harvest level is based on 50% recreational and 50% commercial catch shares. The Medium OY and High OY Alternatives are based on 39% recreational and 61% commercial catch shares, which represent the status quo catch shares adopted as harvest guidelines in 2004. All OY alternatives have the same rebuilding impact on canary rockfish and do not require re-specification of the target rebuilding year or harvest control rule adopted under FMP Amendment 16-2.

2.1.2.4 Cowcod

Alternative cowcod harvest specifications are derived from the rebuilding analysis conducted in 2000 (Butler and Barnes 2000). The Council limited the range of cowcod rebuilding probabilities considered for detailed analysis under FMP Amendment 16-3 (PFMC 2004a) to comply with P_{MAX} values ranging from 55% to 60%. Higher rebuilding probabilities could not be derived using the assessment and rebuilding analysis, due to the limited input data and the model limitations in the cowcod assessment (Butler, *et al.* 1999) and the rebuilding analysis. The Council adopted a cowcod rebuilding plan during their final action on FMP Amendment 16-3 in April 2004. The adopted rebuilding plan has a 60% rebuilding probability, a target rebuilding year of 2090, and a harvest control rule specifying a harvest rate (F) of 0.009. The harvest specifications in accord with the cowcod rebuilding plan are 2005 and 2006 ABCs of 5 mt and 19 mt for the Conception and Monterey INPFC areas, respectively, and OYs of 2.1 mt in each INPFC area for 2005 and 2006 (Tables 2-1a and 2-1b).

2.1.2.5 Darkblotched Rockfish

Darkblotched rockfish alternative harvest levels are based on projections from the most recent stock assessment and rebuilding analysis (Rogers 2003a). Harvest projections are influenced by recent strong recruitment (the 2000 and 2001 year classes), which has not been completely validated in the data used to assess the stock. The SSC/STAR Lite Panel requested progressive inclusion of 1997-1999, 2000, and 2001 recruitment estimates (Ralston, *et al.* 2003). Risk of error progressively increased from including those recruitment estimates because they were based on increasingly limited data. Rebuilding results were sensitive to the high 2000 and 2001 recruitment estimates, and including them allowed much greater OYs because those recruits are projected to enter the fishery in the future and help rebuild the stock before T_{MAX}. The ABCs, on the other hand, were not as affected because the 2000 and 2001 recruits were too small to have fully recruited to the fishery in 2004-2006. This led to OY estimates which were higher than the ABC, even given a 90% probability of rebuilding by the maximum allowable year (T_{MAX}).

The Council considered the three rebuilding scenarios in the Rogers rebuilding analysis (Table 16 in the rebuilding analysis), which ranged from no inclusion of either the 2000 or 2001 estimated recruitments to including both of them. The Council decision used the intermediate scenario, in which only one of the strong estimated recruitments, the 2000 year class, was included. The resulting 272 mt OY for 2004 from this scenario was 88 mt less than was calculated if both recruitments were included. The 272 mt amount also was associated with an 80% likelihood of rebuilding within the maximum timeframe. This calculated OY was then truncated to 240 mt, so as not to exceed the ABC. Since the MSA and NSGs do not allow harvest greater than the ABC, these ABC values are the harvest limits for these 2005 and 2006 specifications. The Council acted in a precautionary manner in choosing an intermediate scenario in which only one of the estimated strong year classes from the assessment model was included in performing the rebuilding projections. And the eventual OY was reduced another 32 mt below the amount (272 mt) that was consistent was an 80% chance of rebuilding under this scenario.

The OY projections for 2005 and 2006 based on the rebuilding plan would have been 303 mt and 424 mt, respectively. However, the ABC projections for 2005 and 2006 are 269 mt and 294 mt, respectively. The Council is constrained to restrict harvest to the ABC, thus these are also the OY specifications under the Council-preferred alternative for 2005 and 2006. These projected harvest specifications are compliant with the darkblotched rockfish rebuilding plan adopted under FMP Amendment 16-2 (PFMC 2003b) and may lead to faster rebuilding given the ABC constraint. The target rebuilding year remains unchanged from the rebuilding plan specification. The harvest control rule, which was amended during the 2004 specifications process (PFMC 2004b)[1/] also remains unchanged with this action.

1/ Regulatory amendment of adopted strategic rebuilding parameters, such as the harvest control rule, is compliant with the process and standards for groundfish rebuilding plans as adopted under FMP (continued...)

2.1.2.6 Dover Sole

The 2005 and 2006 Dover sole ABC and OY are projected from the 2001 assessment (Sampson and Wood 2001). The 40-10 adjustment was applied to the ABC to derive the OY, since the stock's spawning biomass is estimated to be below 40% of its initial, unfished level.

2.1.2.7 Sablefish

The GMT recommended updating the sablefish ABC and OY ranges analyzed in last year's EIS for 2004 management. Therefore, updated harvest level alternatives are presented as derived in the 2002 assessment update (Schirripa 2002). The Low OY harvest level of 6,500 mt is based on the adopted OY for north of Point Conception in 2003. The Medium OY harvest level assumes a density-dependence recruitment hypothesis, but is derived using the stock's default F_{MSY} harvest rate of $F_{45\%}$. The High OY harvest level is based on the default $F_{45\%}$ harvest rate, but assumes recruitment variability is driven more by environmental regime shifts (regime shift hypothesis) than parental stock density. The 40-10 adjustment is applied to all the alternative OYs, since the stock's spawning biomass is predicted to be less than 40% of its initial unfished level (in 2002, $B_{32\%}$ under a density-dependence hypothesis and $B_{39\%}$ under a regime shift hypothesis).

The Council chose the Medium OY sablefish harvest specification as its preferred alternative for 2005-2006. Therefore, a coastwide OY of 7,761 mt of sablefish (7,486 mt for north of the Conception INPFC area; and 275 mt for the Conception INPFC area) is proposed under the Council-preferred OY Alternative for 2005. The 2002 assessment update projects a slight decrease in sablefish exploitable biomass in 2006. Therefore, under the Council-preferred OY, the 2006 OY is 7,634 mt (7,363 mt for north of the Conception INPFC area; and 271 mt for the Conception INPFC area).

2.1.2.8 Shortspine Thornyhead

The 2005 and 2006 shortspine thornyhead ABC and OY are projected from the 2001 assessment (Piner and Methot 2001). The 40-10 adjustment was applied to the ABC to derive the OY, since the stock's spawning biomass is estimated to be below $B_{40\%}$.

2.1.2.9 Widow Rockfish

The range of 2005-2006 harvest specifications for widow rockfish is based on the most recent stock assessment (He, *et al.* 2003b) and rebuilding analysis (He, *et al.* 2003a). The range of harvest specifications attempts to analyze varying rebuilding probabilities and model uncertainties in the assessment and rebuilding analysis. Model uncertainties compelled the SSC to recommend consideration of the base Model 8 and the competing Models 7 and 9 in the He *et al.* (2003a) rebuilding analysis. The Council also limited the range of rebuilding probabilities considered for detailed analysis of rebuilding plans under FMP Amendment 16-3 (PFMC 2004a) to comply with P_{MAX} values ranging from 60% to 90%. Therefore, the range of widow rockfish harvest specifications analyzed in this EIS represents the full range of plausible assessment model outputs and the P_{MAX} range of 60% to 90%. The Low OY specifications comport to the Model 7 results with a rebuilding probability of 90%. The Medium OY specifications are derived using the base Model 8 with a rebuilding probability of 60%, and the High OY specifications are structured using Model 9 with a rebuilding probability of 60%.

1/ (...continued)
Amendment 16-1. The harvest control rule is expected to change with every new, formally-adopted assessment.

The Council adopted a widow rockfish rebuilding plan during their final action on FMP Amendment 16-3 in April 2004. The adopted rebuilding plan parameters were determined using the base Model 8, since the assessment author recommended this model as the most plausible. The adopted rebuilding plan has a 60% rebuilding probability, a target rebuilding year of 2038, and a harvest control rule specifying a constant harvest rate (F) of 0.0093. The harvest specifications in accord with the widow rockfish rebuilding plan are ABCs of 3,218 mt and 3,059 mt for 2005 and 2006, respectively, and OYs of 285 mt and 289 mt for 2005 and 2006, respectively (Tables 2-1a and 2-1b).

2.1.2.10 Yelloweye Rockfish

The 2005 and 2006 yelloweye rockfish ABCs and OYs were projected from the 2002 rebuilding analysis (Methot and Piner 2002b). The Council adopted a yelloweye rockfish rebuilding plan during their final action on FMP Amendment 16-3 in April 2004. The adopted rebuilding plan has an 80% rebuilding probability, a target rebuilding year of 2058, and a harvest control rule specifying a constant harvest rate (F) of 0.0153. The harvest specifications in accord with the yelloweye rockfish rebuilding plan are 2005 and 2006 ABCs of 54 mt and 55 mt, respectively, and OYs of 26 mt and 27 mt in 2005 and 2006, respectively (Tables 2-1a and 2-1b).

2.1.2.11 Yellowtail Rockfish

The 2005 and 2006 yellowtail rockfish ABC and OY are projected from the 2003 assessment (Lai, *et al.* 2003). Projected harvest specifications were derived using Model YT2003N in the assessment, which updates the catch series used in the previous assessment (Tagart, *et al.* 2000) with a newly revised series from Pacific Coast Fisheries Information Network (PacFIN), revised Canadian catches in INPFC area 3C, and new estimates of 1967-1976 foreign catches (Rogers 2003b). The OY equals the ABC, since the stock is estimated to be above the abundance level that supports MSY (or 40% of initial, unfished biomass). The yellowtail rockfish stock was estimated to be at 46% of its initial, unfished biomass in 2002 (Lai, *et al.* 2003).

2.1.3 Stocks and Stock Complexes That Have Not Been Formally Assessed, But Are Considered for Precautionary Harvest Reductions

2.1.3.1 Other Fish

The Other Fish stock complex contains all the unassessed Groundfish FMP species that are neither rockfish (family *Scorpaenidae*) or flatfish. These species include big skate (*Raja binoculata*), California skate (*Raja inornata*), leopard shark (*Triakis semifasciata*), longnose skate (*Raja rhina*), soupfin shark (*Galeorhinus zyopterus*), spiny dogfish (*Squalus acanthias*), finescale codling (*Antimora microlepis*), Pacific rattail (*Coryphaenoides acrolepis*), ratfish (*Hydrolagus colliei*), cabezon (*Scorpaenichthys marmoratus*) (north of the California-Oregon border at 42° N latitude), and kelp greenling (*Hexagrammos decagrammus*).

The status quo No Action ABC/OY specified in 2004 (and in many previous years) for the Other Fish complex was 14,700 mt based on historical catches for these species. The portion of this ABC/OY attributed to the available harvest of cabezon in waters off California was deducted once those 2005-2006 harvest specifications were decided by the Council in April 2004. This deduction for the recently-assessed cabezon stock off California resulted in an ABC of 14,597 mt in 2005 and 14,592 mt in 2006 for the Other Fish complex. The GMT recommended consideration of a 50% reduction of the ABC to set the OY harvest target for the Other Fish complex based on the guidance provided by Restrepo *et al.* (1998) for determining precautionary harvest levels for unassessed stocks. The Council heeded this advice and established an OY for the Other Fish complex of 7,299 mt for 2005 and 7,296 mt in 2006 (both specifications rounded to 7,300 mt in Tables 2-1a and 2-1b).

2.1.3.2 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*), sand sole (*Psettichthys melanostictus*), and starry flounder (*Platichthys stellatus*).

The status quo No Action ABC/OY specified in 2004 (and in many previous years) for the Other Flatfish complex was 7,700 mt based on historical landings for these species. The GMT recommended consideration of a 50% reduction of the ABC to set the OY harvest target for the Other Fish complex based on the guidance provided by Restrepo *et al.* (1998) for determining precautionary harvest levels for unassessed stocks. The GMT also recommended converting the landed catch harvest specifications for the Other Flatfish into a total catch specification that would include any discard mortality for species in the complex. The GMT had not analyzed historical catches of species in the Other Flatfish complex nor had the available observer data been thoroughly explored to recommend harvest specifications for this complex. The Council, therefore, decided a range of ABCs from 4,400 mt to 12,000 mt to encompass the possible range of outcomes from analysis with a 50% reduction of the ABC to determine an OY under the Low OY Alternative and no reduction of the ABC to determine an OY under the High OY Alternative (Tables 2-1a and 2-1b). The Council deferred a final decision on the 2005 and 2006 Other Flatfish ABC and OY until June when the GMT analysis would be provided. The subsequent GMT analysis and recommended harvest specifications for the Other Flatfish complex are found in Section 4.3.1.15.

2.1.3.3 Pacific Cod

The status quo No Action ABC/OY specified in 2004 (and in many previous years) for Pacific cod *(Gadus macrocephalus*) was 3,200 mt based on historical landings for these species. The GMT recommended consideration of a 50% reduction of the ABC to set the OY harvest target for Pacific cod based on the guidance provided by Restrepo *et al.* (1998) for determining precautionary harvest levels for unassessed stocks. The Council heeded this advice and decided a Pacific cod OY of 1,600 mt for 2005 and 2006 (Tables 2-1a and 2-1b).

2.1.4 Stocks That Are Annually Assessed With Bycatch Effects That Need To Be Analyzed For The Next Management Cycle

2.1.4.1 Pacific Whiting

Pacific whiting are managed based on an annual assessment prepared jointly by U.S. and Canadian scientists. A new assessment is expected to be completed this winter and brought to the Council for approval in March 2005, prior to the April 1, 2005 start of the whiting fishery. This new analysis will form the basis for managing the 2005 whiting fishery. In lieu of a more informed range of possible 2005 (and 2006) whiting harvest levels, the Council decided to range whiting OYs for analytical purposes as follows: the Medium OY is projected from the recent assessment (Helser, *et al.* 2004), the Low OY is half the Medium OY, and the High OY is double the Medium OY. It is expected this range is adequately broad to encompass the range of outcomes from the new assessment and rebuilding analysis anticipated early next year.

2.2 Alternative Management Measures

2.2.1 Catch Sharing Options

Harvest allocations for the most constraining groundfish stocks and those newly assessed stocks that have not been formally allocated (i.e., black rockfish) were decided by the Council in June 2004. The CFGC has delegated authority to the California Department of Fish and Game (CDFG) to take management action to stay within Council-adopted harvest guidelines, harvest limits, and OYs. Therefore, in order to facilitate inseason action by CDFG, the Council adopted recreational harvest guidelines for the more constraining stocks (i.e., canary rockfish, yelloweye rockfish, black rockfish, and lingcod). A description of the species where alternative catch sharing options were offered for analysis and the rationale for these options are described as follows. Table 2-4 shows those harvest guidelines by fishery sector decided by Council action. Additionally, in this section of the EIS, research catch estimates of groundfish in recent years are documented along with projected research catches in 2005-2006. These research catch projections are set aside or held in reserve prior to estimating impacts in directed commercial, tribal, and recreational fisheries.

2.2.1.1 Black Rockfish

The black rockfish ABC/OY for the portion of the stock in waters off California and Oregon is derived from the 2003 assessment (Ralston and Dick 2003). This EIS analyzes the same catch sharing option decided for 2004 California and Oregon nearshore fisheries. Recent historical catches of black rockfish in California and Oregon commercial and recreational fisheries are used as a basis for the black rockfish catch sharing option analyzed. The time period for this catch sharing option is 1985-2002, where the average shares are 42% California and 58% Oregon. In 2005, with a black rockfish OY of 753 mt, the state harvest guidelines for recreational and nearshore commercial fisheries combined would be 316 mt for California fisheries and 437 mt for Oregon fisheries. The black rockfish harvest guidelines for California and Oregon fisheries in 2006 are 309 mt and 427 mt, respectively since the OY decreases to 736 mt.

At their September 2004 meeting, the Council recommended NMFS include a specified 2006 commercial harvest guideline for black rockfish taken in Oregon waters once the Oregon Fish and Wildlife Commission makes this allocation decision. This allocation decision would not affect the combined commercial and recreational black rockfish harvest guideline for 2006 Oregon fisheries of 427 mt previously decided in June.

2.2.1.2 Canary Rockfish

Canary rockfish are distributed coastwide and are caught with a variety of fishing gears. Given the low available harvest of canary rockfish under the Council's adopted rebuilding plan and the wide variety of fisheries that incidentally catch canary rockfish, this stock is the most binding constraint to West Coast groundfish fisheries. Sharing the available canary rockfish harvest is perhaps the most difficult decision facing the Council and NMFS. With bocaccio constraints significantly eased in 2004-2006 relative to 2003, canary rockfish catch sharing will now be an even weightier decision, with California fisheries vying for available harvest to allow some increased shelf fishing opportunity.

Although canary rockfish were not assessed in 2003, alternative harvest levels are analyzed because OY values depend on recreational and commercial catch sharing. This is because the recreational fishery tends to take smaller canary rockfish than the commercial fishery, and therefore, has a greater “per ton” impact on canary rockfish rebuilding than the commercial fishery. That is, as the recreational share of the available canary rockfish harvest increases, the OY decreases. Alternative canary rockfish harvest levels are based on projections from the 2002 rebuilding analysis (Methot and Piner 2002a) and the Council's adoption of a canary rockfish rebuilding plan as part of FMP Amendment 16-2 (PFMC 2003b), which specifies rebuilding targets consistent with a P_{MAX} of 60% (the target rebuilding year [T_{TARGET}] specified in FMP Amendment 16-2 is 2074, and the harvest control rule (F) is 0.0220). The Council initially decided two commercial:recreational fishery canary rockfish sharing options for analysis, (1) a 50:50 share that would result in a 43 mt OY in 2005 (45 mt in 2006) under the Council's rebuilding plan, and (2) a 61:39 share that would result in a 48 mt OY in 2005 (51 mt in 2006) under the Council's rebuilding plan. All OY alternatives have the same rebuilding impact on canary rockfish and do not require re-specification of the target rebuilding year or harvest control rule adopted under FMP Amendment 16-2.

In June 2004, the Council approved two regional harvest guidelines for canary rockfish for the recreational fisheries, north (Oregon and Washington) and south (California), which would be divided at the Oregon/California border (42° N latitude). The harvest guidelines approved by the Council are:

North = 8.5 mt
South = 9.3 mt

These values remain constant across all 2005-2006 action alternatives. The states plan to manage their respective recreational fisheries to stay within those specified harvest guidelines. The Council also considered state-specific recreational harvest guidelines for canary rockfish, but favored the flexibility of managing within a northern recreational pool.

Lastly, in a June 2004 inseason action (and thus incorporated in the No Action Alternative), the Council specified a 7.3 mt canary rockfish cap for directed whiting fisheries. This was the estimated impact on the stock in 2004 fisheries. If this cap is projected to be reached prior to attainment of the allocated whiting harvest, the fishery would be closed to avoid overfishing canary rockfish. This would be an automatic action by NMFS, without the need for a deliberate Council decision. The same 7.3 mt canary rockfish cap and management strategy is incorporated in the Council-preferred Alternative (see Section 2.2.4.1).

2.2.1.3 Lingcod

The GMT recommended the Council set separate harvest guidelines for lingcod for the state recreational fisheries for 2005-2006, by dividing the harvest guidelines into north (Oregon and Washington) and south (California) areas. These harvest guidelines would be divided at the California and Oregon border. The GMT notes that the stock assessment area was divided at Cape Blanco, Oregon (43° N latitude) and the Oregon/California border is at 42° N latitude The GMT recommended a formula based on the catch per unit effort (CPUE) data from the Resource Assessment and Conservation Engineering (RACE) survey from 1995-2001 to account for the amount of lingcod that should be transferred from the southern area to the northern area to account for the line shift. Applying this calculation to the Council’s preferred OY for lingcod, results in the following base harvest targets:

Council-preferred OY (2005 and 2006) = 2,414 mt
North of 43° (1,694 mt) + amount for 42° to 43° (107 mt) = 1,801 mt (Oregon and Washington)
South of 42° (719 mt) - amount for 42° to 43° (107 mt) = 612 mt (California)

From these base values, the recreational harvest guidelines would be specified and subtracted from the respective areas, and the states would manage their respective recreational fisheries to stay within those specified harvest guidelines. The recreational harvest guidelines approved by the Council in June are:

2005	2006
North = 206 mt	North = 239 mt

South = 422 mt	South = 422 mt

However, the Council refined the northern recreational lingcod harvest guideline specifications at their September 2004 meeting based on higher effort and catch rate projections in 2005 and 2006 Washington and Oregon recreational fisheries. Higher effort and catch rate projections resulted from the incorporation of 2004 sampling data in projection models. The re-specified northern recreational lingcod harvest guidelines are:

2005	2006
North = 234 mt	North = 271 mt

The remaining amounts from the two areas were then pooled. The catch projections to accommodate the limited entry trawl, fixed gear, and open access fisheries at 2004 levels, and tribal fisheries were removed from the combined pool and managed on a coastwide basis. The GMT notes that the trawl fishery would be constrained by canary rockfish bycatch impacts, and the fixed gear and open access fisheries would be constrained by yelloweye rockfish bycatch impacts. Therefore, the amount of lingcod needed to accommodate those fisheries would be less than the amount that could be taken without those constraints. This results in a substantial difference between the overall total projected catch and the Council-preferred OY.

2.2.1.4 Sablefish

Trawl and nontrawl sablefish allocations are frameworked in the Groundfish FMP and specified in federal regulations. Since all the specified allocations are based on the available harvest of sablefish north of 36° N. lat. (the Conception/Monterey INPFC area boundary), sablefish specifications require apportioning the coastwide sablefish OY to the Conception and north of Conception areas. The GMT proposed using the catch history of commercial sablefish landings north and south of 36° N. lat. during 1998-2002 to proportionally stratify the coastwide OY. The average share of total sablefish landings occurring in the Conception area during 1998-2002 is 3.5%.

Sablefish catch sharing would be based on the north of Conception OY alternatives. The allocations specified in the 2004 federal regulations are as follows: 10% of the north of Conception OY off the top as a tribal set-aside, the expected research catch and estimated take in nongroundfish fisheries off the top with the remaining north of Conception OY allocated to the commercial fishery. This commercial OY is then allocated 9.4% to open access fisheries north of Conception with the remainder allocated to limited entry. The trawl/nontrawl limited entry allocation is 58% trawl and 42% nontrawl with the expected take of sablefish in the at-sea whiting fishery taken off the top of the limited entry trawl allocation. Sablefish discard mortality rates of 8% of landed catch in limited entry fixed gear non-tribal fisheries, and 3% of landed catch in fixed gear tribal fisheries has been assumed in the past. However, beginning in 2004, direct observations from the WCGOP were used to estimate discards in the non-tribal fixed gear fisheries. The assumed 3% discard rate used to analyze tribal fixed gear sablefish discards is updated in this analysis to a 2.3% discard rate calculated as the difference in market size category ratios in the competitive portion of the tribal fishery (approximately 1/3 of the tribal allocation) compared to the non-competitive (approximately 2/3 of the tribal allocation) tribal longline fisheries averaged over the past three years (see Section 4.3.2.4). Although a 21% discard mortality rate has been assumed in the past for limited entry trawl fisheries, observed sablefish discard rates from the WCGOP will be used to analyze expected trawl impacts in this EIS.

2.2.1.5 Widow Rockfish

Directed non-tribal midwater fisheries targeting yellowtail and widow rockfish have not been considered since 2002 due to high canary rockfish bycatch in those fisheries. Canary and widow rockfish constraints in 2005-2006 will likely continue to exclude consideration of directed midwater fisheries. Therefore, without directed yellowtail/widow rockfish midwater fisheries, the sectors that have the highest bycatch of widow rockfish are the at-sea and shoreside whiting fisheries. The Council also decided to continue to manage widow rockfish rebuilding by first constraining whiting-directed fisheries and holding all non-whiting fisheries harmless from the effects of the whiting fisheries. The GMT recommended that the widow rockfish bycatch rate used for the at-sea whiting sectors be derived from the 2000-2003 weighted average bycatch.[2/] Prior to this period, widow rockfish were not fully sorted in landings; they were often specified as mixed *Sebastes* in landings.

The Council also decided to manage 2005 and 2006 groundfish fisheries to stay within the widow rockfish OY by constraining directed whiting fisheries before non-whiting fisheries. Similar to the status quo 2004 management strategy, the Council-preferred Alternative caps directed whiting fisheries to the remaining widow rockfish OY after estimating widow impacts in non-whiting fisheries. The remaining widow rockfish OYs, which represent the bycatch caps, are 231.8 mt and 243.2 mt for 2005 and 2006 whiting fisheries, respectively.

2.2.1.6 Yelloweye Rockfish

The Council directed that the range of 2005-2006 management options to be analyzed relative to state recreational yelloweye harvest guidelines include, (1) no harvest guidelines (consistent with the Ad Hoc Allocation Committee report); and (2) dividing recreational catch shares north and south at the Oregon/California border at 42° N latitude

The Council recommended that projected recreational yelloweye impacts in 2004 be used as the basis for determining regional harvest guidelines or state-specific harvest targets. The GMT updated the No Action bycatch scorecard after the April 2004 Council meeting once they settled on a recommended impact projection model for the California recreational fishery (see Section 4.3.2.7). The projected yelloweye impacts in 2004 marine recreational fisheries on the West Coast are 3.7 mt in California, 3.2 mt in Oregon, and 3.5 mt in Washington (Table 2-5). In June 2004, the Council approved two regional harvest guidelines for yelloweye rockfish for the recreational fisheries, which would be divided at the Oregon/California border (42° N latitude). The harvest guidelines approved by the Council for 2005 and 2006 are:

North = 6.7 mt
South = 3.7 mt

As stated above, the Council considered state-specific recreational harvest guidelines for yelloweye rockfish, but favored the flexibility of managing within a northern recreational pool.

2/ The weighting scheme uses an incidental catch rate estimate based on: (.4*2003)+(.3*2002)+(.2*2001)+(.1*2000).

2.2.1.7 Research Catches

Scientific research activities impact groundfish species. These research activities, whether initiated under the guise of academic or private research authorized by a state scientific research permit (SRP), a Letter of Acknowledgment (LOA) from NMFS, or part of a scientific state or federal survey, contribute to the estimated total mortality of groundfish species and therefore need to be accounted. The Council and NMFS project and account for research catches prior to projecting impacts in directed fisheries and EFP studies. Research catch projections for the 2005-2006 management period are based on recent-year research catch estimates and anticipated research activities. The GMT used 2002 and 2003 research catch estimates (Tables 2-6 and 2-7, respectively) coupled with anticipated research activities to project expected research catches in 2005 and 2006 (Tables 2-8 and 2-9, respectively). Projected research catches are included in the bycatch scorecards (introduced in Section 2.2.4) in an effort to account for all fishing-related mortalities projected for overfished species. These projections are also used to account for mortalities of healthy target groundfish species, such as sablefish, before allocating these resources to fishery sectors. A more detailed description of scientific research activities is found in Chapter 7.

2.2.2 New Management Lines

In April, the GMT recommended that a new depth management line be created for the area south of 42° N latitude (Oregon/California border) at 40 fm. The GMT also recommended a new latitudinal management line be specified at Pigeon Point, California (37°11' N latitude). The Council adopted both of these new management lines for analysis and public review.

2.2.3 Conversion of Exempted Fishing Permits Into Regulations

2.2.3.1 Selective Flatfish Trawl

From 2000 through 2003, the Oregon Department of Fish and Wildlife (ODFW), working cooperatively with Oregon State University and the NMFS, developed and tested a modified flatfish trawl, comparing its performance to a typical West Coast sole trawl using an alternate haul sampling design (King, *et al.* 2004). This experiment showed reductions in bycatch for several overfished species of 34% to 97%, despite the selective flatfish trawl being a larger trawl and having increased catches of flatfish. In addition, an EFP was used in 2003 to evaluate the effectiveness of this type of trawl on a fishery scale covering a broad geographic area. This test also provided explicit information for managers to estimate bycatch rates for fishermen using the selective flatfish trawl in the traditional shelf flatfish fishery.

Currently, a large portion of the continental shelf, known as the Rockfish Conservation Area or RCA, is closed to groundfish trawling to limit the bycatch of several overfished species, notably canary rockfish, darkblotched rockfish, and bocaccio (in the south). The depth range of the groundfish trawl RCA varies seasonally, but during the summer shelf flatfish fishery, it is approximately 75 fm to 200 fm (PFMC, 2002). Although this area contains a large amount of high relief rockfish habitat, it also contains a vast amount of highly productive flatfish habitat and is the primary location of several exploited flatfish species during their migration onto the shelf during summer months (e.g., Petrale sole and Dover sole) (Hagerman 1952; Ketchen and Forrester 1966). Therefore, access to these flatfish stocks is restricted due to the lack of selectivity of conventional bottom trawl gear. Because the selective flatfish trawl showed such significant reductions in bycatch of most overfished rockfish species, its implementation as a management tool has the potential to provide access to some portion of the traditional shelf flatfish fishery and assist the Council in achieving the goals set forth in the Groundfish FMP, such as to maximize the value of the groundfish resource while preventing overfishing (PFMC 2003e).

King *et al.* (2004) provided a large amount of comparative haul data, verifying the performance of the selective flatfish trawl as bycatch-reducing gear. The EFP fishery documented the bycatch rates for species of concern with fishermen conducting normal flatfish fishing operations along different areas of the West Coast both inside and outside of the RCA. Results were then compared to the research data and the WCGOP estimates of bycatch rates as descriptors of a potential fishery. The EFP, therefore, was a feasibility test to determine if the idea tested in the research experiment could be scaled up to a fishery level and be useful for management.

As part of the EFP process, ODFW developed measurable net design criteria because different vessels require nets of different sizes and other specifications. These allowed fishermen to modify or build nets for their vessels that still had the functional components of the selective flatfish trawl, yet were able to be objectively enforced by federal and state enforcement agencies both in port and at sea. The design criteria were: the net must have a headrope at least 30% longer than the footrope, the expected rise of the net could not exceed 3 ft, the headrope must not have any floats along the center 50% of its length, and it must be a two-seam trawl. Otherwise, the trawl had to be a legal small-footrope trawl as defined in federal regulations.

<u>Fishery Design</u>

Because this trawl gear has different selectivities compared to traditional trawl gear for several important bycatch species, bycatch estimates for any fishery using this type of trawl were incorporated into the Council bycatch projection model. The methodology and resulting bycatch rates were presented to the SSC and found to be the best available data to estimate fishery catch and bycatch. The difference in bycatch generated by using the lower rate may be viewed as a savings that could be applied to this fishery or other fisheries facing bycatch constraints, especially from canary rockfish.

Several alternatives for implementation of a fishery using this trawl were developed for analysis. For each alternative, several factors were evaluated, including which types of trawl gear would be allowed in the fishery, what level of observer coverage should be required, where the fishery should occur, and if trip limits should be modified.

2.2.3.2 Arrowtooth Flounder Trawl

The Washington Department of Fish and Wildlife (WDFW) proposed consideration of implementing provisions of their sponsored arrowtooth trawl EFP in regulations for 2005-2006. The arrowtooth trawl EFP was conducted in the last few years to test gear configurations and fishing strategies for their effectiveness in selectively harvesting abundant arrowtooth flounder off Washington while minimizing the bycatch of co-occurring canary rockfish and other overfished groundfish species. Provisions of the EFP considered for regulatory implementation include some access to the existing trawl RCA with discrete canary hotspots closed to fishing, full retention of all rockfish, 100% observer coverage, and overfished species' bycatch caps for each participant in the fishery (see Appendix B, Proposed Arrowtooth Flounder- Rockfish Conservation Area (AT-RCA) Trawl Fishing Program: Scoping Document). The NMFS has subsequently informed WDFW and the Council that the action to convert this EFP into regulations is beyond the scope of the Council actions contemplated for June 2004 to decide 2005-2006 management measures (and analyzed herein), and would require additional analysis of the consequences of some of the proposed regulatory provisions. It is expected that additional analysis and discussion beyond what is provided in this EIS would be needed to convert this EFP into regulations during the 2005-2006 management period. In particular, the use of "compliance monitors" instead of observers to monitor a fishery and 100% observer coverage provisions need further analysis since such provisions are not part of the current Groundfish FMP. Therefore, WDFW is proposing delaying a final decision on amending federal regulations to implement these provisions pending further analysis. This EIS will explore the effects of potentially implementing these provisions during the 2005-2006 management period on the rest of the groundfish fishery. The net effect of implementing these provisions may be consequential to the processing sector (although < 1% of the rockfish retained under this program were considered “unmarketable”) and the management regime (mandatory 100% observer or compliance monitor coverage may be too costly for some fishers), but is not likely to result in increased mortality of overfished species as impacts would be controlled using bycatch caps.

2.2.3.3 Other Exempted Fishing Permits

Other ongoing EFPs have the potential of being implemented as regulations during the 2005-2006 management period depending on results of these efforts. Any decision to convert these EFPs into regulations during the 2005-2006 management period would depend on a formal NEPA analysis in an EA or EIS that would tier off this EIS. A brief description of these other ongoing EFPs follows.

<u>California Selective Flatfish Trawl</u>

The same selective flatfish trawl gear study conducted north of 40°10' N latitude by ODFW will be conducted in 2004 and 2005 south of 40°10' N latitude by CDFG. The need to conduct an EFP in the south is to determine whether the gear works as efficiently at capturing abundant flatfish species on the shelf while avoiding rockfish (primarily bocaccio) as it does in the north. Given the different habitats and species' assemblages found south of Cape Mendocino, the SSC and GMT believed it prudent to test this gear in the south before recommending regulatory implementation of this trawl strategy south of 40°10' N latitude

<u>Oregon Deepwater Complex Fishery Reduced-Discard Strategy</u>

The Council considered converting the ODFW-sponsored EFP into regulations. This EFP was implemented in 2004 to test a discard reduction strategy for the deepwater complex trawl fishery for Dover sole, thornyhead species, and sablefish (DTS). The strategy used written vessel-processor, state-vessel, and state-processor agreements to: reduce economic incentives for discarding, mandate more complete or possibly full retention of DTS species, and create modest incentives for retention of DTS. However, the expected incentives of reducing discard, conducting fewer tows, and providing higher economic efficiency were not realized. Therefore, the Council does not recommend moving forward with this EFP conversion.

2.2.4 Description of the Alternatives

The alternatives analyzed in this EIS include a No Action Alternative that describes the status quo regulations implemented in 2004 (as of May 2004, based on inseason actions decided by the Council at their April 2004 meeting) and a suite of alternative management measures analyzed for their effectiveness at attaining, but not exceeding, the Council preferred harvest specifications (Council OY in Tables 2-1a and 2-1b). Action Alternative 1 describes the most conservative suite of management measures considered for 2005-2006, while Action Alternatives 2 and 3 describe more risk-prone management measures. One featured action the Council wanted to consider for 2005 and 2006 is establishing a more regionalized management approach with harvest guidelines for some of the more constraining groundfish species. Council-adopted harvest guidelines for black rockfish, canary rockfish, lingcod, and yelloweye rockfish are found in Table 2-4.

A Council-preferred Action Alternative was adopted at the Council's June 14-18, 2004 meeting in Foster City, California and subsequently analyzed for this EIS. All alternatives analyzed use the best available science for determining stock status, monitoring total catch, and understanding stock impacts. The estimated mortality of overfished groundfish species under each alternative can be found in the alternative bycatch scorecards. Only 2005 scorecard impact estimates under Action Alternative 1 through 3 are provided for each fishing sector, since there is only a minor variation in some 2005 and 2006 OYs (Tables 2-1a and 2-1b) that cannot be discerned in the aggregated mortality estimates for those sectors where there are annual differences. For instance, for the limited entry fixed gear sector, only the observer data for those participants in the primary sablefish fishery are available and analyzed for management decision making. Since the sablefish OY changes from 2005 to 2006, there are different projected impacts in the primary fishery each year. However, the impacts for the rest of the limited entry fixed gear fleet are based on assumed discard rates, and these cannot be disaggregated from those estimated for the primary sablefish fishery. Therefore, the higher of status quo projected impacts under the No Action Alternative or those impacts estimated using the new limited entry fixed gear primary sablefish model are input in the alternative bycatch scorecards. Differences in estimated impacts for the limited entry fixed gear sector are treated qualitatively in this EIS. Bycatch scorecards for 2005 and 2006 fisheries are presented for the Council-preferred Alternative.

In June 2004, the Council adopted inseason management measures for the non-whiting trawl fishery and the limited entry fixed gear fishery that are described under the No Action Alternative. In addition, the Council adopted an emergency rule giving NMFS authority to close directed whiting fisheries if a projected 7.3 mt of canary rockfish is projected to be reached prior to the end of these fisheries. The intent is to have these management measures remain in effect under the No Action Alternative and the Council-preferred Alternative for 2005-2006. The economic impacts resulting from these minor adjustments are expected to be minimal. The economic analyses, therefore, do not take the effects of these changes into account.

Table 2-5 is the No Action bycatch scorecard; Table 2-10 is the 2005 scorecard for Action Alternative 1, Table 2-11 is the 2005 scorecard for Action Alternative 2, Table 2-12 is the 2005 scorecard for Action Alternative 3, Tables 2-13a and 2-13b are the 2005 and 2006 scorecards for the Council-preferred Alternative, respectively. A description of the alternatives by fishing sector follows.

2.2.4.1 Limited Entry Trawl

Factors influencing a change in limited entry trawl specifications and management measures in 2005 and 2006 include changes in the available yield or OY of groundfish species and stock complexes, consideration for implementing a new selective flatfish trawl shoreward of the trawl RCA north of 40°10' N latitude, and implementation of a provision to close the whiting trawl fishery if a canary or widow rockfish bycatch cap is reached. The analyses of impacts using the selective flatfish trawl gear evolved during the preparation of this EIS and through the Council decision making process. Accordingly, impact projection modeling methodology changed between the preparation of the preliminary DEIS that was presented to the Council in June and final GMT recommendations at the June Council meeting. Consequently, the methodology is different in selective flatfish trawl scenarios under Action Alternatives 1 through 3 than under the Council-preferred Alternative, which, in turn, affects trip limits and projected impacts. Section 4.3.2.1 and the description of the Council-preferred Alternative that follows in this section describes alternative modeling methodologies considered by the GMT and the rationale for the GMT-recommended modeling approach. Comparative tables are presented in Section 4.3.2.1 to illustrate comparable model results using the methodologies under Action Alternatives 1 through 3 and under the Council-preferred Alternative.

The No Action Alternative

Non-Whiting Trawl Fishery

The 2004 trawl trip limits and seasonal RCA configurations (as of May 2004) describe the No Action Alternative and are shown in Tables 2-14 (north of 40°10' N latitude) and 2-15 (south of 40°10' N latitude). These same specifications and estimated impacts of the 2004 management measures are shown in Table 2-16.

These measures do not include a selective flatfish trawl strategy north of Cape Mendocino. Selective flatfish trawls are considered legal, small footrope gear; however, bycatch rates applied to landings of target species using this gear are no different than those calculated using conventional trawls (i.e., the decreased bycatch rates for overfished species from the ODFW research and EFP studies are not applied in the trawl impact analysis). The No Action Alternative does include differential small and large footrope trawl limits by period north of Cape Mendocino. This regulation works by imposing more conservative trip limits during any period when landings are made using small footrope gear. The effect of the differential trip limit strategy is to provide an incentive for trawl fishermen to fish seaward of the trawl RCA (shelf rockfish caught in the limited entry trawl fishery can only be landed using small footrope gear) and thereby minimize impacts on overfished shelf rockfish species, such as canary rockfish.

Under this option, the shelf flatfish fishery would continue under current regulations. Either a traditional small footrope trawl or a selective flatfish trawl could be used as both are legal fishing gears. Observer coverage would be as normally scheduled by the WCGOP, fishing would be restricted to outside of the trawl RCA, and trip limits would be calculated for small footrope trawl as they have in the past.

This option results in lower fishery yield because desired flatfish populations occur in areas where trawl bycatch of overfished species would prevent access. The status quo alternative probably cannot meet the management objective of reducing bycatch to the extent possible, since this option would allow continued use of a higher bycatch gear in areas in which canary rockfish bycatch is constraining fisheries, even though a proven lower bycatch gear is available. Continuing to allow both the selective flatfish trawl and conventional small footrope trawls will not reduce bycatch rates as much as complete replacement with a more selective gear, and in that sense failed to optimize harvest and minimize bycatch for some species. Maintaining restricted access to the RCA will protect habitat there, though at the cost of decreased fishery yield from healthy flatfish stocks.

As a result of inseason action taken in June 2004, the following changes were made to the No Action Alternative:

The Council took action to recommend adjustments to regulatory requirements on the use of trawl gear to better match the way the gear types are used and to provide additional opportunities to harvest target species with minimal impacts to overfished species. North of 40°10' N latitude, midwater gear is principally used in the Pacific whiting fishery. Therefore, the Council recommends removing references to midwater gear in the regulations except for the midwater Pacific whiting fishery and its associated incidental catch allowances for widow rockfish and yellowtail rockfish. Vessels participating in the Pacific whiting fishery within the RCA are required to only have midwater gear on board. However, the Council recommends allowing vessels that have both large footrope and midwater trawl gear onboard while trawling seaward of the RCA on non-whiting trips to access the higher large footrope cumulative limits.

South of 40°10' N latitude, the Council recommends that use of midwater trawl gear be linked with large footrope trawl gear rather than small footrope trawl gear. This action provides the opportunity to harvest the large footrope trawl cumulative limits for chilipepper using midwater trawl gear seaward of the RCA, but would prohibit the use of midwater gear shoreward of the RCA and would close the associated canary rockfish and minor nearshore rockfish landing limits. This Council recommendation is largely at the request of trawl fishery participants who prefer to use midwater trawl gear when targeting chilipepper to reduce the amount of bocaccio bycatch. Additionally, the Council recommended removing language in the trip limit tables that specify differential limits for vessels that use small footrope trawl gear. Unlike vessels north of 40°10' N latitude, vessels to the south are not constrained to smaller trip limits for the entire period if small footrope trawl gear is used. However, for vessels using more than one type of trawl gear during a period, limits are additive up to the largest limit for the type of gear used during that period.

Incidental Landing Limits. In response to industry concerns on discard of incidental catches, the Council recommends small landing allowances of certain shelf rockfish species in limited entry trawl and limited entry fixed gear fisheries for the remainder of the year. The GMT reported that these new limits would not create targeting incentives and would not have impacts on overfished species exceeding those analyzed in the 2004 Specifications EIS (PFMC 2004b).

For limited entry trawl fisheries, in areas north of 40°10' N latitude, the Council recommends allowing cumulative landing limits of 300 pounds per two months for minor shelf rockfish and widow rockfish combined and 500 pounds per two months for lingcod for vessels using large footrope trawl gear seaward of the RCA. In areas south of 40°10' N latitude, the Council recommends allowing cumulative landing limits of 300 pounds per two months for bocaccio and 500 pounds per two months for lingcod for vessels using large footrope or midwater trawl gear seaward of the RCA and an allowance of 1,000 pounds per month of chilipepper rockfish with no more than 200 pounds per month of minor shelf rockfish and widow rockfish combined for vessels using small footrope trawl gear.

Response to Fishery Status. In response to landings through Period 2 (March-April) tracking ahead of projections, the Council recommends adjusting cumulative limits for sablefish, shortspine thornyheads, Dover sole, and petrale sole. The Council also recommends the corrective action to close the midwater widow rockfish and yellowtail rockfish fishery currently scheduled in Period 6.

U.S./Canada Border to 40°10' N Latitude				
Limited Entry Trawl Cumulative Poundage Limits by Period. New limits are underlined.				
	In Areas Deeper than the RCA		Limits for any period if small footrope bottom trawl is used at any time in any area during an entire period	
	Periods 4 & 5	Period 6	Periods 4 & 5	Period 6
Sablefish	15,000 lb / 2 months	11,000 lb / 2 months	10,000 lb / 2 months	5,000 lb / 2 months
Shortspine thornyheads	4,100 lb / 2 months		3,000 lb / 2 months	1,000 lb / 2 months
Dover sole	31,000 lb / 2 months	50,000 lb / 2 months	27,000 lb / 2 months	18,000 lb / 2 months
All Other Flatfish, rex sole, and petrale sole	100,000 lb / 2 months, no more than 30,000 lb / 2 months may be petrale sole	100,000 lb / 2 months, No Limit for petrale sole	80,000 lb / 2 months, no more than 26,000 lb / 2 months may be petrale sole.	70,000 lb / 2 months, no more than 20,000 lb / 2 months may be petrale sole.
Lingcod	500 lb / 2 months		1,000 lb / 2 months in Period 4 and 800 lb / 2 months in Periods 5 and 6	
Minor shelf rockfish and widow rockfish	300 lb/ 2 months		1,000 lb / month, no more than 200 lb / month may be yelloweye rockfish in Periods 4 & 5, 300 lb / month in Period 6	

40°10' N latitude to the U.S./Mexico border		
Limited Entry Trawl Cumulative Limits by Period. New limits are underlined		
	Periods 4 & 5	Period 6
Sablefish	13,000 lb/ 2 months	
Shortspine thornyheads	4,100 lb/ 2 months	
Dover sole	48,000 lb/ 2 months	49,000 lb/2 months
Bocaccio with large footrope or midwater trawl	300 lb/ 2months	
Lingcod with large footrope or midwater trawl	500 lb/ 2 months	
Chilipepper rockfish, minor shelf rockfish, and widow rockfish with small footrope trawl	1,000 lb/ month, no more than 200 lb/ month of which may be minor shelf rockfish including widow rockfish	

Whiting Trawl Fishery

The Pacific whiting OY of 250,000 mt used to manage the 2004 West Coast whiting fishery forms the basis for the No Action Alternative. The GMT recommended exploring overfished species' bycatch implications using a weighted 2000-2003 average bycatch. These rates are applied to the 2004 OY under this alternative. Management measures adopted for 2004 and analyzed under the No Action Alternative for the whiting-directed trawl fishery do not include a “penalty box” strategy for minimizing widow rockfish impacts (see Section 4.3.2.1 for a description of the “penalty box” strategy). Managing widow rockfish bycatch in the whiting fishery under the No Action Alternative also does not include the concept of closing areas where widow rockfish bycatch has been historically highest.

In June 2004, the Council decided to cap the all sectors in the directed whiting fishery at 7.3 mt of estimated canary mortality for the year. The Council delegated authority to NMFS to close all whiting sectors inseason when 7.3 mt of canary were projected to be taken. Accordingly, this cap, management strategy, and delegation of authority to NMFS is incorporated in the No Action Alternative.

Action Alternative 1

Non-Whiting Trawl Fishery

Action Alternative 1 for the limited entry trawl sector apportions the least amount of canary rockfish, the most constraining stock for most of the trawl fishery, for 2005-2006. Trip limits and RCA configurations are modeled to impact about 8 mt of canary rockfish coastwide (Table 2-17).

A more conservative approach to implementing the selective flatfish trawl EFP in regulations is taken under Action Alternative 1. This alternative allows only selective flatfish trawl gear to be used shoreward of 100 fm and north of 40°10' N latitude. An EFP would be used south of 40°10' N latitude to test selective flatfish trawl gear. Bycatch caps would be imposed on the fishery to ensure catch of overfished species does not exceed an allocated amount. Bycatch levels would be monitored via 100% observer coverage for all groundfish trawl fishing shoreward of 100 fm. These aspects create the most conservative approach to using selective flatfish trawl gear in the summer shelf flatfish fishery. Under these regulatory conditions, higher flatfish harvest per vessel is anticipated, depending on the total participation in the fishery.

The benefits of this approach are that the amount of catch and discard will be known through the observer program, and inseason management may be used to constrain bycatch to within authorized amounts. In addition, access to fishing grounds out to 100 fm will allow harvest of species that are not accessible during spring and fall months due to their onshore summer migration pattern. Although all fishing shoreward of 100 fm would require fishers to build a new trawl or modify an existing trawl to meet selective flatfish trawl specifications, it would have the effect of implementing trawl gears with lower bycatch rates for several species of concern. Risks of this option are low participation in the fishery because of the cost of observer requirements and bycatch caps. These aspects may provide incentives for trawlers to switch to deep water complex target species instead. The costs of providing observers, whether federally subsidized or paid for by the vessel, will also tend to deter participation in the fishery. Risks of this option would also include diverting observers away from their regular biological duties to monitor this fishery, resulting in uneven observer sampling of the groundfish fisheries as a whole. In addition, using bycatch caps through a normal federal fishery regulation process has not been tested on the West Coast. A mechanism for using the data collected by the observer program to monitor catch inseason would need to be developed.

Whiting Trawl Fishery

Pacific whiting OYs of 181,287 mt for 2005 and 114,297 mt for 2006 are analyzed for their potential bycatch implications under Action Alternative 1. These harvest levels are half the projected OYs for 2005 and 2006 from the most recent Pacific whiting stock assessment (Helser, *et al.* 2004) under the default $F_{40\%}$ harvest rate and the assumption that the catchability coefficient (q) equals 1. The GMT recommended exploring overfished species' bycatch implications using a weighted 2000-2003 average bycatch. These rates are applied to the 2005 and 2006 OYs under this alternative. Managing widow rockfish bycatch in the whiting fishery under Action Alternative 1 does not entail consideration of additional precautionary measures, such as area closures, given the analytical assumptions described above. This is because the estimated mortality of widow rockfish and the other overfished species in all fishery sectors combined does not exceed 2005 (and 2006) OYs under this level of allowable Pacific whiting harvest (Table 2-10).

Action Alternative 2

Non-Whiting Trawl Fishery

Action Alternative 2 for the limited entry trawl sector apportions an intermediate amount of canary rockfish, the most constraining stock for most of the trawl fishery, for 2005-2006. Trip limits and RCA configurations are modeled to impact about 10 mt of canary rockfish coastwide (Table 2-18).

This option changes the regulations to require all trawl fishing north of 40°10' N latitude and shoreward of 100 fm to use a selective flatfish trawl to reduce bycatch of shelf rockfish, particularly canary rockfish. No special observer coverage is required; observer coverage will be at normal sampling rates as determined by the WCGOP. Testing of the selective flatfish trawl south of 40°10' N latitude will be conducted via EFP only. All shelf trawling will be conducted shoreward of the eastern boundary of the RCA. This option anticipates increased flatfish trip limits and movement of the eastern boundary of the RCA seaward to the 100 fm line, as bycatch impacts allow, to provide enhanced trawl access to healthy flatfish stocks.

This option provides for increased yield from healthy flatfish stocks, as a result of requiring newly developed bycatch reduction technology. It also allows for wider spatial distribution of nearshore trawling effort due to larger grounds being available. This option has lower costs for fishing vessels than Alternative 1, as 100% observer coverage is not required. The lower costs should better stimulate participation in the fishery, speeding the implementation and acceptance of lower bycatch trawls. Successful implementation of this option is more certain because it relies mostly on changes to existing rules governing legal trawl gear rather than enforcement of bycatch caps, as in Alternative 1. This alternative does increase costs for fishermen relative to the status quo, as any vessel wishing to trawl shoreward of the RCA will need to buy a new trawl or modify an existing two-seam trawl to meet the definition of a selective flatfish trawl. These costs should be offset by increased trip limits and access to more productive fishing grounds, resulting in a net gain in income. Because 100% observer coverage is not required, this alternative is less conservative than Alternative 1 relative to meeting shelf rockfish conservation goals; however the risk level should be comparable to other fisheries monitored by the WCGOP. However, this option is more conservative than status quo because gear with lower bycatch impacts will be required and will reduce the likelihood of higher catches of canary rockfish encountered with traditional gear.

Whiting Trawl Fishery

Pacific whiting OYs of 362,573 mt for 2005 and 228,593 mt for 2006 are analyzed for their potential bycatch implications under Action Alternative 2. These are the projected OYs for 2005 and 2006 from the most recent Pacific whiting stock assessment (Helser, *et al.* 2004) under the default $F_{40\%}$ harvest rate and the assumption that the catchability coefficient (q) equals 1. The GMT recommended exploring overfished species' bycatch implications using a weighted 2000-2003 average bycatch. These rates are applied to the 2005 and 2006 OYs under this alternative. Managing widow rockfish bycatch in the whiting fishery under Action Alternative 2 entails consideration of additional precautionary measures, such as area closures, given the analytical assumptions described above. This is because the estimated mortality of widow rockfish in all fishery sectors combined exceeds 2005 (and 2006) OYs given this level of allowable Pacific whiting harvest (Table 2-11). The relative effects of establishing a widow RCA for the whiting fishery vs. discrete area closures (i.e., widow hotspots) versus establishing a penalty box for controlling widow rockfish bycatch are explored under this alternative (see Section 4.3.2.1).

Action Alternative 3

Non-Whiting Trawl Fishery

Action Alternative 3 for the limited entry trawl sector apportions the greatest amount of canary rockfish, the most constraining stock for most of the trawl fishery, for 2005-2006. Trip limits and RCA configurations are modeled to impact about 12 mt of canary rockfish coastwide (Table 2-19).

This option changes the regulations to require all trawl fishing north of 40°10' N latitude and shoreward of 100 fm to use a selective flatfish trawl to reduce bycatch of shelf rockfish, particularly canary rockfish. No special observer coverage is required; observer coverage will be at normal sampling rates as determined by the WCGOP. Testing of the selective flatfish trawl south of 40°10' N latitude will be conducted via EFP only. All shelf trawling will be conducted shoreward of the eastern boundary of the RCA. This option anticipates increased flatfish trip limits and movement of the eastern boundary of the RCA seaward to the 100 fm line, as bycatch impacts allow, to provide enhanced trawl access to healthy flatfish stocks (Table 2-19).

This option provides for increased yield from healthy flatfish stocks, as a result of requiring newly developed bycatch reduction technology. It also allows for wider spatial distribution of nearshore trawling effort due to larger grounds being available. This option has lower costs for fishing vessels than Alternative 1, as 100% observer coverage is not required. The lower costs should better stimulate participation in the fishery, speeding the implementation and acceptance of lower bycatch trawls. Successful implementation of this option is more certain because it relies mostly on changes to existing rules governing legal trawl gear rather than enforcement of bycatch caps, as in Alternative 1. This alternative does increase costs for fishermen relative to the status quo, as any vessel wishing to trawl shoreward of the RCA will need to buy a new trawl or modify an existing two-seam trawl to meet the definition of a selective flatfish trawl. These costs should be offset by increased trip limits and access to more productive fishing grounds, resulting in a net gain in income. Because 100% observer coverage is not required, this alternative is less conservative than Alternative 1, relative to meeting shelf rockfish conservation goals; however the risk level should be comparable to other fisheries monitored by the West Coast Observer Program. However, this option is more conservative than status quo because gear with lower bycatch impacts will be required and will reduce the likelihood of higher catches of canary rockfish encountered with traditional gear.

Whiting Trawl Fishery

Pacific whiting OYs of 725,146 mt for 2005 and 457,186 mt for 2006 are analyzed for their potential bycatch implications under Action Alternative 1. These harvest levels are double the projected OYs for 2005 and 2006 from the most recent Pacific whiting stock assessment (Helser, *et al.* 2004) under the default $F_{40\%}$ harvest rate and the assumption that the catchability coefficient (q) equals 1. The GMT recommended exploring overfished species' bycatch implications using a weighted 2000-2003 average bycatch. These rates are applied to the 2005 and 2006 OYs under this alternative. Managing widow rockfish bycatch in the whiting fishery under Action Alternative 3 entails consideration of additional precautionary measures such as area closures given the analytical assumptions described above. This is because the estimated mortality of widow rockfish and the other overfished species in all fishery sectors combined exceeds 2005 (and 2006) OYs given this level of allowable Pacific whiting harvest (Table 2-12).

The Council-Preferred Action Alternative

Non-Whiting Trawl Fishery

Trip limits, RCA configurations, and species impacts under the Council-preferred Alternative are found in Table 2-20a. More detailed trawl trip limit tables under this preferred alternative are found in Tables 2-21 and 2-22. The Council-preferred Action Alternative for the non-whiting trawl fishery is more in line with Action Alternative 3 as the attainment of targeted species' OYs has been maximized. However, the non-whiting trawl alternatives were developed using a set of bycatch rates observed using conventional trawls for the winter periods (1, 2, and 6) north of 40°10' N latitude. These rates were adjusted to be more consistent with the selective flatfish trawl summer rates with a seasonal differential scaling factor applied for the winter period (see Section 4.3.2.1). As a result of reconfiguring the trawl bycatch model, the estimated impacts of overfished species have been reduced (e.g., canary rockfish impacts are expected to be in the 5.2 mt to 8.0 mt range, rather than the 10.6 mt to 12.0 mt range). Specifically, under the Council-preferred Alternative, the predicted canary rockfish impact for the 2005 and 2006 non-whiting trawl fishery is 5.2 mt. However, given the uncertainty of actual impacts using selective flatfish trawls, the Council decided to specify 8 mt of canary rockfish impacts for the non-whiting trawl fishery in the scorecard. At-sea observers working in the WCGOP will stratify their observations of selective flatfish trawl gear and conventional trawl gear in 2004. These observations of discard using selective flatfish trawls will continue in 2005 and 2006, and actual observed bycatch rates will be modeled for inseason management decision making.

The Council further refined the Council-preferred alternative in September 2004 after observing higher than expected trawl catches of darkblotched and canary rockfishes during the summer. Therefore, to avoid the same early attainment of specified OYs in 2005 and 2006, the Council elected to extend the seaward boundary of the trawl RCA north of 38° N latitude from 150 fm to 200 fm and reduce the trip limit north of 40°10' N latitude for slope rockfish from 8,000 pounds/two months to 4,000 pounds/two months with the pre-specified petrale sole areas open in periods 1 and 6. The GMT believed the higher slope rockfish trip limit (originally recommended to reduce discards), coupled with moving the seaward boundary of the RCA in to 150 fm, created a targeting incentive for trawl fishermen. Such targeting increased the mortality of overfished darkblotched and canary rockfishes beyond what was projected for the trawl sector in 2004. The expected impacts for trawl target species and the incidentally-caught overfished species given these recommended revisions are depicted in Table 2-20b.

Whiting Trawl Fishery

While setting specific harvest specifications and management measures for the 2005 and 2006 Pacific whiting fisheries are not part of the suite of actions considered in this EIS, the Council did specify set-asides for stocks that could potentially constrain opportunities in the Pacific whiting and other West Coast fishing sectors. The two overfished West Coast groundfish stocks that are incidentally caught in the whiting-directed trawl fishery and are addressed in the Council-preferred Action Alternative are canary and widow rockfish.

The need for setting aside part of the canary rockfish OY is obviated by the constraining nature of the low OYs specified in the canary rockfish rebuilding plan. The Council decided to set aside 7.3 mt of canary rockfish annually for the 2005 and 2006 whiting-directed fisheries. This is the amount of canary rockfish that was predicted to be taken in the 2004 whiting fishery by the GMT in March 2004 when the Council decided 2004 whiting harvest specifications and management measures. Under the Council-preferred Alternative, the Council decided to delegate authority to NMFS to close the whiting trawl fishery if 7.3 mt of canary rockfish are estimated to be taken.

The Council also decided to continue to manage widow rockfish rebuilding by first constraining whiting-directed fisheries and holding all non-whiting fisheries harmless from the effects of the whiting fisheries. Therefore, the bycatch scorecards under the Council-preferred Action Alternative (Tables 2-13a and 2-13b) indicate a residual yield of widow rockfish for the whiting fishery after the non-whiting fishery impacts are accounted for. Residual yields of widow rockfish available for 2005 and 2006 whiting fisheries, or the difference between the annual widow rockfish OY and the predicted impacts in non-whiting fisheries, are 231.8 mt and 243.2 mt for 2005 and 2006 whiting fisheries, respectively.

2.2.4.2 Limited Entry Fixed Gear

The No Action Alternative

Limited entry fixed gear trip limits and the nontrawl RCA configuration as of May 2004 describe the No Action Alternative and are shown in Tables 2-23 (north of 40°10' N latitude) and 2-24 (south of 40°10' N latitude). These trip limits and estimated impacts of 2004 management measures are depicted in Table 2-25. Table 2-25 shows the tier limits and associated bycatch under the specified 2004 sablefish OY, but with correctly-specified tier limits calculated from the OY (see discussion below). Under the No Action Alternative, the nontrawl RCA is defined by management lines specified with waypoints at roughly 30 fm to 100 fm in waters off northern California (north of 40°10' N latitude) and Oregon; and zero fm to 100 fm in waters off Washington.

The nontrawl RCA south of 40°10' N latitude and north of Point Conception at 34°27' N latitude in 2004 (and under the No Action Alternative) is defined by management lines specified with waypoints at roughly 30 fm to 150 fm during periods 1, 2, 5, and 6 and 20 fm to 150 fm during periods 3 and 4. 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 nontrawl RCA south of Point Conception is defined by management lines specified with waypoints at roughly 60 fm to 150 fm. This more liberal RCA can be accommodated by the minimal occurrence of canary rockfish in the Southern California Bight.

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, and California scorpionfish vary by period (Table 2-24). However, period 2 is closed for these species north of Point Conception, and period 1 is closed south of Point Conception. There is also a small and variable trip limit for bocaccio during the open nearshore periods to allow some incidental bycatch to be landed rather than discarded dead at sea.

As a result of inseason action taken in June 2004, the following changes were made to the No Action Alternative:

Primary Sablefish Fishery. In April, the Council and the GMT incorrectly recommended sablefish tier limits north of 36° N latitude that were calculated using the 2004 sablefish ABC of 8,185 mt instead of the OY of 7,510 mt. The Council considered impacts to the sablefish resource as well as equity issues between limited entry and open access fixed gear vessels and recommended remedial inseason action to correct the tier limits. The corrected values are 64,300 pounds for Tier 1; 29,200 pounds for Tier 2; and 16,700 pounds for Tier 3. The GMT projects this action may result in sablefish mortality at levels above the OY. The Council decided that reducing opportunity in fishery sectors other than the primary sablefish fishery was unfair, and the risk to future stock productivity of slightly exceeding the OY was minimal. Potentially, additional tonnage will remain unharvested from the sablefish primary fishery, and the limited entry fixed gear and open access daily trip limit fisheries and total harvest will remain below the sablefish OY. The GMT reviewed sablefish landings at its September 12-17, 2004 meeting to see if landings were tracking high and approaching the sablefish OY. The Council did not recommend further adjustments to the sablefish fishery based on this review.

Action Alternative 1

The extent of the nontrawl RCA under Action Alternative 1 is the largest of all the alternatives analyzed in this EIS with the western boundary of the RCA extending out to 150 fm coastwide. While there is an estimated reduction of total estimated mortality of overfished shelf species, such as canary and yelloweye rockfish, this comes at the expense of access to harvest important fixed gear target species, such as slope rockfish species in the south and spiny dogfish and Pacific halibut in the north. Limited entry fixed gear tier limits under Action Alternative 1 are found in Table 2-26.

Action Alternative 2

The nontrawl RCA under Action Alternative 2 specifies the western boundary of the RCA extending out to 125 fm coastwide. While there is an estimated reduction of total estimated mortality of overfished shelf species, such as canary and yelloweye rockfish in the north relative to the No Action Alternative, this comes at the expense of access to harvest important fixed gear target species, such as spiny dogfish and Pacific halibut. The nontrawl RCA in the south is less extensive than that under the No Action Alternative, which specifies a seaward boundary at 150 fm. The impacts to overfished species caught south of Cape Mendocino, such as bocaccio, canary rockfish, cowcod, and yelloweye rockfish, are therefore, greater than under the No Action Alternative. Limited entry fixed gear tier limits under Action Alternative 2 are found in Table 2-26.

Action Alternative 3

The nontrawl RCA under Action Alternative 3 specifies the western boundary of the RCA extending out to 100 fm coastwide. The extent of the nontrawl RCA north of Cape Mendocino is, therefore, the same as under the No Action Alternative, with similar consequent effects on target and overfished species. However, the nontrawl RCA in the south is less extensive than that under the No Action Alternative which specifies a western boundary at 150 fm. The impacts to overfished species caught south of Cape Mendocino, such as bocaccio, canary rockfish, cowcod, and yelloweye rockfish, are therefore greater than under the No Action Alternative or any of the other action alternatives except the Council-preferred Alternative (Table 2-26). While these impacts are not directly quantified, due to the geographic limitation of available observation data from the WCGOP, they are thought to be significant due to the depth distribution of many of these species of concern (Table 3.2.0-1 in Appendix A). Limited entry fixed gear tier limits under Action Alternative 3 are found in Table 2-26.

The Council-Preferred Action Alternative

The nontrawl RCA under the Council-preferred Alternative specifies the same RCA boundaries as the No Action Alternative or a western boundary of 100 fm north of 40°10' N latitude and a western boundary of 150 fm south of 40°10' N latitude Most of the limited entry fixed gear trip limits are also status quo (same as No Action) (Table 2-27 for north of 40°10' N latitude and Table 2-28 for south of 40°10' N latitude). The primary sablefish season tier limits do change relative to the No Action Alternative given the change in the 2005 and 2006 sablefish OY. The tier limits recommended under the Council-preferred Alternative are as follows:

Tiers	2005	Original 2006	Revised 2006
1	64,000 lb	63,000 lb	62,700 lb
2	29,100 lb	28,600 lb	28,500 lb
3	16,600 lb	16,400 lb	16,300 lb

Tables 2-29a and 2-29b depict the estimated species' impacts in the 2005 and 2006 primary sablefish fisheries, respectively using WCGOP observed bycatch rates.

The GMT revised projections of anticipated research catches in 2005 and 2006 (Tables 2-8 and 2-9, respectively) subsequent to the June Council meeting when the Council-preferred Alternative was decided and recommended to NMFS. The revision in these anticipated research catches affected the calculation of the 2006 limited entry fixed gear allocation of sablefish and the 2006 tier limits. **The revised 2006 tier limits are 62,700 pounds for tier 1; 28,500 pounds for tier 2; and 16,300 pounds for tier 3** with an associated slight decrease in the estimated impact on overfished species (Table 2-29c). The Council considered these revisions at their September 2004 meeting and re-specified the 2006 tier limits as shown above and in Table 2-29c.

Also included in the preferred alternative is the allowable retention of Other Flatfish species when fishing with approved gear for sanddabs in commercial fisheries. Current California commercial fishing regulations south of 40°10' N latitude provide for an exemption from season and depth closures placed on other federal groundfish species when fishing for sanddabs using gear specified in state and federal regulations. Regulations specify the exemption for "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 1 lb (0.45 kg) of weight per line." In the commercial limited entry fixed gear and open access fisheries south of 40˚10' N latitude, retention of all other federal flatfish species is permitted when fishing for sanddabs with the defined gear. Sanddabs are associated with sandy habitat which tends to remain separate from primary rockfish habitat. The use of small hook size further reduces the likelihood of rockfish catch.

The Council recommended refining the Council-preferred alternative for the limited entry fixed gear sector south of 40°10' N latitude at their September 2004 meeting by reducing the bi-monthly trip limit for longspine thornyheads from 19,000 pounds to 10,000 pounds and by reducing the bi-monthly trip limit for shortspine thornyheads from 4,200 pounds to 2,000 pounds. Limited entry fixed gear thornyhead species trip limits for fisheries south of Cape Mendocino were originally specified in June using the criterion to match limited entry trawl and limited entry fixed gear trip limits for these species. However, the increase in the trawl trip limits for 2005 and 2006 was partially due to the capacity reduction realized with the trawl buyback program. Providing the same increased limits to the limited entry fixed gear sector was considered unfair in that benefits of reduced trawl capacity should accrue to the remaining trawl fleet. Increased limits to the limited entry fixed gear sector could also risk early attainment of optimum yields for these species.

At their September 2004 meeting, the Council recommended changing the period 5 limited entry fixed gear trip limit for deeper nearshore rockfish between 40°10' N latitude and 34 27' N latitude from a monthly to a two-month limit because it was believed this limit was incorrectly specified in June (all other periods have two-month limits for this stock complex). However, this trip limit may be changed back to a monthly limit in a future inseason action as the impacts were modeled based on the monthly limit originally specified for Period 5 (Table 2-28).

2.2.4.3 Open Access

The No Action Alternative

Open access trip limits and estimated impacts of 2004 management measures (as of May 2004) describe the No Action Alternative and are shown in Tables 2-30 (north of 40°10' N latitude) and 2-31 (south of 40°10' N latitude). The same nontrawl RCA described for limited entry fixed gears under the No Action Alternative (Section 2.2.4.2) would also apply for those open access fisheries not exempt from the RCA restrictions.

Action Alternative 1

The extent of the nontrawl RCA under Action Alternative 1 is the largest of all the alternatives analyzed in this EIS with the western boundary of the RCA extending out to 150 fm coastwide. While there is an estimated reduction of total estimated mortality of overfished shelf species, such as canary and yelloweye rockfish, this comes at the expense of access to harvest of important open access target species, such as slope rockfish species in the south, and spiny dogfish and Pacific halibut in the north.

The effects of open access action alternatives are discussed qualitatively since no direct observations of open access discards are available from the WCGOP. Such data will be available for the first time in April 2005 and will be used for 2005 inseason management decision making. An updated observation data set will be available in November 2005, with annual updates provided every November thereafter. These data will provide more accurate information to manage the West Coast open access fleets.

Action Alternative 2

The nontrawl RCA under Action Alternative 2 specifies the western boundary of the RCA extending out to 125 fm coastwide. While there is an estimated reduction of total estimated mortality of overfished shelf species, such as canary and yelloweye rockfish in the north relative to the No Action Alternative, this comes at the expense of access to harvest of important open access target species, such as spiny dogfish and Pacific halibut. The nontrawl RCA in the south is less extensive than that under the No Action Alternative, which specifies a western boundary at 150 fm. The impacts to overfished species caught south of Cape Mendocino, such as bocaccio, canary rockfish, cowcod, and yelloweye rockfish, are therefore, greater than under the No Action Alternative.

The effects of open access action alternatives are discussed qualitatively since no direct observations of open access discards are available from the WCGOP. Such data will be available for the first time in April 2005 and will be used for 2005 inseason management decision making. An updated observation data set will be available in November 2005, with annual updates provided every November thereafter. These data will provide more accurate information to manage the West Coast open access fleets.

Action Alternative 3

The nontrawl RCA under Action Alternative 3 specifies the western boundary of the RCA extending out to 100 fm coastwide. The extent of the nontrawl RCA north of Cape Mendocino is, therefore, the same as under the No Action Alternative, with similar consequent effects on target and overfished species. However, the nontrawl RCA in the south is less extensive than that under the No Action Alternative which specifies a western boundary at 150 fm. The impacts to overfished species caught south of Cape Mendocino, such as bocaccio, canary rockfish, cowcod, and yelloweye rockfish, are therefore, greater than under the No Action or any of the other action alternatives. While these impacts are not directly quantified due to the geographic limitation of available observation data from the WCGOP, they are thought to be significant due to the depth distribution of many of these species of concern.

The effects of open access action alternatives are discussed qualitatively since no direct observations of open access discards are available from the WCGOP. Such data will be available for the first time in April 2005 and will be used for 2005 inseason management decision making. An updated observation data set will be available in November 2005, with annual updates provided every November thereafter. These data will provide more accurate information to manage the West Coast open access fleets.

The Council-Preferred Action Alternative

The nontrawl RCA under the Council-preferred Alternative specifies the same RCA boundaries as the No Action Alternative or a western boundary of 100 fm north of 40°10' N latitude and a western boundary of 150 fm south of 40°10' N latitude. Most of the open access trip limits are also status quo (same as No Action) (Table 2-32 for north of 40°10' N latitude and Table 2-33 for south of 40°10' N latitude).

At their September 2004 meeting, the Council recommended changing the period 5 open access trip limit for deeper nearshore rockfish between 40°10' N latitude and 34 27' N latitude from a monthly to a two-month limit because it was believed this limit was incorrectly specified in June (all other periods have two-month limits for this stock complex). However, this trip limit may be changed back to a monthly limit in a future inseason action as the impacts were modeled based on the monthly limit originally specified for period 5 (Table 2-33).

The ridgeback prawn trawl fishery in southern California has been subject to the specified trawl RCA restrictions since the onset of depth-based management in 2002. The Council adopted an exemption to this depth restriction for the ridgeback prawn trawl fishery south of Point Conception at 34°27' N latitude in 2005-2006, which allows the fishery to operate out to 100 fm year-round, regardless of the specified bounds of the trawl RCA. Restricting the fishery to shallower depths eliminated fishing opportunity due to the depth distribution of ridgeback prawns.

Also included in the preferred alternative is the allowable retention of Other Flatfish species when fishing with approved gear for sanddabs in commercial fisheries. Current California commercial fishing regulations south of 40°10' N latitude provide for an exemption from season and depth closures placed on other federal groundfish species when fishing for sanddabs using gear specified in state and federal regulations. Regulations specify the exemption for “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 1 lb (0.45 kg) of weight per line." In the commercial limited entry fixed gear and open access fisheries south of 40˚10' N latitude, retention of all other federal flatfish species is permitted when fishing for sanddabs with the defined gear. Sanddabs are associated with sandy habitat which tends to remain separate from primary rockfish habitat. The use of small hook size further reduces the likelihood of rockfish catch.

2.2.4.4 Tribal Fisheries

The No Action Alternative

The Washington coastal tribes (Makah, Quileute, Hoh, and Quinault) prosecuted their groundfish fisheries in 2004 with the following allocations and trip limits. The sablefish allocation was 10% of the total catch OY (for the portion of the stock north of 36° N latitude) of 6,500 mt. This provided an allocation of 631 mt of sablefish after deducting an assumed 3% discard mortality. The tribal commercial harvest of black rockfish was managed with a harvest guideline of 20,000 pounds north of Cape Alava, Washington at 48°09'30" N latitude, and 10,000 pounds between Destruction Island, Washington at 47°40' N latitude and Leadbetter Point, Washington at 46°38'10" N latitude Thornyheads were subject to a 300-pound trip limit as were canary rockfish. Yelloweye rockfish were subject to a 100-pound trip limit. Yellowtail rockfish taken in tribal midwater trawl fisheries were subject to a 30,000-pound, two-month cumulative landing limit, and widow rockfish landings were limited to 10% of the weight of yellowtail rockfish landed in any two-month period. These midwater landing limits were subject to inseason adjustments to minimize the take of canary and widow rockfish. Other rockfish, including species in the minor nearshore, minor shelf, and minor slope rockfish complexes were subject to either a 300-pound trip limit per species or complex, or to the non-tribal limited entry trip limit for those species if those limits were less restrictive. Rockfish taken during the open competition tribal commercial fisheries for Pacific halibut were not subject to trip limits. A full rockfish retention program, as well as a tribal observer program, were instituted to provide catch accountability. Lingcod were subject to a 300-pound trip limit and a 900-pound weekly landing limit. Trip limits for Pacific cod, petrale sole, English sole, rex sole, arrowtooth flounder, and other flatfish in the tribal bottom trawl fishery were the same as for non-tribal limited entry fixed gear fishery at the start of the season (Table 2-14) using the same Council-approved gear. The tribal plan was not to reduce these limits inseason because of the low expected catch unless catch statistics indicated that the tribes would attain more than half the harvest of these species in their usual and accustomed (U and A) fishing areas. The tribal allocation of Pacific whiting in 2004 was 32,500 mt based on the sliding scale allocation formula that specifies the tribal whiting OY based on the total U.S. whiting OY. The Makah tribe was the only one of the four tribes prosecuting a whiting-directed fishery in 2004, or proposing a whiting-directed fishery for 2005-2006.

Action Alternative 1

Tribal proposals for their groundfish fishery are the same as status quo (No Action) with the following exceptions:

- The tribes propose an increased lingcod harvest guideline of between 50 mt and 100 mt. This is increased from the 25 mt harvest guideline the tribes proposed for their 2004 fisheries; however, under this alternative the analysis includes a tribal lingcod harvest guideline of 25 mt.
- The Makah Tribe proposes an increased yellowtail rockfish cumulative landing limit of 180,000 pounds/two months for their midwater trawl fleet. This is increased from their 2004 fleet-wide cumulative landing limit of 150,000 pounds/two months in 2004. As in 2004, landings of widow rockfish are not to exceed 10% of the poundage of yellowtail rockfish landed in their midwater trawl fishery.

- The Makah Tribe proposes a petrale sole trip limit of 50,000 pounds/two months for their fishermen for the entire year. Otherwise, trip and cumulative landing limits for Pacific cod, English sole, rex sole, arrowtooth flounder, and Other Flatfish will be the same as specified at the start of the year for the non-tribal limited entry trawl fishery (same as No Action).
- The Makah Tribe proposes a new pollock test fishery as part of their directed midwater trawl fishery in 2004. If successful targeting of pollock is demonstrated in this fishery, the Makah Tribe proposes a directed pollock fishery in 2005 that is coincident with the tribal whiting fishery.

Action Alternative 2

Tribal management measures are the same as those described in Action Alternative 1, except under this alternative the analysis includes a tribal lingcod harvest guideline of 50 mt.

Action Alternative 3

Tribal management measures are the same as those described in Action Alternative 1, except under this alternative the analysis includes a tribal lingcod harvest guideline of 100 mt.

The Council-Preferred Action Alternative

The tribal groundfish management measures adopted by the Council are status quo (same as No Action) with the following exceptions:

- An increased lingcod harvest guideline of between 50 mt and 100 mt. This is increased from the 25 mt harvest guideline adopted for 2004 tribal fisheries; however, the tribes will not prosecute target lingcod fisheries if the bycatch of other overfished species increases beyond what would have been expected in tribal non-whiting fisheries without this new target fishery.
- An increased yellowtail rockfish cumulative landing limit of 180,000 pounds/two months for the Makah Tribe's midwater trawl fleet. This is increased from their 2004 fleet-wide cumulative landing limit of 150,000 pounds/two months in 2004. As in 2004, landings of widow rockfish are not to exceed 10% of the poundage of yellowtail rockfish landed in their midwater trawl fishery.
- A petrale sole trip limit of 50,000 pounds/two months for the Makah fleet for the entire year. Otherwise, trip and cumulative landing limits for Pacific cod, English sole, rex sole, arrowtooth flounder, and Other Flatfish will be the same as specified at the start of the year for the non-tribal limited entry trawl fishery.
- A new pollock test fishery as part of the Makah Tribe's Pacific whiting fishery in 2004. If successful targeting of pollock is demonstrated in this fishery, the Makah Tribe will prosecute a directed pollock fishery in 2005 that is coincident with the tribal whiting fishery.

2.2.4.5 Washington Recreational

The No Action Alternative

In 2004, the Washington recreational fishery was open year round for groundfish except lingcod, which was open from to the Saturday closest to March 15 (March 13) through the Sunday closest to October 15 (October 17). There was a recreational groundfish bag limit of 15 fish per day including rockfish and lingcod. Of the 15 recreational groundfish allowed to be landed per day, only 10 could be rockfish, with no retention of canary or yelloweye rockfish, and a sublimit of two lingcod with a 24-inch minimum size during the open lingcod season. Recreational groundfish and recreational halibut fishing was prohibited within the "C-shaped" Yelloweye Rockfish Conservation Area (YRCA). Coordinates defining the YRCA are provided in federal regulations at 50 CFR 660.390.

WDFW used their Ocean Sampling Program to monitor groundfish catches inseason. If canary or yelloweye rockfish harvest guidelines were projected to be attained inseason, WDFW would close the recreational groundfish fishery to inside the 30 fm contour to reduce impacts on these species; an inseason depth restriction would apply only in specific high bycatch areas.

Action Alternative 1

WDFW is not proposing any changes to their recreational groundfish fishery from status quo (No Action).

Action Alternative 2

WDFW is not proposing any changes to their recreational groundfish fishery from status quo (No Action).

Action Alternative 3

WDFW is not proposing any changes to their recreational groundfish fishery from status quo (No Action).

The Council-Preferred Action Alternative

The Council adopted status quo (same as No Action) Washington recreational management measures as follows:

- 15 aggregate bottomfish bag limit.
- 10 rockfish sublimit with no retention of canary or yelloweye rockfish.
- 2 lingcod sublimit, with a minimum size limit of 24" and a status quo season.
- Continuation of the fishing prohibitions within the YRCA.

If the recreational harvest guideline for canary rockfish, lingcod, or yelloweye specified for the Washington/Oregon area is projected to be exceeded, the WDFW will consult with the ODFW and may take action inseason to close all or portions of the recreational fishery deeper than 30 fm or adjust seasons, bag limits, or size limits, as needed.

2.2.4.6 Oregon Recreational

The No Action Alternative

In 2004, the Oregon recreational groundfish fishery is open year round with no depth restrictions except during June through September when the fishery is open only inside 40 fm. Catches are also managed using a 10 marine fish daily-bag-limit including rockfish, greenling (*Hexagrammos* spp.), cabezon, and other groundfish species, but excluding salmon, lingcod, perch species, sturgeon, sanddabs, striped bass, tuna, and baitfish. There is no retention of canary and yelloweye rockfish. Anglers may keep two lingcod with a 24-inch minimum size. Additionally, there is a minimum size limit of 16 inch for cabezon and a 10-inch minimum size limit for greenling species.

ODFW will use their Ocean Sampling Program to monitor groundfish catches inseason. If canary or yelloweye rockfish harvest guidelines are projected to be attained inseason, ODFW would close the recreational groundfish fishery to inside a management line specified with waypoints at approximately 30 fm to reduce impacts on these species. ODFW preserved the option of closing the recreational fishery outside 30 fm only in specific high bycatch areas to provide some management flexibility.

Action Alternative 1

ODFW is not proposing any changes to their recreational groundfish fishery from status quo (No Action). However, they intend to explore inseason management options for their recreational groundfish fishery during 2005-2006 that include:

- Reducing the closure period seaward of 40 fm if the duration of the total season is reduced from 12 months due to management of nearshore species. Impacts would not exceed anticipated harvest levels on overfished species.
- Implementing gear restrictions and/or release techniques to reduce the impact of overfished rockfish species if successful techniques were developed, researched, reviewed, and accepted. Impacts would not exceed anticipated harvest levels on overfished species.
- Moving from large offshore closures (i.e., all areas outside the 40 fm management line) to closing hotspots of known canary and yelloweye rockfish concentrations or opening cold spots of areas known to have no or low concentrations of canary and yelloweye rockfish. Impacts would not exceed anticipated harvest levels on overfished species.

Action Alternative 2

Action Alternative 2 is the same as Action Alternatives 1 and 3.

Action Alternative 3

Action Alternative 3 is the same as Action Alternatives 1 and 2.

The Council-Preferred Action Alternative

The Council adopted status quo Oregon recreational management measures, except that Pacific halibut will not be included in the 10 marine fish bag limit. These management measures are:

- Season: Open all year at all depths, except closed outside of the 40 fm curve from June 1 through September 30. Possession of groundfish prohibited in waters deeper than the 40 fm curve during the June through September offshore closure period (consistent with current Oregon state regulations).
- Daily-Bag-Limit: 10 marine fish including rockfish, greenling, cabezon, and other species, not including salmon species, lingcod, Pacific halibut, perch species, sturgeon, sand dabs, striped bass, tuna, and bait fish (herring, smelt, anchovies, and sardines). A two-fish daily-bag-limit for lingcod. No retention of yelloweye rockfish and canary rockfish.
- Minimum Length Limits:
    - ‣ Lingcod: 24 inches
    - ‣ Cabezon: 16 inches
    - ‣ Greenling species: 10 inches

If the recreational harvest guideline for canary, yelloweye, or lingcod specified for the Washington-Oregon area is projected to be exceeded, ODFW will consult with WDFW, and may take action inseason to close all or portions of the recreational fishery deeper than 20 fm or 30 fm or adjust seasons, bag limits, or size limits, as needed.

2.2.4.7 California Recreational

The No Action Alternative

The No Action management measures for the California recreational fishery are those regulations in place as of May 2004. The daily-bag-limit is 10 fish in the rockfish, greenling, cabezon complex, of which one can be bocaccio (10-inch minimum size), three can be cabezon (15-inch minimum size), and two can be greenling species (12 inch minimum size). Additionally, one lingcod with a 30-inch minimum size could be caught during the April through October recreational groundfish season (the limits at the start of the year were 2 lingcod per day at a 24-inch minimum size, but were changed inseason to avoid the possibility of lingcod overharvest as occurred in 2003). Up to five California scorpionfish can be taken per day with a 10-inch minimum size limit during January through February and July through December. A zero fm to 10 fm closure around the Farallon Islands is in place to reduce the estimated take of shallow nearshore rockfish. In April 2004, CDFG and the Council adopted an exemption to the depth-based and season closures for shore-based anglers and all divers as follows: 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 would be exempt from the seasonal closures for rockfish, greenlings, California scorpionfish, California sheephead, and ocean whitefish. Additionally, regional management measures (California management regions are dubbed Rockfish/Lingcod Management Areas [RLMAs]) are in place as described below.

<u>Southern RLMA (U.S./Mexico Border to Point Conception at 34°27' N latitude)</u>

The California recreational groundfish fishery regulations south of Point Conception under the No Action Alternative would be the same as described above except for the following changes:
- Groundfish open March through December shoreward of 60 fm (closed January through February).
- California scorpionfish may only be retained during March, April, November, and December.

<u>Central RLMA (Point Conception to Cape Mendocino at 40°10' N latitude)</u>

The California recreational groundfish fishery regulations for the area between Point Conception and Cape Mendocino under the No Action Alternative would be the same as described above except for the following changes:
- Groundfish open January, February, and September through December shoreward of 30 fm; and May through August inside 20 fm (closed March through April).

<u>Northern RLMA (Cape Mendocino to the California/Oregon Border)</u>

The California recreational groundfish fishery regulations for the area between Cape Mendocino and the California/Oregon border under the No Action Alternative would be the same as described above except for the following changes:
- If canary or yelloweye rockfish harvest guidelines are projected to be attained inseason, CDFG would close the recreational groundfish fishery to shoreward of a management line specified with waypoints at approximately 30 fm to reduce impacts on these species. An inseason depth restriction would apply only in specific high bycatch areas.

Action Alternative 1

Action Alternative 1 management measures for the California recreational fishery are the most conservative regulations considered for 2005-2006. Under this alternative, the daily-bag-limit is **5 fish in the rockfish, greenling, cabezon complex**, of which one may be bocaccio (10-inch minimum size), **one may be cabezon** (15-inch minimum size), and **one may be greenling species** (12 inch minimum size). Additionally, **one lingcod with a 28-inch minimum size may be caught during the April through October recreational groundfish season** (note that seasons vary by region and alternative as described below). Up to five California scorpionfish may be taken per day with a 10-inch minimum size limit. **Shore-based divers only (without boats) and shore-based anglers would be exempt from the seasonal closures for rockfish, greenlings, California scorpionfish, California sheephead, and ocean whitefish.** Additionally, regional management measures are analyzed under this alternative as described below. All other management measures not differentially specified or described under this alternative are status quo (same as No Action).

<u>Southern RLMA (U.S./Mexico Border to Point Conception at 34°27' N latitude)</u>

The California recreational groundfish fishery regulations south of Point Conception under Action Alternative 1 would be the same as described above except for the following changes:

- Groundfish other than California scorpionfish, but including select nongroundfish species (California sheephead and ocean whitefish) open May through September shoreward of 40 fm (closed January through April and October through December) (Figure 2-1).
- California scorpionfish may only be retained during March, April, and July through September shoreward of 40 fm (closed January, February, May, June, and October through December) (Figure 2-1).

<u>Central RLMA (Point Conception to Cape Mendocino at 40°10' N latitude)</u>

The California recreational groundfish fishery regulations for the area between Point Conception and Cape Mendocino under Action Alternative 1 would be the same as described above except for the following changes:

- Groundfish including California scorpionfish, and including select nongroundfish species (California sheephead and ocean whitefish) open in June shoreward of 40 fm; and July through October shoreward of 20 fm (closed January through May and November through December) (Figure 2-2).
- For 2005-2006, a new management line at Pigeon Point (37°11' N latitude) is proposed for use inseason, in addition to current management lines already available. This line is proposed to provide federal consistency with the California Nearshore FMP, which defines two RLMA regions in central California (from Point Conception to Cape Mendocino) with a division at Pigeon Point, and to assist with the data stream for groundfish catch data, which is sampled and estimated in these four regions statewide in the new CRFS sampling program. The management line at Pigeon Point provides a division within the Central RLMA and results in a North-Central and South-Central RLMA. While this alternative combines the two areas in this EIS analysis, there might be different regulations adopted inseason for the North-Central and South-Central RLMAs.

<u>Northern RLMA (Cape Mendocino to the California/Oregon Border)</u>

The California recreational groundfish fishery regulations for the area between Cape Mendocino and the California/Oregon border under the No Action Alternative would be the same as described above except for the following changes:

- Groundfish and ocean whitefish open in July through October shoreward of 40 fm (closed January through June and November through December) (Figure 2-3).

Action Alternative 2

Action Alternative 2 management measures for the California recreational fishery result in intermediate effects relative to the other action alternatives considered for 2005-2006. Under this alternative, the daily-bag-limit is 10 fish in the rockfish, greenling, cabezon complex (status quo), of which one may be bocaccio (10-inch minimum size), **two may be cabezon** (15-inch minimum size), and **one may be greenling species** (12 inch minimum size). Additionally, **two lingcod with a 26-inch minimum size may be caught during the April through October recreational groundfish season** (note that seasons vary by region and alternative as described below). **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 would be exempt from the seasonal closures for rockfish, greenlings, California scorpionfish, California sheephead, and ocean whitefish.** Additionally, regional management measures are analyzed under all the action alternatives except the Council-preferred Alternative, and are as described under Action Alternative 1. All other management measures not differentially specified or described under this alternative are status quo (same as No Action).

Action Alternative 3

Action Alternative 3 management measures for the California recreational fishery are the most liberal regulations considered for 2005-2006. Under this alternative the daily-bag-limit is 10 fish in the rockfish, greenling, cabezon complex (status quo), of which one may be bocaccio (10-inch minimum size), **three may be cabezon** (15-inch minimum size), and **two may be greenling species** (12 inch minimum size). Additionally, **two lingcod with a 24-inch minimum size may be caught during the April through October recreational groundfish season** (note that seasons vary by region and alternative as described below). **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 would be exempt from the seasonal closures for rockfish, greenlings, California scorpionfish, California sheephead, and ocean whitefish.** Additionally, regional management measures are analyzed under all the action alternatives except the Council-preferred Alternative, and are as described under Action Alternative 1. All other management measures not differentially specified or described under this alternative are status quo (same as No Action).

The Council-Preferred Action Alternative

The Council-preferred Alternative differs from the action alternatives in terms of the season structure and the number of management regions where regulations vary. Differences are driven by the Council's specification of harvest guidelines and further deliberations with representatives of the California recreational community. For management of California's nearshore recreational groundfish fishery, CDFG has divided the coastline into four regional areas: three in northern California (North, from 42° N latitude to 40°10' N latitude; North-Central, from 40°10' N latitude to 37°11' N latitude; and South-Central, from 37°11' N latitude to 34°27' N latitude) and one in southern California (from 34°27' N latitude to the California/Mexico border), with the split between northern and southern California at Point Conception (34°27' N latitude). Additionally, based on requests from some California recreational fishery representatives, regulations proposed for the area between Point Conception and Lopez Point (which is an existing management line at 36° N latitude) differ than those north and south of this area. While the CDFG and Council propose beginning the 2005 California recreational season with the same regulations from Cape Mendocino at 40°10' N latitude to Lopez Point, there may be inseason adjustments during 2005 and 2006 to divide the area at Pigeon Pt. at 37°11' N latitude to promulgate different regulations north and south of Pigeon Point.

The Council adopted California recreational management measures as follows:

- Status quo regulations unless otherwise specified.
- Regulations apply to groundfish (with sanddab fishery exception) and associated state-managed species (rock greenling, California sheephead, and ocean whitefish).
- The sport fishery for sanddabs, using gear specified in federal and state regulations (size #2 hooks or smaller), is exempt from the season closures and depth restrictions placed on other federally-managed groundfish.
- Retention of species in the Other Flatfish complex is allowed when fishing with size #2 hooks or smaller for Pacific sanddabs.
- Lingcod size limit is 24 inches with a daily bag limit of 2 fish.
- Combined rockfish + cabezon + greenling complex daily bag limit of 10 fish.
- A two-fish bocaccio sublimit is included in the 10-fish RCG daily bag limit.
- Notwithstanding other fishing opportunities for groundfish, lingcod may not be retained during January, February, March, and December.
- 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 would be exempt from the seasonal closures and depth restrictions for rockfish, greenlings, California scorpionfish, California sheephead, and ocean whitefish.

If the recreational harvest guideline for canary rockfish, yelloweye rockfish, or lingcod specified for California is projected to be exceeded, or if the state harvest guideline for black rockfish is projected to be exceeded when combining recreational harvest projections and annual commercial projections, CDFG and/or the Council and NMFS may take action to close all or part of the recreational fishery in all or part of the state regions in all or part of the remainder of the year. Any closure may pertain to closure of specific groundfish species or specific depths in different regions to achieve catch limitation.

In the northern RLMA (north of 40°10' N. lat to the Oregon/California border), in the case of canary or yelloweye rockfish, CDFG would take action to close all or part of the recreational fishery deeper than the 30-fm management line.

The adopted seasons and depth restrictions by California management region (Figure 2-4) are as follows:

<u>Southern RLMA (U.S./Mexico Border to Point Conception at 34°27' N latitude)</u>

The California recreational groundfish fishery regulations south of Point Conception under the Council-preferred Alternative would be the same as described above except for the following changes:

- Groundfish other than California scorpionfish, but including select nongroundfish species (California sheephead and ocean whitefish) open March through June in the 30 fm to 60 fm zone; open July through September shoreward of 40 fm; and closed January, February, and October through December (Figure 2-4).
- California scorpionfish can only be retained during October and November shoreward of 40 fm and December shoreward of 20 fm (closed January through September) (Figure 2-4).

<u>Southern South-Central RLMA (Point Conception to Lopez Point at 36° N latitude)</u>

The California recreational groundfish fishery regulations for the area between Point Conception and Lopez Point under the Council-preferred Alternative would be the same as described above except for the following changes:

- Groundfish including select nongroundfish species (California sheephead and ocean whitefish) open May through September in the 20 fm to 40 fm zone (closed January through April and October through December) (Figure 2-4).

North-Central and Northern South-Central RLMA (Lopez Point to Cape Mendocino at 40°10' N latitude)

The California recreational groundfish fishery regulations for the area between Lopez Point and Cape Mendocino under the Council-preferred Alternative would be the same as described above except for the following changes:

- Groundfish including select nongroundfish species (California sheephead and ocean whitefish) open July through November shoreward of 20 fm (closed January through June and December) (Figure 2-4).
- For 2005-2006, a new management line at Pigeon Point (37°11' N latitude) is proposed for use inseason, in addition to current management lines already available. This line is proposed to provide federal consistency with the California Nearshore FMP, which defines two RLMA regions in central California (from Point Conception to Cape Mendocino) with a division at Pigeon Point, and to assist with the data stream for groundfish catch data, which is sampled and estimated in these four regions statewide in the new CRFS sampling program. The management line at Pigeon Point provides a division within the Central RLMA and results in a North-Central and South-Central RLMA. While this alternative combines the two areas in this EIS analysis, there might be different regulations adopted inseason for the North-Central and South-Central RLMAs.

Northern RLMA (Cape Mendocino to the California/Oregon Border)

The California recreational groundfish fishery regulations for the area between Cape Mendocino and the California/Oregon border under the Council-preferred Alternative would be the same as described above except for the following changes:

- Groundfish and ocean whitefish open in July through October shoreward of 40 fm (closed January through June and November through December) (Figure 2-4).

2.2.5 Alternatives Considered, But Eliminated From Detailed Study

Any alternative total catch OYs with less than a 50% probability of rebuilding to B_{MSY} within T_{MAX} are not compliant with the MSA, as interpreted in a 2000 Federal Court ruling (*NRDC* v. *Daley, April 25, 2000, U.S. Court of Appeals for the District of Columbia Circuit*). Such alternatives do not meet the purpose and need for action and thus are not analyzed in this EIS.

2.3 Comparison of the Environmental Consequences

Table 2-34 summarizes the impacts of alternative harvest levels, and Table 2-35 summarizes the analyses of physical, biological, and socioeconomic effects of the alternatives presented in Chapters 3-8. These effects are qualitatively assessed in Table 2-35 based on the best professional judgement of the resource experts who contributed to this EIS. The Council-preferred Alternative is expected to allow the stocks to rebuild to MSY biomass levels. Until stocks are rebuilt, there will likely be significant adverse impacts on groundfish fishery participants and groundfish-dependent economies on the West Coast.

2.4 Social Net Benefit Analysis

Net benefit analysis takes costs and benefits into account from a national perspective. Net benefit analysis uses measures of real costs and benefits to all entities affected by an action in order to assess the net effect on the nation. The minimum standard for a cost-benefit analysis is a qualitative listing of positive and negative impacts. From there, an attempt is made to quantify or provide some indicators of the scale of the impacts and, if possible, to assign a monetary value to those changes. A social net benefits analysis of the management alternatives is found in Section 8.6.

TABLE 2-1a. Council-preferred Alternatives for acceptable biological catches (ABCs) and total catch optimum yields (OYs) (mt) for **2005**. (Overfished stocks in CAPS). (Page 1 of 2)

Stock	2004 ABCs/OYs		2005 ABC and OY Alternatives							
			Low OY		Med OY		High OY		Council OY[a/]	
	ABC	OY	ABC	OY	ABC	OY	ABC	OY	ABC	OY
LINGCOD - coastwide	1,385	735	2,922	918	2,922	2,588	2,922	2,636	2,922	2,414
Columbia and U.S./Vanc. areas			1,874	574	1,874	1,874	1,874	1,874		
Eureka, Monterey, and Conception areas			1,048	344	1,048	714	1,048	762		
Pacific Cod	3,200	3,200	3,200	1,600			3,200	3,200	3,200	1,600
Pacific Whiting (Coastwide)	514,441	250,000	181,286	181,286	362,573	362,573	725,146	725,146		
Sablefish (Coastwide)	8,487	7,786	8,368	6,500	8,368	7,761	8,368	8,335	8,368	7,761
N. of 36° (Monterey north)	8,185	7,510		6,270		7,486		8,040		7,486
S. of 36° (Conception area)	302	276		230		275		295		275
PACIFIC OCEAN PERCH	980	444			966	447			966	447
Shortbelly Rockfish	13,900	13,900			13,900	13,900			13,900	13,900
WIDOW ROCKFISH	3,460	284	2,833	0	3,218	285	3,668	505	3,218	285
CANARY ROCKFISH[b/]	256	47	270	43	270	48	270	48	270	46.8
Chilipepper Rockfish	2,700	2,000			2,700	2,000			2,700	2,000
BOCACCIO	400	250	447	134	566	307	745	713	566	307
Splitnose Rockfish	615	461			615	461			615	461
Yellowtail Rockfish	4,320	4,320			3,896	3,896			3,896	3,896
Shortspine Thornyhead - N. of 34°27'	1,030	983			1,055	999			1,055	999
Longspine Thornyhead - N. of 36°	2,461	2,461			2,461	2,461			2,461	2,461
Longspine Thornyhead - S. of 36°	390	195			390	195			390	195
COWCOD - S. of 36° (Conception area)	5	2.4	5	2.1			5	2.4	5	2.1
COWCOD - N. of 36° (Monterey area)	19	2.4	19	2.1			19	2.4	19	2.1
DARKBLOTCHED	240	240			269	269			269	269
YELLOWEYE	53	22	54	24	54	27	54	28	54	26
Nearshore Species										
Black WA	540	540			540	540			540	540
Black OR-CA	775	775			753	753			753	753
Minor Rockfish North	3,680	2,250			3,680	2,250			3,680	2,250
Nearshore HG		122				122				122
Shelf HG		968				968				968
Slope HG		1,160				1,160				1,160
Remaining Rockfish North	1,612	1,216			1,612	1,216			1,612	1,216
Bocaccio	318	238			318	238			318	238
Chilipepper - Eureka	32	32			32	32			32	32
Redstripe	576	432			576	432			576	432
Sharpchin	307	230			307	230			307	230
Silvergrey	38	28			38	28			38	28
Splitnose	242	182			242	182			242	182

TABLE 2-1a. Council-preferred Alternatives for acceptable biological catches (ABCs) and total catch optimum yields (OYs) (mt) for **2005**. (Overfished stocks in CAPS). (Page 2 of 2)

Stock	2004 ABCs/OYs		2005 ABC and OY Alternatives							
			Low OY		Med OY		High OY		Council OY[a/]	
	ABC	OY	ABC	OY	ABC	OY	ABC	OY	ABC	OY
Yellowmouth	99	74			99	74			99	74
Other Rockfish North	2,068	1,034			2,068	1,034			2,068	1,034
Minor Rockfish South	3,412	1,968			3,412	1,968			3,412	1,968
Nearshore HG		615				615				615
Shelf HG		714				714				714
Slope HG		639				639				639
Remaining Rockfish South	854	689			854	689			854	689
Bank	350	262			350	262			350	262
Blackgill	343	306			343	306			343	306
Sharpchin	45	34			45	34			45	34
Yellowtail	116	87			116	87			116	87
Other Rockfish South	2,558	1,279			2,558	1,279			2,558	1,279
Cabezon (off CA only)	Managed under "Other Fish"		88	44	103	69	103	91	103	69
Dover Sole	8,510	7,440			8,522	7,476			8,522	7,476
English Sole	3,100	3,100			3,100	3,100			3,100	3,100
Petrale Sole	2,762	2,762			2,762	2,762			2,762	2,762
Arrowtooth Flounder	5,800	5,800			5,800	5,800			5,800	5,800
Other Flatfish	7,700	7,700	4,400	2,200			12,000	12,000		
Other Fish[c/]	14,700	14,700	14,700	7,350			14,700	14,700	14,600	7,300

a/ Council OY is the Council's preferred harvest alternative for 2005.

b/ The canary rockfish ABC and OY are based on the Council's adopted rebuilding strategy that has a rebuilding target year of 2074, a specified harvest control rule (F = 0.220), and comports to a P_{MAX} (probability of successful rebuilding within the maximum allowable time period) of 60%. The OY varies by the commercial:recreational catch share due to the fact that the recreational fishery takes smaller fish and, therefore, has a greater “per ton” impact than the commercial fishery. The Council-preferred OY is based on a commercial:recreational catch share of 59.8% commercial and 40.2% recreational.

c/ The cabezon harvest specifications were subtracted from the Other Fish complex by INPFC area.

TABLE 2-1b. Council preferred alternatives for acceptable biological catches (ABCs) and total catch optimum yields (OYs) (mt) for **2006**. (Overfished stocks in CAPS). (Page 1 of 2)

Stock	2004 ABCs/OYs		2006 ABC and OY Alternatives							
			Low OY		Med OY		High OY		Council OY[a/]	
	ABC	OY	ABC	OY	ABC	OY	ABC	OY	ABC	OY
LINGCOD - coastwide	1,385	735	2,716	940	2,716	2,414	2,716	2,459	2,716	2,414
Columbia and U.S./Vanc. Areas			1,694	574	1,694	1,694	1,694	1,694		
Eureka, Monterey, and Conception areas			1,021	366	1,021	719	1,021	764		
Pacific Cod	3,200	3,200	3,200	1,600			3,200	3,200	3,200	1,600
Pacific Whiting (Coastwide)	514,441	250,000	114,296	114,296	228,593	228,593	457,186	457,186		
Sablefish (Coastwide)	8,487	7,786	8,175	6,500	8,175	7,634	8,175	8,149	8,175	7,634
N. of 36° (Monterey north)	8,185	7,510		6,270		7,363		7,860		7,363
S. of 36° (Conception area)	302	276		230		271		289		271
PACIFIC OCEAN PERCH	980	444			934	447			934	447
Shortbelly Rockfish	13,900	13,900			13,900	13,900			13,900	13,900
WIDOW ROCKFISH	3,460	284	2,670	0	3,059	289	3,510	513	3,059	289
CANARY ROCKFISH[b/]	256	47	279	45	279	51	279	51	279	47.1
Chilipepper Rockfish	2,700	2,000			2,700	2,000			2,700	2,000
BOCACCIO	400	250	443	140	549	308	733	704	549	308
Splitnose Rockfish	615	461			615	461			615	461
Yellowtail Rockfish	4,320	4,320			3,681	3,681			3,681	3,681
Shortspine Thornyhead - N. of 34°27'	1,030	983			1,077	1,018			1,077	1,018
Longspine Thornyhead - N. of 36°	2,461	2,461			2,461	2,461			2,461	2,461
Longspine Thornyhead - S. of 36°	390	195			390	195			390	195
COWCOD - S. of 36° (Conception area)	5	2.4	5	2.1			5	2.4	5	2.1
COWCOD - N. of 36° (Monterey area)	19	2.4	19	2.1			19	2.4	19	2.1
DARKBLOTCHED	240	240			294	294			294	294
YELLOWEYE	53	22	54	25	54	28	54	29	55	27
Nearshore Species										
Black WA	540	540			540	540			540	540
Black OR-CA	775	775			736	736			736	736
Minor Rockfish North	3,680	2,250			3,680	2,250			3,680	2,250
Nearshore HG		122				122				122
Shelf HG		968				968				968
Slope HG		1,160				1,160				1,160
Remaining Rockfish North	1,612	1,216			1,612	1,216			1,612	1,216
Bocaccio	318	238			318	238			318	238
Chilipepper - Eureka	32	32			32	32			32	32
Redstripe	576	432			576	432			576	432
Sharpchin	307	230			307	230			307	230
Silvergrey	38	28			38	28			38	28

TABLE 2-1b. Council preferred alternatives for acceptable biological catches (ABCs) and total catch optimum yields (OYs) (mt) for **2006**. (Overfished stocks in CAPS). (Page 2 of 2)

Stock	2004 ABCs/OYs		2006 ABC and OY Alternatives							
			Low OY		Med OY		High OY		Council OY[a/]	
	ABC	OY	ABC	OY	ABC	OY	ABC	OY	ABC	OY
Splitnose	242	182			242	182			242	182
Yellowmouth	99	74			99	74			99	74
Other Rockfish North	2,068	1,034			2,068	1,034			2,068	1,034
Minor Rockfish South	3,412	1,968			3,412	1,968			3,412	1,968
Nearshore HG		615				615				615
Shelf HG		714				714				714
Slope HG		639				639				639
Remaining Rockfish South	854	689			854	689			854	689
Bank	350	262			350	262			350	262
Blackgill	343	306			343	306			343	306
Sharpchin	45	34			45	34			45	34
Yellowtail	116	87			116	87			116	87
Other Rockfish South	2,558	1,279			2,558	1,279			2,558	1,279
Cabezon (off CA only)	Managed under "Other Fish"		94	63	108	69	108	107	108	69
Dover Sole	8,510	7,440			8,589	7,564			8,589	7,564
English Sole	3,100	3,100			3,100	3,100			3,100	3,100
Petrale Sole	2,762	2,762			2,762	2,762			2,762	2,762
Arrowtooth Flounder	5,800	5,800			5,800	5,800			5,800	5,800
Other Flatfish	7,700	7,700	4,400	2,200			12,000	12,000		
Other Fish[c/]	14,700	14,700	14,700	7,350			14,700	14,700	14,600	7,300

a/ Council OY is the Council's preferred harvest alternative for 2006.

b/ The canary rockfish ABC and OY are based on the Council's adopted rebuilding strategy that has a rebuilding target year of 2074, a specified harvest control rule (F = 0.220), and comports to a P_{MAX} (probability of successful rebuilding within the maximum allowable time period) of 60%. The OY varies by the commercial:recreational catch share due to the fact that the recreational fishery takes smaller fish and, therefore, has a greater "per ton" impact than the commercial fishery. The Council-preferred OY is based on a commercial:recreational catch share of 60.7% commercial and 39.3% recreational.

c/ The cabezon harvest specifications were subtracted from the Other Fish complex by INPFC area.

TABLE 2-2. Projected median harvest levels (mt) for cabezon in waters off California corresponding to three harvest control rules for the "new catch and 1947 to present CPUE index" analysis, 2004-2007. Results are shown for two F_{MSY} proxies ($F_{50\%}$ and $F_{45\%}$).

	F_{MSY} proxy – $F_{50\%}$			F_{MSY} proxy – $F_{45\%}$		
Year	40-10	60-20	ABC	40-10	60-20	ABC
2004	62	26	82	74	31	99
2005	80	44	88	91	51	103
2006	97	63	94	107	72	108
2007	100	74	97	110	83	109

TABLE 2-3. Projected lingcod spawning stock biomass and relative depletion north (LCN) and south (LCS) of the Eureka/Columbia INPFC management area boundary at 43° N latitude. Data from Jagielo *et al.* (2004).

	LCN			LCS			Coastwide		
Year	Biomass	Target	Ratio	Biomass	Target	Ratio	Biomass	Target	Ratio
2002	6,376	8,321	0.766	3,885	8,108	0.479	10,261	16,428	0.625
2003	8,477	8,321	1.019	4,482	8,108	0.553	12,959	16,428	0.789
2004	10,661	8,321	1.281	5,656	8,108	0.698	16,317	16,428	0.993

TABLE 2-4. Proposed harvest guidelines for selected species and fishery sectors for 2005 and 2006. (Page 1 of 2)

Species	Year	Council-Preferred OY (mt)	Fishery Sector	Sharing Formula (see Section 2.2)	Harvest Guideline or Target (mt)
Black Rockfish (off CA and OR)	2005	753	CA Total	42% of OY	316
			CA Rec. Total	55% of CA Total	175
			CA NS Comm. Total	45% of CA Total	141
			CA Total N. 40°10' N. lat.	60% of CA Total	190
			CA Rec. N. 40°10' N. lat.	39% of CA Total N. 40°10' N. lat.	74
			CA NS Comm. N. 40°10' N. lat.	61% of CA Total N. 40°10' N. lat.	116
			CA Total S. 40°10' N. lat.	40% of CA Total	126
			CA Rec. S. 40°10' N. lat.	80% of CA Total S. 40°10' N. lat.	101
			CA NS Comm. S. 40°10' N. lat.	20% of CA Total S. 40°10' N. lat.	25
			OR Total	58% of OY	437
	2006	736	CA Total	42% of OY	309
			CA Rec. Total	55% of CA Total	170
			CA NS Comm. Total	45% of CA Total	139
			CA Total N. 40°10' N. lat.	60% of CA Total	185
			CA Rec. N. 40°10' N. lat.	39% of CA Total N. 40°10' N. lat.	72
			CA NS Comm. N. 40°10' N. lat.	61% of CA Total N. 40°10' N. lat.	113
			CA Total S. 40°10' N. lat.	40% of CA Total	124
			CA Rec. S. 40°10' N. lat.	80% of CA Total S. 40°10' N. lat.	99
			CA NS Comm. S. 40°10' N. lat.	20% of CA Total S. 40°10' N. lat.	25
			OR Total	58% of OY	427
Canary Rockfish	2005 & 2006	NA	CA Rec.		9.3
			OR & WA Rec.		8.5

TABLE 2-4. Proposed harvest guidelines for selected species and fishery sectors for 2005 and 2006. (Page 2 of 2)

Species	Year	Council-Preferred OY (mt)	Fishery Sector	Sharing Formula (see Section 2.2)	Harvest Guideline or Target (mt)
Lingcod	2005 & 2006	2,414	CA Total	See Section 2.2	612
			CA Rec.		422
			OR & WA Total		1,801
	2005		OR & WA Rec.		~~206~~ 234 [a/]
	2006		OR & WA Rec.		~~239~~ 271 [a/]
Yelloweye	2005 & 2006	26 in 2005 27 in 2006	CA Rec.	See Section 2.2	3.7
			OR & WA Rec.		6.7

a/ The Oregon and Washington recreational lingcod harvest guideline was modified by the Council at their September 2004 meeting.

TABLE 2-5. Estimated mortality (mt) of overfished West Coast groundfish species by fishery in 2004 based on April 2004 Council actions that describe effects under the **No Action Alternative**. (Page 1 of 1)

Fishery	Bocaccioa[a/]	Canary	Cowcod	Dkbl	Lingcod	POP	Widow	Yelloweye
Limited Entry Groundfish								
Trawl- Non-whiting	51.0	10.1	0.5	73.5	104.7	90.7	2.5	0.3
Fixed Gear	13.4	0.9	0.1	0.8	20.0	0.3	0.5	2.5
Whiting								
At-sea whiting motherships		0.9		1.4	0.3	1.7	59.7	0.0
At-sea whiting cat-proc		1.3		7.6	0.4	10.1	84.6	0.4
Shoreside whiting		0.4		0.5	0.7	0.4	29.9	0.0
Tribal whiting		4.7		0.0	0.5	1.5	37.1	0.0
Open Access								
Groundfish directed	10.6	1.0	0.1	0.2	70.0	0.1		0.6
CA Halibut	0.1			0.0	2.0	0.0		
CA Gillnet[b/]	0.5			0.0		0.0	0.0	
CA Sheephead[b/]				0.0		0.0	0.0	0.0
CPS- wetfish[b/]	0.3							
CPS- squid[c/]								
Dungeness crab[b/]	0.0		0.0	0.0		0.0		
HMS[b/]		0.0	0.0	0.0				
Pacific Halibut[b/]	0.0		0.0	0.0		0.0	0.0	0.5
Pink shrimp	0.1	0.5	0.0	0.0	0.5	0.0	0.1	0.1
Ridgeback prawn	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Salmon troll	0.2	1.6	0.0	0.0	0.3	0.0	0.0	0.2
Sea Cucumber	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spot Prawn (trap)								
Tribal								
Midwater Trawl		2.3		0.0	0.1	0.0	40.0	0.0
Bottom Trawl		0.5		0.0	9.0	0.0	0.0	0.0
Troll		0.5		0.0	1.0	0.0		0.0
Fixed gear		0.3		0.0	15.0	0.0	0.0	2.3
Recreational Groundfish								
WA		1.7			65.0			3.5
OR		6.8			109.7		1.4	3.2
CA	62.8	9.3	1.8		268.9		1.4	3.7
Research: Based on 2 most recent NMFS trawl shelf and slope surveys, the IPHC halibut survey, and LOAs with expanded estimates for south of Pt. Conception.								
	2.0	1.0		1.6	3.0	3.0	1.5	1.1
Non-EFP Total	141.1	43.8	2.5	85.6	671.1	107.8	258.7	18.5
EFPs[d/]								
CA: NS FF trawl	10.0	0.5	0.5		20.0			0.5
OR: DTS[e/]		0.1		6.0		18.0		0.1
WA: AT trawl		1.5		3.0	4.5	8.5	5.5	0.5
WA: dogfish LL		0.1		0.5	2.0	0.5	0.5	1.0
WA: pollock		0.1					1.5	0.1
EFP Subtotal	10.0	2.3	0.5	9.5	26.5	27.0	7.5	2.2
TOTAL	151.1	46.1	3.0	95.1	697.6	134.8	266.2	20.7
2004 OY	250	47.3	4.8	240	735	444	284	22
Difference	98.9	1.2	1.8	144.9	37.4	309.2	17.8	1.3
Percent of OY	60.4%	97.5%	62.5%	39.6%	94.9%	30.4%	93.7%	93.9%
Key		= not applicable; trace amount (<0.01 mt); or not reported in available data sources.						

a/ South of 40°10' N. lat.

b/ Mortality estimates are not hard numbers; based on the GMT's best professional judgement.

c/ Bycatch amounts by species unavailable, but bocaccio occurred in 0.1% of all port samples and other rockfish in another 0.1% of all port samples (and squid fisheries usually land their whole catch). In 2001, out of 84,000 mt total landings, 1 mt was groundfish. This suggests that total bocaccio was caught in trace amounts.

d/ Values are proposed EFP bycatch caps, not estimates of total mortality. The EFP is terminated inseason if the cap is projected to be attained early.

e/ The darkblotched rockfish and POP caps are not defined yet for this EFP, but are expected to be lower than the placeholders in this scorecard.

TABLE 2-6. Summary of 2002 scientific fishing catch in pounds converted from numbers of fish (bold numbers reported directly in pounds). (Page 1 of 2)

Scientific Fishing Description	**Whiting**	**Lingcod**	**POP**	**Bocaccio**	**Canary**	**Widow**	**Darkblotched**	**Yelloweye**	**Cowcod**	**Sablefish**	**Dover Sole**	**Arrowtooth**
AFSC - Post Capture and Mortality of Bycatch[a/]	0	0	0	0	0	0	0	0	0	0	0	0
NWFSC - Slope and Shelf Survey	**0**	**1,928**	**765**	**265**	**187**	**743**	**98**	**144**	**38**	**9,486**	**35,826**	**164**
NWFSC - Cooperative Pre-Recruit Whiting Survey	**16**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**0**
NWFSC - Sablefish Pot Survey	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**17,445**[b/]	**15**	**0**
NWFSC - US/Canada Echo Whiting Integration and Oceanographic Survey	**5,243**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**
IPHC - Halibut Survey[a/]	226	73	0	0	36	0	0	691	0	16,810	0	440
ODFW - Selective Flatfish Trawl	**9,281**	**5,401**	**0**	**0**	**66**	**0**	**88**	**22**	**0**	**6,041**	**8,510**	**10,229**
ODFW - Rockfish Assessment	**0**	**0**	**0**	**0**	**34**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Total (lb)	**14,766**	**7,402**	**765**	**265**	**323**	**747**	**186**	**857**	**38**	**49,782**	**44,351**	**10,833**
Total (mt)	**7**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**23**	**20**	**5**
Portion of Total Catch OY	**0.00005**	**0.00582**	**0.00000**	**0.00120**	**0.00158**	**0.00040**	**0.00050**	**0.02879**	**0.00718**	**0.00491**	**0.00270**	**0.00085**

TABLE 2-6. Summary of 2002 scientific fishing catch in pounds converted from numbers of fish (bold numbers reported directly in pounds). (Page 2 of 2)

Scientific Fishing Description	Shtsp Thrnhead	Lngsp Thrnhead	Unid Thrnhead	Chilipepper	Shortbelly	Yellowtail	English Sole	Petrale Sole	Rex Sole	Rock Sole	Other Rockfish	Spiny Dogfish
AFSC - Post Capture and Mortality of Bycatch[a/]	0	0	0	0	0	0	0	0	0	550	0	0
NWFSC - Slope and Shelf Survey	**11,632**	**18,893**	**0**	**3,834**	**0**	**2**	**2,415**	**570**	**6,303**	**62**	**3,978**	**0**
NWFSC - Cooperative Pre-Recruit Whiting Survey	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**7**	**0**
NWFSC - Sablefish Pot Survey	**2**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
NWFSC - US/Canada Echo Whiting Integration and Oceanographic Survey	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**6**
IPHC - Halibut Survey[a/]	51	0	0	0	0	2	0	0	0	6	52	8,329
ODFW - Selective Flatfish Trawl	**198**	**0**	**0**	**0**	**0**	**66**	**375**	**1,345**	**838**	**22**	**3,109**	**309**
ODFW - Rockfish Assessment	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**22**	**0**
Total (lb)	**11,883**	**18,894**	**0**	**3,834**	**1**	**70**	**2,790**	**1,915**	**7,141**	**640**	**7,168**	**8,644**
Total (mt)	**5**	**9**	**0**	**2**	**0**	**0**	**1**	**1**	**3**	**0**	**3**	**4**
Portion of Total Catch OY	**0.00564**	**0.00323**	**NA**	**0.00087**	**0.00000**	**0.00000**	**0.00041**	**0.00031**	**NA**	**NA**	**NA**	**NA**

a/ Survey reported landings in numbers of fish. An average weight (lb) was multiplied by the number of fish to estimate catch in weight for each species. The average weight for most species was estimated from RecFIN data (all modes, all areas) over the years 1998-2003. For species not reported in RecFIN (longspine thornyhead, unidentified thornyhead, rex sole, and other rockfish), a best guess estimate was used to estimate weight.

b/ 85% released alive.

TABLE 2-7. Summary of 2003 scientific fishing catch in pounds converted from numbers of fish (bold numbers reported directly in pounds). (Page 1 of 4)

Scientific Fishing Description	**Whiting**	**Lingcod**	**POP**	**Bocaccio**	**Canary**	**Widow**	**Darkblotched**	**Yelloweye**	**Cowcod**	**Sablefish**	**Dover Sole**	**Arrowtooth**
AFSC - Post Capture and Mortality of Bycatch[a/]	0	88	0	0	0	0	0	0	0	0	0	0
NWFSC - Slope and Shelf Survey	**68,359**	**9,266**	**7,832**	**494**	**2,389**	**2,084**	**8,291**	**547**	**28**	**32,310**	**68,326**	**14,111**
NWFSC - Cooperative Pre-Recruit Whiting Survey[a/]	85,730	131	0	0	0	0	0	0	0	0	41	0
NWFSC - Sablefish Pot Survey[b/]	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**33,927**	**3**	**0**
NWFSC - US/Canada Echo Whiting Integration and Oceanographic Survey	**113,783**	**19**	**28**	**16**	**7**	**9**	**130**	**0**	**0**	**146**	**290**	**228**
NWFSC - Fixed Gear Survey in California Bight	**0**	**45**	**0**	**435**	**0**	**0**	**0**	**0**	**12**	**0**	**0**	**0**
NWFSC - Groundfish Acoustic Monitoring[a/]	0	44	0	0	0	0	0	0	0	0	0	0

TABLE 2-7. Summary of 2003 scientific fishing catch in pounds converted from numbers of fish (bold numbers reported directly in pounds). (Page 2 of 4)

Scientific Fishing Description	**Whiting**	**Lingcod**	**POP**	**Bocaccio**	**Canary**	**Widow**	**Darkblotched**	**Yelloweye**	**Cowcod**	**Sablefish**	**Dover Sole**	**Arrowtooth**
IPHC - Halibut Survey[a/]	446	394	0	0	20	0	0	1,553	0	39,851	0	374
ODFW - Selective Flatfish Trawl	**6,438**	**521**	**3,160**	**0**	**0**	**47**	**2,919**	**3**	**0**	**29,436**	**19,464**	**23,556**
ODFW - Flatfish Selective Pot Gear[c/]	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
EPA - Assessing Benthic Habitat[a/]	4	0	0	0	0	0	0	5	0	7	0	0
WSU - Rockfish Habitat Utilization[d/]	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
CalPoly - Nearshore Fish Survey[c/]	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Total (lb)	**274,760**	**10,508**	**11,020**	**945**	**2,416**	**2,140**	**11,340**	**2,108**	**40**	**135,676**	**88,124**	**38,269**
Total (mt)	**125**	**5**	**5**	**0**	**1**	**1**	**5**	**1**	**0**	**62**	**40**	**17**
Portion of Total Catch OY	**0.00084**	**0.00732**	**0.01326**	**0.02143**	**0.02490**	**0.00117**	**0.02991**	**0.04347**	**0.00378**	**0.00906**	**0.00537**	**0.00299**

TABLE 2-7. Summary of 2003 scientific fishing catch in pounds converted from numbers of fish (bold numbers reported directly in pounds). (Page 3 of 4)

Scientific Fishing Description	Shtsp Thrnhead	Lngsp Thrnhead	Unid Thrnhead	Chilipepper	Shortbelly	Yellow-tail	English Sole	Petrale Sole	Rex Sole	Rock Sole	Other Rockfish	Spiny Dogfish
AFSC - Post Capture and Mortality of Bycatch[a/]	0	0	0	0	0	0	541	0	0	0	0	0
NWFSC - Slope and Shelf Survey	**8,194**	**24,660**	**0**	**24,314**	**13,138**	**8,576**	**9,074**	**3,793**	**16,139**	**416**	**38,133**	**79,991**
NWFSC - Cooperative Pre-Recruit Whiting Survey[a/]	0	0	0	0	0	0	0	0	2	0	1,238	0
NWFSC - Sablefish Pot Survey[b/]	**39**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**0**
NWFSC - US/Canada Echo Whiting Integration and Oceanographic Survey	**40**	**0**	**0**	**3,442**	**20**	**891**	**39**	**27**	**258**	**0**	**1,241**	**12,088**
NWFSC - Fixed Gear Survey in California Bight	**0**	**0**	**0**	**5**	**0**	**9**	**0**	**0**	**0**	**0**	**626**	**0**
NWFSC - Groundfish Acoustic Monitoring[a/]	0	0	0	0	0	3	0	0	0	0	4	0

TABLE 2-7. Summary of 2003 scientific fishing catch in pounds converted from numbers of fish (bold numbers reported directly in pounds). (Page 4 of 4)

Scientific Fishing Description	**Shtsp Thrnhead**	**Lngsp Thrnhead**	**Unid Thrnhead**	**Chilipepper**	**Shortbelly**	**Yellow-tail**	**English Sole**	**Petrale Sole**	**Rex Sole**	**Rock Sole**	**Other Rockfish**	**Spiny Dogfish**
IPHC - Halibut Survey[a/]	274	0	0	0	0	2	0	12	0	0	286	14,989
ODFW - Selective Flatfish Trawl	**9,659**	**4**	**0**	**1**	**0**	**0**	**6**	**317**	**3,179**	**0**	**5,669**	**503**
ODFW - Flatfish Selective Pot Gear[c/]	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
EPA - Assessing Benthic Habitat[a/]	0	0	0	0	0	0	0	0	0	0	8	0
WSU - Rockfish Habitat Utilization[d/]	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
CalPoly - Nearshore Fish Survey[c/]	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Total (lb)	**18,206**	**24,665**	**0**	**27,762**	**13,158**	**9,481**	**9,660**	**4,149**	**19,578**	**416**	**47,209**	**107,571**
Total (mt)	**8**	**11**	**0**	**13**	**6**	**4**	**4**	**2**	**9**	**0**	**21**	**49**
Portion of Total Catch OY	**0.00865**	**0.00455**	**NA**	**0.00630**	**0.00043**	**0.00137**	**0.00141**	**0.00068**	**NA**	**NA**	**NA**	**NA**

a/ Survey reported landings in numbers of fish. An average weight (lb) was multiplied by the number of fish to estimate catch in weight for each species. The average weight for most species was estimated from RecFIN data (all modes, all areas) over the years 1998-2003. For species not reported in RecFIN (longspine thornyhead, unidentified thornyhead, rex sole, and other rockfish), a best guess estimate was used to estimate weight.

b/ All catch was released except 10% of sablefish catch.

c/ Unable to conduct research in 2003.

d/ No fish were caught in 2003.

TABLE 2-8. Predicted Catch from Scientific Fishing per Year in 2005. (Page 1 of 2)

Scientific Fishing Description	Whiting Catch	Lingcod Catch	POP Catch	Bocaccio Catch	Canary Catch	Widow Catch	Darkblotched Catch	Yelloweye Catch	Cowcod Catch	Sablefish Catch	Dover Sole Catch	Arrowtooth Catch
AFSC - Post Capture and Mortality of Bycatch [a/]	0	87.6	0	0	0	0	0	0	0	0	0	0
NWFSC - Slope and Shelf Survey	**68359**	**9266**	**7832**	**494**	**3700 ***	**2084**	**8291**	**547**	**28**	**32310**	**68326**	**14111**
NWFSC - Cooperative Pre-Recruit Whiting Survey [a/]	85730	131	0	0	0	0	0	0	0	0	41	0
NWFSC - Sablefish Pot Survey	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**33927**	**3**	**0**
NWFSC - US/Canada Echo Whiting Integration and Oceanographic Survey	**113783**	**19**	**28**	**16**	**7**	**9**	**130**	**0**	**0**	**146**	**290**	**228**
NWFSC - Fixed Gear Survey in California Bight	**0**	**45**	**0**	**435**	**0**	**0**	**0**	**0**	**12**	**0**	**0**	**0**
NWFSC - Groundfish Acoustic Monitoring [a/]	0	44	0	0	0	0	0	0	0	0	0	0
IPHC - Halibut Survey [a/]	446	394	0	0	20	0	0	1553	0	39851	0	374
ODFW - Flatfish Selective Pot Gear	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Total (lb)	**268318**	**9987**	**7860**	**945**	**3727**	**2093**	**8421**	**2100**	**40**	**106234**	**68660**	**14713**
Total (mt)	**121.7**	**4.5**	**3.6**	**0.4**	**1.7**	**0.9**	**3.8**	**1.0**	**0.0**	**48.2**	**31.1**	**6.7**

* Canary projection based on 2003 final catch and preliminary 2004 data.

TABLE 2-8. Predicted Catch from Scientific Fishing per Year in 2005. (Page 2 of 2)

Scientific Fishing Description	Shortspine Thornyhead Catch	Longspine Thornyhead Catch	Chili-pepper Catch	Short-belly Catch	Yellowtail Catch	English Sole Catch	Petrale Sole Catch	Rex Sole Catch	Rock Sole Catch	Other Rockfish Catch	Spiny Dogfish Catch	Comments
AFSC - Post Capture and Mortality of Bycatch [a/]	0	0	0	0	0	541	0	0	0	0	0	2003 final catch data
NWFSC - Slope and Shelf Survey	**8194**	**24660**	**24314**	**13138**	**8576**	**9074**	**3793**	**16139**	**416**	**38133**	**79991**	2003 final catch data
NWFSC - Cooperative Pre-Recruit Whiting Survey [a/]	0	0	0	0	0	0	0	2	0	1238	0	2003 final catch data
NWFSC - Sablefish Pot Survey	**39**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**0**	2003 final catch data (all catch was released except 10% of sablefish catch)
NWFSC - US/Canada Echo Whiting Integration and Oceanographic Survey	**40**	**0**	**3442**	**20**	**891**	**39**	**27**	**258**	**0**	**1241**	**12088**	2003 final catch data
NWFSC - Fixed Gear Survey in California Bight	**0**	**0**	**5**	**0**	**9**	**0**	**0**	**0**	**0**	**626**	**0**	2003 final catch data
NWFSC - Groundfish Acoustic Monitoring [a/]	0	0	0	0	3	0	0	0	0	4	0	2003 final catch data
IPHC - Halibut Survey [a/]	274	0	0	0	2	0	12	0	0	286	14989	2003 final catch data
ODFW - Flatfish Selective Pot Gear	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	unable to conduct research in 2003
Total (lb)	**8547**	**24661**	**27761**	**13158**	**9481**	**9654**	**3832**	**16399**	**416**	**41532**	**107068**	
Total (mt)	**3.9**	**11.2**	**12.6**	**6.0**	**4.3**	**4.4**	**1.7**	**7.4**	**0.2**	**18.8**	**48.6**	

a/ Survey reported landings in numbers of fish. An average weight (lbs) was multiplied by the number of fish to estimate catch in weight for each species. The average weight for most species was estimated from RecFIN data (all modes, all areas) over the years 1998-2003. For species not reported in RecFIN (longspine thornyhead, unidentified thornyhead, rex sole, and other rockfish), a best guess estimate was used to estimate weight.

Legend

normal text = pounds of fish converted from number of fish

bold text = pounds of fish

TABLE 2-9. Predicted Catch from Scientific Fishing per Year in 2006. (Page 1 of 2)

Scientific Fishing Description	Whiting Catch	Lingcod Catch	POP Catch	Bocaccio Catch	Canary Catch	Widow Catch	Darkblotched Catch	Yelloweye Catch	Cowcod Catch	Sablefish Catch	Dover Sole Catch	Arrowtooth Catch
AFSC - Post Capture and Mortality of Bycatch [a/]	0	87.6	0	0	0	0	0	0	0	0	0	0
NWFSC - Slope and Shelf Survey	**68359**	**9266**	**7832**	**494**	**3700 ***	**2084**	**8291**	**547**	**28**	**32310**	**68326**	**14111**
NWFSC - Cooperative Pre-Recruit Whiting Survey [a/]	85730	131	0	0	0	0	0	0	0	0	41	0
NWFSC - Sablefish Pot Survey	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**33927**	**3**	**0**
NWFSC "Triennial"-style shelf survey	**237760**	**5977**	**2370**	**285**	**2250**	**192**	**3094**			**83527**	**62829**	**15510**
NWFSC - Fixed Gear Survey in California Bight	**0**	**45**	**0**	**435**	**0**	**0**	**0**	**0**	**12**	**0**	**0**	**0**
NWFSC - Groundfish Acoustic Monitoring [a/]	0	44	0	0	0	0	0	0	0	0	0	0
IPHC - Halibut Survey [a/]	446	394	0	0	20	0	0	1553	0	39851	0	374
ODFW - Flatfish Selective Pot Gear	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Total (lb)	**392295**	**15945**	**10202**	**1214**	**5970**	**2276**	**11385**	**2100**	**40**	**189615**	**131199**	**29995**
Total (mt)	**177.9**	**7.2**	**4.6**	**0.6**	**2.7**	**1.0**	**5.2**	**1.0**	**0.0**	**86.0**	**59.5**	**13.6**

* Canary projection based on 2003 final catch and preliminary 2004 data.

TABLE 2-9. Predicted Catch from Scientific Fishing per Year in 2006. (Page 2 of 2)

Scientific Fishing Description	Shortspine Thornyhead Catch	Longspine Thornyhead Catch	Chili-pepper Catch	Short-belly Catch	Yellowtail Catch	English Sole Catch	Petrale Sole Catch	Rex Sole Catch	Rock Sole Catch	Other Rockfish Catch	Spiny Dogfish Catch	Comments
AFSC - Post Capture and Mortality of Bycatch [a/]	0	0	0	0	0	541	0	0	0	0	0	2003 final catch data
NWFSC - Slope and Shelf Survey	**8194**	**24660**	**24314**	**13138**	**8576**	**9074**	**3793**	**16139**	**416**	**38133**	**79991**	2003 final catch data
NWFSC - Cooperative Pre-Recruit Whiting Survey [a/]	0	0	0	0	0	0	0	2	0	1238	0	2003 final catch data
NWFSC - Sablefish Pot Survey	**39**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**0**	2003 final catch data (all catch was released except 10% of sablefish catch)
NWFSC "Triennial"-style shelf survey	**6808**	**659**	**22899**	**12181**	**3122**	**11871**	**2649**	**28501**	**201**	**8448**	**27830**	2001 final catch data
NWFSC - Fixed Gear Survey in California Bight	**0**	**0**	**5**	**0**	**9**	**0**	**0**	**0**	**0**	**626**	**0**	2003 final catch data
NWFSC - Groundfish Acoustic Monitoring [a/]	0	0	0	0	3	0	0	0	0	4	0	2003 final catch data
IPHC - Halibut Survey [a/]	274	0	0	0	2	0	12	0	0	286	14989	2003 final catch data
ODFW - Flatfish Selective Pot Gear	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	unable to conduct research in 2003
Total (lb)	**15315**	**25320**	**47218**	**25319**	**11712**	**21486**	**6454**	**44642**	**617**	**48739**	**122810**	
Total (mt)	**6.9**	**11.5**	**21.4**	**11.5**	**5.3**	**9.7**	**2.9**	**20.2**	**0.3**	**22.1**	**55.7**	

a/ Survey reported landings in numbers of fish. An average weight (lbs) was multiplied by the number of fish to estimate catch in weight for each species. The average weight for most species was estimated from RecFIN data (all modes, all areas) over the years 1998-2003. For species not reported in RecFIN (longspine thornyhead, unidentified thornyhead, rex sole, and other rockfish), a best guess estimate was used to estimate weight.

Legend

normal text = pounds of fish converted from number of fish

bold text = pounds of fish

TABLE 2-10. Estimated mortality (mt) of overfished West Coast groundfish species by fishery in 2005 under **Action Alternative 1**. (Page 1 of 1)

Fishery	Bocaccio[a/]	Canary[b/]	Cowcod	Dkbl	Lingcod	POP	Widow	Yelloweye
Limited Entry Groundfish								
Trawl- Non-whiting	34.6	8.0	0.2	63.1	85.6	56.4	1.3	0.4
Fixed Gear[c/]	13.4	0.9	0.1	1.2	20.0	0.4	0.5	2.5
Whiting								
At-sea whiting motherships		0.6		2.7	0.2	3.6	46.2	0.1
At-sea whiting cat-proc		0.9		3.8	0.3	5.1	65.5	0.2
Shoreside whiting		0.3		0.4	0.5	0.3	19.7	0.0
Tribal whiting		4.1		0.0	0.5	1.6	15.8	0.0
Open Access								
Groundfish directed	10.6	1.0	0.1	0.2	70.0	0.1		0.6
CA Halibut	0.1			0.0	2.0	0.0		
CA Gillnet[d/]	0.5			0.0		0.0	0.0	
CA Sheephead[d/]				0.0		0.0	0.0	0.0
CPS- wetfish[d/]	0.3							
CPS- squid[e/]								
Dungeness crab[d/]	0.0		0.0	0.0		0.0		
HMS d/		0.0	0.0	0.0				
Pacific Halibut[d/]	0.0		0.0	0.0		0.0	0.0	0.5
Pink shrimp	0.1	0.5	0.0	0.0	0.5	0.0	0.1	0.1
Ridgeback prawn	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Salmon troll	0.2	1.6	0.0	0.0	0.3	0.0	0.0	0.2
Sea Cucumber	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spot Prawn (trap)								
Tribal								
Midwater Trawl		1.6		0.0	0.1	0.0	40.0	
Bottom Trawl		0.5		0.0	9.0	0.0	0.0	0.0
Troll		0.5		0.0	1.0	0.0		
Fixed gear		0.4		0.0	15.0	0.0	0.0	2.3
Recreational Groundfish								
WA		1.7			74.0			3.5
OR		6.8			132.0		1.4	3.2
CA	51.8	8.7	0.4		334.3		0.3	1.5
Research: Based on 2 most recent NMFS trawl shelf and slope surveys, the IPHC halibut survey, and LOAs with expanded estimates for south of Pt. Conception.								
	0.4	1.1		3.8	4.5	3.6	0.9	1.0
Non-EFP Total	112.1	39.2	0.8	75.2	749.8	71.1	191.7	16.1
EFPs[f/]								
CA: Sel. FF trawl	10.0	0.5	0.5		20.0			0.5
OR: Sel. FF trawl		0.4		0.5	6.5	0.2		0.2
WA: AT trawl		2.5		3.0	4.5	18.0	5.5	0.5
WA: dogfish LL		0.1		0.5	2.0	8.5	0.5	1.0
WA: pollock		0.1					1.5	0.1
EFP Subtotal	10.0	3.6	0.5	4.0	33.0	26.7	7.5	2.2
TOTAL	122.1	42.8	1.3	79.2	782.8	97.8	199.2	18.4
2005 OY	307		4.2	269	2,414	447	285	26
Difference	184.9		2.9	189.8	1,631.2	349.2	85.8	7.6
Percent of OY	39.8%		31.0%	29.4%	32.4%	21.9%	69.9%	70.6%
Key	(shaded)	= not applicable; trace amount (<0.01 mt); or not reported in available data sources.						

a/ South of 40°10' N. lat.

b/ The canary rockfish OY has yet to be decided.

c/ Fixed gear mortality estimates are the higher of those impacts assumed under the No Action Alternative or those estimated for the primary sablefish fishery (see Section 2.2.4).

d/ Mortality estimates are not hard numbers; based on the GMT's best professional judgement.

e/ Bycatch amounts by species unavailable, but bocaccio occurred in 0.1% of all port samples and other rockfish in another 0.1% of all port samples (and squid fisheries usually land their whole catch). In 2001, out of 84,000 mt total landings, 1 mt was groundfish. This suggests that total bocaccio was caught in trace amounts.

f/ Values are proposed EFP bycatch caps, not estimates of total mortality. The EFP is terminated inseason if the cap is projected to be attained early.

TABLE 2-11. Estimated mortality (mt) of overfished West Coast groundfish species by fishery in 2005 under **Action Alternative 2**. (Page 1 of 1)

Fishery	Bocaccio[a/]	Canary[b/]	Cowcod	Dkbl	Lingcod	POP	Widow	Yelloweye
Limited Entry Groundfish								
Trawl- Non-whiting	44.0	9.9	0.3	65.9	112.7	57.0	1.4	0.5
Fixed Gear[c/]	13.4	0.9	0.1	1.2	20.0	0.4	0.5	2.5
Whiting								
At-sea whiting motherships		1.4		5.8	0.5	7.7	99.2	0.3
At-sea whiting cat-proc		2.0		8.2	0.7	10.9	140.5	0.4
Shoreside whiting		0.6		0.8	1.0	0.6	42.2	0.0
Tribal whiting		5.2		0.1	0.6	2.1	20.1	0.0
Open Access								
Groundfish directed	10.6	1.0	0.1	0.2	70.0	0.1		0.6
CA Halibut	0.1			0.0	2.0	0.0		
CA Gillnet[d/]	0.5			0.0		0.0	0.0	
CA Sheephead[d/]				0.0		0.0	0.0	0.0
CPS- wetfish [d/]	0.3							
CPS- squid[e/]								
Dungeness crab[d/]	0.0		0.0	0.0		0.0		
HMS[d/]		0.0	0.0	0.0				
Pacific Halibut[d/]	0.0		0.0	0.0		0.0	0.0	0.5
Pink shrimp	0.1	0.5	0.0	0.0	0.5	0.0	0.1	0.1
Ridgeback prawn	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Salmon troll	0.2	1.6	0.0	0.0	0.3	0.0	0.0	0.2
Sea Cucumber	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spot Prawn (trap)								
Tribal								
Midwater Trawl		1.6		0.0	0.1	0.0	40.0	
Bottom Trawl		0.5		0.0	22.7	0.0	0.0	0.0
Troll		0.5		0.0	18.1	0.0		
Fixed Gear		0.4		0.0	9.1	0.0	0.0	2.3
Recreational Groundfish								
WA		1.7			65.0			3.5
OR		6.8			109.7		1.4	3.2
CA	51.8	8.7	0.4		334.3		0.3	1.5
Research: Based on 2 most recent NMFS trawl shelf and slope surveys, the IPHC halibut survey, and LOAs with expanded estimates for south of Pt. Conception.								
	0.4	1.1		3.8	4.5	3.6	0.9	1.0
Non-EFP Total	121.5	44.4	0.9	86.0	771.8	82.4	346.6	16.6
EFPs[f/]								
CA: Sel. FF trawl	10.0	0.5	0.5		20.0			0.5
OR: Sel. FF trawl		0.4		0.5	6.5	0.2		0.2
WA: AT trawl		2.5		3.0	4.5	18.0	5.5	0.5
WA: dogfish LL		0.1		0.5	2.0	8.5	0.5	1.0
WA: pollock		0.1					1.5	0.1
EFP Subtotal	10.0	3.6	0.5	4.0	33.0	26.7	7.5	2.2
TOTAL	131.5	48.0	1.4	90.0	804.8	109.1	**354.1**	18.8
2005 OY	307		4.2	269	2,414	447	285	26
Difference	175.5		2.8	179.0	1,609.2	337.9	**-69.1**	7.2
Percent of OY	42.8%		33.3%	33.5%	33.3%	24.4%	**124.2%**	72.5%
Key	(shaded)	= not applicable; trace amount (<0.01 mt); or not reported in available data sources.						

a/ South of 40°10' N. lat.

b/ The canary rockfish OY has yet to be decided.

c/ Fixed gear mortality estimates are the higher of those impacts assumed under the No Action Alternative or those estimated for the primary sablefish fishery (see Section 2.2.4).

d/ Mortality estimates are not hard numbers; based on the GMT's best professional judgement.

e/ Bycatch amounts by species unavailable, but bocaccio occurred in 0.1% of all port samples and other rockfish in another 0.1% of all port samples (and squid fisheries usually land their whole catch). In 2001, out of 84,000 mt total landings, 1 mt was groundfish. This suggests that total bocaccio was caught in trace amounts.

f/ Values are proposed EFP bycatch caps, not estimates of total mortality. The EFP is terminated inseason if the cap is projected to be attained early.

TABLE 2-12. Estimated mortality (mt) of overfished West Coast groundfish species by fishery in 2005 under **Action Alternative 3**. (Page 1 of 1)

Fishery	Bocaccio[a/]	Canary[b/]	Cowcod	Dkbl	Lingcod	POP	Widow	Yelloweye
Limited Entry Groundfish								
Trawl- Non-whiting	44.0	10.6	0.3	66.6	116.6	57.4	1.4	0.5
Fixed Gear[c/]	13.4	0.9	0.1	1.2	20.0	0.4	0.5	2.5
Whiting								
At-sea whiting motherships		2.9		12.2	1.0	16.2	209.6	0.6
At-sea whiting cat-proc		4.1		17.3	1.4	23.0	297.0	0.8
Shoreside whiting		1.2		1.6	2.2	1.2	89.3	0.0
Tribal whiting		5.2		0.1	0.6	2.1	20.1	0.0
Open Access								
Groundfish directed	10.6	1.0	0.1	0.2	70.0	0.1		0.6
CA Halibut	0.1			0.0	2.0	0.0		
CA Gillnet[d/]	0.5			0.0		0.0	0.0	
CA Sheephead[d/]				0.0		0.0	0.0	0.0
CPS- wetfish[d/]	0.3							
CPS- squid[e/]								
Dungeness crab[d/]	0.0		0.0	0.0		0.0		
HMS[d/]		0.0	0.0	0.0				
Pacific Halibut[d/]	0.0		0.0	0.0		0.0	0.0	0.5
Pink shrimp	0.1	0.5	0.0	0.0	0.5	0.0	0.1	0.1
Ridgeback prawn	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Salmon troll	0.2	1.6	0.0	0.0	0.3	0.0	0.0	0.2
Sea Cucumber	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spot Prawn (trap)								
Tribal								
Midwater Trawl		1.6		0.0	0.1	0.0	40.0	
Bottom Trawl		0.5		0.0	35.2	0.0	0.0	0.0
Troll		0.5		0.0	55.6	0.0		
Fixed Gear		0.4		0.0	9.1	0.0	0.0	2.3
Recreational Groundfish								
WA		1.7			65.0			3.5
OR		6.8			109.7		1.4	3.2
CA	51.8	8.7	0.4		334.3		0.3	1.5
Research: Based on 2 most recent NMFS trawl shelf and slope surveys, the IPHC halibut survey, and LOAs with expanded estimates for south of Pt. Conception.								
	0.4	1.1		3.8	4.5	3.6	0.9	1.0
Non-EFP Total	121.5	49.3	0.9	103.0	828.1	104.0	660.6	17.3
EFPs[f/]								
CA: Sel. FF trawl	10.0	0.5	0.5		20.0			0.5
OR: Sel. FF trawl		0.4		0.5	6.5	0.2		0.2
WA: AT trawl		2.5		3.0	4.5	18.0	5.5	0.5
WA: dogfish LL		0.1		0.5	2.0	8.5	0.5	1.0
WA: pollock		0.1					1.5	0.1
EFP Subtotal	10.0	3.6	0.5	4.0	33.0	26.7	7.5	2.2
TOTAL	131.5	**52.9**	1.4	107.0	861.1	130.7	**668.1**	19.6
2005 OY	307		4.2	269	2,414	447	285	26
Difference	175.5		2.8	162.0	1,552.9	316.3	**-383.1**	6.4
Percent of OY	42.8%		33.3%	39.8%	35.7%	29.2%	**234.4%**	75.2%
Key		= not applicable; trace amount (<0.01 mt); or not reported in available data sources.						

a/ South of 40°10' N. lat.
b/ The canary rockfish OY has yet to be decided.
c/ Fixed gear mortality estimates are the higher of those impacts assumed under the No Action Alternative or those estimated for the primary sablefish fishery (see Section 2.2.4).
d/ Mortality estimates are not hard numbers; based on the GMT's best professional judgement.
e/ Bycatch amounts by species unavailable, but bocaccio occurred in 0.1% of all port samples and other rockfish in another 0.1% of all port samples (and squid fisheries usually land their whole catch). In 2001, out of 84,000 mt total landings, 1 mt was groundfish. This suggests that total bocaccio was caught in trace amounts.
f/ Values are proposed EFP bycatch caps, not estimates of total mortality. The EFP is terminated inseason if the cap is projected to be attained early.

TABLE 2-13a. Revised (original in ~~strikeout~~) estimated total mortality of overfished West Coast groundfish species by fishery in **2005** under the **Council-Preferred Alternative** as modified September 2004. (Page 1 of 1)

Fishery	Bocaccio[a/]	Canary	Cowcod	Dkbl	Lingcod	POP	Widow	Yelloweye
Limited Entry Groundfish								
Trawl- Non-whiting[b/]	49.1 ~~51.2~~	8.0	0.5	67.5 ~~76.0~~	86.2 ~~124.2~~	75.3 ~~88.2~~	1.7 ~~1.9~~	0.4
Fixed Gear	13.4	0.9	0.1	1.2	20.0	0.4	0.5	2.5
Whiting[c/]								
At-sea whiting motherships		7.3		1.4	0.3	1.7	231.8	0.0
At-sea whiting cat-proc				7.6	0.4	10.1		0.4
Shoreside whiting				0.5	0.7	0.4		0.0
Tribal whiting				0.0	0.5	1.5		0.0
Open Access								
Groundfish directed	10.6	1.0	0.1	0.2	70.0	0.1		0.6
CA Halibut	0.1			0.0	2.0	0.0		
CA Gillnet[d/]	0.5			0.0		0.0	0.0	
CA Sheephead[d/]				0.0		0.0	0.0	0.0
CPS- wetfish[d/]	0.3							
CPS- squid[e/]								
Dungeness crab[d/]	0.0		0.0	0.0		0.0		
HMS[d/]		0.0	0.0	0.0				
Pacific Halibut[d/]	0.0		0.0	0.0		0.0	0.0	0.5
Pink shrimp	0.1	0.5	0.0	0.0	0.5	0.0	0.1	0.1
Ridgeback prawn	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Salmon troll	0.2	1.6	0.0	0.0	0.3	0.0	0.0	0.2
Sea Cucumber	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spot Prawn (trap)								
Tribal								
Midwater Trawl		1.3		0.0	0.1	0.0	40.0	0.0
Bottom Trawl		0.5		0.0	9.0	0.0	0.0	0.0
Troll		0.5		0.0	1.0	0.0		0.0
Fixed gear		0.3		0.0	15.0	0.0	0.0	2.3
Recreational Groundfish[f/]								
WA		8.5			206.0			6.7
OR							1.4	
CA	43.0	9.3	0.6		422.0		0.9	3.7
Research: Includes NMFS trawl shelf-slope surveys, the IPHC halibut survey, and expected impacts from SRPs and LOAs.								
	0.4	1.7		3.8	4.5	3.6	0.9	1.0
Non-EFP Total	117.8 ~~119.9~~	41.4	1.3	82.2 ~~90.7~~	838.5 ~~876.5~~	93.1 ~~106.0~~	277.3 ~~277.5~~	18.5
EFPs[g/]								
CA: Sel. FF trawl	10.0	0.5	0.5		20.0			0.5
OR: Sel. FF trawl		0.4		0.5	6.5	0.2		0.2
WA: AT trawl		1.75		3.0	4.5	18.0	5.5	0.5
WA: dogfish LL		0.1		0.5	2.0	8.5	0.5	1.0
WA: pollock		0.1					1.5	0.1
EFP Subtotal	10.0	2.9	0.5	4.0	33.0	26.7	7.5	2.3
TOTAL	127.8 ~~129.9~~	44.3	1.8	86.2 ~~94.7~~	871.5 ~~909.5~~	132.7	284.8 ~~285.0~~	20.7
2005 OY	307	46.8	4.2	269	2,414	447	285	26
Difference	179.2 ~~177.1~~	2.5	2.4	182.8 ~~174.3~~	1,542.5 ~~1,504.5~~	314.3	0.2 ~~0.0~~	5.3
Percent of OY	41.6 ~~42.3~~%	94.6%	42.9%	32.0 ~~35.2~~%	36.1 ~~37.7~~%	29.7%	100.0%	79.7%
Key		= either not applicable; trace amount (<0.01 mt); or not reported in available data sources.						

a/ South of 40°10' N. lat.

b/ The species impacts are under the Council's preferred option. The 8.0 mt of canary rockfish includes a buffer against the uncertainty of predicting impacts using new selective flatfish trawl gear. The point estimate of canary rockfish impacts under this option is 4.7 ~~5.2~~ mt.

c/ Estimated impacts for the 2005 whiting fisheries will be calculated in March 2005. The impacts in this scorecard are the 2004 impacts and are used as a placeholder with the exception of widow rockfish which is the residual yield after estimating impacts in non-whiting fisheries. The 7.3 mt of canary rockfish in this scorecard represents the placeholder for 2005 whiting fisheries adopted by the Council in June 2004.

d/ Mortality estimates are not hard numbers; based on the GMT's best professional judgement.

e/ Bycatch amounts by species unavailable, but bocaccio occurred in 0.1% of all port samples and other rockfish in another 0.1% of all port samples (and squid fisheries usually land their whole catch). In 2001, out of 84,000 mt total landings, 1 mt was groundfish. This suggests that total bocaccio was caught in trace amounts.

f/ Values for canary, lingcod, and yelloweye represent proposed harvest guidelines. California recreational estimates have yet to be updated.

g/ Values are proposed EFP bycatch caps, not estimates of total mortality. The EFP is terminated inseason if the cap is projected to be attained early.

TABLE 2-13b. Revised (original in ~~strikeout~~) estimated total mortality of overfished West Coast groundfish species by fishery in **2006** under the **Council-Preferred Alternative** as modified September 2004. (Page 1 of 1)

Fishery	Bocaccio[a/]	Canary	Cowcod	Dkbl	Lingcod	POP	Widow	Yelloweye
Limited Entry Groundfish								
Trawl- Non-whiting[b/]	49.1 ~~51.2~~	8.0	0.5	67.5 ~~76.0~~	86.2 ~~124.2~~	75.3 ~~88.2~~	1.7 ~~1.9~~	0.4
Fixed Gear	13.4	0.9	0.1	1.2	20.0	0.4	0.5	2.5
Whiting[c/]								
At-sea whiting motherships		7.3		1.4	0.3	1.7	243.2	0.0
At-sea whiting cat-proc				7.6	0.4	10.1		0.4
Shoreside whiting				0.5	0.7	0.4		0.0
Tribal whiting				0.0	0.5	1.5		0.0
Open Access								
Groundfish directed	10.6	1.0	0.1	0.2	70.0	0.1		0.6
CA Halibut	0.1			0.0	2.0	0.0		
CA Gillnet[d/]	0.5			0.0		0.0	0.0	
CA Sheephead[d/]				0.0		0.0	0.0	0.0
CPS- wetfish[d/]	0.3							
CPS- squid[e/]								
Dungeness crab[d/]	0.0		0.0	0.0		0.0		
HMS[d/]		0.0	0.0	0.0				
Pacific Halibut[d/]	0.0		0.0	0.0		0.0	0.0	0.5
Pink shrimp	0.1	0.5	0.0	0.0	0.5	0.0	0.1	0.1
Ridgeback prawn	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Salmon troll	0.2	1.6	0.0	0.0	0.3	0.0	0.0	0.2
Sea Cucumber	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spot Prawn (trap)								
Tribal								
Midwater Trawl		1.3		0.0	0.1	0.0	40.0	0.0
Bottom Trawl		0.5		0.0	9.0	0.0	0.0	0.0
Troll		0.5		0.0	1.0	0.0		0.0
Fixed gear		0.3		0.0	15.0	0.0	0.0	2.3
Recreational Groundfish[f/]								
WA		8.5			206.0			6.7
OR							1.4	
CA	43.0	9.3	0.6		422.0		0.9	3.7
Research: Includes NMFS trawl shelf-slope surveys, the NMFS triennial trawl survey, the IPHC halibut survey, and expected impacts from SRPs and LOAs.								
	0.6	2.7		5.2	7.2	4.6	1.0	1.0
Non-EFP Total	118 ~~120.1~~	42.4	1.3	83.6 ~~92.1~~	841.2 ~~879.2~~	94.1 ~~107.0~~	288.8 ~~289.0~~	18.5
EFPs[g/]								
OR: Sel. FF trawl		0.4		0.5	6.5	0.2		0.2
EFP Set Aside		2.5						
EFP Subtotal	0.0	2.9	0.0	0.5	6.5	0.2	0.0	0.2
TOTAL	118 ~~120.1~~	45.3	1.3	84.1 ~~92.6~~	847.7 ~~885.7~~	94.3 ~~107.2~~	288.8 ~~289.0~~	18.6
2006 OY	308	47.1	4.2	294	2,414	447	289	27
Difference	190 ~~187.9~~	1.8	2.9	209.9 ~~201.4~~	1,566.3 ~~1,528.3~~	352.7 ~~339.8~~	0.2 ~~0.0~~	8.4
Percent of OY	38.3 ~~39.0%~~	96.2%	31.0%	28.6 ~~31.5%~~	35.1 ~~36.7%~~	21.1 ~~24.0%~~	100.0%	68.9%
Key		= either not applicable; trace amount (<0.01 mt); or not reported in available data sources.						

a/ South of 40°10' N. lat.

b/ The species impacts are under the Council's preferred option. The 8.0 mt of canary rockfish includes a buffer against the uncertainty of predicting impacts using new selective flatfish trawl gear. The point estimate of canary rockfish impacts under this option is 4.7 ~~5.2~~ mt.

c/ Estimated impacts for the 2006 whiting fisheries will be calculated in March 2006. The impacts in this scorecard are the 2004 impacts and are used as a placeholder with the exception of widow rockfish which is the residual yield after estimating impacts in non-whiting fisheries.

d/ Mortality estimates are not hard numbers; based on the GMT's best professional judgement.

e/ Bycatch amounts by species unavailable, but bocaccio occurred in 0.1% of all port samples and other rockfish in another 0.1% of all port samples (and squid fisheries usually land their whole catch). In 2001, out of 84,000 mt total landings, 1 mt was groundfish. This suggests that total bocaccio was caught in trace amounts.

f/ Values for canary, lingcod, and yelloweye represent proposed harvest guidelines. California recreational estimates have yet to be updated.

g/ Values are proposed EFP bycatch caps, not estimates of total mortality. The EFP is terminated inseason if the cap is projected to be attained early. The EFP set aside is a GMT-recommended set aside used to calculate the 2006 canary rockfish OY. The EFP set aside is determined to result in the same EFP subtotal as decided for 2005.

TABLE 2-14. 2004 Trip limits and gear requirements[a/] for limited entry trawl gear north of 40°10' N. lat.[b/] Other limits and requirements apply. (Page 1 of 3)

			JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
Rockfish Conservation Area[l/] (RCA):								
		North of 40°10' N. lat.	75 fm - modified 200 fm[k/]	60 fm - 200 fm	60 fm - 150 fm	75 fm - 150 fm		
Small footrope or midwater trawl gear is required shoreward of the RCA; all trawl gear (large footrope, midwater trawl, and small footrope gear) is permitted seaward of the RCA.								
A vessel may have more than one type of limited entry bottom trawl gear on board, but the most restrictive trip limit associated with the gear on board applies for that trip and will count toward the cumulative trip limit for that gear. A vessel that is trawling within the RCA (or other closed area) with trawl gear authorized for use within the RCA (or other closed area) may not have any other type of trawl gear on board. See federal regulations for details.								
1	Minor slope rockfish[c/]		4,000 lb/ 2 months		8,000 lb/ 2 months			
2	Pacific ocean perch		3,000 lb/ 2 months					
3	DTS complex		Providing only large footrope or midwater trawl gear is used to land any groundfish species during the entire limit period, then large footrope trawl trip limits apply. If small footrope gear[g/] is used at any time in any area (North or South of 40°10' N. lat., shoreward or seaward of RCA) during the entire limit period, then small footrope trawl limits apply.					
4		Sablefish						
5		large footrope or midwater trawl gear	9,300 lb/ 2 months		16,000 lb/ 2 months			11,000 lb/ 2 months
6		small footrope gear[g/]	2,000 lb/ 2 months		10,000 lb/ 2 months			5,000 lb/ 2 months
7		Longspine thornyhead						
8		large footrope or midwater trawl gear	15,000 lb/ 2 months		18,000 lb/ 2 months			
9		small footrope gear[g/]	1,000 lb/ 2 months					
10		Shortspine thornyhead						
11		large footrope or midwater trawl gear	3,150 lb/ 2 months		4,500 lb/ 2 months			
12		small footrope gear[g/]	1,000 lb/ 2 months		3,000 lb/ 2 months			1,000 lb/ 2 months
13		Dover sole						
14		large footrope or midwater trawl gear	67,500 lb/ 2 months		32,000 lb/ 2 months			50,000 lb/ 2 months
15		small footrope gear[g/]	10,000 lb/ 2 months		27,000 lb/ 2 months			18,000 lb/ 2 months

TABLE 2-14. 2004 Trip limits and gear requirements[a/] for limited entry trawl gear north of 40°10' N. lat.[b/] Other limits and requirements apply. (Page 2 of 3)

		JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
16	Flatfish	Providing only large footrope or midwater trawl gear is used to land any groundfish species during the entire limit period, then large footrope trawl trip limits apply. If small footrope gear[g/] is used at any time in any area (North or South of 40°10' N. lat., shoreward or seaward of RCA) during the entire limit period, then small footrope trawl limits apply.					
17	All other flatfish, Petrale sole, & Rex sole						
18	large footrope or midwater trawl gear for All other flatfish[d/] & Rex sole	100,000 lb/ 2 months					
19	large footrope or midwater trawl gear for Petrale sole	Not limited	100,000 lb/ 2 months				Not limited
20	small footrope gear[g/]	30,000 lb/ 2 months, no more than 10,000 lb/ 2 months of which may be petrale sole.		80,000 lb/ 2 months, no more than 30,000 lb/ 2 months of which may be petrale sole.			70,000 lb/ 2 months, no more than 20,000 lb/ 2 months of which may be petrale sole.
21	Arrowtooth flounder						
22	large footrope or midwater trawl gear	Not limited	150,000 lb/ 2 months				Not limited
23	small footrope gear[g/]	4,000 lb/ 2 months	11,000 lb/ 2 months				8,000 lb/ 2 months
24	Whiting[e/]	Before the primary whiting season: 20,000 lb/trip -- During the primary season: mid-water trawl permitted in the RCA. See federal regulations for season and trip limit details. -- After the primary whiting season: 10,000 lb/trip					
25	Minor shelf rockfish[c/] & Widow rockfish						
26	large footrope trawl	CLOSED[f/]					
27	midwater trawl for Widow rockfish	Before the primary whiting season: CLOSED[f/] – 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 federal regulations for primary whiting season and trip limit details. -- After the primary whiting season: CLOSED[f/]					12,000 lb/ 2 months
28	midwater for Minor shelf rockfish or small footrope trawl[g/] for minor shelf & widow	300 lb/ month		1,000 lb/ month, no more than 200 lb/ month of which may be yelloweye rockfish			300 lb/ month
29	Canary rockfish						
30	large footrope trawl	CLOSED[f/]					
31	midwater or small footrope trawl[g/]	100 lb/ month		300 lb/ month		100 lb/ month	

TABLE 2-14. 2004 Trip limits and gear requirements[a/] for limited entry trawl gear north of 40°10' N. lat.[b/] Other limits and requirements apply. (Page 3 of 3)

			JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
32	Yellowtail							
33		large footrope trawl	CLOSED[f/]					
34		midwater trawl	Before the primary whiting season: CLOSED[f/] – During primary whiting 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 federal regulations for primary whiting season and trip limit details. -- After the primary whiting season: CLOSED[f/]					18,000 lb/ 2 months
35		small footrope trawl[g/]	In landings without flatfish, 1,000 lb/ month. As flatfish bycatch, per trip limit is the sum of 33% (by weight) of all flatfish except arrowtooth flounder, plus 10% (by weight) of arrowtooth flounder. Total yellowtail landings not to exceed 10,000 lb/ 2 months, no more than 1,000 lb/ month of which may be landed without flatfish.					
36	Minor nearshore rockfish							
37		large footrope trawl	CLOSED[f/]					
38		midwater or small footrope trawl[g/]	300 lb/ month					
39	Lingcod[h/]							
40		large footrope trawl	CLOSED[f/]					
41		midwater or small footrope trawl[g/]	800 lb/ 2 months		1,000 lb/ 2 months		800 lb/ 2 months	
42	Other Fish[i/]		Not limited					

a/ Gear requirements and prohibitions are explained above.

b/ "North" means 40°10' N. lat. to the U.S./Canada border. 40°10' N. lat. is about 20 nm south of Cape Mendocino, California.

c/ Bocaccio and chilipepper are included in the trip limits for minor shelf rockfish and splitnose rockfish is included in the trip limits for minor slope rockfish.

d/ "Other" flatfish means all flatfish at 50 CFR 660.302 except those in this table with species-specific management measures, including trip limits.

e/ The whiting "per trip" limit in the Eureka area shoreward of 100 fm is 10,000 lb/ trip all year. Outside Eureka area, the 20,000 lb/ trip limit applies.

f/ Closed means that it is prohibited to take and retain, possess, or land the designated species in the time or area indicated.

g/ Small footrope trawl means a bottom trawl net with a footrope no larger than 8 inches (20 cm) in diameter.

h/ The minimum size limit for lingcod is 24 inches (61 cm) total length.

i/ Other fish are defined at 50 CFR 660.302, as those groundfish species or species groups for which there is no trip limit, size limit, quota, or harvest guideline.

j/ The "Rockfish Conservation Area" is a gear and/or sector specific closed area generally described by depth contours but specifically defined by lat./long. coordinates in federal regulations.

k/ The "modified 200 fm" line is modified to exclude certain petrale sole areas from the RCA.

TABLE 2-15. 2004 trip limits and gear requirements[a/] for limited entry trawl gear south of 40°10' N latitude.[b/] Other limits and requirements apply. (Page 1 of 2)

<table>
<tr><th></th><th></th><th>JAN-FEB</th><th>MAR-APR</th><th>MAY-JUN</th><th>JUL-AUG</th><th>SEP-OCT</th><th>NOV-DEC</th></tr>
<tr><td colspan="8">Rockfish Conservation Area[f/] (RCA):</td></tr>
<tr><td></td><td>40°10' - 34°27' N. lat.</td><td colspan="2">75 fm - 150 fm (additional closure between the shoreline and 10 fm around the Farallon Islands)</td><td colspan="2">100 fm - 150 fm (additional closure between the shoreline and 10 fm around the Farallon Islands)</td><td colspan="2">75 fm - 150 fm (additional closure between the shoreline and 10 fm around the Farallon Islands)</td></tr>
<tr><td></td><td>South of 34°27' N. lat.</td><td colspan="2">75 fm - 150 fm along the mainland coast; shoreline - 150 fm around islands</td><td colspan="2">100 fm - 150 fm along the mainland coast; shoreline - 150 fm around islands</td><td colspan="2">75 fm - 150 fm along the mainland coast; shoreline - 150 fm around islands</td></tr>
<tr><td colspan="8">Small footrope or midwater trawl gear is required shoreward of the RCA; all trawl gear (large footrope, midwater trawl, and small footrope gear) is permitted seaward of the RCA.</td></tr>
<tr><td colspan="8">A vessel may have more than one type of limited entry bottom trawl gear on board, but the most restrictive trip limit associated with the gear on board applies for that trip and will count toward the cumulative trip limit for that gear. A vessel that is trawling within the RCA (or other closed area) with trawl gear authorized for use within the RCA (or other closed area) may not have any other type of trawl gear on board. See federal regulations for details.</td></tr>
<tr><td>1</td><td colspan="7">Minor slope rockfish[c/]</td></tr>
<tr><td>2</td><td>40°10' - 38° N. lat.</td><td colspan="2">7,000 lb/ 2 months</td><td colspan="4" rowspan="2">50,000 lb/ 2 months</td></tr>
<tr><td>3</td><td>South of 38° N. lat.</td><td colspan="2">40,000 lb/ 2 months</td></tr>
<tr><td>4</td><td colspan="7">Splitnose</td></tr>
<tr><td>5</td><td>40°10' - 38° N. lat.</td><td colspan="2">7,000 lb/ 2 months</td><td colspan="4" rowspan="2">50,000 lb/ 2 months</td></tr>
<tr><td>6</td><td>South of 38° N. lat.</td><td colspan="2">40,000 lb/ 2 months</td></tr>
<tr><td>7</td><td>DTS complex</td><td colspan="6">If fishing North of 40°10' N. lat. at any time during the cumulative limit period, differential trip limits based on footrope size and crossover provisions will apply during the entire limit period.</td></tr>
<tr><td>8</td><td>Sablefish</td><td colspan="2">11,250 lb/ 2 months</td><td colspan="4">14,500 lb/ 2 months</td></tr>
<tr><td>9</td><td>Longspine thornyhead</td><td colspan="2">15,000 lb / 2 months</td><td colspan="4">18,000 lb / 2 months</td></tr>
<tr><td>10</td><td>Shortspine thornyhead</td><td colspan="2">3,000 lb/ 2 months</td><td colspan="4">4,500 lb/ 2 months</td></tr>
<tr><td>11</td><td>Dover sole</td><td colspan="2">39,000 lb/ 2 months</td><td colspan="4">49,000 lb/ 2 months</td></tr>
<tr><td>12</td><td>Flatfish</td><td colspan="6">If fishing North of 40°10' N. lat. at any time during the cumulative limit period, differential trip limits based on footrope size and crossover provisions will apply during the entire limit period.</td></tr>
<tr><td>13</td><td>All other flatfish[d/] & Rex sole</td><td>100,000 lb/ 2 months</td><td rowspan="2">All other flatfish plus petrale & rex sole: 100,000 lb/ 2 months, no more than 20,000 lb/ 2 months of which may be petrale sole</td><td colspan="3" rowspan="2">All other flatfish plus petrale & rex sole: 120,000 lb/ 2 months, no more than 20,000 lb/ 2 months of which may be petrale sole</td><td>120,000 lb/ 2 months</td></tr>
<tr><td>14</td><td>Petrale sole</td><td>No limit</td><td>No limit</td></tr>
<tr><td>15</td><td>Arrowtooth flounder</td><td>No limit</td><td colspan="4">10,000 lb/ 2 months</td><td>No limit</td></tr>
<tr><td>16</td><td>Whiting[e/]</td><td colspan="6">Before the primary whiting season: 20,000 lb/trip -- During the primary whiting season: mid-water trawl permitted in the RCA. See federal regulations for season and trip limit details. -- After the primary whiting season: 10,000 lb/trip</td></tr>
<tr><td>17</td><td>Minor shelf rockfish, Widow, and Chilipepper rockfish[c/]</td><td colspan="6">Providing only large footrope trawl gear is used to land any groundfish species during the entire limit period, then large footrope limit applies.</td></tr>
<tr><td>18</td><td>large footrope trawl for Minor shelf rockfish</td><td colspan="6">300 lb/ month</td></tr>
<tr><td>19</td><td>large footrope trawl for Chilipepper rockfish</td><td colspan="2">2,000 lb/ 2 months</td><td colspan="2">12,000 lb/ 2 months</td><td colspan="2">8,000 lb/ 2 months</td></tr>
<tr><td>20</td><td>large footrope or midwater trawl for</td><td colspan="6">CLOSED[f/]</td></tr>
</table>

TABLE 2-15. 2004 trip limits and gear requirements[a/] for limited entry trawl gear south of 40°10' N latitude.[b/] Other limits and requirements apply. (Page 2 of 2)

		JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
	Widow rockfish						
21	midwater for Minor shelf or Chilipepper rockfish or small footrope trawl[g/] for minor shelf, widow & chilipepper	300 lb/ month					
22	Bocaccio	Providing only large footrope trawl gear is used to land any groundfish species during the entire limit period, then large footrope limit applies.					
23	large footrope trawl	100 lb/month					
24	midwater or small footrope trawl[g/]	CLOSED[f/]					
25	Canary rockfish						
26	large footrope trawl	CLOSED[f/]					
27	midwater or small footrope trawl[g/]	100 lb/ month		300 lb/ month		100 lb/ month	
28	Cowcod	CLOSED[f/]					
29	Minor nearshore rockfish						
30	large footrope trawl	CLOSED[f/]					
31	midwater or small footrope trawl[g/]	300 lb/ month					
32	Lingcod[h/]						
33	large footrope trawl	CLOSED[f/]					
34	midwater or small footrope trawl[g/]	800 lb/ 2 months		1,000 lb/ 2 months		800 lb/ 2 months	
35	Other Fish[i/]	Not limited					

a/ Gear requirements and prohibitions are explained above.

b/ "South" means 40°10' N. lat. to the U.S./Mexico border. 40°10' N. lat. is about 20 nm south of Cape Mendocino, California.

c/ Yellowtail is included in the trip limits for minor shelf rockfish and POP is included in the trip limits for minor slope rockfish.

d/ "Other" flatfish means all flatfish at 50 CFR 660.302 except those in this table with species specific management measures, including trip limits.

e/ The whiting "per trip" limit in the Eureka area shoreward of 100 fm is 10,000 lb/ trip all year. Outside Eureka area, the 20,000 lb/ trip limit applies.

f/ Closed means that it is prohibited to take and retain, possess, or land the designated species in the time or area indicated.

g/ Small footrope trawl means a bottom trawl net with a footrope no larger than 8 inches (20 cm) in diameter.

h/ The minimum size limit for lingcod is 24 inches (61 cm) total length.

i/ Other fish are defined at 50 CFR 660.302 as those groundfish species or species groups for which there is no trip limit, size limit, quota, or harvest guideline.

j/ The "Rockfish Conservation Area" is a gear and/or sector specific closed area generally described by depth contours but specifically defined by lat./long. coordinates in federal regulations.

TABLE 2-16. Limited entry trawl trip limits, the seasonal RCA configuration, and estimated impacts to target and overfished species under the **No Action Alternative** (status quo as of May 2004). (Page 1 of 1)

		Mortality (mt)		
		North	South	Total
Rebuilding Species	Lingcod	67.6	34.8	102.4
	Canary	9.1	0.8	9.9
	POP	91.2	0.0	91.2
	Darkblotched	61.0	12.5	73.5
	Widow	2.4	0.1	2.5
	Bocaccio	0.0	40.2	40.2
	Yelloweye	0.1	0.1	0.3
	Cowcod	0.0	0.5	0.5
Target Species	Sablefish	2,446	620	3,065
	Longspine	522	256	778
	Shortspine	589	260	848
	Dover	4,666	1,969	6,634
	Arrowtooth	1,724	211	1,936
	Petrale	2,155	237	2,392
	Other Flat	3,768	2,125	5,893
	Slope Rock	203	332	536

		RCA Boundaries (fm)		Bimonthly Cumulative Limits (pounds)							
Subarea	Period	Inside Line	Outside Line	Sablefish	Long-spine	Short-spine	Dover	Other Flatfish	Petrale sublimit	Arrow-tooth	Slope Rock
North of 40°10'	1	75	150	9,300	15,000	3,100	67,500	100,000	No Limit	No Limit	4,000
	2	60	150	9,300	15,000	3,100	67,500	100,000	100,000	150,000	4,000
	3	60	150	16,000	18,000	4,500	32,000	100,000	100,000	150,000	8,000
	4	75	150	16,000	18,000	4,500	32,000	100,000	100,000	150,000	8,000
	5	75	150	16,000	18,000	4,500	32,000	100,000	100,000	150,000	8,000
	6	75	150	11,000	18,000	4,500	50,000	100,000	No Limit	No Limit	8,000
North Small Footrope Limit	1	75	150	2,000	1,000	1,000	10,000	30,000	10,000	4,000	
	2	60	150	2,000	1,000	1,000	10,000	30,000	10,000	4,000	
	3	60	150	10,000	1,000	3,000	27,000	80,000	30,000	11,000	
	4	75	150	10,000	1,000	3,000	27,000	80,000	30,000	11,000	
	5	75	150	10,000	1,000	3,000	27,000	80,000	30,000	11,000	
	6	75	150	5,000	1,000	1,000	18,000	70,000	20,000	8,000	
38° - 40°10'	1	75	150	11,200	15,000	3,000	39,000	100,000	No Limit	No Limit	10,000
	2	75	150	11,200	15,000	3,000	39,000	100,000	20,000	10,000	10,000
	3	100	150	14,500	18,000	4,500	49,000	120,000	20,000	10,000	50,000
	4	100	150	14,500	18,000	4,500	49,000	120,000	20,000	10,000	50,000
	5	75	150	14,500	18,000	4,500	49,000	120,000	20,000	10,000	50,000
	6	75	150	14,500	18,000	4,500	49,000	120,000	No Limit	No Limit	50,000
South of of 38°	1	75	150	11,200	15,000	3,000	39,000	100,000	No Limit	No Limit	40,000
	2	75	150	11,200	15,000	3,000	39,000	100,000	20,000	10,000	40,000
	3	100	150	14,500	18,000	4,500	49,000	120,000	20,000	10,000	50,000
	4	100	150	14,500	18,000	4,500	49,000	120,000	20,000	10,000	50,000
	5	75	150	14,500	18,000	4,500	49,000	120,000	20,000	10,000	50,000
	6	75	150	14,500	18,000	4,500	49,000	120,000	No Limit	No Limit	50,000

TABLE 2-17. Limited entry trawl trip limits, the seasonal RCA configuration, and estimated impacts to target and overfished species under **Action Alternative 1**. (Page 1 of 1)

		Mortality (mt)		
		North	South	Total
Rebuilding Species	Lingcod	63.6	22.1	85.6
	Canary	7.5	0.5	8.0
	POP	56.4	0.0	56.4
	Darkblotched	51.5	11.6	63.1
	Widow	1.3	0.1	1.3
	Bocaccio	0.0	34.6	34.6
	Yelloweye	0.3	0.1	0.4
	Cowcod	0.0	0.2	0.2
Target Species	Sablefish	2,264	551	2,815
	Longspine	597	285	882
	Shortspine	616	275	891
	Dover	4,372	1,959	6,332
	Arrowtooth	1,564	211	1,775
	Petrale	1,908	234	2,142
	Other Flatfish + English Sole	3,123	1,084	4,207
	Slope Rock	203	388	592

		RCA Boundaries (fm)		Bimonthly Cumulative Limits (pounds)							
Subarea	Period	Inside Line	Outside Line	Sablefish	Long-spine	Short-spine	Dover	Other Flatfish	Petrale sublimit	Arrow-tooth	Slope Rock
North of 40°10'	1	75	150	8,000	15,000	3,500	60,000	100,000	No Limit	No Limit	8,000
	2	75	150	8,000	15,000	3,500	60,000	100,000	85,000	150,000	8,000
	3	60	150	18,000	23,000	4,900	32,000	100,000	85,000	150,000	8,000
	4	60	150	18,000	23,000	4,900	32,000	100,000	85,000	150,000	8,000
	5	60	150	18,000	23,000	4,900	32,000	100,000	85,000	150,000	8,000
	6	75	150	8,000	15,000	3,500	60,000	100,000	No Limit	No Limit	8,000
North Selective Flatfish Trawl Limit	1	75	150	2,000	1,000	1,000	10,000	30,000	10,000	6,000	
	2	75	150	2,000	1,000	1,000	10,000	40,000	15,000	8,000	
	3	60	150	8,000	1,000	3,000	15,000	40,000	15,000	8,000	
	4	60	150	8,000	1,000	3,000	15,000	40,000	15,000	8,000	
	5	60	150	8,000	1,000	3,000	15,000	40,000	15,000	8,000	
	6	75	150	5,000	1,000	1,000	10,000	30,000	10,000	8,000	
South of of 40°10'	1	75	150	13,000	19,000	4,200	46,000	100,000	No Limit	No Limit	40,000
	2	75	150	13,000	19,000	4,200	46,000	100,000	85,000	10,000	40,000
	3	75	150	13,000	19,000	4,200	46,000	100,000	85,000	10,000	40,000
	4	75	150	13,000	19,000	4,200	46,000	100,000	85,000	10,000	40,000
	5	75	150	13,000	19,000	4,200	46,000	100,000	85,000	10,000	40,000
	6	75	150	13,000	19,000	4,200	46,000	100,000	No Limit	No Limit	40,000

TABLE 2-18. Limited entry trawl trip limits, the seasonal RCA configuration, and estimated impacts to target and overfished species under **Action Alternative 2**. (Page 1 of 1)

		Mortality (mt)		
		North	South	Total
Rebuilding Species	Lingcod	86.1	26.6	112.7
	Canary	9.4	0.6	9.9
	POP	57.0	0.0	57.0
	Darkblotched	54.1	11.8	65.9
	Widow	1.3	0.1	1.4
	Bocaccio	0.0	44.0	44.0
	Yelloweye	0.4	0.1	0.5
	Cowcod	0.0	0.3	0.3
Target Species	Sablefish	2,614	597	3,211
	Longspine	544	285	829
	Shortspine	596	275	871
	Dover	4,794	1,968	6,762
	Arrowtooth	1,607	211	1,818
	Petrale	2,149	246	2,395
	Other Flatfish	4,099	1,338	5,438
	Slope Rock	203	388	592

		RCA Boundaries (fm)		Bimonthly Cumulative Limits (pounds)							
Subarea	Period	Inside Line	Outside Line	Sablefish	Long-spine	Short-spine	Dover	Other Flatfish	Petrale sublimit	Arrow-tooth	Slope Rock
North of 40°10'	1	75	150	8,000	15,000	3,500	60,000	120,000	No Limit	No Limit	8,000
	2	75	150	8,000	15,000	3,500	60,000	120,000	95,000	150,000	8,000
	3	100	150	18,000	23,000	4,900	32,000	120,000	95,000	150,000	8,000
	4	100	150	18,000	23,000	4,900	32,000	120,000	95,000	150,000	8,000
	5	100	150	18,000	23,000	4,900	32,000	120,000	95,000	150,000	8,000
	6	75	150	8,000	15,000	3,500	60,000	120,000	No Limit	No Limit	8,000
North Selective Flatfish Trawl Limit	1	75	150	2,000	1,000	1,000	10,000	40,000	15,000	6,000	
	2	75	150	2,000	1,000	1,000	10,000	40,000	15,000	6,000	
	3	100	150	10,000	1,000	3,000	25,000	55,000	17,000	11,000	
	4	100	150	10,000	1,000	3,000	25,000	55,000	17,000	11,000	
	5	100	150	10,000	1,000	3,000	25,000	55,000	17,000	11,000	
	6	75	150	5,000	1,000	1,000	10,000	40,000	15,000	8,000	
South of 40°10'	1	75	150	13,000	19,000	4,200	46,000	120,000	No Limit	No Limit	40,000
	2	75	150	13,000	19,000	4,200	46,000	120,000	95,000	10,000	40,000
	3	100	150	13,000	19,000	4,200	46,000	120,000	95,000	10,000	40,000
	4	100	150	13,000	19,000	4,200	46,000	120,000	95,000	10,000	40,000
	5	75	150	13,000	19,000	4,200	46,000	120,000	95,000	10,000	40,000
	6	75	150	13,000	19,000	4,200	46,000	120,000	No Limit	No Limit	40,000

TABLE 2-19. Limited entry trawl trip limits, the seasonal RCA configuration, and estimated impacts to target and overfished species under **Action Alternative 3**. (Page 1 of 1)

		Mortality (mt)		
		North	South	Total
Rebuilding Species	Lingcod	89.9	26.7	116.6
	Canary	10.0	0.6	10.6
	POP	57.4	0.0	57.4
	Darkblotched	54.8	11.9	66.6
	Widow	1.3	0.1	1.4
	Bocaccio	0.0	44.0	44.0
	Yelloweye	0.4	0.1	0.5
	Cowcod	0.0	0.3	0.3
Target Species	Sablefish	2,692	620	3,312
	Longspine	544	285	829
	Shortspine	596	275	871
	Dover	4,691	1,968	6,659
	Arrowtooth	1,607	211	1,818
	Petrale	2,258	246	2,504
	Other Flatfish	4,498	1,338	5,837
	Slope Rock	203	388	592

		RCA Boundaries (fm)		Bimonthly Cumulative Limits (pounds)							
Subarea	Period	Inside Line	Outside Line	Sablefish	Long-spine	Short-spine	Dover	Other Flatfish	Petrale sublimit	Arrow-tooth	Slope Rock
North of 40°10'	1	75	150	9,000	15,000	3,500	60,000	120,000	No Limit	No Limit	8,000
	2	75	150	9,000	15,000	3,500	60,000	120,000	100,000	150,000	8,000
	3	100	150	18,000	23,000	4,900	32,000	120,000	100,000	150,000	8,000
	4	100	150	18,000	23,000	4,900	32,000	120,000	100,000	150,000	8,000
	5	100	150	18,000	23,000	4,900	32,000	120,000	100,000	150,000	8,000
	6	75	150	9,000	15,000	3,500	60,000	120,000	No Limit	No Limit	8,000
North Selective Flatfish Trawl Limit	1	75	150	2,000	1,000	1,000	12,000	75,000	20,000	6,000	
	2	75	150	2,000	1,000	1,000	12,000	75,000	20,000	6,000	
	3	100	150	10,000	1,000	3,000	18,000	85,000	25,000	11,000	
	4	100	150	10,000	1,000	3,000	18,000	85,000	25,000	11,000	
	5	100	150	10,000	1,000	3,000	18,000	85,000	25,000	11,000	
	6	75	150	5,000	1,000	1,000	12,000	75,000	20,000	8,000	
South of 40°10'	1	75	150	13,500	19,000	4,200	46,000	120,000	No Limit	No Limit	40,000
	2	75	150	13,500	19,000	4,200	46,000	120,000	100,000	10,000	40,000
	3	100	150	13,500	19,000	4,200	46,000	120,000	100,000	10,000	40,000
	4	100	150	13,500	19,000	4,200	46,000	120,000	100,000	10,000	40,000
	5	75	150	13,500	19,000	4,200	46,000	120,000	100,000	10,000	40,000
	6	75	150	13,500	19,000	4,200	46,000	120,000	No Limit	No Limit	40,000

TABLE 2-20a. 2005 limited entry trawl trip limits, the seasonal RCA configuration, and estimated impacts to target and overfished species under the **Council-Preferred Alternative**. Impacts for the selective flatfish trawl strategy estimated using the GMT-recommended bycatch estimation methodology and the previous methodological approach are depicted (see Section 4.3.2.1 for details). (Page 1 of 2)

		Estimated Mortality (mt)		
		No Select Gear Impacts	Adopted Select Gear Rate Impacts	Initial Select Gear Rate Impacts
Rebuilding Species	Lingcod	144.7	124.2	134.5
	Canary	22.3	5.2	13.1
	POP	92.9	88.2	62.7
	Darkblotched	81.5	76.0	71.9
	Widow	3.2	1.9	1.7
	Bocaccio	51.2	51.2	51.2
	Y'eye	0.4	0.4	0.6
	Cowcod	0.5	0.5	0.5
Target Species	Sablefish	3,382	3,382	3,382
	Longspine	854	854	854
	Shortspine	894	894	894
	Dover	7,361	7,361	7,361
	Arrowtooth	2,714	2,714	2,714
	Petrale	2,661	2,661	2,661
	Other Flat & Eng. Sole	6,023	6,023	6,023
	Slope Rockfish	781	603	603

TABLE 2-20a. 2005 limited entry trawl trip limits, the seasonal RCA configuration, and estimated impacts to target and overfished species under the **Council-Preferred Alternative**. Impacts for the selective flatfish trawl strategy estimated using the GMT-recommended bycatch estimation methodology and the previous methodological approach are depicted (see Section 4.3.2.1 for details). (Page 2 of 2)

		RCA Boundaries		Limits and RCA Configurations Adopted for 2005 Trawl Management							
SUBAREA	Period	INLINE	OUTLINE	Sablefish	Longspine	Shortspine	Dover	Other Flat & Eng.	Petrale	Arrowt'th	Slope Rock
N 40°10'	1	75	150	9,500	15,000	3,500	69,000	110,000	No Limit	No Limit	8,000
	2	100	150	9,500	15,000	3,500	69,000	110,000	42,000	150,000	8,000
	3	100	150	17,000	23,000	4,900	30,000	110,000	42,000	150,000	8,000
	4	100	150	17,000	23,000	4,900	30,000	110,000	42,000	150,000	8,000
	5	100	150	17,000	23,000	4,900	30,000	110,000	42,000	150,000	8,000
	6	75	150	8,000	15,000	3,500	69,000	110,000	No Limit	No Limit	8,000
North Select Gear Limit	1	75	150	1,500	1,000	1,000	20,000	100,000	25,000	70,000	8,000
	2	100	150	10,000	1,000	1,000	35,000	100,000	35,000	70,000	8,000
	3	100	150	10,000	1,000	3,000	50,000	100,000	35,000	70,000	8,000
	4	100	150	10,000	1,000	3,000	50,000	100,000	35,000	70,000	8,000
	5	100	150	10,000	1,000	3,000	50,000	100,000	35,000	70,000	8,000
	6	75	150	1,500	1,000	1,000	20,000	100,000	25,000	70,000	8,000
38°-40°10'	1	75	150	14,000	19,000	4,200	50,000	110,000	No Limit	No Limit	40,000
	2	100	150	14,000	19,000	4,200	50,000	110,000	42,000	10,000	40,000
	3	100	150	14,000	19,000	4,200	50,000	110,000	42,000	10,000	40,000
	4	100	150	14,000	19,000	4,200	50,000	110,000	42,000	10,000	40,000
	5	100	150	14,000	19,000	4,200	50,000	110,000	42,000	10,000	40,000
	6	75	150	14,000	19,000	4,200	50,000	110,000	No Limit	No Limit	40,000
S 38°	1	75	150	14,000	19,000	4,200	50,000	110,000	No Limit	No Limit	40,000
	2	100	150	14,000	19,000	4,200	50,000	110,000	42,000	10,000	40,000
	3	100	150	14,000	19,000	4,200	50,000	110,000	42,000	10,000	40,000
	4	100	150	14,000	19,000	4,200	50,000	110,000	42,000	10,000	40,000
	5	100	150	14,000	19,000	4,200	50,000	110,000	42,000	10,000	40,000
	6	75	150	14,000	19,000	4,200	50,000	110,000	No Limit	No Limit	40,000

TABLE 2-20b. Revised 2005 limited entry trawl trip limits, the seasonal RCA configuration, and estimated impacts to target and overfished species under the **Council-Preferred Alternative**. Impacts for the selective flatfish trawl strategy are estimated using the GMT-recommended bycatch estimation methodology (see Section 4.3.2.1 for details). (Page 1 of 2)

		Mortality (mt)		
		North	South	Total
Rebuilding Species	Lingcod	55.9	30.3	86.2
	Canary	4.1	0.6	4.7
	POP	75.3	0.0	75.3
	Darkblotched	56.2	11.4	67.5
	Widow	1.7	0.1	1.7
	Bocaccio	0.0	49.1	49.1
	Yelloweye	0.3	0.1	0.4
	Cowcod	0.0	0.5	0.5
Target Species	Sablefish	2,544.1	755.5	3,299.6
	Longspine	555.4	295.2	850.6
	Shortspine	585.9	283.3	869.2
	Dover	5,102.0	2,107.1	7,209.1
	Arrowtooth	2,323.8	192.4	2,516.1
	Petrale	2,385.4	259.2	2,644.5
	Other Flatfish & English Sole	4,570.0	1,458.3	6,028.2
	Slope Rock	81.1	347.8	428.8

TABLE 2-20b. Revised 2005 limited entry trawl trip limits, the seasonal RCA configuration, and estimated impacts to target and overfished species under the **Council-Preferred Alternative**. Impacts for the selective flatfish trawl strategy are estimated using the GMT-recommended bycatch estimation methodology (see Section 4.3.2.1 for details). (Page 2 of 2)

		RCA Boundaries (fm)		Bimonthly Cumulative Limits (pounds)							
SUBAREA	Period	Inside Line	Outside Line	Sablefish	Longspine	Shortspine	Dover	Other Flatfish & English sole	Petrale	Arrowtooth	Slope Rock
North of 40°10'	1	75	200 [a/]	9,500	15,000	3,500	69,000	110,000	No Limit	No Limit	4,000
	2	100	200	9,500	15,000	3,500	69,000	110,000	42,000	150,000	4,000
	3	100	200	17,000	23,000	4,900	30,000	110,000	42,000	150,000	4,000
	4	100	200	17,000	23,000	4,900	30,000	110,000	42,000	150,000	4,000
	5	100	200	17,000	23,000	4,900	30,000	110,000	42,000	150,000	4,000
	6	75	200 [a/]	8,000	15,000	3,500	69,000	110,000	No Limit	No Limit	4,000
North Selective Flatfish Gear Limit	1	75	200 [a/]	1,500	1,000	1,000	20,000	100,000	25,000	70,000	4,000
	2	100	200	10,000	1,000	1,000	35,000	100,000	35,000	70,000	4,000
	3	100	200	10,000	1,000	3,000	50,000	100,000	35,000	70,000	4,000
	4	100	200	10,000	1,000	3,000	50,000	100,000	35,000	70,000	4,000
	5	100	200	10,000	1,000	3,000	50,000	100,000	35,000	70,000	4,000
	6	75	200 [a/]	1,500	1,000	1,000	20,000	100,000	25,000	70,000	4,000
38° - 40°10'	1	75	200 [a/]	14,000	19,000	4,200	50,000	110,000	No Limit	No Limit	40,000
	2	100	200	14,000	19,000	4,200	50,000	110,000	42,000	10,000	40,000
	3	100	200	14,000	19,000	4,200	50,000	110,000	42,000	10,000	40,000
	4	100	200	14,000	19,000	4,200	50,000	110,000	42,000	10,000	40,000
	5	100	200	14,000	19,000	4,200	50,000	110,000	42,000	10,000	40,000
	6	75	200 [a/]	14,000	19,000	4,200	50,000	110,000	No Limit	No Limit	40,000
South of 38°	1	75	150	14,000	19,000	4,200	50,000	110,000	No Limit	No Limit	40,000
	2	100	150	14,000	19,000	4,200	50,000	110,000	42,000	10,000	40,000
	3	100	150	14,000	19,000	4,200	50,000	110,000	42,000	10,000	40,000
	4	100	150	14,000	19,000	4,200	50,000	110,000	42,000	10,000	40,000
	5	100	150	14,000	19,000	4,200	50,000	110,000	42,000	10,000	40,000
	6	75	150	14,000	19,000	4,200	50,000	110,000	No Limit	No Limit	40,000

a/ Includes Petrale sole subareas.

TABLE 2-21. DRAFT 2005-2006 trip limits and gear requirements[a/] for limited entry trawl gear north of 40°10' N latitude.[b/] (Page 1 of 2)

		JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
	Rockfish Conservation Area[j/] (RCA):						
	North of 40°10' N. lat.	75 fm - ~~150~~ modified 200 fm[k/ l/]	100 fm - ~~150~~ 200 fm[k/]				75 fm - ~~150~~ modified 200 fm[k/ l/]
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. Midwater trawl gear is permitted only for vessels participating in the primary whiting season.							
A vessel may have more than one type of limited entry bottom trawl gear on board, but the most restrictive trip limit associated with the gear on board applies for that trip and will count toward the cumulative trip limit for that gear. A vessel that is trawling within the RCA (or other closed area) with trawl gear authorized for use within the RCA (or other closed area) may not have any other type of trawl gear on board. **See federal regulations for details.** North of 40°10 N. lat., midwater trawl gear is permissible only for vessels participating in the primary whiting season. On non-whiting trips, vessels with both large footrope and midwater trawl gear on board during a trip may access the large footrope limits while fishing with large footrope gear seaward of the RCA.							
1	**Minor slope rockfish[c/]**	~~8,000~~ 4,000 lb/ 2 months[k/]					
2	**Pacific ocean perch**	3,000 lb/ 2 months					
3	**DTS complex**	Providing only large footrope gear is used to land any groundfish species during the entire limit period, then large footrope trawl trip limits apply. If selective flatfish trawl gear[g/] is used at any time in any area (North of 40°10' N. lat., shoreward or seaward of RCA) during the entire limit period, then selective flatfish trawl limits apply.					
4	Sablefish						
5	large & small footrope gear	9,500 lb/ 2 months		17,000 lb/ 2 months			8,000 lb/ 2 months
6	selective flatfish trawl gear [g/]	1,500 lb/ 2 months	10,000 lb/ 2 months				1,500 lb/ 2 months
7	Longspine thornyhead						
8	large & small footrope gear	15,000 lb/ 2 months		23,000 lb/ 2 months			15,000 lb/ 2 months
9	selective flatfish trawl gear[g/]	1,000 lb/ 2 months					
10	Shortspine thornyhead						
11	large & small footrope gear	3,500 lb/ 2 months		4,900 lb/ 2 months			3,500 lb/ 2 months
12	selective flatfish trawl gear[g/]	1,000 lb/ 2 months		3,000 lb/ 2 months			1,000 lb/ 2 months
13	Dover sole						
14	large & small footrope gear	69,000 lb/ 2 months		30,000 lb/ 2 months			69,000 lb/ 2 months
15	selective flatfish trawl gear[g/]	20,000 lb/ 2 months	35,000 lb/ 2 months	50,000 lb/ 2 months			20,000 lb/ 2 months
16	**Flatfish**	Providing only large footrope gear is used to land any groundfish species during the entire limit period, then large footrope trawl trip limits apply. If selective flatfish trawl gear[g/] is used at any time in any area (North of 40°10' N. lat., shoreward or seaward of RCA) during the entire limit period, then selective flatfish trawl limits apply.					
17	All other flatfish, Petrale sole, & Rex sole						
18	large & small footrope gear for All other flatfish[d/] & Rex sole	110,000 lb/ 2 months	All other flatfish, rex sole, and petrale sole: 110,000 lb/ 2 months, no more than 42,000 lb/ 2 months of which may be petrale sole.				110,000 lb/ 2 months
19	large & small footrope gear for Petrale sole	Not limited					Not limited
20	selective flatfish trawl gear[g/]	100,000 lb/ 2 months, no more than 25,000 lb/ 2 months of which may be petrale sole.	100,000 lb/ 2 months, no more than 35,000 lb/ 2 months of which may be petrale sole.				100,000 lb/ 2 months, no more than 25,000 lb/ 2 months of which may be petrale sole.
21	Arrowtooth flounder						
22	large & small footrope gear	Not limited	150,000 lb/ 2 months				Not limited
23	selective flatfish trawl gear[g/]	70,000 lb/ 2 months					
24	**Whiting[e/]**	Before the primary whiting season: 20,000 lb/trip -- During the primary season: mid-water trawl permitted in the RCA. See federal regulations for season and trip limit details. -- After the primary whiting season: 10,000 lb/trip					

TABLE 2-21. DRAFT 2005-2006 trip limits and gear requirements[a/] for limited entry trawl gear north of 40°10' N latitude.[b/] (Page 2 of 2)

		JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
25	**Minor shelf rockfish[c/] & Widow rockfish**						
26	large & small footrope gear	300 lb/ 2 months					
27	midwater trawl for Widow rockfish	Before the primary whiting season: CLOSED[f/] -- 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 federal regulations for primary whiting season and trip limit details. -- After the primary whiting season: CLOSED[f/]					
28	selective flatfish trawl gear [g/] for minor shelf & widow	300 lb/ month		1,000 lb/ month, no more than 200 lb/ month of which may be yelloweye rockfish			300 lb/ month
29	**Canary rockfish**						
30	large & small footrope gear	CLOSED[f/]					
31	selective flatfish trawl gear [g/]	100 lb/ month		300 lb/ month		100 lb/ month	
32	**Yellowtail**						
33	large & small footrope gear	300 lb/ 2 months					
34	midwater trawl	Before the primary whiting season: CLOSED[f/] -- During primary whiting 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 federal regulations for primary whiting season and trip limit details. -- After the primary whiting season: CLOSED[6/]					
35	selective flatfish trawl gear [g/]	2,000 lb/ 2 months					
36	**Minor nearshore rockfish**						
37	large & small footrope gear	CLOSED[f/]					
38	selective flatfish trawl gear [g/]	300 lb/ month					
39	**Lingcod[h/]**						
40	large & small footrope gear	500 lb/ 2 months					
41	selective flatfish trawl gear [g/]	800 lb/ 2 months		1,000 lb/ 2 months		800 lb/ 2 months	
42	**Other Fish[i/]**	Not limited					

a/ Gear requirements and prohibitions are explained above.
b/ "North" means 40°10' N. lat. to the U.S./Canada border. 40°10' N. lat. is about 20 nm south of Cape Mendocino, California.
c/ Bocaccio and chilipepper are included in the trip limits for minor shelf rockfish and splitnose rockfish is included in the trip limits for minor slope rockfish.
d/ "Other" flatfish means all flatfish at 50 CFR 660.302 except those in this table with species-specific management measures, including trip limits.
e/ The whiting "per trip" limit in the Eureka area shoreward of 100 fm is 10,000 lb/ trip all year. Outside Eureka area, the 20,000 lb/ trip limit applies.
f/ Closed means that it is prohibited to take and retain, possess, or land the designated species in the time or area indicated.
g/ NMFS and enforcement personnel are currently developing a description of the gear specifications for selective flatfish trawls. These specifications will be available in the final regulations to be implemented on January 1, 2005.
h/ The minimum size limit for lingcod is 24 inches (61 cm) total length.
i/ Other fish are defined at 50 CFR 660.302, as those groundfish species or species groups for which there is no trip limit, size limit, quota, or harvest guideline.
j/ The "Rockfish Conservation Area" is a gear and/or sector specific closed area generally described by depth contours but specifically defined by lat./long. coordinates in federal regulations.
k/ Adjusted by the Council at their September 2004 meeting.
l/ The "modified 200 fm" line is modified to exclude certain petrale sole areas from the RCA.

TABLE 2-22. DRAFT 2005-2006 Trip limits and gear requirements[a/] for limited entry trawl gear south of 40°10' N latitude[b/] (Page 1 of 2)

		JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
NOTE: These management measures are not considered final until noticed in the *Federal Register*.							
Rockfish Conservation Area[l/] (RCA):							
	40°10' - 38° N. lat.	75 fm - ~~150~~ modified 200 fm[k/ l/]	100 fm - ~~150~~ 200 fm[k/]				75 fm - ~~150~~ modified 200 fm[k/ l/]
	38° - 34°27' N. lat.	75 fm - 150 fm (additional closure between the shoreline and 10 fm around the Farallon Islands)	100 fm - 150 fm (additional closure between the shoreline and 10 fm around the Farallon Islands)				75 fm - 150 fm (additional closure between the shoreline and 10 fm around the Farallon Islands)
	South of 34°27' N. lat.	75 fm - 150 fm along the mainland coast; shoreline - 150 fm around islands	100 fm - 150 fm along the mainland coast; shoreline - 150 fm around islands				75 fm - 150 fm along the mainland coast; shoreline - 150 fm around islands
Small footrope gear is required shoreward of the RCA; all trawl gear (large footrope, midwater trawl, and small footrope gear) is permitted seaward of the RCA.							
A vessel may have large footrope and midwater trawl gear on board at the same time. If a vessel has small footrope trawl gear on board, then it may not have any other trawl gear on board. For vessels using more than one type of trawl gear during a cumulative limit period, limits are additive up to the largest limit for the type of gear used during that period. A vessel that is trawling within the RCA (or other closed area) with trawl gear authorized for use within the RCA (or other closed area) may not have any other type of trawl gear on board. **See federal regulations for details.**							
1	**Minor slope rockfish[c/]**	40,000 lb/ 2 months					
4	**Splitnose**	40,000 lb/ 2 months					
7	**DTS complex**	If fishing North of 40°10' N. lat. at any time during the cumulative limit period, differential trip limits based on footrope size and crossover provisions will apply during the entire limit period.					
8	Sablefish	14,000 lb/ 2 months					
9	Longspine thornyhead	19,000 lb / 2 months					
10	Shortspine thornyhead	4,200 lb/ 2 months					
11	Dover sole	50,000 lb/ 2 months					
12	**Flatfish**	If fishing North of 40°10' N. lat. at any time during the cumulative limit period, differential trip limits based on footrope size and crossover provisions will apply during the entire limit period.					
13	All other flatfish[d/] & Rex sole	110,000 lb/ 2 months	All other flatfish plus petrale & rex sole: 110,000 lb/ 2 months, no more than 42,000 lb/ 2 months of which may be petrale sole				110,000 lb/ 2 months
14	Petrale sole	No limit					No limit
15	Arrowtooth flounder	No limit	10,000 lb/ 2 months				No limit
16	**Whiting[e/]**	Before the primary whiting season: 20,000 lb/trip -- During the primary whiting season: mid-water trawl permitted in the RCA. See federal regulations for season and trip limit details. -- After the primary whiting season: 10,000 lb/trip					
17	**Minor shelf rockfish, Widow, and Chilipepper rockfish[c/]**						
18	large footrope or midwater trawl for Minor shelf rockfish	300 lb/ month					
19	large footrope or midwater trawl for Chilipepper rockfish	2,000 lb/ 2 months		12,000 lb/ 2 months		8,000 lb/ 2 months	
20	large footrope or midwater trawl for Widow rockfish	CLOSED[f/]					
21	small footrope trawl[g/] for minor shelf, widow & chilipepper	300 lb/ month					
22	**Bocaccio**						
23	large footrope or midwater trawl	300 lb/ 2 months					
24	small footrope trawl[g/]	CLOSED[f/]					

TABLE 2-22. DRAFT 2005-2006 Trip limits and gear requirements[a/] for limited entry trawl gear south of 40°10' N latitude[b/] (Page 2 of 2)

NOTE: These management measures are not considered final until noticed in the *Federal Register*.

			JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
25	**Canary rockfish**							
26		large footrope or midwater trawl	CLOSED[f/]					
27		small footrope trawl[g/]	100 lb/ month		300 lb/ month		100 lb/ month	
28	**Cowcod**		CLOSED[f/]					
29	**Minor nearshore rockfish**							
30		large footrope or midwater trawl	CLOSED[f/]					
31		small footrope trawl[g/]	300 lb/ month					
32	**Lingcod[8/]**							
33		large footrope or midwater trawl	500 lb/ 2 months					
34		small footrope trawl[g/]	800 lb/ 2 months		1,000 lb/ 2 months		800 lb/ 2 months	
35	**Other Fish[9/]**		Not limited					

a/ Gear requirements and prohibitions are explained above.

b/ "South" means 40°10' N. lat. to the U.S./Mexico border. 40°10' N. lat. is about 20 nm south of Cape Mendocino, California.

c/ Yellowtail is included in the trip limits for minor shelf rockfish and POP is included in the trip limits for minor slope rockfish.

d/ "Other" flatfish means all flatfish at 50 CFR 660.302 except those in this table with species-specific management measures, including trip limits.

e/ The whiting "per trip" limit in the Eureka area shoreward of 100 fm is 10,000 lb/ trip all year. Outside Eureka area, the 20,000 lb/ trip limit applies.

f/ Closed means that it is prohibited to take and retain, possess, or land the designated species in the time or area indicated.

g/ NMFS and enforcement personnel are currently developing a description of the gear specifications for selective flatfish trawls. These specifications will be available in the final regulations to be implemented on January 1, 2005.

h/ The minimum size limit for lingcod is 24 inches (61 cm) total length.

i/ Other fish are defined at 50 CFR 660.302, as those groundfish species or species groups for which there is no trip limit, size limit, quota, or harvest guideline.

j/ The "Rockfish Conservation Area" is a gear and/or sector specific closed area generally described by depth contours but specifically defined by lat./long. coordinates in federal regulations.

k/ Adjusted by the Council at their September 2004 meeting.

l/ The “modified 200 fm” line is modified to exclude certain petrale sole areas from the RCA.

TABLE 2-23. 2004 trip limits for limited entry fixed gear north of 40°10' N. lat.[a/] Other limits and requirements apply. (Page 1 of 1)

	JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
Rockfish Conservation Area[h/] (RCA):						
North of 46°16' N. lat.	shoreline - 100 fm					
46°16' N. lat. - 40°10' N. lat.	30 fm - 100 fm					
1 Minor slope rockfish[d/]	4,000 lb/ 2 months					
2 Pacific ocean perch	1,800 lb/ 2 months					
3 Sablefish	300 lb/ day, or 1 landing per week of up to 900 lb, not to exceed 3,600 lb/ 2 months					
4 Longspine thornyhead	10,000 lb/ 2 months					
5 Shortspine thornyhead	2,100 lb/ 2 months					
6 Dover sole	5,000 lb/ month					
7 Arrowtooth flounder						
8 Petrale sole						
9 Rex sole						
10 All other flatfish[b/]						
11 Whiting[c/]	10,000 lb/ trip					
12 Minor shelf rockfish, widow, and yellowtail rockfish[d/]	200 lb/ month					
13 Canary rockfish	CLOSED[e/]					
14 Yelloweye rockfish						
15 Minor nearshore rockfish	5,000 lb/ 2 months, no more than 1,200 lb of which may be species other than black or blue rockfish[f/]					
16 Lingcod[g/]	CLOSED[e/]		400 lb/ month			CLOSED[e/]
17 Other fish[i/]	Not limited					

a/ "North" means 40°10' N. lat. to the U.S./Canada border. 40°10' N. lat. is about 20 nm south of Cape Mendocino, California.

b/ "Other flatfish" means all flatfish at 50 CFR 660.302 except those in this table with species-specific management measures, including trip limits.

c/ The whiting "per trip" limit in the Eureka area shoreward of 100 fm is 10,000 lb/ trip all year. Outside Eureka area, the 20,000 lb/ trip limit applies.

d/ Bocaccio and chilipepper are included in the trip limits for minor shelf rockfish and splitnose rockfish is included in the trip limits for minor slope rockfish.

e/ Closed means that it is prohibited to take and retain, possess, or land the designated species in the time or area indicated.

f/ For black rockfish north of Cape Alava (48˚09'30" N. lat.), and between Destruction Island (47˚40'00" N. lat.) and Leadbetter Point (46˚38'10" N. lat.), there is an additional limit of 100 lb or 30% by weight of all fish on board, whichever is greater, per vessel, per fishing trip.

g/ The minimum size limit for lingcod is 24 inches (61 cm) total length.

h/ The "Rockfish Conservation Area" is a gear and/or sector specific closed area generally described by depth contours but specifically defined by lat./long. coordinates in federal regulations.

i/ Other fish are defined at 50 CFR 660.302, as those groundfish species or species groups for which there is no trip limit, size limit, quota, or harvest guideline.

TABLE 2-24. 2004 trip limits for limited entry fixed gear south of 40°10' N latitude.[a] Other limits and requirements apply. (Page 1 of 2)

		JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
	Rockfish Conservation Area[g] (RCA):						
	40°10' - 34°27' N. lat.	30 fm - 150 fm (also applies around islands, there is an additional closure between the shoreline and 10 fm around the Farallon Islands)		20 fm - 150 fm (also applies around islands, there is an additional closure between the shoreline and 10 fm around the Farallon Islands)		30 fm - 150 fm (also applies around islands, there is an additional closure between the shoreline and 10 fm around the Farallon Islands)	
	South of 34°27' N. lat.	60 fm - 150 fm (also applies around islands)					
1	Minor slope rockfish[d]						
2	40°10' - 38° N. lat.	7,000 lb/ 2 months		50,000 lb/ 2 months			
3	South of 38° N. lat.	40,000 lb/ 2 months					
4	Splitnose						
5	40°10' - 38° N. lat.	7,000 lb/ 2 months		50,000 lb/ 2 months			
6	South of 38° N. lat.	40,000 lb/ 2 months					
7	Sablefish						
8	40°10' - 36° N. lat.	300 lb/ day, or 1 landing per week of up to 900 lb, not to exceed 3,600 lb/ 2 months					
9	South of 36° N. lat.	350 lb/ day, or 1 landing per week of up to 1,050 lb					
10	Longspine thornyhead	10,000 lb/ 2 months					
11	Shortspine thornyhead	2,000 lb/ 2 months					
12	Dover sole	5,000 lb/ month When fishing for Pacific sanddabs, 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 1 lb (0.45 kg) of weight per line are not subject to the RCAs.					
13	Arrowtooth flounder						
14	Petrale sole						
15	Rex sole						
16	All other flatfish[b]						
17	Whiting[c]	10,000 lb/ trip					
18	Minor shelf rockfish, widow, and yellowtail rockfish[d]						
19	40°10' - 34°27' N. lat.	300 lb/ 2 months	CLOSED[e]	200 lb/ 2 months		300 lb/ 2 months	
20	South of 34°27' N. lat.	CLOSED[e]	2,000 lb/ 2 months				
21	Chilipepper rockfish	2,000 lb/ 2 months, this opportunity only available seaward of the nontrawl RCA					
22	Canary rockfish	CLOSED[e]					
23	Yelloweye rockfish	CLOSED[e]					
24	Cowcod	CLOSED[e]					
25	Bocaccio						
26	40°10' - 34°27' N. lat.	200 lb/ 2 months	CLOSED[e]	100 lb/ 2 months		200 lb/ 2 months	
27	South of 34°27' N. lat.	CLOSED[e]	300 lb/ 2 months				
28	Minor nearshore rockfish						
29	Shallow nearshore						
30	40°10' - 34°27' N. lat.	300 lb/ 2 months	CLOSED[e]	500 lb/ 2 months	600 lb/ 2 months	500 lb/ 2 months	300 lb/ 2 months
31	South of 34°27' N. lat.	CLOSED[e]	300 lb/ 2 months				
32	Deeper nearshore						
33	40°10' - 34°27' N. lat.	500 lb/ 2 months	CLOSED[e]	500 lb/ 2 months		400 lb/month	500 lb/ 2 months

TABLE 2-24. 2004 trip limits for limited entry fixed gear south of 40°10' N latitude.[a/] Other limits and requirements apply. (Page 2 of 2)

		JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
34	South of 34°27' N. lat.	CLOSED[e/]	500 lb/ 2 months	600 lb/ 2 months			400 lb/ 2 months
35	California scorpionfish	CLOSED[e/]	300 lb/ 2 months		400 lb/ 2 months		300 lb/ 2 months
36	Lingcod[f/]	CLOSED[e/]		400 lb/ month, when nearshore open			CLOSED[e/]
37	Other fish[h/]	Not limited					

a/ "South" means 40°10' N. lat. to the U.S./Mexico border. 40°10' N. lat. is about 20 nm south of Cape Mendocino, California.

b/ "Other flatfish" means all flatfish at 50 CFR 660.302 except those in this table with species specific management measures, including trip limits.

c/ The whiting "per trip" limit in the Eureka area shoreward of 100 fm is 10,000 lb/ trip all year. Outside Eureka area, the 20,000 lb/ trip limit applies.

d/ POP is included in the trip limits for minor slope rockfish.

e/ Closed means that it is prohibited to take and retain, possess, or land the designated species in the time or area indicated.

f/ The minimum size limit for lingcod is 24 inches (61 cm) total length.

g/ The "Rockfish Conservation Area" is a gear and/or sector specific closed area generally described by depth contours but specifically defined by lat./long. coordinates in federal regulations.

h/ Other fish are defined at 50 CFR 660.302 as those groundfish species or species groups for which there is no trip limit, size limit, quota, or harvest guideline.

TABLE 2-25. Revised 2004 sablefish primary fishery tier limits and projected bycatch of depleted species associated with all sablefish catch in the limited entry fixed gear fishery under the No Action Alternative. Seaward boundary of RCA at 100 fm north of 40°10' and at 150 fm south of 40°10'. (Page 1 of 1)

	Coastwide	Gear rates and bycatch		Combined
	summary	Longline	Pot	bycatch
Total catch allocated (mt)	**2,545**			
Observed sablefish discard rate	15.91%	14.89%	18.00%	
Discard mortality percentage of				
landed mt + discarded mt	3.65%	3.39%	4.207%	
Assumed discard mortality (mt)	93			
Landed catch target (mt)	**2,452**			
Amount allocated to:				
DTL (mt)	368			
Primary fishery (mt)	**2,084**			
Primary fishery tier limits (lb)				
Tier 1	64,253	64,300		
Tier 2	29,206	29,200		
Tier 3	16,689	16,700		
Percent of total catch, by area	100%			
Percent of area catch, by gear		63.1%	36.8%	
Estimated distribution of total catch, by gear	2,545	1,607	938	
Bycatch ratios[a/]				
Lingcod		0.368%	0.148%	
Widow rockfish		0.001%	0.000%	
Canary rockfish		0.036%	0.000%	
Yelloweye rockfish		0.081%	0.000%	
Bocaccio rockfish[b/]		0.000%	0.000%	
Cowcod rockfish[b/]		0.000%	0.000%	
Pacific ocean perch		0.018%	0.000%	
Darkblotched rockfish		0.045%	0.009%	
Projected bycatch impacts (mt)				
Lingcod		5.9	1.4	**7.3**
Widow rockfish		0.0	0.0	**0.0**
Canary rockfish		0.6	0.0	**0.6**
Yelloweye rockfish		1.3	0.0	**1.3**
Bocaccio rockfish[b/]		0.0	0.0	**0.0**
Cowcod rockfish[b/]		0.0	0.0	**0.0**
Pacific ocean perch		0.3	0.0	**0.3**
Darkblotched rockfish		0.7	0.1	**0.8**

a/ The bycatch ratios are calculated by dividing the total catch of each species by the total poundage of sablefish that was caught.
b/ Please note that the observer data on which these rates are based include no observations from south of Fort Bragg, California, so these are likely underestimates of true bycatch.

TABLE 2-26. Proposed 2005 sablefish primary fishery tier limits and projected bycatch of depleted species associated with all sablefish catch in the limited entry fixed-gear fishery under all action alternatives. (Page 1 of 2)

	Action Alternatives											
	Alternative 1 Seaward boundary of the RCA at 150 fm				Alternative 2 Seaward boundary of the RCA at 125 fm				Alternative 3 Seaward boundary of the RCA at 100 fm			
	Fleet summary	Gear rates/bycatch Longline	Gear rates/bycatch Pot	Coastwide bycatch	Fleet summary	Gear rates/bycatch Longline	Gear rates/bycatch Pot	Coastwide bycatch	Fleet summary	Gear rates/bycatch Longline	Gear rates/bycatch Pot	Coastwide bycatch
Total catch allocated (mt)	**2,536**				**2,536**				**2,536**			
Observed sablefish discard rate	18.49%	19.24%	17.82%		15.6%	16.42%	17.84%		15.6%	14.12%	18.01%	
Discard mortality percentage of landed mt + discarded mt	**4.3%**	**4.5%**	**4.2%**		**4.0%**	**3.8%**	**4.2%**		**3.6%**	**3.2%**	**4.2%**	
Assumed discard mortality (mt)	110				100				90			
Landed catch target (mt)	**2,426**				**2,436**				**2,446**			
Amount allocated to:												
DTL (mt)	364				365				367			
Primary fishery (mt)	**2,062**				**2,070**				**2,079**			
Primary fishery tier limits (lb)												
Tier 1	63,574	**63,600**			63,833	**63,800**			64,087	**64,100**		
Tier 2	28,897	**28,900**			29,015	**29,000**			29,131	**29,100**		
Tier 3	16,513	**16,500**			16,580	**16,600**			16,646	**16,600**		
Percent of catch, by gear		65%	35%			65%	35%			65%	35%	
Amount of catch, by gear	2,536	1,648	888		2,536	1,648	888		2,536	1,648	888	
Bycatch ratios[a/]												
Lingcod		0.183%	0.059%			0.282%	0.080%			0.400%	0.151%	
Widow rockfish		0.000%	0.000%			0.000%	0.000%			0.001%	0.000%	
Canary rockfish		0.005%	0.000%			0.025%	0.000%			0.042%	0.000%	
Yelloweye rockfish		0.034%	0.000%			0.060%	0.000%			0.089%	0.000%	
Bocaccio rockfish[b/]		0.000%	0.000%			0.000%	0.000%			0.000%	0.000%	
Cowcod rockfish[b/]		0.000%	0.000%			0.000%	0.000%			0.000%	0.000%	
Pacific ocean perch		0.024%	0.000%			0.022%	0.000%			0.017%	0.000%	
Darkblotched rockfish		0.068%	0.009%			0.055%	0.009%			0.041%	0.009%	
Projected bycatch mortality impacts (mt)												
Lingcod		3.0	0.5	**3.5**		4.7	0.7	**5.4**		6.6	1.3	**7.9**
Widow rockfish		0.0	0.0	**0.0**		0.0	0.0	**0.0**		0.0	0.0	**0.0**
Canary rockfish		0.1	0.0	**0.1**		0.4	0.0	**0.4**		0.7	0.0	**0.7**
Yelloweye rockfish		0.6	0.0	**0.6**		1.0	0.0	**1.0**		1.5	0.0	**1.5**
Bocaccio rockfish [b/]		0.0	0.0	**0.0**		0.0	0.0	**0.0**		0.0	0.0	**0.0**

TABLE 2-26. Proposed 2005 sablefish primary fishery tier limits and projected bycatch of depleted species associated with all sablefish catch in the limited entry fixed-gear fishery under all action alternatives. (Page 2 of 2)

	Action Alternatives											
	Alternative 1 Seaward boundary of the RCA at 150 fm				Alternative 2 Seaward boundary of the RCA at 125 fm				Alternative 3 Seaward boundary of the RCA at 100 fm			
	Fleet	Gear rates/bycatch		Coastwide	Fleet	Gear rates/bycatch		Coastwide	Fleet	Gear rates/bycatch		Coastwide
	summary	Longline	Pot	bycatch	summary	Longline	Pot	bycatch	summary	Longline	Pot	bycatch
Cowcod rockfish [b/]		0.0	0.0	**0.0**		0.0	0.0	**0.0**		0.0	0.0	**0.0**
Pacific ocean perch		0.4	0.0	**0.4**		0.4	0.0	**0.4**		0.3	0.0	**0.3**
Darkblotched rockfish		1.1	0.1	**1.2**		0.9	0.1	**1.0**		0.7	0.1	**0.8**

a/ The bycatch ratios are calculated by dividing the total catch of each species by the total poundage of sablefish that was caught.
b/ Please note that the observer data on which these rates are based include no observations from south of Fort Bragg, California, so these are likely underestimates of true bycatch.

TABLE 2-27. DRAFT 2005-2006 trip limits for limited entry fixed gear north of 40°10' N latitude[a] (Page 1 of 1)

NOTE: These management measures are not considered final until noticed in the *Federal Register*.

		JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
	Rockfish Conservation Area[h] (RCA):						
	North of 46°16' N. lat.	shoreline - 100 fm					
	46°16' N. lat. - 40°10' N. lat.	30 fm - 100 fm					
1	**Minor slope rockfish[d]**	4,000 lb/ 2 months					
2	**Pacific ocean perch**	1,800 lb/ 2 months					
3	**Sablefish**	300 lb/ day, or 1 landing per week of up to 900 lb, not to exceed 3,600 lb/ 2 months					
4	**Longspine thornyhead**	10,000 lb/ 2 months					
5	**Shortspine thornyhead**	2,100 lb/ 2 months					
6	**Dover sole**	5,000 lb/ month					
7	**Arrowtooth flounder**						
8	**Petrale sole**						
9	**Rex sole**						
10	**All other flatfish[b]**						
11	**Whiting[c]**	10,000 lb/ trip					
12	**Minor shelf rockfish, widow, and yellowtail rockfish[d]**	200 lb/ month					
13	**Canary rockfish**	CLOSED[e]					
14	**Yelloweye rockfish**	CLOSED[e]					
15	**Minor nearshore rockfish**	5,000 lb/ 2 months, no more than 1,200 lb of which may be species other than black or blue rockfish[f]					
16	**Lingcod[g]**	CLOSED[e]		800 lb/ 2 months			CLOSED[e]
17	**Other fish[i]**	Not limited					

a/ "North" means 40°10' N. lat. to the U.S./Canada border. 40°10' N. lat. is about 20 nm south of Cape Mendocino, California.

b/ "Other flatfish" means all flatfish at 50 CFR 660.302 except those in this table with species specific management measures, including trip limits.

c/ The whiting "per trip" limit in the Eureka area shoreward of 100 fm is 10,000 lb/ trip all year. Outside Eureka area, the 20,000 lb/ trip limit applies.

d/ Bocaccio and chilipepper are included in the trip limits for minor shelf rockfish and splitnose rockfish is included in the trip limits for minor slope rockfish.

e/ Closed means that it is prohibited to take and retain, possess, or land the designated species in the time or area indicated.

f/ For black rockfish north of Cape Alava (48°09'30" N. lat.) and between Destruction Island (47°40'00" N. lat.) and Leadbetter Point (46°38'10" N. lat.), there is an additional limit of 100 lb or 30% by weight of all fish on board, whichever is greater, per vessel, per fishing trip.

g/ The minimum size limit for lingcod is 24 inches (61 cm) total length.

h/ The "Rockfish Conservation Area" is a gear and/or sector specific closed area generally described by depth contours but specifically defined by lat./long. coordinates in federal regulations.

i/ Other fish are defined at 50 CFR 660.302, as those groundfish species or species groups for which there is no trip limit, size limit, quota, or harvest guideline.

TABLE 2-28. DRAFT 2005-2006 trip limits for limited entry fixed gear south of 40°10' N latitude.[a/] (Page 1 of 1)

NOTE: These management measures are not considered final until noticed in the *Federal Register*.

		JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
Rockfish Conservation Area[g/] (RCA):							
	40°10' - 34°27' N. lat.	30 fm - 150 fm (also applies around islands, there is an additional closure between the shoreline and 10 fm around the Farallon Islands)		20 fm - 150 fm (also applies around islands, there is an additional closure between the shoreline and 10 fm around the Farallon Islands)		30 fm - 150 fm (also applies around islands, there is an additional closure between the shoreline and 10 fm around the Farallon Islands)	
	South of 34°27' N. lat.	60 fm - 150 fm (also applies around islands)					
1	**Minor slope rockfish[d/]**	40,000 lb/ 2 months					
4	**Splitnose**	40,000 lb/ 2 months					
7	**Sablefish**						
8	40°10' - 36° N. lat.	300 lb/ day, or 1 landing per week of up to 900 lb, not to exceed 3,600 lb/ 2 months					
9	South of 36° N. lat.	350 lb/ day, or 1 landing per week of up to 1,050 lb					
10	**Longspine thornyhead**	~~19,000~~ 10,000 lb / 2 months[i/]					
11	**Shortspine thornyhead**	~~4,200~~ 2,000 lb/ 2 months[i/]					
12	**Dover sole**	5,000 lb/ month 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 1 lb (0.45 kg) of weight per line are not subject to the RCAs.					
13	**Arrowtooth flounder**						
14	**Petrale sole**						
15	**Rex sole**						
16	**All other flatfish[b/]**						
17	**Whiting[c/]**	10,000 lb/ trip					
18	**Minor shelf rockfish, widow, and yellowtail rockfish[d/]**						
19	40°10' - 34°27' N. lat.	300 lb/ 2 months	CLOSED[e/]	200 lb/ 2 months		300 lb/ 2 months	
20	South of 34°27' N. lat.	2,000 lb/ 2 months		2,000 lb/ 2 months			
21	**Chilipepper rockfish**	2,000 lb/ 2 months, this opportunity only available seaward of the nontrawl RCA					
22	**Canary rockfish**	CLOSED[e/]					
23	**Yelloweye rockfish**	CLOSED[e/]					
24	**Cowcod**	CLOSED[e/]					
25	**Bocaccio**						
26	40°10' - 34°27' N. lat.	200 lb/ 2 months	CLOSED[e/]	100 lb/ 2 months	300 lb/ 2 months		
27	South of 34°27' N. lat.	300 lb/ 2 months		300 lb/ 2 months			
28	**Minor nearshore rockfish [d/]**						
29	Shallow nearshore						
30	40°10' - 34°27' N. lat.	300 lb/ 2 months	CLOSED[e/]	500 lb/ 2 months	600 lb/ 2 months	500 lb/ 2 months	300 lb/ 2 months
31	South of 34°27' N. lat.						
32	Deeper nearshore						
33	40°10' - 34°27' N. lat.	500 lb/ 2 months	CLOSED[e/]	500 lb/ 2 months		400 lb/~~month~~ 2 months[i/]	500 lb/ 2 months
34	South of 34°27' N. lat.			600 lb/ 2 months			400 lb/ 2 months
35	California scorpionfish	300 lb/ 2 months	CLOSED[e/]	300 lb/ 2 months	400 lb/ 2 months		300 lb/ 2 months
36	**Lingcod[f/]**	CLOSED[e/]		800 lb/ 2 months			CLOSED[e/]
37	**Other fish[h/]**	Not limited					

a/ "South" means 40°10' N. lat. to the U.S./Mexico border. 40°10' N. lat. is about 20 nm south of Cape Mendocino, California.

b/ "Other flatfish" means all flatfish at 50 CFR 660.302 except those in this table with species-specific management measures, including trip limits.

c/ The whiting "per trip" limit in the Eureka area shoreward of 100 fm is 10,000 lb/ trip all year. Outside Eureka area, the 20,000 lb/ trip limit applies.

d/ POP is included in the trip limits for minor slope rockfish.

e/ Closed means that it is prohibited to take and retain, possess, or land the designated species in the time or area indicated.

f/ The minimum size limit for lingcod is 24 inches (61 cm) total length.

g/ The "Rockfish Conservation Area" is a gear and/or sector specific closed area generally described by depth contours but specifically defined by lat./long. coordinates in federal regulations.

h/ Other fish are defined at 50 CFR 660.302, as those groundfish species or species groups for which there is no trip limit, size limit, quota, or harvest guideline.

i/ Adjusted by the Council at their September 2004 meeting.

TABLE 2-29a. **2005** sablefish primary fishery tier limits and projected bycatch of depleted species associated with all sablefish catch in the limited entry fixed-gear fishery under the **Council-preferred Alternative**. (Page 1 of 1)

	Seaward boundary of RCA at 100 fm north of 40°10' N. lat. and at 150 fm south of 40°10' N. lat.			
	Coastwide summary	Gear rates and bycatch		Combined bycatch
		Longline	Pot	
Total catch allocated (mt)	**2,536**			
Observed sablefish discard rate	15.91%	14.89%	18.00%	
Discard mortality percentage of landed mt + discarded mt	3.65%	3.39%	4.207%	
Assumed discard mortality (mt)[a/]	93			
Landed catch target (mt)	**2,443**			
Amount allocated to:				
DTL (mt)	367			
Primary fishery (mt)	**2,077**			
Primary fishery tier limits (lb)				
Tier 1	64,034	**64,000**		
Tier 2	29,106	**29,100**		
Tier 3	16,632	**16,600**		
Percent of total catch, by area	100%			
Percent of area catch, by gear		63.2%	36.9%	
Estimated distribution of total catch, by gear	2,536	1,601	935	
Bycatch ratios[b/]				
Lingcod		0.368%	0.148%	
Widow rockfish		0.001%	0.000%	
Canary rockfish		0.036%	0.000%	
Yelloweye rockfish		0.081%	0.000%	
Bocaccio rockfish[c/]		0.000%	0.000%	
Cowcod rockfish[c/]		0.000%	0.000%	
Pacific ocean perch		0.018%	0.000%	
Darkblotched rockfish		0.045%	0.009%	
Projected bycatch impacts (mt)				
Lingcod		5.9	1.4	**7.3**
Widow rockfish		0.0	0.0	**0.0**
Canary rockfish		0.6	0.0	**0.6**
Yelloweye rockfish		1.3	0.0	**1.3**
Bocaccio rockfish[c/]		0.0	0.0	**0.0**
Cowcod rockfish[c/]		0.0	0.0	**0.0**
Pacific ocean perch		0.3	0.0	**0.3**
Darkblotched rockfish		0.7	0.1	**0.8**

a/ As in previous years, the rate of mortality for discarded sablefish in the fixed-gear fishery is assumed to be 20%.
b/ The bycatch ratios are calculated by dividing the total catch of each species by the total poundage of sablefish that was caught.
c/ Note that the observer data on which these rates are based include no observations from south of Fort Bragg, California, so these are likely underestimates of true bycatch.

TABLE 2-29b. **2006** sablefish primary fishery tier limits and projected bycatch of depleted species associated with all sablefish catch in the limited entry fixed-gear fishery under the **Council-preferred Alternative**. (Page 1 of 1)

	Seaward boundary of RCA at 100 fm north of 40°10' N. lat. and at 150 fm south of 40°10' N. lat.			
	Coastwide summary	Gear rates and bycatch		Combined bycatch
		Longline	Pot	
Total catch allocated (mt)	**2,495**			
Observed sablefish discard rate	15.91%	14.89%	18.00%	
Discard mortality percentage of landed mt + discarded mt	3.65%	3.39%	4.207%	
Assumed discard mortality (mt)[a/]	93			
Landed catch target (mt)	**2,402**			
Amount allocated to:				
DTL (mt)	360			
Primary fishery (mt)	**2,042**			
Primary fishery tier limits (lb)				
Tier 1	62,959	**63,000**		
Tier 2	28,618	**28,600**		
Tier 3	16,353	**16,400**		
Percent of total catch, by area	100%			
Percent of area catch, by gear		63.2%	36.9%	
Estimated distribution of total catch, by gear	2,495	1,601	935	
Bycatch ratios[b/]				
Lingcod		0.368%	0.148%	
Widow rockfish		0.001%	0.000%	
Canary rockfish		0.036%	0.000%	
Yelloweye rockfish		0.081%	0.000%	
Bocaccio rockfish[c/]		0.000%	0.000%	
Cowcod rockfish[c/]		0.000%	0.000%	
Pacific ocean perch		0.018%	0.000%	
Darkblotched rockfish		0.045%	0.009%	
Projected bycatch impacts (mt)				
Lingcod		5.9	1.4	**7.3**
Widow rockfish		0.0	0.0	**0.0**
Canary rockfish		0.6	0.0	**0.6**
Yelloweye rockfish		1.3	0.0	**1.3**
Bocaccio rockfish[c/]		0.0	0.0	**0.0**
Cowcod rockfish[c/]		0.0	0.0	**0.0**
Pacific ocean perch		0.3	0.0	**0.3**
Darkblotched rockfish		0.7	0.1	**0.8**

a/ As in previous years, the rate of mortality for discarded sablefish in the fixed-gear fishery is assumed to be 20%.
b/ The bycatch ratios are calculated by dividing the total catch of each species by the total poundage of sablefish that was caught.
c/ Note that the observer data on which these rates are based include no observations from south of Fort Bragg, California, so these are likely underestimates of true bycatch.

TABLE 2-29c. Revised **2006** sablefish primary fishery tier limits and projected bycatch of depleted species associated with all sablefish catch in the limited entry fixed-gear fishery to be considered by the Council in September 2004. (Page 1 of 1)

	Seaward boundary of RCA at 100 fm north of 40°10' N. lat. and at 150 fm south of 40°10' N. lat.			
	Coastwide summary	Gear rates and bycatch		Combined bycatch
		Longline	Pot	
Total catch allocated (mt)	**2,482**			
Observed sablefish discard rate	15.91%	14.89%	18.00%	
Discard mortality percentage of landed mt + discarded mt	3.65%	3.39%	4.207%	
Assumed discard mortality (mt)[a/]	91			
Landed catch target (mt)	**2,391**			
Amount allocated to:				
DTL (mt)	359			
Primary fishery (mt)	**2,032**			
Primary fishery tier limits (lb)				
Tier 1	62,661	**62,700**		
Tier 2	28,482	**28,500**		
Tier 3	16,276	**16,300**		
Percent of total catch, by area	100%			
Percent of area catch, by gear		63.2%	36.9%	
Estimated distribution of total catch, by gear	2,482	1,567	914	
Bycatch ratios[b/]				
Lingcod		0.368%	0.148%	
Widow rockfish		0.001%	0.000%	
Canary rockfish		0.036%	0.000%	
Yelloweye rockfish		0.081%	0.000%	
Bocaccio rockfish[c/]		0.000%	0.000%	
Cowcod rockfish[c/]		0.000%	0.000%	
Pacific ocean perch		0.018%	0.000%	
Darkblotched rockfish		0.045%	0.009%	
Projected bycatch impacts (mt)				
Lingcod		5.8	1.4	**7.1**
Widow rockfish		0.0	0.0	**0.0**
Canary rockfish		0.6	0.0	**0.6**
Yelloweye rockfish		1.3	0.0	**1.3**
Bocaccio rockfish[c/]		0.0	0.0	**0.0**
Cowcod rockfish[c/]		0.0	0.0	**0.0**
Pacific ocean perch		0.3	0.0	**0.3**
Darkblotched rockfish		0.7	0.1	**0.8**

a/ As in previous years, the rate of mortality for discarded sablefish in the fixed gear fishery is assumed to be 20%.
b/ The bycatch ratios are calculated by dividing the total catch of each species by the total poundage of sablefish that was caught.
c/ Note that the observer data on which these rates are based include no observations from south of Fort Bragg, California, so these are likely underestimates of true bycatch.

TABLE 2-30. 2004 trip limits for open access gears north of 40°10' N. lat.[a/] Other limits and requirements apply. (Page 1 of 1)

		JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
	Rockfish Conservation Area[h/] (RCA):						
	North of 46°16' N. lat.	shoreline - 100 fm					
	46°16' N. lat. - 40°10' N. lat.	30 fm - 100 fm					
1	Minor slope rockfish[b/]	Per trip, no more than 25% of weight of the sablefish landed					
2	Pacific ocean perch	100 lb/ month					
3	Sablefish	300 lb/ day, or 1 landing per week of up to 900 lb, not to exceed 3,600 lb/ 2 months					
4	Thornyheads	CLOSED[e/]					
5	Dover sole	3,000 lb/month, no more than 300 lb of which may be species other than Pacific sanddabs.					
6	Arrowtooth flounder						
7	Petrale sole						
8	Rex sole						
9	All other flatfish[c/]						
10	Whiting	300 lb/ month					
11	Minor shelf rockfish, widow and yellowtail rockfish[b/]	200 lb/ month					
12	Canary rockfish	CLOSED[e/]					
13	Yelloweye rockfish	CLOSED[e/]					
14	Minor nearshore rockfish	5,000 lb/ 2 months, no more than 1,200 lb of which may be species other than black or blue rockfish[f/]					
15	Lingcod[f/]	CLOSED[e/]		300 lb/ month			CLOSED[e/]
16	Other Fish[g/]	Not limited					
17	PINK SHRIMP EXEMPTED TRAWL (not subject to RCAs)						
18	North	Effective April 1 - October 31, 2004: 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.					
19	SALMON TROLL						
20	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. All groundfish species are subject to the open access limits, seasons and RCA restrictions listed in the table above.					

a/ "North" means 40°10' N. lat. to the U.S./Canada border. 40°10' N. lat. is about 20 nm south of Cape Mendocino, California.

b/ Bocaccio and chilipepper rockfishes are included in the trip limits for minor shelf rockfish and splitnose rockfish is included in the trip limits for minor slope rockfish.

c/ "Other flatfish" means all flatfish at 50 CFR 660.302 except those in this table with species-specific management measures, including trip limits.

d/ For black rockfish north of Cape Alava (48°09'30" N. lat.), and between Destruction Island (47°40' N. lat.) and Leadbetter Point (46°38'10" N. lat.) there is an additional limit of 100 lbs or 30% by weight of all fish on board, whichever is greater, per vessel, per fishing trip.

e/ Closed means that it is prohibited to take and retain, possess, or land the designated species in the time or area indicated.

f/ The size limit for lingcod is 24 inches (61 cm) total length.

g/ Other fish are defined at 50 CFR 660.302 as those groundfish species or species groups for which there is no trip limit, size limit, quota, or harvest guideline.

h/ The "Rockfish Conservation Area" is a gear and/or sector specific closed area generally described by depth contours, but specifically defined by lat./long. coordinates in federal regulations.

TABLE 2-31. 2004 trip limits for open access gears south of 40°10' N latitude[a/] other limits and requirements apply. (Page 1 of 2)

		JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
	Rockfish Conservation Area[g/] (RCA):						
	40°10' - 34°27' N. lat.	30 fm - 150 fm (also applies around islands, there is an additional closure between the shoreline and 10 fm around the Farallon Islands)		20 fm - 150 fm (also applies around islands, there is an additional closure between the shoreline and 10 fm around the Farallon Islands)		30 fm - 150 fm (also applies around islands, there is an additional closure between the shoreline and 10 fm around the Farallon Islands)	
	South of 34°27' N. lat.	60 fm - 150 fm (also applies around islands)					
1	Minor slope rockfish[b/]						
2	40°10' - 38° N. lat.	Per trip, no more than 25% of weight of the sablefish landed					
3	South of 38° N. lat.	10,000 lb/ 2 months					
4	Splitnose	200 lb/ month					
5	Sablefish						
6	40°10' - 36° N. lat.	300 lb/ day, or 1 landing per week of up to 900 lb, not to exceed 3,600 lb/ 2 months					
7	South of 36° N. lat.	350 lb/ day, or 1 landing per week of up to 1,050 lb					
8	Thornyheads						
9	40°10' - 34°27' N. lat.	CLOSED[e/]					
10	South of 34°27' N. lat.	50 lb/ day, no more than 1,000 lb/ 2 months					
11	Dover sole	3,000 lb/month, no more than 300 lb of which may be species other than Pacific sanddabs. When fishing for Pacific sanddabs, 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 1 lb of weight per line are not subject to the RCAs.					
12	Arrowtooth flounder						
13	Petrale sole						
14	Rex sole						
15	All other flatfish[c/]						
16	Whiting	300 lb/ month					
17	Minor shelf rockfish, widow and chilipepper rockfish[b/]						
18	40°10' - 34°27' N. lat.	300 lb/ 2 months	CLOSED[e/]	200 lb/ 2 months		300 lb/ 2 months	
19	South of 34°27' N. lat.	CLOSED[e/]	500 lb/ 2 months				
20	Canary rockfish	CLOSED[e/]					
21	Yelloweye rockfish	CLOSED[e/]					
22	Cowcod	CLOSED[e/]					
23	Bocaccio						
24	40°10' - 34°27' N. lat.	200 lb/ 2 months	CLOSED[e/]	100 lb/ 2 months		200 lb/ 2 months	
25	South of 34°27' N. lat.	CLOSED[e/]	100 lb/ 2 months				
26	Minor nearshore rockfish						
27	Shallow nearshore						
28	40°10' - 34°27' N. lat.	300 lb/ 2 months	CLOSED[e/]	500 lb/ 2 months	600 lb/ 2 months	500 lb/ 2 months	300 lb/ 2 months
29	South of 34°27' N. lat.	CLOSED[e/]	300 lb/ 2 months				
30	Deeper nearshore						
31	40°10' - 34°27' N. lat.	500 lb/ 2 months	CLOSED[e/]	500 lb/ 2 months		400 lb/month	500 lb/ 2 months
32	South of 34°27' N. lat.	CLOSED[e/]	500 lb/ 2 months	600 lb/ 2 months			400 lb/ 2 months
33	California scorpionfish	CLOSED[e/]	300 lb/ 2 months		400 lb/ 2 months		300 lb/ 2 months
34	Lingcod[d/]	CLOSED[e/]		300 lb/ month, when nearshore open			CLOSED[e/]
35	Other Fish[f/]	Not limited					
36	PINK SHRIMP EXEMPTED TRAWL GEAR (not subject to RCAs)						
37	South	Effective April 1 - October 31, 2004: 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					

TABLE 2-31. 2004 trip limits for open access gears south of 40°10' N latitude[a/] other limits and requirements apply. (Page 2 of 2)

		JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
		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.					
38	PRAWN AND, SOUTH OF 38°57'30" N. LAT., CALIFORNIA HALIBUT AND SEA CUCUMBER EXEMPTED TRAWL						
39	EXEMPTED TRAWL Rockfish Conservation Area[g/] (RCA):						
40	40°10' - 34°27' N. lat.	75 fm - 150 fm (additional closure between the shoreline and 10 fm around the Farallon Islands)		100 fm - 150 fm (additional closure between the shoreline and 10 fm around the Farallon Islands)		75 fm - 150 fm (additional closure between the shoreline and 10 fm around the Farallon Islands)	
41	South of 34°27' N. lat.	75 fm - 150 fm along the mainland coast; shoreline - 150 fm around islands		100 fm - 150 fm along the mainland coast; shoreline - 150 fm around islands		75 fm - 150 fm along the mainland coast; shoreline - 150 fm around islands	
42		Groundfish 300 lb/trip. Trip limits in this table also apply and are counted toward the 300 lb groundfish per trip limit. The amount of groundfish landed may not exceed the amount of the target species landed, except that the amount of spiny dogfish landed may exceed the amount of target species landed. Spiny dogfish are limited by the 300 lb/trip overall groundfish limit. The daily trip limits for sablefish coastwide and thornyheads south of Pt. Conception and the overall groundfish "per trip" limit may not be multiplied by the number of days of the trip. Vessels participating in the California halibut fishery south of 38o57'30" N. lat. are allowed to (1) land up to 100 lb/day of groundfish without the ratio requirement, provided that at least one California halibut is landed and (2) land up to 3,000 lb/month of flatfish, no more than 300 lb of which may be species other than Pacific sanddabs, sand sole, starry flounder, rock sole, curlfin sole, or California scorpionfish (California scorpionfish is also subject to the trip limits and closures in line 33).					

a/ "South" means 40°10' N. lat. to the U.S./Mexico border. 40°10' N. lat. is about 20 nm south of Cape Mendocino, California.

b/ Yellowtail rockfish is included in the trip limits for minor shelf rockfish, and POP is included in the trip limits for minor slope rockfish.

c/ "Other flatfish" means all flatfish at 50 CFR 660.302 except those in this table with species-specific management measures, including trip limits.

d/ The size limit for lingcod is 24 inches (61 cm) total length.

e/ Closed means that it is prohibited to take and retain, possess, or land the designated species in the time or area indicated.

f/ Other fish are defined at 50 CFR 660.302 as those groundfish species or species groups for which there is no trip limit, size limit, quota, or harvest guideline.

g/ The "Rockfish Conservation Area" is a gear and/or sector specific closed area generally described by depth contours, but specifically defined by lat./long. coordinates in federal regulations.

TABLE 2-32. DRAFT 2005-2006 Trip limits for open access gears north of 40°10' N latitude.[a/] (Page 1 of 1)

		JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
	NOTE: These management measures are not considered final until noticed in the *Federal Register*.						
	Rockfish Conservation Area[g/] (RCA):						
	North of 46°16' N. lat.	shoreline - 100 fm					
	46°16' N. lat. - 40°10' N. lat.	30 fm - 100 fm					
1	**Minor slope rockfish[b/]**	Per trip, no more than 25% of weight of the sablefish landed					
2	**Pacific ocean perch**	100 lb/ month					
3	**Sablefish**	300 lb/ day, or 1 landing per week of up to 900 lb, not to exceed 3,600 lb/ 2 months					
4	**Thornyheads**	CLOSED[e/]					
5	**Dover sole**	3,000 lb/month, no more than 300 lb of which may be species other than Pacific sanddabs.					
6	**Arrowtooth flounder**						
7	**Petrale sole**						
8	**Rex sole**						
9	**All other flatfish[c/]**						
10	**Whiting**	300 lb/ month					
11	**Minor shelf rockfish, widow and yellowtail rockfish[b/]**	200 lb/ month					
12	**Canary rockfish**	CLOSED[e/]					
13	**Yelloweye rockfish**	CLOSED[e/]					
14	**Minor nearshore rockfish**	5,000 lb/ 2 months, no more than 1,200 lb of which may be species other than black or blue rockfish[f/]					
15	**Lingcod[e/]**	CLOSED[e/]		300 lb/ month			CLOSED[5/]
16	**Other Fish[7/]**	Not limited					
17	**PINK SHRIMP EXEMPTED TRAWL** *(not subject to RCAs)*						
18	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.					
19	**SALMON TROLL**						
20	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. All groundfish species are subject to the open access limits, seasons and RCA restrictions listed in the table above.					

a/ "North" means 40°10' N. lat. to the U.S./Canada border. 40°10' N. lat. is about 20 nm south of Cape Mendocino, California.

b/ Bocaccio and chilipepper rockfishes are included in the trip limits for minor shelf rockfish and splitnose rockfish is included in the trip limits for minor slope rockfish.

c/ "Other flatfish" means all flatfish at 50 CFR 660.302 except those in this table with species-specific management measures, including trip limits.

d/ For black rockfish north of Cape Alava (48°09'30" N. lat.), and between Destruction Island (47°40' N. lat.) and Leadbetter Point (46°38'10" N. lat.), there is an additional limit of 100 lbs or 30% by weight of all fish on board, whichever is greater, per vessel, per fishing trip.

e/ Closed means that it is prohibited to take and retain, possess, or land the designated species in the time or area indicated.

f/ The size limit for lingcod is 24 inches (61 cm) total length.

g/ Other fish are defined at 50 CFR 660.302, as those groundfish species or species groups for which there is no trip limit, size limit, quota, or harvest guideline.

h/ The "Rockfish Conservation Area" is a gear and/or sector specific closed area generally described by depth contours, but specifically defined by lat./long. coordinates in federal regulations.

TABLE 2-33. DRAFT 2005-2006 Trip limits for open access gears south of 40°10' N latitude.[a/] (Page 1 of 2)

NOTE: These management measures are not considered final until noticed in the *Federal Register*.

		JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
	Rockfish Conservation Area[g/] (RCA):						
	40°10' - 34°27' N. lat.	30 fm - 150 fm (also applies around islands, there is an additional closure between the shoreline and 10 fm around the Farallon Islands)		20 fm - 150 fm (also applies around islands, there is an additional closure between the shoreline and 10 fm around the Farallon Islands)		30 fm - 150 fm (also applies around islands, there is an additional closure between the shoreline and 10 fm around the Farallon Islands)	
	South of 34°27' N. lat.	60 fm - 150 fm (also applies around islands)					
1	**Minor slope rockfish[b/]**						
2	40°10' - 38° N. lat.	Per trip, no more than 25% of weight of the sablefish landed					
3	South of 38° N. lat.	10,000 lb/ 2 months					
4	**Splitnose**	200 lb/ month					
5	**Sablefish**						
6	40°10' - 36° N. lat.	300 lb/ day, or 1 landing per week of up to 900 lb, not to exceed 3,600 lb/ 2 months					
7	South of 36° N. lat.	350 lb/ day, or 1 landing per week of up to 1,050 lb					
8	**Thornyheads**						
9	40°10' - 34°27' N. lat.	CLOSED[e/]					
10	South of 34°27' N. lat.	50 lb/ day, no more than 1,000 lb/ 2 months					
11	**Dover sole**	3,000 lb/month, no more than 300 lb of which may be species other than Pacific sanddabs. 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 1 lb of weight per line are not subject to the RCAs.					
12	**Arrowtooth flounder**						
13	**Petrale sole**						
14	**Rex sole**						
15	**All other flatfish[c/]**						
16	**Whiting**	300 lb/ month					
17	**Minor shelf rockfish, widow and chilipepper rockfish[b/]**						
18	40°10' - 34°27' N. lat.	300 lb/ 2 months	CLOSED[e/]	200 lb/ 2 months		300 lb/ 2 months	
19	South of 34°27' N. lat.	500 lb/ 2 months		500 lb/ 2 months			
20	**Canary rockfish**	CLOSED[e/]					
21	**Yelloweye rockfish**	CLOSED[e/]					
22	**Cowcod**	CLOSED[e/]					
23	**Bocaccio**						
24	40°10' - 34°27' N. lat.	200 lb/ 2 months	CLOSED[e/]	100 lb/ 2 months		200 lb/ 2 months	
25	South of 34°27' N. lat.	100 lb/ 2 months		100 lb/ 2 months			
26	**Minor nearshore rockfish**						
27	Shallow nearshore						
28	40°10' - 34°27' N. lat.	300 lb/ 2 months	CLOSED[e/]	500 lb/ 2 months	600 lb/ 2 months	500 lb/ 2 months	300 lb/ 2 months
29	South of 34°27' N. lat.						
30	Deeper nearshore						
31	40°10' - 34°27' N. lat.	500 lb/ 2 months	CLOSED[e/]	500 lb/ 2 months		400 lb/~~month~~ 2 months[h/]	500 lb/ 2 months
32	South of 34°27' N. lat.			600 lb/ 2 months			400 lb/ 2 months
33	California scorpionfish	300 lb/ 2 months	CLOSED[e/]	300 lb/ 2 months	400 lb/ 2 months		300 lb/ 2 months
34	**Lingcod[d/]**	CLOSED[e/]		300 lb/ month, when nearshore open			CLOSED[e/]
35	**Other Fish[f/]**	Not limited					
36	**PINK SHRIMP EXEMPTED TRAWL GEAR** *(not subject to RCAs)*						
37	South	**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					

TABLE 2-33. DRAFT 2005-2006 Trip limits for open access gears south of 40°10' N latitude.[a/] (Page 2 of 2)

~~NOTE: These management measures are not considered final until noticed in the *Federal Register*.~~

			JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
			groundfish limits and do not have species-specific limits. The amount of groundfish landed may not exceed the amount of pink shrimp landed.					
38	**RIDGEBACK PRAWN AND, SOUTH OF 38°57'30" N. LAT., CA HALIBUT AND SEA CUCUMBER EXEMPTED TRAWL**							
39		**EXEMPTED TRAWL Rockfish Conservation Area[g/] (RCA) for CA Halibut and Sea Cucumber:**						
40		40°10' - 34°27' N. lat.	75 fm - 150 fm (additional closure between the shoreline and 10 fm around the Farallon Islands)	100 fm - 150 fm (additional closure between the shoreline and 10 fm around the Farallon Islands)				75 fm - 150 fm (additional closure between the shoreline and 10 fm around the Farallon Islands)
41		South of 34°27' N. lat.	75 fm - 150 fm along the mainland coast; shoreline - 150 fm around islands	100 fm - 150 fm along the mainland coast; shoreline - 150 fm around islands				75 fm - 150 fm along the mainland coast; shoreline - 150 fm around islands
42		**EXEMPTED TRAWL Rockfish Conservation Area[g/] (RCA) for Ridgeback Prawn:**						
43		South of 34°27' N. lat.	100 fm - 150 fm along the mainland coast; shoreline - 150 fm around islands					
44			Groundfish 300 lb/trip. Trip limits in this table also apply and are counted toward the 300 lb groundfish per trip limit. The amount of groundfish landed may not exceed the amount of the target species landed, except that the amount of spiny dogfish landed may exceed the amount of target species landed. Spiny dogfish are limited by the 300 lb/trip overall groundfish limit. The daily trip limits for sablefish coastwide and thornyheads south of Pt. Conception and the overall groundfish "per trip" limit may not be multiplied by the number of days of the trip. Vessels participating in the California halibut fishery south of 38°57'30" N. lat. are allowed to (1) land up to 100 lb/day of groundfish without the ratio requirement, provided that at least one California halibut is landed and (2) land up to 3,000 lb/month of flatfish, no more than 300 lb of which may be species other than Pacific sanddabs, sand sole, starry flounder, rock sole, curlfin sole, or California scorpionfish (California scorpionfish is also subject to the trip limits and closures in line 33).					

a/ "South" means 40°10' N. lat. to the U.S./Mexico border. 40°10' N. lat. is about 20 nm south of Cape Mendocino, California.
b/ Yellowtail rockfish is included in the trip limits for minor shelf rockfish, and POP is included in the trip limits for minor slope rockfish.
c/ "Other flatfish" means all flatfish at 50 CFR 660.302 except those in this table with species-specific management measures, including trip limits.
d/ The size limit for lingcod is 24 inches (61 cm) total length.
e/ Closed means that it is prohibited to take and retain, possess, or land the designated species in the time or area indicated.
f/ Other fish are defined at 50 CFR 660.302 as those groundfish species or species groups for which there is no trip limit, size limit, quota, or harvest guideline.
g/ The "Rockfish Conservation Area" is a gear and/or sector specific closed area generally described by depth contours, but specifically defined by lat./long. coordinates in federal regulations.
h/ Adjusted by the Council at their September 2004 meeting.

TABLE 2-34. Comparison of harvest level alternatives. (Page 1 of 1)

No Action (2004 OYs)	Low OY Alternative	Medium OY Alternative	High OY Alternative	Council OY Alternative
• OYs not based on new stock assessments (lingcod & cabezon), forward projections from recent stock assessments, or rebuilding plans adopted by Amendment 16-3. • For other stocks, except yellowtail rockfish, OYs within Low OY-High OY range. • New precautionary reductions for Pacific cod, other flatfish, and "other fish" complexes not applied.	Most precautionary alternative, assumes least long-term risk for highest short-term cost. Significantly adverse socioeconomic impacts likely.	Same as Council OY alternative except lingcod, canary rockfish, and yelloweye rockfish OYs are higher; OYs for four other stocks not identified in this alternative. (see Section 2.1 for explanations). Slightly less precautionary than Council OY Alternative.	Least precautionary alternative, assumes most long-term risk for greatest short-term benefit.	As with Medium OY Alternative, adopts OYs with intermediate level of precaution. Lingcod and yelloweye rockfish OYs apply the lower OY value of 2005/2006 to both years. Canary rockfish OY based on actual commercial-recreational catch sharing. Defers choice of Pacific whiting OY pending new stock assessment and bycatch information from 2004 season.

TABLE 2-35. Summary of impacts of management measure alternatives. (Page 1 of 2)

	No Action Alternative	Alternative 1	Alternative 2	Alternative 3	Council-preferred Alternative June 2004	Council-preferred Alternative September 2004
EFH and Ecosystem	Second largest RCA, fishing effort similar to Alts 2 & 3, likely second least impact	Largest RCA, least fishing effort, likely least impact	RCA area smaller than Alt 1, intermediate fishing effort, impacts likely greater than No Action & Alt 1	Same RCA area as Alt 2, intermediate fishing effort, impacts likely equal Alt 2	Smallest RCA, highest fishing effort, likely greatest impact	Largest RCA, effort and impacts similar to No Action
Groundfish Species						
Overfished species	Rebuilding OYs not exceeded, but not all projected harvests consistent with adopted 2005-2006 OYs	Rebuilding OYs not exceeded, most precautionary alternative	Canary and widow rockfish rebuilding OYs exceeded, without mitigation overfishing occurs	Canary and widow rockfish rebuilding OYs exceeded, without mitigation overfishing occurs, least precautionary	Rebuilding OYs not exceeded if whiting fishery canary & widow rockfish “caps” not exceeded, modestly precautionary	Rebuilding OYs not exceeded if whiting fishery canary & widow rockfish “caps” not exceeded, modestly precautionary
Target species	OYs not exceeded, but not all projected harvests consistent with 2005-2006 OYs, harvest levels similar to Alt 1	OYs not exceeded, lowest harvest levels	OYs not exceeded, intermediate harvest levels	OYs not exceeded, intermediate harvest levels	OYs not exceeded, highest harvest levels	OYs not exceeded, next highest harvest levels
Nongroundfish Species	Alternatives indistinguishable, no significant impacts to nongroundfish species					
Protected Species	Fishing effort similar to Alts 2 & 3, likely second least impact	Least fishing effort, likely least impact	Intermediate fishing effort, impacts likely greater than No Action & Alt 1	Impacts likely equal Alt 2	Highest fishing effort, likely greatest impact, but ESA, MMPA threshold not exceeded	ESA, MMPA threshold not exceeded
Management Regime (Public sector)	Least impact to management regime in terms of monitoring and enforcement requirements, regulatory complexity	Action alternatives indistinguishable in terms of impacts; factors contributing to complexity include implementation of selective flatfish trawl gear requirement, whiting bycatch reduction measures, area management				

TABLE 2-35. Summary of impacts of management measure alternatives. (Page 2 of 2)

	No Action Alternative	Alternative 1	Alternative 2	Alternative 3	Council-preferred Alternative June 2004	Council-preferred Alternative September 2004
Fisheries Impacts						
LE Trawl ($ mil exvessel)	$36.4	$33.6	$35.5	$36.0	$37.0	
LE FG Sablefish ($ mil exvessel)	$9.8	$9.8	$9.7	$9.8	$9.8	$9.6
Other Groundfish ($ mil exvessel)	$23.4	$25.9	$26.2	$26.2	$25.2	
Tribal ($ mil exvessel)	$6.9	$8.1	$8.2	$8.3	$8.3	$8.3
Recreational Impacts ('000 trips)	4,309	4,309	4,309	4,309	4,309	4,309
Buyers and Processors ($ mil exvessel groundfish)	$86.3	$86.0	$88.1	$88.8	$88.8	
General Public (relative change in net benefits)	0	+	+	-	-	+
Communities ($ mil income impacts)	$648.8	$646.8	$650.3	$651.4	$651.8	

Southern RLMA Proposed 2005-06 Recreational Regulations

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish[a/]					< 40fm	< 40fm	< 40fm	< 40fm	< 40fm			
Shelf rockfish[b/]					< 40fm	< 40fm	< 40fm	< 40fm	< 40fm			
California scorpionfish			< 40fm	< 40fm			< 40fm	< 40fm	< 40fm			
Cabezon					< 40fm	< 40fm	< 40fm	< 40fm	< 40fm			
Greenlings (rock, kelp)					< 40fm	< 40fm	< 40fm	< 40fm	< 40fm			
California sheephead					< 40fm	< 40fm	< 40fm	< 40fm	< 40fm			
Ocean whitefish					< 40fm	< 40fm	< 40fm	< 40fm	< 40fm			
Lingcod					< 40fm	< 40fm	< 40fm	< 40fm	< 40fm			
Sanddabs												

Key:

	Allowed in all depths
< 40fm	Allowed only in waters < 40fm
	Closed
	Lingcod closed nesting season

a/ Nearshore rockfish are defined as black rockfish, black-and-yellow rockfish, blue rockfish, brown rockfish calico rockfish, China rockfish, copper rockfish, gopher rockfish, grass rockfish, kelp rockfish, olive rockfish, quillback rockfish, and treefish.

b/ Shelf rockfish include bocaccio, canary, cowcod, widow, yelloweye, yellowtail, shortbelly, bronzespotted chameleon, chilipepper, dwarf-red, flag, freckled, greenblotched, greenspotted, greenstriped, halfbanded, honeycomb, Mexican, pink, pinkrose, pygmy, redstripe, rosethorn, rosy, silvergrey, speckled, squarespot, starry, stripetail, swordspine, tiger, and vermilion rockfish. Note that the retention of canary, yelloweye, and cowcod rockfish is prohibited.

FIGURE 2-1. Proposed 2005-2006 California recreational fishery seasons and depth restrictions for the Southern Rockfish/Lingcod Management Area south of Point Conception under Action Alternatives 1-3.

Central RLMA Proposed 2005-06 Recreational Regulations

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish[a/]						< 40fm	< 20fm	< 20fm	< 20fm	< 20fm		
Shelf rockfish[b/]						< 40fm	< 20fm	< 20fm	< 20fm	< 20fm		
California scorpionfish						< 40fm	< 20fm	< 20fm	< 20fm	< 20fm		
Cabezon						< 40fm	< 20fm	< 20fm	< 20fm	< 20fm		
Greenlings (rock, kelp)						< 40fm	< 20fm	< 20fm	< 20fm	< 20fm		
California sheephead						< 40fm	< 20fm	< 20fm	< 20fm	< 20fm		
Ocean whitefish						< 40fm	< 20fm	< 20fm	< 20fm	< 20fm		
Lingcod						< 40fm	< 20fm	< 20fm	< 20fm	< 20fm		
Sanddabs												

Key:

	Allowed in all depths
< 20fm	Allowed only in waters < 20fm
< 40fm	Allowed only in waters < 40fm
	Closed
	Lingcod closed nesting season

a/ Nearshore rockfish are defined as black rockfish, black-and-yellow rockfish, blue rockfish, brown rockfish, calico rockfish, China rockfish, copper rockfish, gopher rockfish, grass rockfish, kelp rockfish, olive rockfish, quillback rockfish, and treefish.

b/ Shelf rockfish include bocaccio, canary, cowcod, widow, yelloweye, yellowtail, shortbelly, bronzespotted chameleon, chilipepper, dwarf-red, flag, freckled, greenblotched, greenspotted, greenstriped, halfbanded, honeycomb, Mexican, pink, pinkrose, pygmy, redstripe, rosethorn, rosy, silvergrey, speckled, squarespot, starry, stripetail, swordspine, tiger, and vermilion rockfish. Note that the retention of canary, yelloweye, and cowcod rockfish is prohibited.

FIGURE 2-2. Proposed 2005-2006 California recreational fishery seasons and depth restrictions for the Central Rockfish/Lingcod Management Area north of Point Conception to Cape Mendocino under Action Alternatives 1-3.

Northern RLMA Proposed 2005-06 Recreational Regulations

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish[a/]							< 40fm	< 40fm	< 40fm	< 40fm		
Shelf rockfish[b/]							< 40fm	< 40fm	< 40fm	< 40fm		
Cabezon							< 40fm	< 40fm	< 40fm	< 40fm		
Greenling (rock, kelp)							< 40fm	< 40fm	< 40fm	< 40fm		
California sheephead							< 40fm	< 40fm	< 40fm	< 40fm		
Ocean whitefish							< 40fm	< 40fm	< 40fm	< 40fm		
Lingcod							< 40fm	< 40fm	< 40fm	< 40fm		

Key:

< 40fm	Allowed only in waters < 40fm
	Closed
	Lingcod closed nesting season

a/ Nearshore rockfish are defined as black rockfish, black-and-yellow rockfish, blue rockfish, brown rockfish, calico rockfish, China rockfish, copper rockfish, gopher rockfish, grass rockfish, kelp rockfish, olive rockfish, quillback rockfish, and treefish.

b/ Shelf rockfish include bocaccio, canary, cowcod, widow, yelloweye, yellowtail, shortbelly, bronzespotted chameleon, chilipepper, dwarf-red, flag, freckled, greenblotched, greenspotted, greenstriped, halfbanded, honeycomb, Mexican, pink, pinkrose, pygmy, redstripe, rosethorn, rosy, silvergrey, speckled, squarespot, starry, stripetail, swordspine, tiger, and vermilion rockfish. Note that the retention of canary, yelloweye, and cowcod rockfish is prohibited.

FIGURE 2-3. 2005-2006 California recreational fishery seasons and depth restrictions for the Northern Rockfish/Lingcod Management Area north of Cape Mendocino under Action Alternatives 1-3.

REGION		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
North	OR/CA border to 40°10' N. lat.							< 40fm	< 40fm	< 40fm	< 40fm		
NCentral and northern-SCentral	40°10' N lat. to 36° N. lat							< 20fm	< 20fm	< 20fm	< 20fm	< 20 fm	
southern-SCentral	36° N. lat. to 34°27' N. lat.					20-40 fm	20-40fm	20-40fm	20-40fm	20-40fm			
South	34°27' N. lat. to CA/Mex border			30-60 fm	30-60fm	30-60fm	30-60fm	< 40fm	< 40fm	< 40fm			
South Scorpionfish											< 40fm	< 40fm	< 20fm

KEY

	Groundfish closed in all waters
< 20 fm	Fishing permitted in waters less than 20 fm
< 40 fm	Fishing permitted in waters less than 40 fm
20-40 fm	Fishing permitted only between 20 fm and 40 fm
30-60 fm	Fishing permitted only between 30 fm and 60 fm

FIGURE 2-4. 2005-2006 California recreational fishery seasons and depth restrictions by management region under the Council-preferred Alternative.

3.0 WEST COAST MARINE ECOSYSTEMS AND ESSENTIAL FISH HABITAT

3.1 Affected Environment

3.1.1 West Coast Marine Ecosystems

Appendix A, Section 2.3.1 describes the West Coast fishery ecosystem. Marine ecosystems are influenced by the characteristics of the water column and underlying substrate. Key factors in the water column include water depth and temperature, vertical mixing, and currents. Temperature and depth place physiological limits on the distribution of species. Depth and water turbidity determine light penetration, which is required for primary production by phytoplankton. Vertical and horizontal mixing bring nutrients into the photic zone, the upper layers where light penetrates, further influencing the level of primary production. Large-scale surface and subsurface current systems affect water temperature, nutrients, and the transport of planktonic life forms, including larval fish. Nearshore and continental shelf zones are the most productive areas because the relatively shallow depths allow light penetration throughout the water column and complete mixing. Nonetheless, commercially important groundfish species are also found on the continental slope, the zone marking the transition from the shallower shelf to the deep abyssal plain. Physical characteristics of the bottom affect ecosystems. Large coastal features—islands and embayments, for example—affect water circulation. Bottom topography is important to the distribution of benthic species. As implied by their name, many rockfish species prefer hard substrate; flatfish, including commercially important species like Dover sole, require sand or mud substrate.

Climate change is also an important influence on the productivity of marine ecosystems, which in turn has an important effect on fishery production. Scientists have become more aware of cyclical climate changes in recent years. Many people are aware of the El Niño-Southern Oscillation phenomenon; strong events have had noticeable effects across the Pacific and continental U.S. El Niño events also affect West Coast marine ecosystems. During such an event, warm water moves up the West Coast, inhibiting the upwelling of cold nutrient-rich water. With fewer nutrients available in the photic zone, primary production suffers, which also affects species higher up on the food chain, including many commercially important groundfish species. Scientists have also identified a much longer climate cycle, which they have dubbed the Pacific Decadal Oscillation, or PDO. This is a shift between periods of relatively warm sea surface temperatures off the West Coast and cooler water. During the warm phase, as with El Niño, fisheries production suffers. Scientists now realize that a warm phase began around 1976 and 1977, just at the time domestic fisheries were expanding. As harvest rates increased dramatically, fish stocks were becoming less productive. By examining climate records scientists estimate that these cycles last for about 20 years, and there is evidence that West Coast waters recently entered a cooler phase, which should enhance productivity. This phenomenon is important when considering overfished species, because stock productivity is a key factor in estimating how much fishing mortality a stock can sustain and still rebuild in the time period dictated by the rebuilding plan.

3.1.2 Essential Fish Habitat

The MSA, as amended by the 1996 SFA, requires NMFS and federal fishery councils to describe EFH for the species they manage. They must also enumerate potential threats to EFH from both fishing and non-fishing activities. These descriptions are compiled as part of each FMP. NMFS completed this task for the West Coast in 1998. EFH descriptions have been incorporated into the groundfish FMP in a detailed appendix (available online at: http://www.nwr.noaa.gov/1sustfsh/efhappendix/page1.html). However, a subsequent court challenge at the national level has required NMFS and the fishery councils to go back and do a better job of identifying, characterizing, and proposing protection measures for EFH. NMFS Northwest

Region (NWR) is currently preparing an EIS to address this challenge. The completion date for this project is early 2006. Chapter 4 in Appendix A gives an overview of how EFH for the West Coast has been identified and characterized to date. That section of the appendix also details what is known about the effects of fishing and non-fishing activities on EFH.

EFH must be identified for each life stage of each species in the fishery management unit. Thus, when taken together, groundfish EFH covers all marine and coastal waters in the West Coast EEZ. Currently, seven composite characterizations of different types have EFH have been identified. These are broad classifications based on bottom type, topography, and water depth.

Management measure alternatives that affect fishing activities having potential adverse effects on EFH must be evaluated. Evaluation of fishery effects on EFH is done through a consultation process with the NMFS Office of Habitat Conservation. One method of evaluating fishery effects is based on fishing effects on habitat types. As discussed in the Groundfish FMP, fishing gear can damage benthic habitat, which may contribute to the kinds of ecological effects described in the previous section. Altered habitat may favor some species, contributing to a change in community structure, and more broadly, to the population productivity of fish populations caught in fisheries.

3.2 Criteria Used to Evaluate Impacts

The proposed action will directly and indirectly affect the level of fishing activity, which—to the degree certain types of fishing gear adversely affect EFH—could result in differential impacts among the alternatives. Increased fishing effort could lead to an increase in fishing-related impacts, while a decrease in fishing effort would have the opposite effect. Thus, changes in fishing effort could be one way to evaluate the relative effects of the alternatives. However, there are limited data available on the distribution, intensity, and duration of fishing effort associated with the groundfish fisheries.[1/] Furthermore, different gear types have different kinds of impacts to habitat, although bottom trawl gear is likely to have the greatest impact because of its extensive contact with substrate. The effects of fishing gear on different types of habitat is not well understood either. For example, in high energy environments (e.g., strong wave action or currents) the relative effect of fishing gear may be modest compared to more stable, low energy environments. Currently, there is insufficient information to fully evaluate the effects of the proposed action on EFH.

Impacts of the proposed action at the ecosystem level are at least as difficult to predict. The direct effect of fishing authorized under the proposed action is to remove fish from ecosystems. This may change the relative abundance of species at different trophic levels, affecting ecosystem structure, and contributing to follow-on indirect and cumulative effects. However, the nature, intensity, and location of these effects are not well understood, especially across the range of marine ecosystems potentially affected by changes in the abundance of harvested groundfish species.

Given these limitations, projected groundfish landings and proposed closed areas are used as proxies for fishing effort as criteria to assess the relative effects of the alternatives on essential habitat and ecosystem function.

1/ Fishing locations are reported in logbooks required for limited entry trawl vessels. Similar reporting is not required for other sectors catching groundfish. To date, a model has not been developed to predict the distribution and intensity of fishing effort for a given set of management measures. As part of the EFH EIS referenced below, NMFS is developing a model to predict impacts on EFH, which includes a component for predicting fishing effort distribution and intensity.

When an agency is evaluating reasonably foreseeable significant adverse effects, there is incomplete or unavailable information, and the costs of obtaining it are exorbitant or the means unknown, the agency must, (1) so state, (2) describe the importance of the unavailable information to the assessment, (3) summarize any existing scientific information, and (4) evaluate impacts based on generally accepted scientific principals (40 CFR Part 1502.22), which may accord with the best professional judgement of agency staff. NMFS acknowledges that the information necessary to fully evaluate impacts to EFH and marine ecosystems, as described in the preceding paragraph, cannot be reasonably obtained at this time, and impacts are generally unknown. Necessary information may become available at a future date. As mentioned above, NMFS is preparing an EIS 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)). This EIS is gathering more information about the effects of fishing in order to evaluate alternatives to minimize fishing effects on EFH to the extent practicable, as required by the MSA. The DEIS is scheduled for release in February 2005, and the EIS process will be completed (by signing of the ROD) in February 2006. Given the schedule for the EFH EIS and the transition to a multi-year management system for groundfish harvest specifications, the earliest that any predictive use of this model might be used would be for the 2007-2008 management cycle. The following evaluation is based on best professional judgement of NMFS and Council staff.

3.3 Discussion of Direct and Indirect Impacts

Appendix A Chapter 4 describes adverse impacts of fishing gear to EFH, including ecosystem effects, in general terms. Ecosystem effects are, almost by definition, indirect. Overfishing has reduced some fish stocks to levels that are a small fraction of estimated unfished biomass and may affect trophic relationships: these species are less available both as prey and predators. Direct effects to habitat result from the deployment of fishing gear that damages benthic habitat. Habitat modification can also have indirect ecological effects because different species may be better adapted to the altered habitat, displacing other species. Bottom trawl footrope restrictions implemented by the Council, which would apply under all the alternatives, make it difficult for fishers to access rock piles and other areas of complex topography (due to the risk of gear damage). This helps protect important, complex habitat and creates defacto refugia for species preferring that habitat type. Biodiversity impacts are directly and indirectly related to overfishing, to the degree that these species are extirpated in all or part of their range. For overfished species, the harvest level (OY) alternatives are based on different legally-compliant rebuilding strategies. The Council has adopted, and NMFS implemented, rebuilding plans for four overfished species—canary rockfish, darkblotched rockfish, lingcod, and POP. The choice of OYs for these species is dictated by their rebuilding plans. (See Chapter 2 for a discussion of the OY alternatives.) In a separate action, the Council adopted rebuilding plans for the remaining four overfished species—bocaccio, cowcod, widow rockfish, and yelloweye rockfish—at the April 2004 meeting. Harvest level alternatives for these species vary based on the alternatives evaluated in that separate action (PFMC 2004a). In choosing the preferred alternative in that action, and adopting rebuilding plans for those species, the Council determined the harvest levels under the Council-preferred OY alternative for this biennial harvest specifications EIS. Under the rebuilding plans, these harvest levels are predicted to rebuild the stocks to a target biomass approximating B_{MSY}, which will also reduce the likelihood of range contraction or extinction. This does not preclude, however, the cumulative effects of unfavorable environmental conditions or biological and behavioral constraints (inhibiting successful reproduction for example), which pose a remote possibility of localized or species extinction. Given the current state of knowledge and available data, it is not possible to quantitatively evaluate the ecosystem, habitat, and biodiversity effects of the alternatives. Section 3.5 qualitatively compares the relative impacts of the alternatives.

The effects of fishery management practices on the physical environment typically include such things as fishing gear effects on the ocean floor, changes in water quality associated with vessel traffic, and fish processing discards as a result of fishing practices. There are no data to suggest that characteristics of the California Current System or topography of the coast change with fishery management or fishing practices. However, there is information to indicate fishery management and fishing practices may have an effect on EFH.

In general, potential bottom trawl fishing-related impacts to groundfish habitat take the form of lost or discarded fishing gear and direct disturbance of the seafloor from contact by trawl nets. While the effects of fishing on groundfish habitat have not been directly investigated, there is some research exploring how gear affects habitat. Auster and Langton (1999) reviewed a variety of studies reporting habitat effects due to fishing for a wide range of habitats and gear types. Commonalities of all studies included immediate effects on species composition and diversity and a reduction of habitat complexity.

Bottom trawling gear is known to modify seafloor habitats by altering benthic habitat complexity and by removing or damaging infauna and sessile organisms (Freese, *et al.* 1999; Friedlander, *et al.* 1999). In a study on the shelf and slope off California, high-resolution sidescan-sonar images of the Eureka area revealed deep gouges on the seafloor believed to be caused by trawl doors (Friedlander, *et al.* 1999). The effects of bottom trawling on a "hard bottom" (pebble, cobble, and boulder) seafloor was also investigated in the Gulf of Alaska, and results indicated a significant number of boulders were displaced and emergent epifauna were removed or damaged after a single pass with trawl gear. Casual observations during the Freese *et al.* (1999) study revealed that *Sebastes* species use cobble-boulder and epifaunal invertebrates for cover. When boulders are displaced, they can still provide cover; but when piles of boulders are displaced, it reduces the number and complexity of crevices (Freese, *et al.* 1999).

Limited qualitative observations of fish traps, longlines, and gillnets dragged across the seafloor during set and retrieval showed results similar to mobile gear, such that some types of organisms living on the seabed were dislodged. Quantitative studies of acute and chronic effects of fixed gear on habitat have not been conducted (Auster and Langton 1999).

In addition to fishing activities, humans have many direct and indirect effects on groundfish habitat. However, these are considered cumulative impacts because the proposed action only regulates fishing activity. For the most part, the alternatives do not.

In the last few decades, marine debris has also been recognized as posing a risk to marine organisms via entanglement and ingestion. Seafloor debris was surveyed from Point Conception, California, to the United States/Mexico international border at depths of 10 m to 200 m, and anthropogenic debris occurred on approximately 14% of the mainland shelf. Of the debris sampled, discarded fishing gear had the largest spatial coverage, followed by plastic, metal, and other debris (e.g., shoe soles and automobile parts) (Moore and Allen 1999). Less is known about the quantity of marine debris off Washington and Oregon, but it may be at levels that could negatively affect marine organisms.

3.4 Discussion of Cumulative Impacts

Cumulative effects result primarily in changes in the productivity of ecosystem components, which itself may be a result in fishery-induced changes in ecosystem structure. These factors include:

Climate variability. Climate cycles affect population productivity. Since predictions about future productivity are based on past relationships, between stock size and recruitment for example, if underlying conditions change, these predictions may be inaccurate. Thus, if climate is not or cannot be accounted for when modeling population dynamics, scientists may under- or over-predict population growth and sustainable fishery removals.

Ecosystem structure. Structural change becomes an effect itself (if resulting from fishery removals) that could interact cumulatively with the effects of the alternatives. Ultimately, it is the presence and differing abundances of species that constitutes ecosystem structure. The abundance of a given species is in turn the result of physiographic conditions (water temperature, relief, depth, etc.), processes external to an arbitrarily bounded system (e.g., fishing mortality), and interactions between system components (trophic relationships). Structure can change as a result of internal feedback. For example, scientists have posited "cultivation/depensation effects" that may lead to recruitment failure even though one would expect compensation to declines in biomass (MacCall 2002a; Walters and Kitchell 2001). (Compensatory response assumes that growth and survival are density dependent.)

Non-fishing impacts to habitat. These change physiographic conditions, which may produce changes in ecosystem structure. (See Section 4.4 in Appendix A.) While nonfishing human impacts have not been directly assessed on groundfish habitat, a study of flatfish in Puget Sound, Washington, indicated that anthropogenic stressors included chemical contaminant exposure and alteration of nearshore nursery habitats (Johnson, *et al.* 1998). The New England Fishery Management Council compiled a list of human-induced threats to fish habitat that may be used as a guide to factors affecting groundfish species off the West Coast. Oil, heavy metals, acid, chlorine, radioactive waste, herbicides and pesticides, sediments, greenhouse gases, and ozone loss are thought to be chemical factors that affect fish habitat. Biological threats can include the introduction of non-indigenous species, stimulation of nuisance and toxic algae, and the spread of disease. Human activities that may physically threaten fish habitat are dredging and disposal, mineral harvesting, vessel activity, shoreline alteration, and debris (Wilbur and Pentony 1999). With some notable exceptions (such as the live fish fishery in Southern California) most limited entry and directed open access fisheries do not occur in the inshore areas directly affected by these activities. However, according to EFH descriptions in the Groundfish FMP, early life stages of some target species—such as Pacific cod, whiting, bocaccio, and English sole—use estuarine habitat, so these stocks could be affected if nearshore nonfishing activities reduce productivity by damaging habitat.

Past and future fishing activity and related management actions. Excluding whiting, the highest groundfish landings were in 1982, primarily because of very large catches of widow rockfish. Landings were lower, although fairly stable through the 1980s, but began to decline steeply beginning in the early 1990s. Non-whiting landings fell by 67% between 1992 and 2002. (See Appendix A Tables 6-1a through 6-1c, which show historical landings by weight, and exvessel revenue in current and inflation-adjusted dollars.) Using landings as a proxy for changes in fishing effort, past effort was substantially higher than is likely to occur in the near future. This activity likely resulted in substantial impacts to EFH and by reducing fish populations affecting ecosystem structure. The trawl vessel buyback program, implemented in December 2003, retired about one third of the limited entry fleet. Although this may allow increases in landing limits and more fishing effort by the remaining vessels, the net effect is likely to be a reduction in total trawl effort. In the foreseeable future, the need to rebuild overfished groundfish stocks will likely constrain fishing effort to levels near or modestly above the level occurring at present. The distribution and intensity of fishing effort, and therefore impacts to EFH, could be affected by measures implemented pursuant to the EFH EIS mentioned above in Section 3.2. This EIS will include alternatives addressing the MSA requirement to minimize, to the extent practicable, the adverse effects of fishing on EFH (§303(a)(7)). Measures could reduce overall fleet capacity, close areas to fishing, or require fishing gear modifications to reduce EFH impacts. Any such measures would likely come into effect in 2006.

3.5 Summary of Impacts

As discussed in Section 3.2, currently, there is insufficient information to directly predict the impacts of the alternatives on EFH and the West Coast marine ecosystem. Two indirect measures that can be derived from catch projections produced by the trawl bycatch model (Hastie 2001; Hastie [2003]) are the area of the trawl

RCA and projected total catch estimates of major target species.[2/] Although other gear types also have adverse impacts on EFH, current information, as discussed above, indicates that trawl gear has the greatest impact. Equally important to this evaluation, model outputs of projected catches are only available for the limited entry trawl sector. The limited entry trawl sector also accounts for a large proportion of landings, mainly north of 40º10' N latitude. However, when making comparisons across gear types a correlation between landings and effort cannot be applied because of differences in both the unit of effort and CPUE between gear types. For these reasons, projections of activity in the trawl sector is used as a proxy for the relative impact on EFH of the alternatives.

Table 3-1 shows the area of the trawl RCA under each alternative. RCA boundaries vary by two-month period; the values reported in the table are annual averages. The right-hand column expresses the area covered as a percentage of the size of the RCA under Alternative 1, which has the largest RCA. With some exceptions, bottom trawling is prohibited within the RCA. Impacts from bottom trawling are, therefore, substantially reduced. An alternative that implements an RCA covering a large area could result in reduced fishing impacts to EFH.

Table 3-2 uses catch projections stratified by the area seaward of the RCA versus shoreward of the RCA and north and south of 40º10' N latitude to present an index of catches by area. For each stratum, the percentage reflects a multiple of lowest projected catch among the alternatives for that stratum. For example, Alternative 1 has the lowest projected catch in the area shoreward of the RCA north of 40º10' N latitude, represented by the 100% value, while the No Action Alternative, using the same modeling outputs, shows a projected catch 1.58 times (158%) Alternative 1 for this area. (It should be noted that the Council-preferred Alternative was developed using updated overfished species bycatch rates for the selective flatfish trawl gear that will be required shoreward of the RCA. Applying the updated bycatch rates, which are lower than those used to develop the preliminary range of alternatives, would not affect projected target species catch. However, the Council-preferred Alternative allowed higher trip limits for the selective flatfish trawl, and thus higher target species catches, to be applied.) Projected catches may be used as a proxy for expected effort, although this simple approach must be qualified. CPUE is likely to vary by area and season because of changes in target species' abundance, bottom characteristics, and fishing strategy. This means there is unlikely to be a one-to-one correlation between catch and effort when comparing a given area across alternatives, and it is not possible to make statements about the relative effects on different areas within an alternative. Projected catches give a more direct indication of ecosystem effects as a measure of the removal of target species' biomass.

Using the two metrics described above, the relative impacts of the alternatives on EFH and marine ecosystems are summarized:

<u>The No Action Alternative</u>. This alternative has the second-largest trawl RCA among the alternatives, although very close to Alternative 1. Looking at projected catches for all areas (the right-hand column in Table 3-2), the level of effort is likely to be equivalent to Alternatives 2 and 3. Projected catches seaward of the RCA are slightly higher than Alternatives 1 and 2, which may indicate a lower level of effort in these areas in comparison to those two alternatives. The No Action Alternative is predicted to have a greater impact on EFH and marine ecosystems than Alternative 1 and an impact equivalent to Alternatives 2 and 3.

<u>Alternative 1</u>. This alternative has the largest trawl RCA among the alternatives. It is also projected to result in the lowest catches among the alternatives overall and in each area except for seaward of the RCA in the

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2/ The target species projections are for sablefish, Dover sole, longspine and shortspine thornyheads, arrowtooth flounder, petrale sole, and other flatfish.

north. Generally, seaward of the RCA Alternatives 1, 2, and 3 have very similar projected catches, which may indicate a similar level of impact on habitats in those areas. Alternative 1 is predicted to have the least impact on EFH and marine ecosystems of the alternatives.

Alternative 2. This alternative and Alternative 3 have the same size trawl RCA, which is two-thirds the size of the RCA under Alternative 1. They also have similar levels of projected catch. Projected catch under Alternatives 2 and 3 in areas seaward of the RCA is similar to or slightly lower than projected catch under Alternative 1 and No Action, especially in the north. Shoreward of the RCA, projected catch is higher than under No Action and Alternative 1. Alternatives 2 and 3 are predicted to affect EFH and marine ecosystems to the same degree, which is greater than Alternative 1 or No Action.

Alternative 3. This alternative is predicted to have an effect indistinguishable form Alternative 2, as discussed above.

The Council-preferred Alternative. This alternative as adopted in June 2004 has the smallest RCA of all the alternatives. However, the Council modified the size of the RCA for 2005-2006 at the September 2004 meeting, after the DEIS was published, extending the seaward boundary to 200 fathoms north of 38° N latitude. The resulting area is greater than under Alternatives 2 and 3, but smaller than Alternative 1 and No Action. Projected catches are substantially higher shoreward of the RCA in the northern region: almost double the No Action alternatives and more than three times Alternative 1. Projected catches in the shoreward area in the southern region are less than under No Action, but greater than the other action alternatives. As with all the alternatives, only small footrope gear is allowed shoreward of the RCA (selective flatfish gear is a modification of the small footrope gear category), which may mitigate impacts to EFH because this type of gear cannot be used in areas with rocky substrate. Although intended to reduce catches of overfished rockfish species occurring in this habitat type, this requirement also prevents trawling in rock areas, which may support more sensitive habitat containing habitat-forming benthic organisms such as corals and sponges. Overall, it is predicted this alternative will have the greatest impact on EFH and the ecosystem because projected target species catch, acting as a proxy for fishing effort, is highest under this alternative.

Cumulative impacts. External factors that are likely to combine with effects of the proposed action to produce cumulative impacts are described in Section 3.4. There is insufficient information to determine if the relative magnitude of cumulative effects under the different alternatives will differ from the relative magnitude of direct and indirect effects. It is likely, however, that external factors would effect EFH and marine ecosystems in the same degree under all of the alternatives. Therefore, those alternatives producing greater direct and indirect impacts would be expected to result in greater cumulative impacts.

TABLE 3-1. Trawl rockfish conservation area (RCA) average area (square miles) under the alternatives.

Alternative	North of 40º10'	South of 40º10'	Total	% of Largest RCA
No Action	10,048	4,394	14,422	97.2%
Alternative 1	10,033	4,832	14,865	100.0%
Alternative 2	5,438	4,394	9,832	66.1%
Alternative 3	5,438	4,394	9,832	66.1%
Council-preferred	4,681	3,955	8,636	58.1%
Council-preferred as revised in September 2004	6,026	4168	10,194	68.6%

TABLE 3-2. Total catch of major target species by area by alternative, expressed as a percent of the lowest value in each stratum.

Alternative/Area	Shoreward of RCA	Seaward of RCA	All Areas
No Action			
North	158%	110%	113%
South	171%	109%	
Alternative 1			
North	100%	108%	100%
South	100%	100%	
Alternative 2			
North	234%	100%	112%
South	126%	101%	
Alternative 3			
North	254%	101%	115%
South	126%	102%	
Preferred Alternative			
North	308%	105%	125%
South	144%	110%	

4.0 GROUNDFISH SPECIES

4.1 Affected Environment: Groundfish Species

There are over 80 species of groundfish managed under the Groundfish FMP. These species include over 60 species of rockfish in the family *Scorpaenidae*, 7 roundfish species, 12 flatfish species, assorted shark, skate, and a few miscellaneous bottom-dwelling marine fish species. Management of these groundfish species is based on principles outlined in the MSA, Groundfish FMP, and NSGs, which provide guidance on the 10 national standards in the MSA. Stock assessments are based on resource surveys, catch trends in West Coast fisheries, and other data sources. Section 7.1.3.4 describes, in general terms, how stock assessments are conducted and reviewed before they are applied in West Coast groundfish management. Table 3.2.0-1 in Appendix A depicts the latitudinal and depth distributions of groundfish species managed under the Groundfish FMP.

The passage of the SFA in 1996 incorporated current conservation and rebuilding mandates into the MSA. These mandates, including abundance-based standards for declaring a stock overfished, in a "precautionary" status, or at levels that can support MSY (healthy or "rebuilt"), were subsequently incorporated in the Groundfish FMP with adoption of Amendments 11 and 12. The abundance-based reference points for managing West Coast groundfish species are relative to an estimate of "virgin" or unexploited biomass of the stock, which is denoted as B_0 and is defined as the average equilibrium abundance of a stock's spawning biomass before it is affected by fishing-related mortality. The Magnuson-Stevens Act and NSGs employ the MSY concept to frame management objectives. MSY represents a theoretical maximum surplus production from a population of constant size; NSGs define it as "the largest long-term average catch or yield that can be taken from a stock or stock complex under prevailing ecological and environmental conditions." Thus, for a given population, and set of ecological conditions, there is a biomass that produces MSY (denoted as B_{MSY}), which is less than the equilibrium size in the absence of fishing (B_0). (Generally, population sizes above B_{MSY} are less productive, because of competition for resources.) The harvest rate used to specify harvest levels designed to achieve or sustain B_{MSY} is referred to as the Maximum Fishing Mortality Threshold (MFMT, denoted as F_{MSY}). There are two harvest specification reference points defined in the Groundfish FMP, a total catch OY and an ABC. The OY is typically the management target and is usually less than the ABC, based on the need to rebuild stocks to B_{MSY} (see the following discussion). The ABC, which is the maximum allowable harvest, is calculated by applying an estimated or proxy F_{MSY} harvest rate to the estimated abundance of the exploitable stock.

The Council-specified proxy MSY abundance for most West Coast groundfish species is 40% of B_0 (denoted as $B_{40\%}$). The Council-specified threshold for declaring a stock overfished is when the stock's spawning biomass declines to less than 25% of B_0 (denoted as $B_{25\%}$). The MSA and NSGs refer to this threshold as the Minimum Stock Size Threshold or MSST. A rebuilding plan that specifies how total fishing-related mortality is constrained to achieve an MSY abundance level within the legally allowed time is required by the MSA and Groundfish FMP when a stock is declared overfished.

Stocks estimated to be above the overfishing threshold, yet below an abundance level that supports MSY, are considered to be in the "precautionary zone." The Council has specified precautionary reductions in harvest rates for such stocks to increase abundance to $B_{40\%}$. The methodology for determining this precautionary reduction is described in the Groundfish FMP and is referred to as the 40-10 adjustment. As the stock declines below $B_{40\%}$, the total catch OY is reduced from the ABC until, at 10% of B_0, the OY is set to zero. However, in practice the 40-10 adjustment only applies to stocks above $B_{25\%}$ (the MSST) because once a stock falls below this level, an adopted rebuilding plan supplants it. Most stocks with an estimated abundance greater than $B_{40\%}$ are managed by setting harvest to the ABC. Figure 2-3 in

Appendix A presents this framework graphically. The CDFG has an analogous precautionary policy to the Council's 40-10 adjustment specified in their nearshore FMP. Called the 60-20 adjustment, the precautionary reduction of OY from the ABC would begin at 60% of B_0 until, at 20% of B_0, the OY is set to zero.

4.2 Criteria Used to Evaluate Impacts

Relative uncertainty of a stock's status is an important evaluation criterion. Most stocks managed under the Groundfish FMP have never been assessed. These stocks may need a greater level of precautionary management to prevent overfishing. In cases where other constraints (such as management measures designed to rebuild overfished stocks) limit fishing access to unassessed stocks, precautions may be implicit in the alternatives. However, in other cases, where access to an unassessed stock is not so limited, stock status uncertainty may need to be directly factored into management decisions.

The relative effectiveness of alternative management measures to control fishing-related mortality (to attain but not exceed total catch OYs) is also used as an evaluation criteria. Some groundfish stocks, such as lingcod and bocaccio, have been overharvested in recent years (Tables 4-1 and 4-2), and management measures considered for 2005-2006 should be responsive to this problem.

Additionally, the uncertainty of catch monitoring/estimating systems in the current management regime should be a factor in evaluating impacts on groundfish stocks. This is because current catch monitoring systems are differentially effective and/or reliable by fishery sector. For instance, the NMFS WCGOP is mandated for the limited entry trawl, limited entry fixed gear, and open access fixed gear sectors, but not for recreational or tribal fisheries. Also, observer data is only currently available for the limited entry trawl and limited entry fixed gear sablefish fisheries. Open access fixed gear observations are anticipated in early 2005. Given that some species are differentially impacted by different fishing gears/sectors, data systems used in management by fishery sector and the precautions structured in alternative management measures are important considerations when evaluating impacts.

4.3 Discussion of Direct and Indirect Impacts

4.3.1 Alternative Harvest Levels

Alternative groundfish harvest levels contemplated for a change from status quo (2004 specifications) are based on new stock assessments (cabezon and lingcod), based on projections from the most recent assessment (bocaccio, black rockfish, canary rockfish, cowcod, Dover sole, sablefish, shortspine thornyheads, widow rockfish, yelloweye rockfish, and yellowtail rockfish), based on the potential application of precautionary harvest reductions for stocks and stock complexes that have not been formally assessed (Pacific cod, Other Fish, and Other Flatfish) or based on the need to analyze a range of potential bycatch effects prior to the next formal assessment (Pacific whiting).

4.3.1.1 Cabezon (in Waters off California)

The first assessment of cabezon (*Scorpaenichthys marmoratus*) on the West Coast was done last year (Cope, *et al.* 2004) and formally approved by the Council for use in 2005-2006 management decision making in March 2004. While cabezon are distributed coastwide along the West Coast, this assessment concentrated on the southern portion of the stock in waters off California because it was determined that the available data for the northern portion of the stock was insufficient for population evaluation. The predicted spawning output of the southern cabezon stock was 34.7% of the stocks initial unfished biomass. While this is above the MSST of $B_{25\%}$, it is below the target level of spawning output that is predicted to support the MSY of

$B_{40\%}$ (or B_{MSY}). Therefore, according to the groundfish harvest policies in California and in federal regulations, a precautionary reduction of the ABC is appropriate to achieve B_{MSY}. Two precautionary harvest policies are considered in this EIS: the Council's 40-10 rule and the 60-20 rule as specified in California's Nearshore FMP.

Dr. Andre Punt, one of the contributing assessment authors, provided cabezon harvest projections for the southern portion of the stock under these two precautionary harvest policies, the ABC rule, and two harvest control rules ($F_{45\%}$ and $F_{50\%}$) (Table 2-2). The range of alternative harvest levels analyzed covers the broadest range of projected harvest levels given these varying harvest rates and policies.

The CFGC recommended using the proxy F_{MSY} harvest rate of $F_{45\%}$ (i.e., the harvest rate predicted to build the stock's biomass to B_{MSY}) to set the ABC and the 60-20 precautionary harvest policy to set the OY. Additionally, the CFGC recommended using the 2005-2007 average OY projected using these harvest policies and control rules to establish the 2005 and 2006 cabezon OY. The Council agreed to these recommendations and set a cabezon OY of 69 mt for 2005-2006 as their preferred harvest level (Council OY in Tables 2-1a and 2-1b). This OY is clearly more precautionary than the High OY alternative (91 mt and 107 mt in 2005 and 2006, respectively) which uses the same default $F_{45\%}$ harvest rate to determine the ABC, but with the OY reduced using the Council's 40-10 adjustment rather than CDFG's 60-20 adjustment. The Low OY alternative (44 mt and 63 mt in 2005 and 2006, respectively) has an ABC determined using a lower harvest rate of $F_{50\%}$ with the same 60-20 adjustment to determine the OY. It is noted that the SSC recommended an $F_{45\%}$ harvest rate as an F_{MSY} proxy for setting the ABC for groundfish species such as cabezon as a risk-neutral policy (PFMC 2000b). This proxy harvest rate is intermediate to the $F_{50\%}$ rate prescribed for species with lower potential productivity, such as rockfish, and the $F_{40\%}$ rate for more resilient species, such as flatfishes. The application of the very precautionary 60-20 adjustment to set the OY in the Council-preferred OY Alternative is considered risk-averse.

4.3.1.2 Lingcod

A new lingcod (*Ophiodon elongatus*) assessment was done last year (Jagielo, *et al.* 2004) and formally approved by the Council for use in 2005-2006 management decision making in March 2004. This assessment updated the previous coastwide lingcod assessment (Jagielo, *et al.* 2000). As in the last assessment, separate age-structured assessment models were constructed for northern areas (Columbia and U.S.-Vancouver INPFC areas) and southern areas (Conception, Monterey, and Eureka INPFC areas). Results from these two models were combined to obtain coastwide estimates of spawning biomass, the depletion level, and other relevant assessment outputs.

This assessment indicates that the lingcod stock has achieved its rebuilding objective of $B_{40\%}$ in the north (actually 28% above $B_{40\%}$), but was at $B_{31\%}$ in the south. However, the adopted lingcod rebuilding plan specifies a coastwide rebuilding objective. The Council's SSC, working in concert with the lead assessment author, recalculated the coastwide lingcod stock status in March 2004 using actual 2003 harvests (the assessment, which was completed during 2003, assumed harvest would be equal to the specified OY in 2003). Their calculations indicated that the spawning biomass at the start of 2004 was within 99.3% of B_{MSY} (or $B_{40\%}$) on a coastwide basis (Table 2-3). Therefore, the Council could not recommend to NMFS that the stock should be declared rebuilt.

The range of alternative lingcod harvest levels analyzed for 2005-2006 is based on the new assessment. The Low OY alternative applies the harvest control rule specified in the lingcod rebuilding plan (F = 0.0531 in the north and F = 0.0610 in the south) that was adopted as part of FMP Amendment 16-2 (PFMC 2003b) to the new north and south estimates of spawning biomass. The Medium OY Alternative applies the new estimated harvest control rules[1/] (F = 0.17 in the north and F = 0.15 in the south) to new biomass estimates and assumes a rebuilding probability (P_{MAX} or the probability of rebuilding in the maximum allowable time according to the NSGs) of 70%. The High OY Alternative assumes new biomass and harvest control rule estimates[1/] (F = 0.18 in the north and F = 0.16 in the south) with a P_{MAX} of 60%. The preferred Council OY Alternative is to use the Medium OY Alternative ABC projected for 2005 and 2006, but the OY projected for 2006 (2,414 mt, which is projected to be lower than 2005; Tables 2-1a and 2-1b) for both years. Implicit in this action is a regulatory amendment of the harvest control rule adopted in the rebuilding plan which comports with the process and standards criteria for rebuilding plans adopted under FMP Amendment 16-1 (PFMC 2003a).

4.3.1.3 Bocaccio (in Waters off California South of 40°10' N Latitude)

The range of 2005-2006 harvest specifications for bocaccio south of 40°10' N latitude is based on the most recent stock assessment (MacCall 2003b) and rebuilding analysis (MacCall 2003a). The range of harvest specifications attempts to analyze varying rebuilding probabilities and model uncertainties in the assessment and rebuilding analysis. Model uncertainties compelled the STAR Panel (Helser, *et al.* 2003) and the SSC to recommend consideration of the STATc base model and the competing STARb1 and STARb2 models. The Council also limited the range of rebuilding probabilities considered for detailed analysis of rebuilding plans under FMP Amendment 16-3 (PFMC 2004a) to comply with P_{MAX} values ranging from 60% to 90%. Therefore, the range of bocaccio harvest specifications analyzed in this EIS represents the full range of plausible assessment model outputs and the P_{MAX} range of 60% to 90%. The Low OY specifications comport to the STARb2 model with a rebuilding probability of 90%. The Medium OY specifications are derived using the STATc base model with a rebuilding probability of 70% and the High OY specifications are structured using the STARb1 model with a rebuilding probability of 60%. The No Action (2004) bocaccio harvest specifications were based on the STARb2 model with a P_{MAX} of 70%. These specifications were also projected for the 2004 fishing year, while the specifications for the action alternatives, including the Council-preferred Alternative, were projected for the 2005 and 2006 fishing years.

The Council adopted a bocaccio rebuilding plan during their final action on FMP Amendment 16-3 in April 2004. The adopted rebuilding plan parameters were determined using the STATc base model since the assessment author recommended this model as the most plausible. The adopted rebuilding plan has a 70% rebuilding probability, a target rebuilding year of 2023, and a harvest control rule specifying a constant harvest rate (F) of 0.0498. The harvest specifications in accord with the bocaccio rebuilding plan are ABCs of 566 mt and 549 mt for 2005 and 2006, respectively and OYs of 307 mt and 309 mt for 2005 and 2006, respectively (Tables 2-1a and 2-1b).

Bocaccio are managed in the north as part of the Remaining Rockfish North complex. While a separate ABC and OY were determined in the Rogers et al. (1996) assessment of *Sebastes* based on historical landings in the north, the management unit is the Remaining Rockfish North complex due to the paucity of information for a quantitative stock-specific assessment. Genetic research indicates a lack of genetic mixing between the stock located south of 40°10' N latitude and the stock located in waters off northern Washington. NMFS trawl survey information also indicates a break in bocaccio distribution north and south with very few bocaccio ever observed in waters off northen California and Oregon. The stock was never formally assessed north of 40°10' N latitude due to a lack of available information. Therefore, the judgement of the GMT and other DEIS authors was that there was not enough information available to develop and analyze a range of harvest level alternatives for the Remaining Rockfish North complex, nor was this particularly necessary due

1/ Note that the estimated lingcod harvest control rule varies with the rebuilding probability (see Jagielo *et al.* 2004).

to the lack of expected impacts given the depth-based area closures and gear restrictions that were part of the considered 2005-2006 management actions in the north. For 2005-2006, the Remaining Rockfish North complex will be managed under the Council's precautionary policy of setting the complex's total catch OY at 56.25% of historic landing levels (historical catch * 0.75 = ABC, ABC * 0.75 = total catch OY).

4.3.1.4 Black Rockfish (in Waters off Oregon and California)

A new black rockfish assessment was done for the portion of the coastwide stock occurring off the coasts of Oregon and California (Ralston and Dick 2003). Previous assessments were done for the portion of the stock occurring off the coasts of Oregon north of Cape Falcon and Washington. Alternative harvest levels in the assessment for the portion of the black rockfish stock occurring off Oregon and California were ranged to capture the major uncertainty of historical landings prior to 1978. Black rockfish catches prior to 1945 were assumed to be zero in the assessment. Many gaps in historical landings of black rockfish since 1945 were evident, and these landings were reconstructed using a variety of data sources. The base model assumed cumulative landings of black rockfish from all fisheries was 17,100 mt from 1945 to 1977. The projected 2005-2006 harvest specifications for black rockfish in the waters off Oregon and California used this base case catch scenario. The OY equals the ABC since the stock is predicted to be above B_{MSY}. The projected 2005 and 2006 ABCs/OYs for black rockfish are 753 mt and 736 mt, respectively.

4.3.1.5 Canary Rockfish

Alternative canary rockfish harvest levels are based on projections from the 2002 rebuilding analysis (Methot and Piner 2002a) and the Council's adoption of a canary rockfish rebuilding plan as part of FMP Amendment 16-2, which specifies rebuilding targets consistent with a P_{MAX} of 60% (the target rebuilding year [T_{TARGET}] specified in FMP Amendment 16-2 is 2074 and the harvest control rule (F) is 0.0220). Although canary rockfish were not assessed in 2003 or 2004, alternative harvest levels are analyzed because OY values depend on recreational and commercial catch sharing. This is because the recreational fishery tends to take smaller canary rockfish than the commercial fishery, and therefore, has a greater "per ton" impact on canary rockfish rebuilding than the commercial fishery. That is, as the recreational share of the available canary rockfish harvest increases, the OY decreases. The Low OY canary rockfish harvest level is based on 50% recreational and 50% commercial catch shares. The Medium OY and High OY alternatives are based on 39% recreational and 61% commercial catch shares, which represent the status quo catch shares adopted as harvest guidelines in 2004. All OY alternatives have the same rebuilding impact on canary rockfish and do not require re-specification of the target rebuilding year or harvest control rule adopted under FMP Amendment 16-2.

4.3.1.6 Cowcod

Alternative cowcod harvest specifications are derived from the rebuilding analysis conducted in 2000 (Butler and Barnes 2000). The Council limited the range of cowcod rebuilding probabilities considered for detailed analysis under FMP Amendment 16-3 (PFMC 2004a) to comply with P_{MAX} values ranging from 55% to 60%. Higher rebuilding probabilities could not be derived using the assessment and rebuilding analysis due to the limited input data and the model limitations in the cowcod assessment (Butler, *et al.* 1999) and the rebuilding analysis. The Council adopted a cowcod rebuilding plan during their final action on FMP Amendment 16-3 in April 2004. The adopted rebuilding plan has a 60% rebuilding probability, a target rebuilding year of 2090, and a harvest control rule specifying a harvest rate (F) of 0.009. The harvest specifications in accord with the cowcod rebuilding plan are 2005 and 2006 ABCs of 5 mt and 19 mt for the Conception and Monterey INPFC areas, respectively, and OYs of 2.1 mt in each INPFC area for 2005 and 2006 (Tables 2-1a and 2-1b).

4.3.1.7 Darkblotched Rockfish

Darkblotched rockfish alternative harvest levels are based on projections from the most recent stock assessment and rebuilding analysis (Rogers 2003a). Harvest projections are influenced by recent strong recruitment (the 2000 and 2001 year classes), which has not been completely validated in the data used to assess the stock. The SSC/STAR Lite Panel requested progressive inclusion of 1997-1999, 2000, and 2001 recruitment estimates (Ralston, *et al.* 2003). Risk of error progressively increased from including those recruitment estimates because they were based on increasingly limited data. Rebuilding results were sensitive to the high 2000 and 2001 recruitment estimates, and including them allowed much greater OYs because those recruits are projected to enter the fishery in the future and help rebuild the stock before T_{MAX}. The ABCs, on the other hand, were not as affected because the 2000 and 2001 recruits were too small to have fully recruited to the fishery in 2004-2006. This led to OY estimates which were higher than the ABC, even given a 90% probability of rebuilding by the maximum allowable year (T_{MAX}).

The Council considered the three rebuilding scenarios in the Rogers rebuilding analysis (Table 16 in the rebuilding analysis), which ranged from no inclusion of either the 2000 or 2001 estimated recruitments to including both of them. The Council decision used the intermediate scenario, in which only one of the strong estimated recruitments, the 2000 year class, was included. The resulting 272 mt OY for 2004 from this scenario was 88 mt less than was calculated if both recruitments were included. The 272 mt amount also was associated with an 80% likelihood of rebuilding within the maximum timeframe. This calculated OY was then truncated to 240 mt, so as not to exceed the ABC. Since the MSA and NSGs do not allow harvest greater than the ABC, these ABC values are the harvest limits for these 2005 and 2006 specifications. The Council acted in a precautionary manner in choosing an intermediate scenario in which only one of the estimated strong year classes from the assessment model was included in performing the rebuilding projections. And the eventual OY was reduced another 32 mt below the amount (272 mt) that was consistent was an 80% chance of rebuilding under this scenario.

The OY projections for 2005 and 2006 based on the rebuilding plan would have been 303 mt and 424 mt, respectively. However, the ABC projections for 2005 and 2006 are 269 mt and 294 mt, respectively. The Council is constrained to restrict harvest to the ABC, thus these are also the OY specifications under the Council-preferred alternative for 2005 and 2006. These projected harvest specifications are compliant with the darkblotched rockfish rebuilding plan adopted under FMP Amendment 16-2 (PFMC 2003b) and may lead to faster rebuilding given the ABC constraint. The target rebuilding year remains unchanged from the rebuilding plan specification. The harvest control rule, which was amended during the 2004 specifications process (PFMC 2004b)[2/] also remains unchanged with this action.

4.3.1.8 Dover Sole

The 2005 and 2006 Dover sole ABC and OY are projected from the 2001 assessment (Sampson and Wood 2001). The 40-10 adjustment was applied to the ABC to derive the OY, since the stock's spawning biomass is estimated to be below 40% of its initial unfished level.

2/ Regulatory amendment of adopted strategic rebuilding parameters, such as the harvest control rule, is compliant with the process and standards for groundfish rebuilding plans as adopted under FMP Amendment 16-1. The harvest control rule is expected to change with every new, formally-adopted assessment.

4.3.1.9 Sablefish

The GMT recommended updating the sablefish ABC and OY ranges analyzed in last year's EIS for 2004 management. Therefore, updated harvest level alternatives are presented as derived in the 2002 assessment update (Schirripa 2002). The Low OY harvest level of 6,500 mt is based on the adopted OY for north of Point Conception in 2003. The Medium OY harvest level assumes a density-dependence recruitment hypothesis, but is derived using the stock's default F_{MSY} harvest rate of $F_{45\%}$. The High OY harvest level is based on the default $F_{45\%}$ harvest rate, but assumes that recruitment variability is driven more by environmental regime shifts (regime shift hypothesis) than parental stock density. The 40-10 adjustment is applied to all the alternative OYs, since the stock's spawning biomass is predicted to be less than 40% of its initial unfished level (in 2002, $B_{32\%}$ under a density-dependence hypothesis and $B_{39\%}$ under a regime shift hypothesis).

The Council chose the Medium OY sablefish harvest specification as its preferred alternative for 2005-2006. Therefore, a coastwide OY of 7,761 mt of sablefish (7,486 mt for north of the Conception INPFC area; and 275 mt for the Conception INPFC area) is proposed under the Council-preferred OY Alternative for 2005. The 2002 assessment update projects a slight decrease in sablefish exploitable biomass in 2006. Therefore, under the Council-preferred OY, the 2006 OY is 7,634 mt (7,363 mt for north of the Conception INPFC area; and 271 mt for the Conception INPFC area).

4.3.1.10 Shortspine Thornyhead

The 2005 and 2006 shortspine thornyhead ABC and OY are projected from the 2001 assessment (Piner and Methot 2001). The 40-10 adjustment was applied to the ABC to derive the OY, since the stock's spawning biomass is estimated to be below $B_{40\%}$.

4.3.1.11 Widow Rockfish

The range of 2005-2006 harvest specifications for widow rockfish is based on the most recent stock assessment (He, *et al.* 2003b) and rebuilding analysis (He, *et al.* 2003a). The range of harvest specifications attempts to analyze varying rebuilding probabilities and model uncertainties in the assessment and rebuilding analysis. Model uncertainties compelled the SSC to recommend consideration of the base Model 8 and the competing Models 7 and 9 in the He *et al.* (2003a) rebuilding analysis. The Council also limited the range of rebuilding probabilities considered for detailed analysis of rebuilding plans under FMP Amendment 16-3 (PFMC 2004a) to comply with P_{MAX} values ranging from 60% to 90%. Therefore, the range of widow rockfish harvest specifications analyzed in this EIS represents the full range of plausible assessment model outputs and the P_{MAX} range of 60% to 90%. The Low OY specifications comport to the Model 7 results with a rebuilding probability of 90%. The Medium OY specifications are derived using the base Model 8 with a rebuilding probability of 60%, and the High OY specifications are structured using Model 9 with a rebuilding probability of 60%.

The Council adopted a widow rockfish rebuilding plan during their final action on FMP Amendment 16-3 in April 2004. The adopted rebuilding plan parameters were determined using the base Model 8, since the assessment author recommended this model as the most plausible. The adopted rebuilding plan has a 60% rebuilding probability, a target rebuilding year of 2038, and a harvest control rule specifying a constant harvest rate (F) of 0.0093. The harvest specifications in accord with the widow rockfish rebuilding plan are ABCs of 3,218 mt and 3,059 mt for 2005 and 2006, respectively, and OYs of 285 mt and 289 mt for 2005 and 2006, respectively (Tables 2-1a and 2-1b).

4.3.1.12 Yelloweye Rockfish

The 2005 and 2006 yelloweye rockfish ABCs and OYs were projected from the 2002 rebuilding analysis (Methot and Piner 2002b). The Council adopted a yelloweye rockfish rebuilding plan during their final action on FMP Amendment 16-3 in April 2004. The adopted rebuilding plan has an 80% rebuilding probability, a target rebuilding year of 2058, and a harvest control rule specifying a constant harvest rate (F) of 0.0153. The harvest specifications in accord with the yelloweye rockfish rebuilding plan are 2005 and 2006 ABCs of 54 mt and 55 mt, respectively, and OYs of 26 mt and 27 mt in 2005 and 2006, respectively (Tables 2-1a and 2-1b).

4.3.1.13 Yellowtail Rockfish

The 2005 and 2006 yellowtail rockfish ABC and OY are projected from the 2003 assessment (Lai, *et al.* 2003). Projected harvest specifications were derived using model YT2003N in the assessment, which updates the catch series used in the previous assessment (Tagart, *et al.* 2000) with a newly revised series from PacFIN, revised Canadian catches in INPFC area 3C, and new estimates of 1967-1976 foreign catches (Rogers 2003b). The OY equals the ABC, since the stock is estimated to be above the abundance level that supports MSY (or 40% of initial unfished biomass). The yellowtail rockfish stock was estimated to be at 46% of its initial unfished biomass in 2002 (Lai, *et al.* 2003).

4.3.1.14 Other Fish

The Other Fish stock complex contains all the unassessed Groundfish FMP species that are neither rockfish (family *Scorpaenidae*) or flatfish. These species include big skate (*Raja binoculata*), California skate (*Raja inornata*), leopard shark (*Triakis semifasciata*), longnose skate (*Raja rhina*), soupfin shark (*Galeorhinus zyopterus*), spiny dogfish (*Squalus acanthias*), finescale codling (*Antimora microlepis*), Pacific rattail (*Coryphaenoides acrolepis*), ratfish (*Hydrolagus colliei*), cabezon (*Scorpaenichthys marmoratus*) (north of the California/Oregon border at 42° N latitude), and kelp greenling (*Hexagrammos decagrammus*).

The status quo No Action ABC/OY specified in 2004 (and in many previous years) for the Other Fish complex was 14,700 mt based on historical catches for these species. The portion of this ABC/OY attributed to the available harvest of cabezon in waters off California was deducted once those 2005-2006 harvest specifications were decided by the Council in April 2004. This deduction for the recently-assessed cabezon stock off California resulted in an ABC of 14,597 mt in 2005 and 14,592 mt in 2006 for the Other Fish complex. The GMT recommended consideration of a 50% reduction of the ABC to set the OY harvest target for the Other Fish complex based on the guidance provided by Restrepo *et al.* (1998) for determining precautionary harvest levels for unassessed stocks. The Council heeded this advice and established an OY for the Other Fish complex of 7,299 mt for 2005 and 7,296 mt in 2006 (Tables 2-1a and 2-1b). These specifications were rounded to 14,600 mt (ABC) and 7,300 mt (OY) for both years.

4.3.1.15 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*), sand sole (*Psettichthys melanostictus*), and starry flounder (*Platichthys stellatus*).

Since the implementation of the Groundfish FMP in 1982, an ABC of 7,700 mt has been specified for all flatfish species other than Dover sole, English sole, petrale sole, and arrowtooth flounder. No stock assessments have been conducted for any of the species comprising the Other Flatfish category. The original basis for the specific value of 7,700 mt is not documented, though it is believed to have been derived from landed catches that occurred during the 1970s.

Beginning in 1998 with the adoption of FMP Amendment 11, the Council began a policy of specifying OYs that included a precautionary reduction from the ABC in many cases where the ABC was derived from very limited modeling, or landings data, alone. A reduction of 25% was applied in cases with limited modeling ("data moderate"), and a 50% reduction was applied in most cases where ABCs were based on landed catch ("data poor"). However, a precautionary reduction has not been applied to the ABC in specifying an OY for Other Flatfish. Due to uncertainty regarding the basis for the current ABC and the absence of a precautionary reduction in specifying recent OYs, the GMT undertook a review of specification options for Other Flatfish.

The species that comprise the Other Flatfish group occupy habitats that range from the continental slope to nearshore areas, including fresh-water estuaries. Species such as rex sole and sanddabs inhabit depths and bottom types that are well-sampled by NMFS trawl surveys, while others, such as starry flounder and sand sole, are found primarily in shallower depths than are sampled by the trawl surveys. Consequently, survey data may provide insight into the abundance of some, but not all, species within this category.

Commercial Landings and Prices

Landings of Other Flatfish species have varied considerably since 1981, with declines observed for most species. As presented in Table 4-3, for the five-year period ending in 2003, landings of rex sole, sand sole, and starry flounder were 61%, 75%, and 90% lower, respectively, than for the five-year period beginning in 1981. For sanddabs, the other major species in this group, landings increased by 54% between these two periods. The reduction in landings of the first three species could reflect lower abundance, a shift in the availability of the species to the fishery, a reduction in demand for these species, or some combination of these factors.

Between these two five-year periods, real prices (adjusted using the West Coast consumer price index for food, base=2000) for rex sole, sand sole, and starry flounder also fell substantially: by 54%, 62%, and 69% respectively. Although the real price of sanddabs also declined by 44%, its price fell by the smallest percentage of the four species. These data suggest that changes in consumer demand may have played a role in the landings reductions of these species. Reduction in the fleet size of vessels targeting nearshore flatfish is another factor leading to lower landings. The number of such vessels dropped by about two-thirds over this period in Washington, with a similar attrition in northern Oregon.

Survey Trends

Two of the four species have been well-sampled by the NMFS triennial trawl (shelf) survey from 1977 to 2001. The catch of sanddabs and rex sole per unit of survey effort (swept area) have increased substantially since the early years of this survey (Table 4-4). The average of the CPUE estimates from 1998 and 2001 for sanddabs is nearly 19 times higher than the average of the CPUEs from 1977 and 1980. Average CPUE for rex sole in the last pair of surveys is more than four times higher than in the first pair. The increase in survey CPUE for these two species is at or above the high end of the range observed for petrale and English soles and arrowtooth flounder, all of which are believed to be near or above their target biomasses. Consequently, survey abundance trends provide no suggestion that the decline in rex sole landings is indicative of a decline in abundance. For both of these species, harvests at the high end of the range observed since 1981 have not resulted in any downward trend in survey CPUE (as illustrated in Figure 4-1). Figures 4-2 and 4-3 depict survey trends for the other flatfish species in the Other Flatfish complex.

Other Considerations

An important consideration in evaluating the vulnerability of these species lies in comparison of their size at maturity relative to their size when retained by trawl gear. For most of the Other Flatfish species, the lengths at which maturity is reached are not known with much precision. Estimates for many of these species rely on older "visual inspection" techniques that have been shown to be unreliable in comparisons with more recent histological studies. However, a substantial proportion of each of these species reach maturity between 20 cm and 30 cm in length (Casillas, *et al.* 1998; Castillo 1995). Since none of these species have been assessed, trawl fishery or survey selectivity curves have not been calculated. Based on selectivity curves estimated for Dover and English soles, it is likely that retention in trawl gear would also be increasing rapidly over some portion of this length range. As a result, it is probably reasonable to conclude that some percentages of these species have an opportunity to reproduce before they would be vulnerable to trawl gear.

Another factor is the accessibility of trawlers to some of these species. In California and Washington, trawl vessels are not allowed to fish within three nautical miles of the coast, with some exceptions off central California. This restriction off California predates the Groundfish FMP by 20 years or more; however, it was not implemented off Washington until 2001. Therefore, the trawl fishery has very limited opportunities in waters off these states to access starry flounder and sand sole. Nevertheless, the historical access of trawlers to these species north of California does not preclude the possibility that substantial depletions may have occurred in the past.

ABC Recommendation

The GMT recommends establishing a new ABC for the Other Flatfish group that is based on the highest 1981-2003 landings of sanddabs (1995) and rex sole (1982) and on the 1994-1998 average landings for the remaining species in the group. Since these amounts represent only landed catch, not total removals, discard data from studies occurring during the same eras were used to estimate the total catch that would have been associated with the landings (Table 4-5). This approach yields an ABC of 6,781 mt for the Other Flatfish complex.

OY Recommendation

The GMT believes that the available supporting information warrant the application of different precautionary reductions to two sets of species within the Other Flatfish group. For sanddabs and rex sole, the available trawl survey data, along with the sizes of selectivity and maturity, lead the GMT to recommend and the Council to adopt a data-moderate reduction of 25% be used in calculating the contribution of these species to the Other Flatfish OY. The Council believes that it is reasonable to assume that the stocks are above B_{MSY} based on the survey and fisheries information available for these stocks. The remaining species in the group are also likely to begin reproduction prior to retention by trawl gear, and two of the three states restrict access of trawlers to the primary depth distribution of the two species that have contributed the bulk of landings among the remaining species. However, environmental factors, such as estuarine and nearshore water quality, may also play an important role in the current status of starry flounder and sand sole. Since an assessment of starry flounder is currently scheduled to be conducted during 2005, the GMT believes it prudent to use a 50% precautionary reduction when calculating the OY component for these species. Survey and fisheries information on these species is less abundant than on rex sole and sanddabs. Thus, the Council is recommending reducing the portion of the Other Flatfish OY for these species by 50%. This recommendation is consistent with Restrepo *et al.* (1998) recommendations for stocks in a data-poor situation that are not overfished, yet below B_{MSY}. The Council does not have information to conclude that these stocks are below B_{MSY}, but takes this precautionary approach in order to acknowledge a lack of data. These OY reductions are consistent with the Council's precautionary policies for setting minor rockfish OYs.

As shown in Table 4-5, this approach would result in an OY of 4,909 mt, 93% of which would be derived from sanddabs and rex sole. Based on recent runs of the trawl bycatch model, the annual average discard of these species is expected to be about 28%. This would permit landings of roughly 3,500 mt, or about twice the annual average landings of these species over the five-year period from 1999 to 2003. Because of the stability of recent landings of species other than sanddabs and rex sole, at levels near or below the calculated landed catch equivalent of their OY contribution, the GMT believes that setting a single OY for all Other Flatfish is sufficiently precautionary at this time.

4.3.1.16 Pacific Cod

The status quo No Action ABC/OY specified in 2004 (and in many previous years) for Pacific cod *(Gadus macrocephalus*) was 3,200 mt based on historical landings for these species. The GMT recommended consideration of a 50% reduction of the ABC to set the OY harvest target for Pacific cod based on the guidance provided by Restrepo *et al.* (1998) for determining precautionary harvest levels for unassessed stocks. The Council heeded this advice and recommended a Pacific cod OY of 1,600 mt for 2005 and 2006 (Tables 2-1a and 2-1b).

4.3.1.17 Pacific Whiting

Pacific whiting are assessed annually with the Council deciding harvest levels and management specifications every March. Therefore, Council and NMFS actions to be made for the 2005-2006 management cycle and analyzed herein do not include adoption of a Pacific whiting OY, nor management measures for the whiting-directed fishery. However, there is a need to analyze a broad range of possible whiting OYs to understand the potential bycatch implications of whiting-directed fisheries on overfished and other groundfish species. Likewise, potential management measures for the whiting fishery that might reduce bycatch are explored in Section 4.3.2.1. The three alternative harvest levels for Pacific whiting are ranged as follows: Medium OY are the projected ABCs/OYs in 2005 and 2006 from the last assessment (Helser, *et al.* 2004), the Low OY ABCs/OYs are half the Medium OY specifications, and High OY are double the Medium OY specifications. Bycatch implications of these alternative whiting harvest levels are explored below.

4.3.2 Alternative Management Measures

4.3.2.1 Limited Entry Trawl

<u>Modeling Bycatch and Discard in the Limited Entry Trawl Fishery</u>

NMFS Northwest Fisheries Science Center began modeling trawl bycatch of species designated for rebuilding in the fall of 2001. The bycatch model is based on projecting future landings of major target species (excluding Pacific hake) by each permitted vessel, through use of recent landings data and a specified array of trip limits. Projected landings are then translated into estimates of total bycatch mortality, for species under rebuilding, through the application of bycatch ratios. Since its introduction, the bycatch model has undergone numerous changes to keep pace with the changing fishery management environment and the availability of new data. The purpose of this section is to briefly review the evolution of the model and to highlight changes in modeling procedures or input data that have been incorporated in the model used in the analyses herein.

Prior to April 2003, bycatch ratios used in the model were derived from three available sources of information: trawl logbooks and two research studies that deployed observers on a subset of voluntarily participating trawl vessels during some years between 1986 and 1996. The trawl fishery was stratified using area (north and south of 40°10' N latitude), bimonthly period and target fishery, and bycatch ratios were specified for each stratum. The ratios were expressed in terms of total bycatch pounds per landed pound of the target species in each target fishery.

In April 2003, those bycatch ratios were replaced by new ones calculated from data collected between September 2001 and August 2002 by the WCGOP. Because management was actively considering the use of depth-based closed areas, the bycatch data had to be stratified by depth to facilitate analysis of management options. Due to the limited number of observations during the first year of WCGOP's monitoring and the variances associated with bycatch ratios calculated from extensively stratified data, the previous stratification of the data into target fisheries and bimonthly periods was discontinued, in favor of depth. Subsequent modeling during 2003 used bycatch ratios that were expressed in terms of total bycatch pounds per landed pound of all target species combined. In order to partition projected vessel catch into appropriate depth strata, the depth distributions for each modeled target species were summarized from recent trawl logbook data for each vessel, where available. In cases where a vessel was not represented in the logbook data set, representative averages for vessels in the same area and size class were used.

For final analysis (in September 2003) of management measures for the 2004 fishery, the model was enhanced to provide estimates of total mortality for target species, using annual, species-specific discard rates calculated from the first year of observer data. These rates were used to calculate the total catch that would give rise to the landings projected by the model.

The principal data inputs to the bycatch model are derived from fishtickets, logbooks, and the WCGOP data base. As new data are added to each of these data sets, it is expected that the corresponding model inputs will be updated. As a general rule, data from multiple years are combined in a weighted manner, where more recent data are weighted more heavily. This is particularly important for current modeling of the trawl fishery, since management has changed dramatically in recent years. Although using only the most recent year to project the future might at first seem to be the best approach to addressing the rate of management change, there are important reasons for basing projections on multiple years.

First, fisheries may close prematurely in some years, as the inshore fishery did in 2003. Failure to incorporate multiple years into the projection process would provide no basis for projecting vessel activity during the same period the following year. This is also the case when data sets for the previous year are not fully complete at a time when modeling updates are needed. Even when components of the fishery are not closed, there may be considerable variation in the target species trip limits that are in effect for the same bimonthly period during a series of years. Vessel participation in the traditional groundfish fishery can also be affected by opportunities in other West Coast fisheries, such as hake, shrimp, and crab. Incorporating data from multiple years provides projections that are more robust to annual fluctuations in vessel participation than would reliance on the most recent single year. The model used throughout 2004 (and in this EIS) draws upon fishticket and logbook data from the 2000 to 2003 fisheries. In combining data from these years, the data from 2000 receives roughly one-fifth the weight assigned to data from 2003.

For most species in the northern and southern areas, bycatch ratios are either lower or are little changed from the values employed in 2003 modeling. In both regions, bycatch ratios for lingcod are higher in most depth strata than the values used in 2003. For other species, where the percentage of increase in bycatch ratios appears large, the absolute differences are nearly always measured in hundredths or thousandths of a percent. There were relatively small increases in the coastwide discard rates for shortspine, petrale, and arrowtooth in depths greater then 150 fm. However, substantial downward trends were observed across all depths in the discard rates for sablefish, Dover sole, and minor flatfish species.

The effect of incorporating the second year of trawl observer data in the model may be shown by projecting impacts of overfished and target groundfish species using the same management scenarios analyzed in September 2003 for 2004. For four of the species (canary, yelloweye, cowcod, and widow), the change in bycatch is less than 1.5 mt, and for the first three of these, projected bycatch decreases. Projected bycatch of lingcod and POP each increase by about 15 mt (or roughly 20%), but totals remain below 100 mt for each. Projected darkblotched bycatch decreases by about 20% (21 mt), while bocaccio bycatch falls by nearly 40% (8.9 mt). Projected discards for sablefish and minor flatfish decrease by roughly 40% (over 575 mt each) with the inclusion of the second year of observer data. Dover sole discard also decreased substantially, by more than 20% and 200 mt. Minor increases in discard, both in the 10% to 12% range, are estimated for shortspine and arrowtooth.

Following the September 2003 Council meeting, the trawl fleet approved a plan to buy back permits and vessel fishing endorsements from roughly one-third of the groundfish trawl fleet. The removal of these permitted vessels from the projection model has a substantial impact on the size of trip limits that can be supported by available amounts of target and bycatch species. In order not to overstate the effect of the buy back, attention was focused on previously latent or little-used permits that have recently been transferred to new holders. Where appropriate, the prior history of the new permit holder was substituted for the permit's actually history. In other such cases where an increase in permit landings is anticipated, a catch history that is representative of other similarly sized vessels in the same area was used.

Three minor revisions to the bycatch model were implemented for 2004. All of these involve the methods used to calculate and apply bycatch ratios. The first concerns the measurement of target species catch used in calculating and applying bycatch ratios; the second involves the geographic stratification of data that are used to calculate bycatch ratios; and the third involves the seasonal stratification of data that are used to calculate ratios. When the bycatch model was first developed, it did not contain procedures for calculating total catch amounts of the included target species. The model projected landings of these species, and bycatch ratios for rebuilding species were calculated using landed catch of target species as the denominator. As referenced above, the model was modified prior to the September 2003 Council meeting so that inclusion of discard rates for target species would allow the modeling of 2004 measures to automatically include calculation of total catches, based on the projected landings of each target species.

Holding other model parameters constant, a reduction in the discard rate of a particular species will not affect landed catch, but will reduce the total catch projected by the model. Aside from possible bycatch consequences, this reduction would allow the trip limits for those target species to be increased. But since bycatch ratios used in the model have been expressed in terms of the landed catch of target species, the reduction in target species discard would lead inevitably to an increase in projected bycatch of the rebuilding species. Commencing with modeling during 2004, the bycatch ratios were calculated with reference to the total catch of target species, and those ratios were applied to the projected total target species catches in the model.

Following the implementation of depth-specific bycatch rates, and a period in which darkblotched bycatch was underestimated for the fishery occurring between 38° N latitude and 40°10' N latitude, bycatch rates for depth strata deeper than 150 fm have been calculated using a dividing line of 38° N latitude for all species except POP. Commencing with modeling during 2004, 40°10' N latitude was used to delineate northern and southern bycatch rates for all species and depths, with the exception of darkblotched bycatch occurring in waters deeper than 150 fm.

As described above, the combination of limited observer data from the first year of data collection and the need to evaluate bycatch on a depth-specific basis resulted in discontinued use of seasonal bycatch rates in analysis conducted during 2003. With the accrual of a second year of observer data, the model reinstated some degree of seasonality in bycatch rates.

Within each depth strata, results are summarized according to four alternative approaches for stratifying bycatch results over the span of a calendar year. The first of these approaches is the same as used in 2003: all periods of the year are combined. In the second approach, data from bi-monthly periods 1, 2, and 6 are combined into a winter season, and data from remaining periods form a summer season. In the third approach, periods 1 and 6 form the winter season, periods 3 and 4 represent the summer, and periods 2 and 5 are combined to form a spring-fall transitional period. The final approach maintains each bi-monthly period as a stratum of analysis.

Due to management restrictions that encouraged northern vessels to fish seaward of the trawl RCA throughout most of the second year of data collection, the number of hauls and amount of target species tonnage observed shoreward of the RCA north of 40°10' N latitude fell dramatically. Only one-quarter to one-third of the unweighted combined observations within each depth stratum came from the second year. Even with the proposed method of combining data (using a 0.6 weight for the second year), the second year does not contribute even half of the target species poundage. Of particular note is the lack of observations shallower than 75 fm in period 1 – fewer than 20 hauls in both years combined. In addition to the regulatory factors encouraging the fleet to fish deeper in the north, the deep-water fishery was largely closed throughout the final three months of 2001. As a result, for tows starting outside of 150 fm, the second year of observation contributes between 57% and 61% of all observed tows and tonnage.

Unlike the northern region, the area south of 40°10' N latitude had a large increase in the observed tows and tonnage in the nearshore depths (less than 60 fm) that remained open to fishing throughout all of the second year of observation. This increase is particularly useful for bycatch modeling, since these shoreward depth strata contained very little data from the first year of observation. The previous paucity of data resulted from the high percentage of first-year observations that were for hauls originating in depths that were later closed during 2003. Many of the first-year hauls observed in shallow depths were also targeting California halibut and were subsequently removed from the data set. The level of observation in waters deeper than 150 fm during the second year is slightly higher for the entire 12 months. However, the overall increase was driven by the substantially higher second-year level of observation during Periods 5 and 6. As discussed for the northern area, this was a direct result of the October closure of fishing for most deep-water species in 2001.

Both bycatch ratios and their coefficients of variation (CVs) exhibit considerable variability among two-month periods. Some of this variability may reflect true underlying seasonal differences in the rates of species co-occurrence or availability to trawl gear. But limited sample sizes, combined with infrequent, large bycatch events, are also likely contributing factors to the observed ranges of values. Consequently, a balance must be struck between the desire that the bycatch model reflect the real variability in bycatch relationships throughout the course of a year and the desire to avoid a situation where random chance in the measurement of bycatch leads to the imposition of a trip limit regime that contains unnecessary fluctuation from period to period.

It would also appear important that the same level of seasonal stratification be used for analysis of all potential depths restrictions within the general shallow and deep zones of each area. Failure to do so could result in attempts to avoid the implications of a high two-month bycatch ratio in the 'less than 75 fm' stratum, for example, by shifting to the 'less than 60 fm' stratum, where pooling of bycatch data across additional periods might, by itself, be responsible for producing a lower bycatch ratio for use in that period. This means that, within each area and general depth zone, the determination of appropriate seasonal stratification must be driven by the potential management depth stratum that represents the “weakest link” to seasonal disaggregation of the data. In light of sample sizes and CVs in the various strata, the approach for seasonal stratification for 2004 bycatch modeling is to use the two, six-month (winter/summer) seasons for all depth strata less than 100 fm, and to use the three, four-month (winter/transition/summer) seasons for depth strata greater than 150 fm.

Given these considerations, the SSC agreed with the recommended stratifications for the trawl bycatch model. The bycatch ratios for overfished groundfish species by area, depth, and season using selective flatfish trawls and conventional trawls are found in Tables 4-6a and 4-6b, respectively. Bycatch ratios for important trawl target species by area, depth, and season using conventional trawls are found in Table 4-7.

While there is no change to seaward boundary of the southern trawl Rockfish Conservation Area in the Council-preferred Alternative from No Action, the specified bocaccio trip limit for large footrope gear under the Council-preferred Alternative is designed to better account for incidental mortalities of bocaccio caught as bycatch while targeting deep water target species such as Dover sole, thornyheads, and sablefish. The GMT believes such a small trip limit (300 pounds/two months) will not encourage targeting of bocaccio, which is not considered a desired and valuable commercial target species anyway. This trip limit represents a slight increase from the large footrope trip limit under the No Action Alternative of 100 pounds/month.

Analysis of Alternatives: Non-whiting Trawl Fisheries

This EIS analyzed the effect of varying limited entry trawl trip limits and RCA configurations targeting 8 mt, 10 mt, and 12 mt of canary rockfish impact, respectively, in non-whiting directed groundfish trawl fisheries in 2005 and 2006. However, the GMT recommended an alternative analytical approach to estimating impacts using selective flatfish trawls at the June Council meeting. As a result of this recommendation, the analytical approach used to estimate groundfish impacts using selective flatfish trawls under Action Alternatives 1 through 3 differs from the approach used under the Council-preferred Alternative. A more detailed explanation of this issue is presented below with a table comparing and contrasting the two alternative modeling approaches. All the action alternatives, including the Council-preferred Alternative, specify the exclusive use of selective flatfish trawl gear shoreward of the trawl RCA north of 40°10' N latitude, which is different than the No Action Alternative of exclusive use of small footrope gear shoreward of the trawl RCA. The selective flatfish trawl was first tested in a 2000-2002 cooperative research study by ODFW, NMFS, and Oregon State University, followed by a 2003 fleet-wide EFP study in high relief habitats north of 40°10' N latitude (see section 2.2.3.1). Figure 4-4 shows two charts of the West Coast EEZ north of 42° N latitude. Those maps show areas of recent adult canary rockfish abundance, based on data from the Northwest and Alaska Fisheries Science Centers' trawl surveys, and on trawl logbook data. Overlaid atop the maps' symbols marking areas of recent canary abundance are marks showing the tow start locations for vessels that participated in the ODFW selective flatfish trawl EFP in 2003. Trawl surveys have historically been held in waters between about 30-700 fm, while the ODFW selective flatfish trawl EFP was conducted between the shoreline and 100 fm. These charts show that many of the selective flatfish trawl EFP tows were conducted in areas of recent adult canary rockfish abundance.

Under Action Alternative 1, where the non-whiting trawl fishery is constrained to take no more than 8 mt of canary rockfish, the trawl RCA is extensive - larger than for the other analyzed alternatives (Table 2-17). Likewise, trip limits are smaller than for the other action alternatives to minimize canary impacts. Total mortalities of all overfished species are estimated to be less under Action Alternative 1 relative to all the other action alternatives and the No Action Alternative. One effect of the large RCA is that smaller vessels forced to fish shoreward of the RCA using selective flatfish trawls[3/] are limited to depths shallower than 75 fm year-round and shallower than 60 fm during the summer periods 3 through 5 (May through October) in the north. Forcing vessels to fish this shallow does impact Dungeness crab in the north, which are molting during summer months. There is also a significant loss of available trawl grounds for these vessels, since Washington and California do not allow trawling within their state territorial waters (zero to 3 nm). The lower trip limits needed to minimize canary impacts also result in significant under-attainment of species allocated to the trawl fishery, most notably sablefish, Dover sole, petrale sole, Other Flatfish, English sole, and arrowtooth flounder. The projected impact to shortspine and longspine thornyheads is higher under this alternative due to the anticipated effect of shifting more effort seaward of the RCA in the north where these species are found.

Trip limits and RCA configurations under Action Alternative 2 are intermediate to those under the other action alternatives and most similar to the effects projected under the No Action Alternative (Tables 2-18 and 2-16). Under Action Alternative 2, the canary impacts were constrained to about 10 mt, and the RCA was configured to allow fishing shoreward of 100 fm through the summer periods 3 through 5 to access sablefish, petrale sole, Dover sole, and Other Flatfish species, which are distributed more shallow in the summer. However, constraining the fishery to 10 mt of canary rockfish does not allow year-round opportunity to fish out to 100 fm. The analyses for Action Alternatives 1 through 3 (Tables 2-17, 2-18, and 2-19) use selective trawl bycatch rates derived from the ODFW selective trawl EFP only during the summer periods 3 through 5, since this was the timeframe when the EFP study was conducted. Arguments for and against this analytical approach are more thoroughly discussed below.

The trip limits and RCA configurations under Action Alternative 3 are more liberal than those under Action Alternatives 1 and 2. The same RCA configuration under Action Alternative 2 was modeled with higher trip limits under Action Alternative 3. Action Alternative 3 was structured to constrain the fishery to take 12 mt of canary rockfish. However, as shown in Table 2-19, target species' OYs and allocations begin to constrain the fishery before 12 mt of canary are projected to be taken. The constraining target species that prevent a more liberal fishery under this alternative are sablefish, Dover sole, petrale sole, and shortspine thornyheads. With these species constraints, about 10.6 mt of canary are projected to be taken (Table 2-19).

The Council-preferred Alternative is most similar to Action Alternative 3 in that trawl trip limits are limited by attainment of target species' OYs and allocations prior to being constrained by overfished species. However, the analytical approach for estimating impacts in the selective flatfish trawl strategy shoreward of the RCA north of 40°10' N latitude is different under the Council-preferred Alternative as explained generally above and in more detail below. Under the GMT-recommended analytical approach to estimating impacts in the selective flatfish trawl strategy, the estimated canary rockfish impact in 2005 and 2006 for all the non-whiting trawl efforts is 5.2 mt (Table 2-20a). Given the uncertainty in estimating these impacts, the Council decided to allocate 8.0 mt of canary rockfish impacts for non-whiting trawl fisheries under the preferred alternative.

In September 2004, the Council revised the non-whiting limited entry trawl management measures in response to higher than anticipated catches of canary and darkblotched rockfish in the summer 2004 trawl fishery. The Council recommended revising the Council-preferred Alternative by extending the seaward boundary of the trawl RCA north of 38° N latitude from the 150-fm management line to the 200-fm management line. Additionally, the slope rockfish trip limit north of 40°10' N latitude was reduced from

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3/ Exclusive use of selective flatfish trawls is contemplated only for the fishery north of 40°10' N latitude South of 40°10' N latitude, only small footrope trawls are allowed shoreward of the trawl RCA under the action alternatives.

8,000 pounds/two months to 4,000 pounds/two months. These revisions were recommended by the GMT after observing much higher landings of darkblotched rockfish than expected. The higher slope rockfish trip limit, coupled with the ability of the fleet to fish seaward of 150 fm was believed to have induced targeting of slope rockfish in the summer 2004 fishery. The expected impacts for target species and the incidentally-caught overfished species given these recommended revisions are depicted in Table 2-20b.

All of the trawl action alternatives were modeled to stay within the allocations calculated using the Council-preferred OYs adopted in April 2004. The GMT also modeled the trip limits, RCA configurations, and estimated species' impacts under the Low OY and High OY harvest levels. Table 4-9 indicates, with a similar 10 mt canary impact as Action Alternative 2 and a 75 fm to 150 fm trawl RCA, higher trip limits for sablefish, Dover sole, and petrale sole can be accommodated with the suite of High OYs listed in Tables 2-1a and 2-1b. Table 4-10 conversely shows that with a similar 10 mt canary impact and a similar trawl RCA configuration (with the exception of a deeper inline of 100 fm in periods 1 and 6 in the north), trip limits for sablefish, Dover sole, and Other Flatfish are appreciably lower with the suite of Low OYs in Tables 2-1a and 2-1b.

Consideration of Winter Month Application of Selective Flatfish Trawl Bycatch Rates

The selective flatfish trawl (SFFT) has proven effective at reducing the take of rockfish along the continental shelf north of 40°10' N latitude between the months of May and October. When SFFT bycatch rates are used in the GMT’s trawl bycatch model for the months of May through October, substantial savings in canary rockfish, for example, are predicted when compared to model outputs using WCGOP observer bycatch rates. When SFFT bycatch rates replace WCGOP rates for the entire year within the trawl bycatch model, predicted savings in rockfish are even more substantial. However, due to the fact that the SFFT EFP was not conducted during the winter months, there was some question as to what the appropriate rates should be during the winter months for SFFT trawl model scenarios. Several alternative approaches for winter-season bycatch rates in the SFFT trawl model were considered for predicting incidental catch of rebuilding species during the winter months. These options are outlined below.

Option 1: WCGOP Bycatch Rates in Winter
Initial SFFT trawl model configurations used SFFT bycatch rates in periods 3, 4, and 5 (May through October) and used WCGOP rates for the remainder of the year. This approach was based on the notion that the SFFT had not been tested in the winter months, so there should be no effort to apply SFFT bycatch rates to times when the gear had not been tested.

Option 2: SFFT Bycatch Rates in Winter compared to WCGOP Rates in Winter
This option compared model outputs that use SFFT bycatch rates year round, with outputs described in Option 1 (SFFT rates in periods 3, 4, and 5, and WCGOP in winter). The two outputs are then described as a high and low risk, where the use of WCGOP rates in the winter is a low risk option, and the use of SFFT rates year round is a high risk option. This approach was based on the notion that the SFFT will prove effective at reducing rockfish take during winter months.

Option 3: Combination of 1 and 2
The third option gives some recognition to the fact that the SFFT is likely to perform in the winter months also, but uses a precautionary means of predicting SFFT bycatch during the winter. Under this option, if WCGOP rates are lower in the winter months than in the summer months, then SFFT rates are used throughout the year. If WCGOP rates are higher in the winter months than in the summer months, then WCGOP rates are left in place for the winter.

Option 4: Predict SFFT Bycatch Rates in Winter through WCGOP Trends

The fourth option is a means of predicting SFFT bycatch rates during the winter months by normalizing WCGOP bycatch rates to SFFT bycatch rates. This option assumes that the SFFT will continue to work effectively during the winter months, and the seasonal pattern of bycatch in the SFFT will resemble the seasonal pattern of bycatch in the WCGOP rates. However, instead of using the actual WCGOP rates in winter months, a scalar is applied to WCGOP bycatch rates in the winter that is determined based on the percentage difference of SFFT and WCGOP bycatch data in periods 3, 4, and 5.

The GMT determined that normalizing SFFT incidental catch data to WCGOP incidental catch data (option 4) was the best approach to estimating the incidental mortality of rebuilding species in trawl fisheries if the selective flatfish trawl were to be put into regulation. This approach was determined to be best because the chief differential between selective gear and non-selective gear is the reductions in rockfish catch. Other patterns in incidental catch (such as seasonal changes in incidental catch rates) are expected to remain the same since these differences are a function of distribution and behavior of target and incidental species (such as fish migration and habitat preference) and can be differentiated from the gear effect. For example, seasonal migrations of flatfish onto the continental shelf in the summer would be expected to decrease the incidental catch rates during those months for rebuilding species that primarily inhabit the shelf and are assumed not to migrate (such as canary rockfish). All else being equal, an increase in the abundance of flatfish on the shelf would increase the denominator in the incidental catch rate calculation, thus decreasing the incidental catch rate for shelf-oriented rebuilding species in the summer months. Such patterns have generally been observed in the WCGOP. Therefore, these trends were applied to the selective flatfish trawl EFP data (after applying the percent reduction in incidental catch rates that were observed in summer months) to estimate winter season incidental catch rates. In summary, while the selected gear should achieve a notable reduction in catch of rockfish, seasonal patterns in the incidental catch of rockfish that have been observed in the WCGOP should remain if the selective trawl gear is put into regulation. It is further noted that the WCGOP will provide observed discard data in the fishery in 2005 and 2006 with implementation of the selective flatfish trawl strategy in regulations. These WCGOP data will be used for inseason management decision making during the 2005-2006 management period.

Analysis of Alternatives: Whiting Trawl Fisheries

This section describes sector allocations and impacts on rebuilding species for the range of Pacific whiting options described in Section 2.2.4.1. Deciding 2005 and 2006 harvest specifications and management measures for whiting trawl fisheries is not part of the contemplated action in this EIS; however, it is still important to analyze these connected/anticipated actions[4/] so that potential bycatch implications in whiting-directed trawl fisheries are better understood. Allocations are estimated by (1) setting the tribal allocation based on a sliding scale that is matched to the OY, (2) attributing a 2,000 mt mortality estimate to research and other non-whiting-directed fishing activities, and (3) calculating shoreside and at-sea allocations based on the remaining OY. The shoreside allocation is equal to 42%, non-tribal mothership is equal to 24%, and the catcher processor allocation is equal to 34% of remaining OY.

The GMT reviewed recent observer data by year and sector in the whiting fishery (Table 4-11) and recommended that 2000-2003 weighted average bycatch rates for overfished species be used to analyze bycatch implications in this fishery. Data used for developing incidental catch rates are from NMFS observer data from the at-sea sector and landed catch records for shoreside landings made by the shoreside and tribal sectors. That data is used to develop catch rates that are estimated by summing the catch of each rebuilding species and dividing that by the sum of Pacific whiting catch for each sector and year, for years 2000-2003.

4/ A new Pacific whiting assessment is anticipated this winter with subsequent Council action to set 2005 whiting harvest specifications and management measures scheduled for March 2005.

The analysis uses historical incidental catch rates from 2000 to 2003 in combination with a decay function that weighs 2003 rates at 40%, 2002 rates at 30%, 2001 rates at 20%, and 2000 rates at 10%. This approach is based on the notion that more recent seasons are likely to be more reflective of the projected season. These weighted average rates are applied to each sector allocation to estimate that sector's impacts on rebuilding species under each alternative (2005) whiting OY (Table 4-12). A similar treatment of 2006 whiting OY alternatives is not provided here because the 2005 alternatives are considered adequately informative.

As can be seen from Table 4-12, the projected bycatch of widow rockfish in the whiting fishery alone under the Medium OY and High OY Alternatives (whiting OYs of 362,573 mt and 725,146 mt, respectively) exceed the Council-preferred widow rockfish OY of 285 mt in 2005. Therefore, with the assumptions underlying the GMT analysis of impacts and absent further precautionary strategies, Action Alternatives 2 and 3 do not work given the widow impacts in the whiting fishery (Tables 2-11 and 2-12).

Precautionary strategies explored in this analysis (under Action Alternative 2) include establishing a whiting RCA defined with a shoreward boundary at the 75 fm management line and a seaward boundary at the 200 fm management line and/or closure of discrete areas with high widow rockfish bycatch rates (hotspot areas). The GMT reviewed the concept of establishing a whiting RCA and an analysis done by ODFW staff regarding widow rockfish area management using discrete closed areas where widow bycatch has been highest based on 1999-2003 observations from each whiting sector (Appendix B). This report demonstrates that establishing a whiting RCA, or choosing specific areas for closure, can drastically reduce widow bycatch. The GMT suggested additional analyses to support a more comprehensive review of these bycatch management concepts. ODFW announced that they would hold three public meetings with shoreside whiting industry participants, present and discuss these ideas, and report the results. The Council did not wish to recommend these management measures until it had a chance to review additional analyses and hear industry comment. Barring resolution of uncertainties of widow area management, a tiered EA with full analyses of these management concepts will be needed for the Council to consider widow area management when deciding whiting harvest specifications and management measures in March 2005.

Another consideration for managing widow rockfish in the shoreside whiting fishery is establishing a widow "penalty box." This management strategy is the assessment of a "days at sea" penalty on any vessel owner based on the poundage of widow rockfish caught by the vessel. That is, a fisherman would have to delay his participation in the ongoing fishery for a certain number of days based on the amount of widow rockfish landed in his previous trip. The penalty box has been employed in the shoreside whiting fishery through state regulations to decrease the bycatch of yellowtail rockfish. Decreased catch rates of yellowtail rockfish by shoreside sector fishermen have been attributed to the penalty box strategy. It is not clear how this strategy would work for the at-sea sectors (motherships and catcher-processors), since it would not be economical to abruptly stop fishing once the fishing operation has started. Also, motherships simply process their fish at-sea and rely on catcher vessels to supply catch. Catcher vessels cannot functionally move far from the mothership since towing a full net of whiting cannot be practically done for long distances. An alternative strategy that is employed by some vessels in the catcher-processor sector is to monitor bycatch by area in real time for the entire fleet and actively avoid areas where widow bycatch has occurred. Such an adaptive strategy may work well given the 100% observer coverage in the at-sea sectors and the need to stay within the widow OY or face early closure of the whiting fishery. Following the removal of the EFP from the shoreside whiting fishery with FMP Amendment 10, the whiting fishery will be a regulation fishery. Under normal rules, no mechanism would be in place to impose a penalty box for high widow bycatch in any sector. A mechanism for this type of bycatch management system would need to be developed and analyzed through the Council process.

The Council recommends annual bycatch caps for directed whiting fisheries for the most constraining overfished groundfish species for the 2005 and 2006 seasons. A canary rockfish cap of 7.3 mt is recommended. In early June of 2004, one disaster tow of 3.9 mt near Heceta Bank by a catcher vessel fishing for a factory ship in the mothership sector risked exceeding the estimated 7.3 mt of canary rockfish anticipated to be taken in all directed whiting fisheries. The Council decided to cap the all sectors in the directed whiting fishery at 7.3 mt of estimated canary mortality for the year. The Council delegated authority to NMFS to close all whiting sectors inseason when 7.3 mt of canary were projected to be taken. The same cap and delegated authority is recommended for managing 2005 and 2006 directed whiting fisheries. The Council also decided to manage 2005 and 2006 groundfish fisheries to stay within the widow rockfish OY by constraining directed whiting fisheries before non-whiting fisheries. Similar to the status quo 2004 management strategy, the Council-preferred Alternative caps directed whiting fisheries to the remaining widow rockfish OY after estimating widow impacts in non-whiting fisheries. The remaining widow rockfish OYs, which represent the bycatch caps, are 231.8 mt and 243.2 mt for 2005 and 2006 whiting fisheries, respectively (Tables 2-13a and 2-13b). No other bycatch caps, other that the ultimate sector allocations of whiting, are specified under the Council-preferred Alternative.

4.3.2.2 Limited Entry Fixed Gear

Modeling Bycatch and Discard in the Limited Entry Fixed Gear Primary Sablefish Fishery

The Northwest Fisheries Science Center (NWFSC) began modeling bycatch of overfished species in the groundfish trawl fishery in the fall of 2001. The evolution of that modeling was marked in 2003 by the introduction of bycatch data from the first year of trawl coverage, beginning in September 2001, by the WCGOP. The WCGOP began pilot coverage of the limited entry fixed gear sablefish fishery during the 2001 primary season, between August and October. However, full coverage of this fishery did not begin until 2002. For the trawl fleet, the existence of logbooks and studies that used onboard observers allowed parameterization and use of the bycatch model prior to the availability of observer data. However, comparable data sources were not available for the fixed gear fleet. Now that the WCGOP has processed data collected during the seven-month primary seasons in both 2002 and 2003, in addition to the pilot coverage from 2001, the development of a framework for modeling discard and bycatch in the fixed gear sablefish fisheries may advance.

Sablefish is the principal groundfish target species for most limited entry fixed gear vessels, which range in length from 33 feet to 95 feet. Limited entry vessels fish for sablefish primarily north of Monterey, California. Groundfish permits for these vessels may be endorsed for the use of longline and/or pot gears. The fleet typically fishes in depths greater than 80 fm, and has recently faced closures of depths shallower than 100 fm north of 40°10' N latitude and shallower than 150 fm south of 40°10' N latitude. These closures have been intended to reduce bycatch of overfished species.

While most of the fleet's sablefish catch is retained, some is discarded at sea. Reasons for at-sea discard include unmarketability and attainment of vessel landing limits. Also, since the price paid by processors for sablefish is dependent on fish size, small fish may sometimes be discarded, as fishermen seek to maximize the value of their landed catch allowances. Unlike most rockfish, sablefish do not have swim bladders that explode when the fish are retrieved rapidly from great depth. Consequently, if handled properly, discarded sablefish can experience high rates of survival (Olla, *et al.* 1998).

There are approximately 225 limited entry fixed gear permits, of which 164 are “sablefish-endorsed”. Sablefish-endorsed permits provide the permit holder with an annual share of the sablefish allocated to the primary fishery for fixed gear permits. Sablefish-endorsed permits are assigned to one of three tiers: 1, 2, or 3. Of the 164 sablefish-endorsed permits, 28 are assigned to Tier 1, 42 to Tier 2, and 94 to Tier 3. Each Tier 1 permit receives 1.4% of the fishery allocation, with Tiers 2 and 3 receiving 0.64% and 0.36%, respectively. Each year, these shares are translated into amounts of poundage, or “tier limits,” which may be caught during the primary fishery. For the 2003 season, these shares translated into tier limits of 53,000 pounds for Tier 1, 24,000 pounds for Tier 2, and 14,000 pounds for Tier 3.

Holders of permits that are not sablefish-endorsed are not permitted to land amounts of sablefish in excess of daily/weekly trip limit provisions. During 2003, daily landing limits ranged from 300 pounds to 350 pounds, depending on the area fished. There was also a weekly option that provided the opportunity to make a single delivery during a week, up to a poundage threshold that ranged between 800 pounds and 1,100 pounds. Landings made under either of these options are also capped by a two-month limit, which normally falls between 2,100 pounds and 3,600 pounds. Outside of the primary season, or following the attainment of their tier limits, holders of sablefish-endorsed permits may also land sablefish under the provisions of the daily/weekly limit.

The primary sablefish fishery currently takes place over a seven-month season from April 1 to October 31. The seven-month season was implemented first in 2002. During 2001, the season was open from August 15, 2001 to October 31, 2001. For several years prior to 2001, tier limits were assigned, but they could only be fished during a roughly 10-day window. Any primary season tonnage left uncaught would then be divided into equal limits that were available to permitted vessels during a two-week “mop-up” fishery. Permit holders may now land their tier limits at anytime during the seven-month season. However, once the primary season opens, all sablefish landed by a sablefish-endorsed permit is counted towards attainment of its tier limit.

Regulations allow for up to three sablefish-endorsed limited entry permits to be 'stacked' on a single vessel. Stacking additional sablefish-endorsed permits on a vessel allows the vessel to land sablefish up to the sum of the associated tier limits. However, stacking does not convey additive landing limits for any other species, nor for sablefish when caught under the daily/weekly option. For example, using 2003 tier limits, a vessel with a Tier 1 permit which bought or leased an additional Tier 2 and a Tier 3 permit could land a total of 91,000 pounds of sablefish during the primary fishery (Tier 1 + Tier 2 + Tier 3 = 53,000 pounds + 24,000 pounds + 14,000 pounds). Prior to 2002, there were no provisions for obtaining additional tier limits through permit stacking in this fishery. Permit stacking was implemented to increase the economic efficiency of the fleet and promote fleet capacity reduction.

The first step in modeling bycatch in the trawl fleet is projecting landed catch for each permit during each two-month management period throughout the year. Since trip limits may change from one two-month period to the next, this approach is necessary in order to capture seasonal differences in historic participation, as well as to facilitate analysis of alternative trip limit scenarios. Recent fishticket and logbook data are used to project landings for target species, given trip limits and depth management constraints. These expected target species landings are then translated into projected total mortalities for target and overfished species, using relationships derived from observer data.

The structure of the limited entry primary fixed gear fishery for sablefish is fundamentally different. The sablefish tier limit that is provided to each sablefish-endorsed permit may be landed at any time and in any amounts throughout the seven-month season. Where trawl vessels commonly do not achieve full limits for all target species in each two-month period, there is a reasonable expectation that seven months provides ample opportunity for all tier limits to be landed. Furthermore, the current seven-month length of the primary season has only existed since 2002. The shortness of this time series presents difficulties for determining when tier-limit fishing will occur and for interpreting changes in fishery seasonality between 2002 and 2003. Shifts between these two years could represent an ordinary amount of inter-annual variability, reflecting the variability of alternative fishing opportunities or fluctuations in real or expected sablefish prices. Alternatively, they could represent a more permanent shift in behavior that reflects fishermen's increased understanding of how to maximize the value of their fishery participation, given this new structure.

To complicate matters further, with the fishery's stacking provisions, there is much greater opportunity for inter-annual movement of permits between vessels than is the case in the trawl fleet. Hence, the timing and location of future sablefish catch is dependent on the leasing arrangements for stacked permits; and these leasing arrangements may not be fully resolved until after the season formally begins. Since permits may be stacked without regard to which gear is being used, the gear endorsement of a permit is not a sure indicator of the gear that will be used to catch its tier poundage. Thus, a similar degree of uncertainty may also be associated with the share of catch projected for longline and pot gears. Finally, there is no system of comprehensive logbooks for the fixed gear fleet, as there is for trawl. Logbooks are useful in calibrating bycatch estimates between observed and unobserved vessel trips.

In light of these issues, the existing structure of the trawl bycatch model is not particularly well suited for the task of estimating total mortality of sablefish and overfished species in the 2004 tier limit fishery. Since the stability of seasonal participation and gear share in this fishery is highly uncertain, it is reasonable to evaluate whether average discard and bycatch rates across all months and gears might be applied to the anticipated sablefish catch of each permit. In considering this option, attention should be paid to whether some method of combining observer data from the three available years produces distributions of observed poundage for each gear type that are at least roughly proportional to their fleet averages over 2002-2003. Similarly, the patterns of observed gear shares across months should approximate those evidenced by the fishery in 2002 and 2003.

For two of the overfished rockfish species, bocaccio and cowcod, bycatch rates are zero. Caution is urged in the use of these results, since no primary season landings south of Fort Bragg, California were observed. Not surprisingly, bycatch ratios for lingcod, and canary and yelloweye rockfishes are significantly higher shoreward of 100 fm than they are seaward of that depth. Even when compared to the adjoining 100 fm to 125 fm interval, the shoreward bycatch rates are three or more times higher. Bycatch ratios for darkblotched and POP increase only slightly in moving from a 100 fm threshold to a 150 fm threshold. Since there are no logbook records for this fleet, these data represent the best available information regarding the depth distribution of tier-limit sablefish fishing over these time periods. Roughly 65% of the sablefish were caught seaward of 150 fm, 76% seaward of 125 fm, and 92% seaward of 100 fm.

While bycatch is generally lower when pot gear is used, it is interesting to note that observed pot sets shallower than 150 fm had higher associated bycatch of lingcod than did longline sets in those depths. Discard rates for sablefish were generally higher for observed pot vessels, particularly in waters deeper than 125 fm. There is also a clear difference in the average depth of fishing between the two gears. The pot fleet caught 89% of its sablefish in waters deeper than 150 fm, compared to just 52% for the longline fleet. Eighty-nine percent of the longline-caught sablefish were taken in waters deeper than 100 fm.

Several factors support the use of a relatively simple method of estimating sablefish discard and the bycatch of overfished species in the 2004-2006 primary sablefish fisheries. Given the newness of the current fishing structure and the inherent flexibilities conveyed by permit stacking and a seven-month cumulative limit period, there is considerable uncertainty regarding the temporal, geographic, and gear distributions of catch that will be realized. Holding each gear type individually accountable for its performance is not realistic because it is the gear that is used, not the permit's endorsement that will affect performance. Since a permit with either gear endorsement may be stacked on a vessel using either gear, and permits may be transferred to different holders even after the season begins, there is no way to attribute differential discard/bycatch impacts to permits on the basis of gear endorsement prior to the season. In addition to these difficulties in reliably modeling participation and given the currently available data, the precision of bycatch estimates degrade rapidly as monthly strata are introduced.

For these reasons, the approach for 2004-2006 is to use fleetwide, season-long estimates of discard and bycatch, and apply those to the total catch of sablefish allocated to this fishery. A weighted combination of observer data from 2001-2003 was used in calculating bycatch results for this purpose. The following weights are used with data from each year: 2003: 0.4; 2002: 0.35; 2001: 0.25. While the bycatch ratios are derived from observations of only tier-limit fishing for sablefish, there are no other sources of information on bycatch in the portion of the fishery conducted under daily/weekly options. Finally, given the lack of observations south of the Fort Bragg area, the reported bycatch estimates for bocaccio and cowcod are not likely to reflect the true impact on these stocks. This is particularly the case for the columns that reflect fishing shallower than 150 fm in Tables 2-25 and 2-26.

Analysis of Alternatives

The only quantitative bycatch analysis available for the limited entry fixed gear sector is for the portion of the fleet participating in the primary sablefish fishery. Table 2-25 shows results for the primary sablefish fishery under the No Action Alternative with recalculated tier limits using the OY rather than the ABC (see Section 2.2.4.2). These results are compared to those for the action alternatives in Table 2-26. Note that the action alternatives differ by varying the size of the nontrawl RCA by adjusting the seaward boundary line. Therefore, under Action Alternative 1, there is a seaward RCA line of 150 fm coastwide. While this is status quo south of 40°10' N latitude, it is much more conservative than the status quo boundary of 100 fm north of 40°10' N latitude Likewise, Action Alternative 2, with a seaward RCA boundary of 125 fm, is more liberal than status quo in the south and more conservative in the north. Lastly, Action Alternative 3 is much more liberal in the south and status quo in the north. There is a seven-fold difference in the estimated canary rockfish impacts in the primary sablefish fishery under Action Alternative 1 relative to Action Alternative 3 (Table 2-26). However, this canary impact is still rather small at 0.7 mt, given the liberal RCA boundary under Action Alternative 3. The bycatch scorecards (Tables 2-5, 2-10, 2-11, 2-12, 2-13a, and 2-13b) have the same estimated impacts of overfished species for the limited entry fixed gear sector. This is because the estimated impacts by species in these tables are the higher of estimated impacts in the primary sablefish impact model (from Tables 2-25 and 2-26) or the impacts under the No Action Alternative using assumed discard rates (Table 2-5). However, there is clearly an effect of varying the size of the nontrawl RCA on the estimated mortality of overfished species that can only be addressed qualitatively. The estimated mortality of overfished shelf species (bocaccio, cowcod, canary, lingcod, widow, and yelloweye) would be progressively higher under Action Alternatives 3, 2, and 1 since more fishing is progressively allowed in depths where these species are found.

Given the uncertainty in effects associated with varying the size of the nontrawl RCA, the Council recommends a status quo nontrawl RCA in 2005-2006. Many fixed gear fishermen fishing south of 40°10' N latitude requested consideration of a line change that would allow them to fish in the 100 fm to 150 fm zone to access chilipepper rockfish. They maintained that fishticket landing records from past years, when the fishery was not as constrained by the need to rebuild depleted species, would show that chilipepper rockfish were targeted cleanly with little bycatch of canary rockfish and other now-overfished species. The GMT considered this request, but could not recommend a change in the southern nontrawl RCA bounds due to the lack of observer data in the south to verify these claims. They were concerned with the NMFS trawl survey results in the south which showed that canary rockfish were most prevalent in the 100 fm to 125 fm depth zone. They were also concerned with the bocaccio bycatch implications based on the strong co-occurrence of chilipepper rockfish and bocaccio. Similar requests were made for relaxing the bounds of the northern nontrawl RCA to better access important target species like Pacific halibut and spiny dogfish. The uncertainty in the bycatch implications for severely-constraining overfished species, such as canary and yelloweye rockfish, also led the Council to recommend a status quo northern nontrawl RCA. It is noted that new open access and limited entry fixed gear observation data from the WCGOP will be available in April and November 2005. Observations from fixed gear efforts in shallow water and south of Fort Bragg, California are anticipated in these forthcoming data reports. These data will be used for inseason management decision making during 2005-2006, which should decrease the uncertainty in impact assessment and may allow further consideration of measures that would relax the nontrawl RCA bounds and allow the fleet to better access chilipepper rockfish.

Most of the limited entry fixed gear trip limits are also status quo (same as No Action) (Table 2-27 for north of 40°10' N latitude and Table 2-28 for south of 40°10' N latitude) under the Council-preferred Alternative. One exception was an increase in the thornyhead limits following the long-term convention of matching the limited entry trawl and fixed gear trip limits. However, subsequent to the June Council meeting when the Council-preferred Alternative was decided, the GMT realized the increase in trawl trip limits for thornyheads due to fleet reduction from the trawl buyback program should not be shared by the limited entry fixed gear fleet. The GMT expressed concern that the limited entry fixed gear thornyhead limits are too high, which might lead to early attainment of the shortspine thornyhead OY. Therefore, the GMT recommended the Council re-specify lower 2005 and 2006 thornyhead trip limits for the limited entry fixed gear sector at their September 2004 meeting. The Council followed that recommendation by refining the Council-preferred alternative for the limited entry fixed gear sector south of 40°10' N latitude by reducing the bi-monthly trip limit for longspine thornyheads from 19,000 pounds to 10,000 pounds and by reducing the bi-monthly trip limit for shortspine thornyheads from 4,200 pounds to 2,000 pounds.

The primary sablefish season tier limits do change relative to the No Action Alternative given the change in the 2005 and 2006 sablefish OY. The tier limits recommended under the Council-preferred Alternative are as follows:

Tiers	2005	Original 2006	Revised 2006
1	64,000 lb	63,000 lb	62,700 lb
2	29,100 lb	28,600 lb	28,500 lb
3	16,600 lb	16,400 lb	16,300 lb

Tables 2-29a and 2-29b depict the estimated species' impacts in the 2005 and 2006 primary sablefish fisheries, respectively, using WCGOP observed bycatch rates.

The GMT revised projections of anticipated research catches in 2005 and 2006 (Tables 2-8 and 2-9, respectively) subsequent to the June Council meeting when the Council-preferred Alternative was decided and recommended to NMFS. The revision in the anticipated research catch of sablefish affected the calculation of the 2006 limited entry fixed gear allocation of sablefish and the 2006 tier limits. The GMT originally set aside 53 mt of expected sablefish catch in 2005 and 2006 research fisheries when they modeled the effects of alternative limited entry fixed gear sablefish management measures. However, the revised research catch estimates of 48.2 mt of sablefish in 2005 (Table 2-8) and 86 mt of sablefish in 2006 (Table 2-9) affected these model results. While the 2005 sablefish tier limits and associated overfished species' impacts did not change, the 2006 specifications did. **The revised 2006 tier limits are 62,700 pounds for Tier 1; 28,500 pounds for Tier 2; and 16,300 pounds for Tier 3** with an associated slight decrease in the estimated impact on overfished species (Table 2-29c). The Council considered these revisions at their September 2004 meeting and re-specified the 2006 tier limits as shown above and in Table 2-29c.

At their September 2004 meeting, the Council recommended changing the period 5 limited entry fixed gear trip limit for deeper nearshore rockfish between 40°10' N latitude and 34 27' N latitude from a monthly to a two-month limit because it was believed this limit was incorrectly specified in June (all other periods have two-month limits for this stock complex). However, this trip limit may be changed back to a monthly limit in a future inseason action as the impacts were modeled based on the monthly limit originally specified for period 5 (Table 2-28).

4.3.2.3 Open Access

The same qualitative assessment of limited entry fixed gear impacts under 2005-2006 management alternatives applies for the open access sector. The bycatch scorecards (Tables 2-5, 2-10, 2-11, 2-12, 2-13a, and 2-13b) do not differentiate the effect of a varying nontrawl RCA since there are no empirical observations yet available for this sector. However, there is clearly an effect of varying the size of the nontrawl RCA on the estimated mortality of overfished species that can only be addressed qualitatively. The estimated mortality of overfished shelf species (bocaccio, cowcod, canary, lingcod, widow, and yelloweye) would be higher under Action Alternative 3, than under Action Alternative 2, than under Action Alternative 1 since more fishing is progressively allowed in depths where these species are found. In the absence of direct observations of discard by depth zone, the Council-preferred Alternative specifies the same nontrawl RCA configuration as the No Action Alternative. South of 40°10' N latitude, where the majority of the West Coast open access fleet operates, the nontrawl RCA is the most restrictive under the Council-preferred Alternative with a 150-fm seaward boundary (same as in Action Alternative 1). New open access observation data from the WCGOP will be available in April and November 2005. Observations from fixed gear efforts in shallow water and south of Fort Bragg, California are anticipated in these forthcoming data reports. These data will be used for inseason management decision making during 2005-2006, which should decrease the uncertainty in future impact assessment.

At their September 2004 meeting, the Council recommended changing the period 5 open access trip limit for deeper nearshore rockfish between 40°10' N latitude and 34 27' N latitude from a monthly to a two-month limit because it was believed this limit was incorrectly specified in June (all other periods have two-month limits for this stock complex). However, this trip limit may be changed back to a monthly limit in a future inseason action as the impacts were modeled based on the monthly limit originally specified for period 5 (Table 2-28).

<u>Ridgeback Prawn RCA Exemption to 100 fm South of Point Conception</u>

The proposed 2005-2006 shoreward trawl RCA boundary under the Council-preferred Alternative is 75 fm in periods 1 and 6, and 100 fm in periods 2 through 5. Nongroundfish trawl fisheries, such as the West Coast trawl fisheries targeting California halibut, sea cucumbers, and ridgeback prawns, are open access and exempt from the FMP gear and permit restrictions regulating most West Coast trawl efforts. However, since the advent of depth-based management of West Coast groundfish fisheries in late 2002, nongroundfish trawl fisheries have been subject to the depth/area restrictions imposed with the establishment of the trawl RCA. An exemption is proposed under the Council-preferred Alternative to allow the ridgeback prawn trawl fishery to operate within the trawl RCA to 100 fm when the shoreward boundary of the trawl RCA is at 75 fm.

The ridgeback prawn fishery operates between October 1 through May 30 in California south of Point Conception (34°27' N latitude), primarily off Ventura within the Santa Barbara channel and, to a lesser extent, around Catalina Island, between 50 fm and 85 fm, with an average depth of 75 fm. Primary trawling areas (obtained from trawl log data) are over sandy substrate, as evaluated from habitat mapping conducted by staff with the Channel Islands National Marine Sanctuary (CINMS).

Ridgeback prawn trawlers are currently permitted to retain 300 pounds of groundfish bycatch per trip. The most common bycatch species landed with the target species are species of sole, California halibut, butterfish (*Peprilus simillimus*), white croaker, spot prawn, and sea cucumber (Table 4-13). Several soft-bottom species incidentally caught are discarded due to small size or lack of market demand, including poachers (family *Agonidae*), combfish (family *Zaniolepididae*), midshipman species (*Porichthys* spp.), small perch, kelpfish, occasional skates, and two small species of rockfish (stripetail and greenstriped rockfish). Ridgeback prawns do not share the same habitat with bocaccio, canary, cowcod, widow, or yelloweye rockfish.

Prawn trawlers are currently prohibited from fishing within the southern trawl RCA. In contrast, the pink shrimp trawl fishery is exempted from RCA boundaries because of state-required bycatch excluders that effectively reduce bycatch of rockfish. Current state regulations do not require the use of bycatch excluders in the ridgeback prawn trawl fishery. Industry input has suggested that the rigid excluders required in the pink shrimp fishery may not be appropriate for the gear used in the ridgeback prawn trawl fishery. Participating vessels are small single riggers (with one double rigger), ranging in length from 32 ft to 60 ft. Nylon nets are small with headropes from 35 ft to 70 ft and floats to keep the gear 3 ft to 6 ft off the seafloor, with doors weighing between 250 and 550 pounds. Because the small boats operating in the fishery are not capable of pulling rigid grates, a study is currently underway to identify excluder devices appropriate for the fishing gear. After the effectiveness of six configurations is evaluated, the CDFG intends to specify these requirements in regulation to enhance target selectivity of the gear and to reduce bycatch of soft-bottom fish stocks. These efforts are not being made in response to bycatch of any overfished species observed in this fishery, but simply to reduce bycatch overall.

The ridgeback prawn fishery operates primarily between 35 fm to 90 fm, with an average fishing depth of 75 fm. Trawl log data show that 99% of ridgeback prawns are caught in depths of 101 fm or less. Therefore, in periods 2 through 5 of 2005-2006 when the shoreward boundary of the trawl RCA is at 100 fm, the fishery will be able to continue operating over traditional fishing grounds. However, the fishery may be significantly impacted when the shoreward boundary of the trawl RCA is at 75 fm in periods 1 and 6. Trawl data evaluated from 2001 showed that 40% of the annual catch occurred in depths of 75 fm to 100 fm. An exemption to the RCA closure between 75 fm to 100 fm will allow the fishery to continue fishing operations in traditional fishing grounds in sandy habitats without impact to the overfished rockfish stocks the RCA is intended to protect.

4.3.2.4 Tribal Fisheries

Description of Tribal Groundfish Fisheries

In 1994, the U.S. government formally recognized that the four Washington coastal tribes (Makah, Quileute, Hoh, and Quinault) have treaty rights to fish for groundfish; and concluded, in general terms, they may take half of the harvestable surplus of groundfish available in the tribes' usual and accustomed (U and A) fishing areas (described at 60 CFR 660.324). West Coast treaty tribes have formal allocations for sablefish, black rockfish, and Pacific whiting. Members of the four coastal treaty tribes participate in commercial, ceremonial, and subsistence fisheries for groundfish off the Washington coast. 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.

There are several groundfish species taken in tribal fisheries for which the tribes have no formal allocations and some species for which no specific allocation has been determined. Rather than try to reserve specific allocations of these species, the tribes recommend trip limits for these species to the Council, which tries to accommodate these fisheries. Tribal trip limits for groundfish species without tribal allocations are usually intended to constrain direct catch and incidental retention of overfished species in the tribal groundfish fisheries.

Twelve 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.

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 between the tribes according to a mutually agreed-upon allocation scheme. Specific sablefish allocations are managed by the individual sablefish tribes, beginning in March and lasting into the autumn, depending on vessel participation management measures used. Participants in the halibut and sablefish fisheries tend to use hook-and-line gear, as required by the International Pacific Halibut Commission (IPHC). By agreement the tribes also use snap gear for equity reasons in the fully competitive halibut and sablefish fisheries (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).

In 2004, tribal sablefish longline fisheries were allocated 10% of the portion of the total catch OY north of 36° N latitude (751 mt) and then were discounted 3% of that allocation for discard mortality, for a landed catch allocation of 728.5 mt. For the commercial harvest of black rockfish off Washington State, the treaty tribes have a harvest guideline of: 20,000 pounds (9,072 kg) north of Cape Alava (48˚09'30" N latitude), and 10,000 pounds (4,536 kg) between Destruction Island (47˚40'00" N latitude) and Leadbetter Point (46˚38'10" N latitude).

In addition to these 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. 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 fished on the tribal whiting allocation.

In 1999 and 2000, 32,500 mt of whiting was set aside for treaty Indian tribes on the coast of Washington State, resulting in a commercial OY of 199,500 mt for 2000. In 2001 and 2002, the landed catch OY declined to 190,400 mt and 129,600 mt, respectively, and the tribal allocations for those years were also reduced to 27,500 mt and 22,680 mt, respectively. 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.

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 widow rockfish (not to exceed 10% of yellowtail landings in a given period), canary rockfish (300 pounds per trip), and minor nearshore, shelf, and slope rockfish (300 pounds per trip combined). 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.

In 2005 and 2006 the tribes are proposing increased targeting of lingcod primarily with hook-and-line gear (i.e., either trolled dinglebar or jig) as well as bottom trawl pending the results of a test fishery in 2004. The tribes would not propose increased targeting on lingcod unless bycatch rates were shown to be low enough to stay within current projected levels. Trip limits for incidental landings in all other tribal fisheries would likewise be increased to account for higher abundances reflected in the increasing OY as a result of rebuilding.

Table 8-8 shows recorded landings of groundfish species by treaty tribes from 1995 to 2003. Since 1996, Pacific whiting have comprised the vast bulk of tribal landings, even though in 2000 and 2001 whiting landings were relatively low due to reduced availability of Pacific whiting in the U and A.

Bycatch in the Tribal Groundfish Fisheries

Tribal directed groundfish fisheries are subject to full retention requirements. 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, and yellowtail rockfish. These trip limits are intended to constrain direct catches while allowing for small incidental catches. Trip limits of 300 pounds each exist for combined longspine and shortspine thornyheads, canary rockfish, minor shelf rockfish, and minor slope rockfish. Yelloweye rockfish are subject to a 100 pounds per trip limit. For all other species, limited entry trip limits apply. Rockfish trip limits do not apply during fully competitive fisheries for Pacific halibut, nor 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. Trip limit overages in all other fisheries are forfeited to the tribes. In 2002, the midwater yellowtail fishery accounted for all of the rockfish trip limit overages (443 pounds of canary rockfish, 713 pounds of darkblotched rockfish, and 212 pounds of widow rockfish). The only trip limit overage in 2003 was also from the midwater yellowtail fishery (3,889 pounds of yellowtail rockfish). The Makah Tribe has an observer program in place to verify bycatch levels. Table 4-14 compares bycatch of overfished species in observed versus unobserved trips. There was no observed discard of target species in 2003. Observed trips comprise 16% of all trips (5 of 34). These rates, from the first year of the observer program, are based on fairly small sample sizes and thus are not yet used for statistical comparison.

Estimated groundfish bycatch in Makah trawl and troll fisheries in recent years is depicted in Table 4-15. Among the overfished species, the table shows some bycatch of widow rockfish and canary rockfish in midwater and bottom trawl and lingcod bycatch in bottom trawl and salmon troll fisheries. Estimated bycatch in tribal longline fisheries in recent years is shown in Table 4-16. The table shows some bycatch of lingcod, canary rockfish, and yelloweye rockfish in tribal halibut and sablefish fisheries. Table 4-14 shows observed versus unobserved bycatch of overfished species in the Makah Tribe's bottom trawl fishery. Target species discard composed of small and unmarketable sole and arrowtooth flounder comprised 8.1% of total flatfish catch. Observed trips comprise 13% of all trips (23 of 175). As with the midwater observer program, these rates are based on small sample sizes and are not used for statistical comparison.

Discard and Retention in Tribal Sablefish Fisheries

The tribal sablefish allocation is 10% of the OY for the area north of 36° N latitude. This amount is reduced by about 2.3% 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 three years (Table 4-17). This difference is then applied to the noncompetitive fishery allocation share (2/3) to get the rate of discards, and multiplied by 20% to get the estimated sablefish mortality rate due to discards.[5/] 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, estimated to be 60,000 pounds (dressed weight) in 2004, 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. In 2002, these forfeitures accounted for 1,634 pounds in four landings (one per vessel). There were no forfeitures in 2003, when the tribal allocation of sablefish was not fully taken. The lack of discard in the tribal trawl fishery does not significantly affect the overall rate of 2.3% applied to tribal sablefish fisheries.

<u>2005-2006 Management Measures</u>

For 2005-2006, the tribal fisheries for sablefish, black rockfish, and Pacific whiting are separate fisheries, and are regulated by the tribes so as not to exceed their allocations. The tribal allocation for black rockfish is the same in 2005-2006 as in 2004 (30,000 pounds harvest guideline). Also similar to 2004, the tribal sablefish allocation is 10% of the total catch OY specified for the Monterey, Eureka, Columbia, and U.S./Vancouver INPFC areas under the proposed action (748.6 mt in 2005 and 736.3 mt in 2006), less 2.3% for estimated discard mortality, for landed allocations of 731.4 mt in 2005 and 719.4 mt in 2006.

From 1999 through 2004, the tribal allocation of Pacific whiting has been based on a methodology originally proposed by the Makah Tribe in 1998. The methodology is an abundance-based sliding scale that determines the tribal allocation based on the level of the overall U.S. OY, up to a maximum 17.5% tribal harvest ceiling at OY levels below 145,000 mt. The tribes have proposed using the same methodology in 2005-2006. The Pacific whiting U.S. OY specification is expected to be decided at March 2005 Council meeting.

4.3.2.5 Washington Recreational

<u>Estimation of Recreational Groundfish Impacts in Washington</u>

The Washington Ocean Sampling Program (OSP) generates catch and effort estimates for the recreational boat-based groundfish fishery, which are provided to 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 a.m. - end of the day) or entering the port (approximately 8 a.m. 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 only collects information on released catch

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5/ Northwest Fisheries Science Center estimate of mortality as a share of total sablefish discards is 20%.

and 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 throughout the sampling season primarily to observe hatchery salmon mark rates but also to collect rockfish discard information for halibut charter 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 the March-October season.

Sampling Schedules - due to differences in effort patterns, weekdays/weekend days are stratified. Usually, both weekend days and a random three of five weekdays are sampled.

Personnel - OSP sampling staff include two permanent biologists coordinating data collection, approximately twenty-two port samplers, four 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:

____Exit Count___ * Ps sampled = Pt
Total boats sampled

where Ps = any parameter (anglers, fish retained, fish released) withing a stratum,
and Pt = total of any parameter with stratum for the sample day

Algorithm for expanding for non-sampled days:

Total Weekday Catch = (Pt) on sampled weekdays* no. of weekdays in stratum
number weekdays sampled

Total Weekend Catch = (Pt) on sampled weekend days* no. weekend days in stratum
number weekend days sampled

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, albacore).

Washington Recreational Fishery Impact Modeling

Projected impacts for Washington's recreational fishery are essentially based upon the previous season's harvest estimated by the OSP and incorporated in RecFIN. This is especially true if recreational regulations remain consistent. When bag limit changes are proposed, traditional bag limit analyses are performed by setting individual bags that exceed the proposed bag in the raw data down to the level of the proposed bag and then recalculating total catch. As expected, this often results in fairly minor changes, especially if only a small portion of the total catch is represented by catch taken in near-limit bags. Also, when bag limits become extremely small, it is difficult to differentiate between targeted retained catch and truly incidental catches that are retained. For example, in 2004 the canary bag limit was reduced from one to zero to remove any possible incentive to target this species. Additionally, WDFW has used the zero bag limit as an element in a public information campaign encouraging anglers to change fishing behavior to avoid areas where overfished rockfish such as yelloweye and canary might be expected to be taken. It is difficult to determine from existing data what portion of fish taken under a 1-fish bag limit were an intended, targeted catch, or a truly incidental catch. Therefore, WDFW did not quantify a mortality savings in the scorecard impact as a result of this change, but rather assumed there would be some catch saved due to reduced targeting and this could subsequently be measured through the angler interview program that collects information on discarded catch.

Modeling impacts from area (depth) restrictions are even more problematic than bag limits, since there is little information in historical recreational catch data with respect to depth. Therefore, there is an unavoidable qualitative aspect to modeling impacts from depth restrictions that have largely been based upon the distribution of the fish in question rather than information in the catch database. However, in 2002, the OSP program began collecting fishing depth as well as discard information. This information will be keypunched and analyzed with respect to depth of catch for species of concern. Since the Washington recreational management measures include prohibiting fishing deeper than 30 fm if certain catch targets are approached, the depth analysis will be structured to determine fishing activity and catch relative to this depth.

Inseason catch projections are based upon the most recent OSP estimates to date with subsequent months extrapolated from the previous season. This includes producing inseason reports of discard information for prohibited species such as yelloweye and canary. Plans for 2004 and beyond include a monthly iteration of this report that incorporates catches to date with projections for the remainder of the season. However, 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 other unforseen factors.

Analysis of Alternatives

All the action alternatives, as well as the No Action Alternative, are the same for Washington recreational management measures. The principal management strategy is to closely monitor the recreational fishery and close all or part of fishery inseason if harvest guidelines are projected to be exceeded. As in 2004, Washington managers will consider closing all or part of the fishery seaward of the 30 fm management line in response to harvest guideline attainment. It is noted that the 2003 catch of yelloweye was about 4 mt (Table 4-18). This is approximately 0.5 mt higher than the GMT-recommended Washington recreational harvest guideline. While Washington managers suspect the 2003 RecFIN yelloweye total mortality estimate of 4.0 mt is too high because of an implausibly high average weight of landed and discarded yelloweye in this fishery (~10 pounds according to B. Culver, personal communication), they remain committed to using 3.5 mt as a Washington recreational yelloweye harvest guideline in 2005 and 2006.

4.3.2.6 Oregon Recreational

Estimation of Recreational Groundfish Impacts in Oregon

Modeling of expected 2005-2006 Oregon recreational fishery impacts of selected groundfish species was based on landings in recent years. For the ocean boat fishery, the data source was the ODFW Ocean

Recreational Boat Survey (ORBS). For the shore and estuary fishery, the data source was the MRFSS. Analyzed species included black, blue, brown, canary, china, copper, grass, quillback, widow, and yelloweye rockfishes; as well as kelp greenling, cabezon, and lingcod. Base level landings for the ocean boat fishery (in numbers of fish) were based on 2003 landings because these data reflect regulations most similar to those expected in 2005-2006 (i.e., bag limits, effort shifts to avoid overfished species, etc.). Base level landings for the shore and estuary fishery (in weight, kg) are largely unaffected by management of overfished species and reflect the most recent five-year average, 1998-2002, because the MRFSS program is designed to more accurately capture trends rather than annual values. Average weights for only greenling and cabezon were adjusted for minimum length changes.

The expected average weight per fish was based on the 2002-2003 average for the ocean boat fishery. A two year average was used because of small annual sample sizes for the more infrequently observed species.

The expected reduction in catch due to offshore closures was based on the data from the 2003 at-sea observer study on Oregon charter vessels (91 observations that represent 3% of total charter groundfish trips). Available observer data from 2001 (105 observations) were not used because they are not representative of the current and projected fishery in 2005 and 2006. For example, in 2001 approximately 44% of the canary rockfish were taken in waters deeper than 40 fm, compared to approximately 9% in 2003, because much of the fleet had moved from fishing offshore waters to avoid overfished species. The observer study was not conducted in 2002. The following percent reduction rates (for numbers of fish) were applied to appropriate months (June through September) expected to be closed outside of 40 fm: canary rockfish = 9.2; yelloweye rockfish = 27.8; lingcod = 13.8; and widow rockfish = 69.2 (Table 4-19).

Annual angler effort in 2005 and 2006 for ocean, shore and estuary areas is assumed to be similar to 2003 and 2004. Angler groundfish effort in 2003 for the ocean boat fishery was 57,000 angler trips. Groundfish angler trips in the shore and estuary fishery are not available, only total trips. During offshore closures outside of 40 fm, effort and catch were projected to be shifted from the offshore closure areas to open nearshore areas. The estimated increase in effort in nearshore waters is 5% because approximately 5% of the total effort in 2003 was in offshore waters. Most of the offshore effort occurs in the charter fleet.

Closure of Stonewall Banks provided an additional reduction in impacts on offshore species beyond that due to the 5% effort shift based on charter vessel observations. Most angler effort at Stonewall Banks is from private boats and not charter boats, and therefore, the effects of closure at Stonewall Banks could not be estimated from the observer data. Stonewall Banks is one of the few Oregon areas between 38 fm and 50 fm that is fished for recreational groundfish. To estimate the impacts on canary and yelloweye rockfishes, the 2002-2003 average weights for canary and yelloweye rockfishes were applied to 2003 landings in the directed groundfish fishery on Stonewall Banks. It was estimated that 70% of this catch occurred during the June-September period based on the 2003 monthly profile for the entire Oregon recreational groundfish fishery.

The catch of lingcod has increased steadily in recent years, likely due to the stock's rebuilding. Based on this trend, a 17% annual increase in catch is expected over 2003 levels.

No bag limit or minimum length changes are proposed for 2005-2006; thus the same procedure as reported in the 2004 EIS (PFMC 2004b) was used to analyze the impacts of regulations. In 2004, minimum length changes were adopted for greenling (none in 2003 to 10-inches) and cabezon (15 inches in 2003 to 16 inches). The effect of adopting a minimum length of 10 inches for greenling is assumed to be zero for the ocean boat fishery because greenling caught in this fishery are generally larger than 12 inches. The estimated greenling reduction of 24% in the shore and estuary fisheries is based on MRFSS weight by length profiles.

Discards of overfished groundfish species (canary and yelloweye rockfishes and lingcod) were analyzed for proposed 2005-2006 fisheries. For lingcod, an estimated 95% of released fish are estimated to survive discard (personal communication with the GMT). Estimates of discard impacts were made for canary rockfish and yelloweye rockfish due to non-retention. This was based on using 2003 catch, 2002-2003 average weight, and appropriate catch scalars for offshore closures (see above). A 100% mortality rate was assumed for canary rockfish released in waters over 20 fm, a 50% mortality rate was assumed for canary rockfish released in waters over 10 fm, but less than 20 fm, and 15.9% mortality rate was assumed for canary rockfish released in waters 10 fm or less (maximum of range of likely mortality from Albin and Karpov (1995)). Canary rockfish releases by depth (10-fm increments) were derived from the 2003 at-sea observations and result in 66% mortality with no depth closures and 63% mortality during depth closures (Table 4-20). For yelloweye rockfish, 100% mortality at all depths was assumed because observations were too few to stratify by 10-fm increments.

Discard impacts were also estimated for released canary rockfish and yelloweye rockfish due to angler preferences (small size) and regulatory-induced release during 2003 (bag limits). Addressing releases due to bag limits is necessary because the base year for estimating catch of these species in 2005-2006 was 2003 when bag limits of 1 canary rockfish and 1 yelloweye rockfish were in effect. For 2005-2006 the bag limits are zero (non-retention) for these two species. The discard rate, based on the 2003 at-sea observation program, was 44% of canary rockfish retained (239 observations) and 6% of yelloweye rockfish retained (18 observations). The same mortality rates discussed in the above paragraph were used. The modeling assumed that canary rockfish discarded are 42% of average 2002-2003 retained size based on at-sea observations in 2003 (38 fish observed with an average size of 0.4 kg compared to the average size from dockside sampling of 0.96 kg). For yelloweye rockfish, similar average size of landed fish was assumed since there were too few observations taken at-sea.

During the 2005-2006 all-depth Pacific halibut fisheries, the estimated canary rockfish and yelloweye rockfish impact due to non-retention requirements was based on the creel survey of the 2003 fishery. This fishery was open May through October on authorized days under non-retention for these two species of rockfish. The 2002-2003 average weight was used to estimate impacts in metric tons.

Table 4-21 documents historical landings of important groundfish species in the 2000-2003 Oregon recreational groundfish fishery. Table 4-22 details the estimated distribution of recreational catch in Oregon by season for important species and species groups under the 2005 and 2006 management alternatives.

4.3.2.7 California Recreational

The CDFG developed an impact projection model that was reviewed by the GMT at their May and June 2004 meetings. The GMT recommends this model for use in projecting impacts of groundfish species in 2004-2006 in California recreational fisheries. This model is described below and is used in impact analyses in this EIS.

<u>Introduction and Overview of California Recreational Fisheries and Factors Influencing Catch Projection Modeling for 2005-2006</u>

Recreational fisheries management for multispecies 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 provide fishing opportunities that keep total catch of overfished species within the reduced limits that are necessary to rebuild the stocks.

Prior to 2000, the recreational daily bag limit for rockfish was 15 fish per angler and there were 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 analysis of the effect of particular regulations difficult to determine.

For the 2005-2006 management cycle, the CDFG analyzed a time series of recreational catch data from RecFIN (www.recfin.org) to determine a suite of regulations that would be expected to constrain the fishery within the available catch limits for a number of species or species groups with regional and/or statewide catch limitations.

The RecFIN catch estimates are a result of the MRFSS, which consists of two parts, (1) an intercept survey that samples several modes of fishing on a two-month basis (a wave) and which has been conducted from 1983 to 2003 (except 1990 to 1992), and (2) a complementary telephone survey that is used to estimate effort and expand sample data (www.recfin.org/recfin/mrfss_basics.htm). The sample size for the intercept and telephone surveys are small, and the resulting RecFIN catch estimates are highly variable. The MRFSS survey only divides California into two areas, northern and southern California, which are divided at Point Conception (34°27' N latitude).

California's coastline is diverse, and species assemblages, weather, and resident population/fishing effort vary greatly in the north, central, and south parts of the state. For management of California's nearshore recreational groundfish fishery, CDFG has divided the coastline into four regional areas: three in northern California (North, from 42º N latitude to 40°10' N latitude; North-Central, from 40°10' N latitude to 37°11' N latitude; and South-Central, from 37°11' N latitude to 34°27' N latitude) and one in southern California (from 34°27' N latitude to CA/Mexico border), with the split between northern and southern California at Point Conception (34°27' N latitude) as in the MRFSS survey.

The Council gave guidance to CDFG to emphasize the most recent catch estimates in catch projection modeling for 2005-2006. Catches have been increasing in recent years compared to the 1990s; emphasizing the catch estimates from these recent years allows the base catches within the model to reflect this increasing trend. However, California's 2003 RecFIN catch and effort estimates were statistical anomalies and are currently under review by the RecFIN Statistical Committee. In response to this data concern, and in consideration of guidance provided by the SSC to Dr. Jim Hastie to incorporate multiple years of observer data into bycatch modeling, CDFG analytical staff decided to use a weighted decay function (0.7) that incorporates recent high catches with a longer time period to better represent annual variability in the analysis. This methodology was reviewed by the GMT and approved by the Council for use. Recent years have been restricted by depth and fishing months, so each year of fishing was adjusted to reflect a full year of fishing with no depth restrictions for purposes of projection. Percent of catch by wave and depth was applied to the weighted decay function output resulting in matrices that show predicted catch for each harvest group and region combination. Season options were created and analyzed to show resulting impacts.

CDFG/California Recreational Groundfish Model Assumptions for Projecting 2005-2006 Catch

The model incorporates a number of parameters and assumptions, all of which are either risk-neutral or risk-averse (precautionary). Model output predicts expected catch under any combination of season and depth fishing restrictions by region.

- Effort shift inshore stratified by depth - The model includes a 39.3% increase in expected landings when depth strata are closed seaward of 20 fm, and a 27.6% increase when depth strata are closed seaward of 30 fm, to account for an effort shift into shallow water when fishing is closed seaward of 20 fm and 30 fm, respectively. These values are based on an analysis of effort shift performed by the CDFG in 2002, and updated in May 2004 with more recent data and depth stratification. The model applies the third

(P75) and second (P50) quartile values of effort shift for 20 fm and 30 fm, as adjusted by the general trend of effort increase over time in months not restricted by depth (median = 10.6%).

- Effort shift inshore - The model includes a 48.7% increase in expected landings for open depth strata at strata less than 30 fm to account for an effort shift into shallow water when fishing outside 30 fm is closed. This is the upper quartile value from the 2002 CDFG effort shift analysis.

- Discard mortality estimates are assumed to be 100% for prohibited species (canary, cowcod, and yelloweye rockfish) in all depth strata open to fishing. Catch by depth and depth-based discard mortality rates are available (Albin and Karpov 1995); however, they are not incorporated into the model at this time to account for unquantifiable illegal retention in addition to bycatch mortality.

- California scorpionfish and lingcod hooking mortality rate is assumed to be 5%.

- Historical percentages by wave - Estimates of historical percent of total catch by wave were calculated for each region based on RecFIN data (weight of A+B1) from 1993-1999, which was a time period when seasons and depths were unconstrained. Data availability for the northern region (California/Oregon border to 40°10' N latitude) was limited, so similar estimates from Oregon were obtained from RecFIN and used to obtain a seasonal pattern of catch by wave (per discussion with D. Bodenmiller, ODFW).

- Expanded 2003 base-year methodology - With respect to creating a 2003 base year expanded to represent potential catch in an unconstrained season, a more conservative approach is used in the current model to generate estimates than that used for the 2004 inseason calculations in early April 2004.

- Under the current approach, the full year expanded catch builds up from unadjusted RecFIN data (i.e., no adjustment for "derby effect" applied) to what might be expected if that level of effort and catch rates were applied to a complete year (back-calculating and applying percent by wave).

- The method used at the April 2004 Council meeting instead created an "adjusted 2003" data set by spreading 2003 effort between waves based on moderating any derby effect in wave 4 and using proxy 2002 catches from waves closed in 2003, adjusted by increased effort and catch rates that year.

- Minimum size and bag limits - The estimates of landings for each year were not standardized to reflect the same minimum size and bag limits. For instance, lingcod catches have not been standardized to a single size limit and thus the output reflects the following:
    - 2 fish at 24" for 1999, 2002, 2003
    - 2 fish at 26" for 2000, 2001

- It is assumed that the impact of this non-standardization is minimal under the current model.

- Bocaccio adjustment for fully-recruited 1999 year class effect - The adjustment present in last year's model that doubled bocaccio is not in the current version of the model. The 2002 and 2003 catches presumably reflect the full recruitment of the 1999 year class into the fishery, so additional adjustments are not needed.

Application of a Decay Function Methodology to Weight Historical Catch Data for Use in Predicting Future Catches

Background:
At the March 2003 Council meeting, the SSC met with Dr. Jim Hastie to discuss how to most appropriately weight each of the years of commercial fisheries' observer data in the bycatch model and how to incorporate future observer data years. The SSC discussion resulted in a recommendation to apply a decay function to each year back in succession to give greatest significance to the most recent year of data and give decreasing significance to earlier years. The CDFG believes this methodology is also appropriate for application to California's recreational catch history in predicting future behavior of the recreational fishing fleet.

Preferred Approach:
CDFG analysts recommend the use of a 0.7 weighting factor equation for application to the California recreational fisheries data, as an alternative to more arbitrary approaches that give equal weight to each year in a pre-selected set of input years (Table 4-23). Under the recommended decay function approach, each successively older year is given a weight of 0.7 times the more recent year that it preceded. Given the extant 18-year RecFIN catch history, the most recent year (2003) accounts for 30.0% of the catch information in the "base year" calculation. The 2000-2003 period contributes 76.1%, the 1990-1999 period contributes 22.1%, and the 1983-1989 period contributes the remaining 1.8%.

Selection of 0.7 Weighting Factor in Decay Function Model

A Decay Function model was selected to model 2005-2006 landings, because this method:
- Provides more weight to recent years, giving greater significance to the most recent years and less significance to earlier years.
- Was recommended by the SSC as a methodology for weighting years of commercial observer data in the bycatch model.

The 0.7 weighting factor was selected for use in the Decay Function model because of the following:
- The primary data contribution comes from 2000-2003 (76.1%; 2003 alone contributes 30%).
- Includes a contribution from the 1990s (22.1%) and a small contribution from the 1980's (1.8%).
    - Inclusion of 1980s in the model was considered appropriate because, unlike other sections of the West Coast, a large portion of the California rockfish catches during the 1980's was taken by recreational anglers.
    - Inclusion of the 1980s and 1990s in the model, along with 2000-2003, was not considered a deficit in the predictive abilities of the model. This is because differences in regulations between the past two decades relative to more recent years were to a large extent accounted for through expansions of the recent catches for closed months and closed depths (i.e., catches from more recent years now reflect an expanded full fishing season within all depths for purposes of projection).

Estimates of recreational catch from 2003 alone were not used because:

Actual catch information was only available for part of the year in most of the state due to the six-month closure from January through June, and closure of depths outside 20 fm or 30 fm during open fishing months;
    - One of the premises of the projection model is to look at a full season without depth restrictions. To use 2003 in the model, the 2003 catches have to be expanded based on assumptions of take of fish in January through June and take of fish within closed depths. The resulting expanded catch includes a higher proportion than other years of "estimated" take which introduces a higher level of uncertainty than earlier years.

- Concerns still linger about the accuracy of the 2003 July through August (Wave 4) catch estimates, particularly since observations in the field do not support the extremely high estimate of private/rental anglers generated through the Random Digit Dialing (phone) survey for effort.

While the reasons provided above make 2003 a poor choice for a base year, it is still appropriate to include the 2003 information within the model because it provides the most recent information on catches under the current regulations, stock abundance, and angler fishing behavior. For inclusion in the model, however, it was important to expand the catch information, as mentioned above, to a full season.

Inputs and Key Parameters for the Model

1. BASE YEAR CATCH: Caught and retained (MRFSS "A" catch) plus filleted/caught and released dead (MRFSS "B1" catch) in WEIGHT of fish. Assumed to be estimates for an unrestricted fishing year with no months closed and no depths closed. Most of the years were without season and depth constraints; however 2000 to 2003 had some restrictions. For now, the two month closures in 2000 and 2001 have been unaccounted for. For 2002 and 2003, a back calculation method was used to add a catch estimate for what the catch would have been (based on percent caught in waves and depths in prior years), if all months and all depths had been open.

2. MORTALITY: 100% mortality factor for prohibited species: 100% mortality of canary, cowcod, and yelloweye rockfish caught incidental to fishing for other species is built into the model.

3. INCIDENTAL MORTALITY FOR CALIFORNIA SCORPIONFISH: To account for incidental catch while fishing for other species during a California scorpionfish closure. For the 2004 model, it was 18%, and for 2004 inseason and for 2005-2006, it was changed to 5% from CDFG research data.

4. EFFORT SHIFT: Accounted for when fishing is restricted to shallow waters (i.e., inside 30 fm or inside 20 fm) by applying a 48.7% increase to catch (a 14.7% effort shift was used for the 2004 model).

Post Model Adjustment Possibilities

- Currently, no adjustments for increased stock abundance are in place. Species to consider stock increases for are bocaccio and lingcod.

- Currently, no savings of increased size limit or decreased bag limit are accounted for, such as recent regulatory changes for lingcod.

- Currently, discarded fish weight estimate uses the same average weight as retained fish and is likely an overestimate of weight.

Rockfish-Cabezon-Greenling Bag Limits

If the harvest guideline or harvest target for any nearshore rockfish species within the Rockfish-Cabezon-Greenling (RCG) complex is projected to be exceeded, state action may be taken to reduce the bag limit from 10 fish (status quo) to a number less than 10 fish (Figure 4-5). The proposed reduction in bag limit may apply specifically to the private boat, shore-based, and diving modes, resulting in a differential bag limit for these modes and the CPFV mode due to economical implications for CPFVs when a bag limit is reduced below 10 fish. A separate option is to include CPFVs in a bag limit reduction. This management response may be particularly effective for nearshore rockfish species such as black rockfish, where limiting depth may not be the most effective tool.

Lingcod Bag and Minimum Size

CDFG is proposing alternatives to fishery closure as an inseason management response to projected over-harvest of lingcod. If the CDFG determines that more restrictive management measures are necessary to slow the harvest of lingcod, an increase in the minimum size limit, or a reduction in the bag limit from two to one, may be implemented. Projected harvest for each upcoming month may be multiplied according to the coefficients for size and/or bag limit to identify the management response necessary to keep projected catch within the recreational harvest guideline.

Coefficients to modify projected catch of lingcod from a two-fish bag limit to a one-fish bag limit, or from 24" to a larger minimum size:

Size	Size Coefficient	Bag Limit Coefficient
24	0	0.214
25	0.169	0.18
26	0.304	0.15
27	0.43	0.12
28	0.521	0.1
29	0.581	0.07
30	0.641	0.039
31	0.685	0.025
32	0.723	0.011

Estimation of Impacts

The CDFG is proposing the same seasons outlined in Section 2.2.4.7 and Figures 2-1, 2-2, and 2-3 for Action Alternatives 1-3. The estimated impact on select groundfish species in 2005 and 2006 California recreational fisheries by region are shown in Table 4-24. The estimated impacts of select groundfish species under the Council-preferred Alternative are shown in Table 4-25.

Included in the Council-preferred Alternative for California recreational fisheries is a change in the allowable minimum size of lingcod from 30 inches to 24 inches. The increased impact of reducing the lingcod minimum size limit can be easily accommodated in the recommended harvest guideline for that fishery. The increased lingcod OY from the new assessment (Jagielo, *et al*. 2004) allows this greater opportunity to harvest lingcod.

Also included in the preferred alternative is the allowable retention of Other Flatfish species when fishing with approved gear for sanddabs in recreational (and commercial) fisheries. Current California recreational fishing regulations and commercial fishing regulations south of 40°10' N latitude provide for an exemption from season and depth closures placed on other federal groundfish species when fishing for sanddabs using gear specified in state and federal regulations. Regulations specify the exemption for "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 1 lb (0.45 kg) of weight per line." In the commercial limited entry fixed gear and open access fisheries south of 40˚10' N latitude, retention of all other federal flatfish species is permitted when fishing for sanddabs with the defined gear. In the sport fishery for sanddabs, however, retention of other federal flatfish is currently not permitted while fishing with this gear in otherwise closed areas. The proposed regulation allows for retention of flatfish caught incidentally while targeting sanddabs in the recreational fishery and is not expected to result in mortality of rockfish. Sanddabs are associated with sandy habitat which tends to remain separate from primary rockfish habitat. The use of small hook size further reduces the likelihood of rockfish catch.

4.4 Discussion of Cumulative Impacts

The cumulative impacts of the alternatives on groundfish stocks and stock complexes are found in Tables 2-5, 2-10, 2-11, 2-12, 2-13a, and 2-13b. The most constraining stocks (i.e. those stocks with estimated cumulative impacts close to the OY) are at the greatest risk of being overfished under the 2005 and 2006 management alternatives. Canary rockfish is the most constraining stock and is caught in most of the sectors in the management regime. Tracking canary rockfish mortalities closely inseason will be critical to avoid overfishing that stock.

Disaster tows in directed whiting fisheries are possible in the next two years, which could compromise canary and widow rockfish stock rebuilding objectives. Using bycatch caps to manage these species' impacts in the directed whiting fishery under the Council-preferred Alternative is a good precaution. The full observer coverage in the at-sea fishery and full retention in the shoreside sector enables this management strategy.

Risk and uncertainty is greatest when impacts are significant in the open access and California recreational sectors given the variability in past harvests and the lack of information available in those sectors. In 2002 and 2003 the lingcod and bocaccio harvests in those fisheries contributed to overfishing (Tables 4-1 and 4-2). However, the significant increase in the 2005 and 2006 OYs for those species ameliorates the risk. This is especially true considering the large yield residual (i.e., difference between the OY and the estimated mortality) in the Council-preferred scorecards for those species (Tables 2-13a and -13b). It is also likely, given recent recruitments and the constraints imposed on 2005 and 2006 fisheries, lingcod will attain the rebuilding target during the 2005 and 2006 management cycle. A new stock assessment next year will validate this prediction.

The other groundfish stock that has experienced overfishing in recent years has been shortspine thornyheads (Tables 4-1 and 4-2). The reason the shortspine thornyhead OY has been exceeded was the shift of commercial effort into deeper waters with the advent of depth-based management and higher than expected levels of discard. The prescriptive reduction in limited entry fixed gear trip limits recommended by the GMT and specified by the Council in September 2004 was considered necessary to avoid overfishing shortspine thornyheads again in 2005 and 2006. Inseason modeling of landings and discards using updated WCGOP data should aid in more precise catch accounting of this stock.

TABLE 4-1. Draft estimated 2002 total catch mortality (mt) of selected groundfish species from West Coast commercial, tribal and recreational fisheries. (Page 1 of 2)

	LANDINGS AND MORTALITY			TARGETS						
Species	Estimated total catch	**PRELIM** Estimated commercial fishery discard mortality [a/]	Actual landings [b/]	Total catch ABC	Total catch OY	Shore-side discard	Shoreside discard mortality	At-sea whiting bycatch	Mortality from fixed gear sablefish (all north)	Mid-water widow/ yellowtail fishery (period 6)
Lingcod	980.0	159.1	820.9	841	577	313.5	156.7	0.5	1.8	0.1
Pacific cod	798.5	41.8	756.7	3,200	3,200	41.8	41.8			
Pacific whiting [c/]	132,367.9	2,368.5	129,999.4	188,000	129,600	2,312.2	2,312.2			56.3
Sablefish (north)	4,330.4	701.6	3,628.8	8,209	4,367	1,285.0	642.5		59.1	
Sablefish (south)	189.8		189.8	441	229					
Dover sole	7,583.8	1,264.8	6,319.0	8,510	7,440	1,264.8	1,264.8			
English sole	1,594.5	415.2	1,179.3	3,100		415.2	415.2			
Petrale sole	1,965.4	167.3	1,798.1	2,762		167.3	167.3			
Arrowtooth flounder	4,979.3	2,888.6	2,090.7	5,800		2,888.6	2,888.6			
Other flatfish	2,336.7	633.5	1,703.2	7,700		633.5	633.5			
Pacific ocean perch	185.3	34.5	150.8	689	350	30.5	30.5	3.8	0.0	0.1
Shortbelly	11.7	11.4	0.3	13,900	13,900	11.4	11.4			
Widow	547.0	193.5	353.5	3,871	856	3.3	3.3	154.7	0.0	35.5
Canary	109.7	41.2	68.4	272	93	32.1	32.1	5.2	1.3	2.7
Chilipepper	249.0	74.0	175.0	2,700	2,000	74.0	74.0			
Bocaccio	140.3	28.6	111.7	198	100	28.0	28.0	0.6		
Splitnose	79.1	22.6	56.5	615	461	22.6	22.6			
Yellowtail	1,532.3	285.6	1,246.6	3,146	3,146	285.6	285.6			

TABLE 4-1. Draft estimated 2002 total catch mortality (mt) of selected groundfish species from West Coast commercial, tribal and recreational fisheries. (Page 2 of 2)

	LANDINGS AND MORTALITY			**TARGETS**						
Species	Estimated total catch	**PRELIM** Estimated commercial fishery discard mortality [a/]	Actual landings [b/]	Total catch ABC	Total catch OY	Shore-side discard	Shoreside discard mortality	At-sea whiting bycatch	Mortality from fixed gear sablefish (all north)	Mid-water widow/ yellowtail fishery (period 6)
Shortspine Thornyheads	1,155.7	389.4	766.3	1,004	955	389.4	389.4			
Longspine Thds. (north)	2,098.4	373.3	1,725.1	2,461	2,461	373.3	373.3			
Longspine Thds. (south)	124.7		124.7	390	195					
Unspecified Thornyheads	71.6		71.6							
Cowcod, Monterey	2.2	1.4	0.8	19	2.4	1.4	1.4			
Cowcod, Conception	0.0		0.0	5	2.4					
Yelloweye	11.2	2.1	9.1	52	13.5	0.5	0.5		1.6	
Darkblotched	202.2	96.3	105.9	205	168	93.0	93.0	3.2	0.1	

a/ Preliminary estimated discard mortality in the commercial fishery. Preliminary trawl discard calculated by applying discard mortality rates from combined 2001-2003 WCGOP data to 2002 trawl logbook data, by area and depth strata. Discard totals estimated for tows recorded in logbooks is expanded using state-specific ratios of fishticket landings to retained logbook catch. Several trawl EFPs were conducted during 2003 and all required full retention of *Sebastes* species. Since all potential discards were landed and captured within the fishticket reporting system, application of non-EFP discard rates to all logbook tows would overstate the true amounts of discard (and total catch) for *Sebastes* species. Because an official listing of tows conducted as part of EFPs was not available at the time these estimates were made, an interim approach for categorizing EFP tows was used. During 2003, only EFP participants had the ability to legally bottom trawl for groundfish within the trawl RCA. Utilizing this restriction, rockfish discard rates were not applied to target tonnage caught within the RCA depths off Oregon and Washington. Additionally, the principal EFP in Washington allowed large amounts of arrowtooth flounder to be landed in excess of trip limits. Accordingly, tows by Washington vessels that exceeded the 2-month allowance of arrowtooth flounder for non-EFP vessels also received the same analytical treatment.

b/ Includes shoreside commercial and tribal landings from PacFIN, observed total catch including estimated discards in the at-sea whiting fishery, and RecFIN recreational catch plus observed discard mortality (A+B1).

c/ Estimated commercial discards shown for whiting are from the non-whiting groundfish fishery. Total catches of whiting in all sectors of the directed whiting fishery are tracked inseason through full retention (shoreside) or observers (at-sea).

TABLE 4-2. Draft estimated 2003 total catch mortality (mt) of selected groundfish species from West Coast commercial, tribal and recreational fisheries. (Page 1 of 2)

	LANDINGS AND MORTALITY			**TARGETS**					
Species	Estimated total catch	**PRELIM.** Estimated commercial fishery discard mortality [a/]	Actual landings [b/]	Total catch ABC	Total catch OY	Shoreside discard	Shoreside discard mortality	At-sea whiting bycatch	Mortality from fixed gear sablefish (all, north of 36° N. lat.)
Lingcod	1,366.6	81.7	1,284.9	841	651	159.8	79.9	0.5	1.3
Pacific Cod	1,323.1	73.5	1,249.6	3,200	3,200	73.5	73.5		
Pacific whiting [c/]	142,913.8	1,422.7	141,491.1	188,000	148,200	1,422.7	1,422.7		
Sablefish (north)	6,386.6	1,126.1	5,260.5	8,209	6,500	2,067.4	1,033.7		92.4
Sablefish (south)	204.0		204.0	441	294				
Dover sole	8,342.2	956.6	7,385.7	8,510	7,440	956.6	956.6		
English sole	1,241.4	339.0	902.4	3,100		339.0	339.0		
Petrale sole	2,160.6	144.4	2,016.2	2,762		144.4	144.4		
Arrowtooth flounder	3,243.5	904.8	2,338.7	5,800		904.8	904.8		
Other flatfish	2,093.5	490.7	1,602.8	7,700		490.7	490.7		
Pacific ocean perch	160.1	21.9	138.2	689	377	15.5	15.5	6.3	
Shortbelly	9.3	2.3	7.0	13,900	13,900	2.3	2.3		
Widow	57.9	16.1	41.8	3,871	832	1.7	1.7	14.4	
Canary	46.8	12.5	34.3	272	44	10.9	10.9	0.9	0.6
Chilipepper	49.5	15.4	34.1	2,700	2,000	15.4	15.4		
Bocaccio	29.1	8.5	20.6	198	20	8.2	8.2	0.3	
Splitnose	118.8	9.3	109.5	615	461	9.3	9.3		
Yellowtail	504.5	22.1	482.4	3,146	3,146	22.1	22.1		

TABLE 4-2. Draft estimated 2003 total catch mortality (mt) of selected groundfish species from West Coast commercial, tribal and recreational fisheries. (Page 2 of 2)

	LANDINGS AND MORTALITY			**TARGETS**					
Species	Estimated total catch	**PRELIM.** Estimated commercial fishery discard mortality [a/]	Actual landings [b/]	Total catch ABC	Total catch OY	Shoreside discard	Shoreside discard mortality	At-sea whiting bycatch	Mortality from fixed gear sablefish (all, north of 36° N. lat.)
Shortspine thornyheads	1,220.2	387.8	832.4	1,004	955	387.8	387.8		
Longspine Thds. (north)	1,834.8	323.9	1,510.9	2,461	2,461	323.9	323.9		
Longspine Thds. (south)	153.1		153.1	390	195				
Cowcod, Monterey	0.4	0.2	0.1	19	2	0.2	0.2		
Cowcod, Conception	0.0		0.0	5	2				
Yelloweye	8.1	1.5	6.6	52	22	0.3	0.3		1.3
Darkblotched	139.9	51.8	88.1	205	172	47.3	47.3	4.3	0.2
Black rockfish (north)	174.0		174.0	615					
Black rockfish (south)	976.1		976.1	500					
Black rockfish total	1,150.1		1,150.1	1,115					

a/ Preliminary estimated discard mortality in the commercial fishery. Preliminary trawl discard calculated by applying discard ismortality rates from combined 2001-2003 WCGOP data to 2002 trawl logbook data, by area and depth strata. Discard totals estimated for tows recorded in logbooks is expanded using state-specific ratios of fishticket landings to retained logbook catch. Several trawl EFPs were conducted during 2003 and all required full retention of *Sebastes* species. Since all potential discards were landed and captured within the fishticket reporting system, application of non-EFP discard rates to all logbook tows would overstate the true amounts of discard (and total catch) for *Sebastes* species. Because an official listing of tows conducted as part of EFPs was not available at the time these estimates were made, an interim approach for categorizing EFP tows was used. During 2003, only EFP participants had ability to legally bottom trawl for groundfish within the trawl RCA. Utilizing this restriction, rockfish discard rates were not applied to target tonnage caught within the RCA depths off Oregon and Washington. Additionally, the principal EFP in Washington allowed large amounts of arrowtooth flounder to be landed in excess of trip limits. Accordingly, tows by Washington vessels that exceeded the 2-month allowance of arrowtooth flounder for non-EFP vessels also received the same analytical treatment.

b/ Includes shoreside commercial and tribal landings from PacFIN, observed total catch including estimated discards in the at-sea whiting fishery, and RecFIN recreational catch plus observed discard mortality (A+B1).

c/ Estimated commercial discards shown for whiting are from the non-whiting groundfish fishery. Total catches of whiting in all sectors of the directed whiting fishery are tracked inseason through full retention (shoreside) or observers (at-sea).

TABLE 4-3. Commercial landings (mt) of currently unassessed flatfish species, 1981-2003. (Page 1 of 1)

	Better Sampled by Survey				Less Well Sampled by Survey							
			Rex Sole + Sanddab									
Year	Sanddab	Rex Sole	mt	% of all	Curlfin Sole	Starry Flounder	Butter Sole	Rock Sole	Sand Sole	Other/ Unspecified Flatfish	All Non-Assessed Flatfish	Sum of Other Species
1981	569	1,551	2,119	58%	2	575	22	19	598	337	3,673	1,553
1982	723	1,741	2,464	63%	4	431	23	47	694	254	3,917	3,917
1983	503	1,454	1,957	65%	4	292	8	17	462	250	2,990	1,033
1984	530	1,273	1,803	68%	3	346	3	11	327	157	2,650	847
1985	629	1,423	2,052	59%	2	726	5	16	451	199	3,451	1,399
1986	615	1,208	1,823	66%	2	295	18	12	491	116	2,757	934
1987	769	1,190	1,960	68%	4	281	20	8	520	108	2,900	941
1988	651	1,266	1,917	70%	3	373	5	14	308	104	2,724	807
1989	730	1,145	1,875	63%	2	530	3	17	407	130	2,965	1,090
1990	878	878	1,756	70%	0	328	1	12	353	50	2,500	744
1991	882	1,170	2,052	63%	1	698	1	15	409	58	3,235	1,183
1992	605	875	1,480	73%	0	154	0	10	294	76	2,015	535
1993	639	786	1,425	74%	1	135	1	16	303	55	1,937	512
1994	1,205	842	2,047	84%	3	86	1	11	252	36	2,435	389
1995	1,364	929	2,293	90%	1	62	0	8	138	57	2,559	267
1996	894	850	1,744	87%	2	53	1	10	138	52	2,000	256
1997	1,171	812	1,983	86%	3	105	3	34	139	43	2,309	326
1998	777	637	1,414	83%	8	99	5	30	86	58	1,698	284
1999	1,212	590	1,802	89%	3	57	1	11	107	45	2,024	223
2000	878	542	1,420	89%	1	46	1	14	75	44	1,600	181
2001	903	559	1,462	85%	5	49	1	15	124	56	1,711	249
2002	821	595	1,416	83%	4	48	1	24	181	30	1,703	287
2003	724	614	1,338	83%	1	47	0	24	150	43	1,603	265

TABLE 4-4. Comparison of Alaska Fisheries Science Center triennial trawl survey CPUE, commercial landed catch (mt), and a ratio of the two values, for selected flatfish species, 1977-2001. (Page 1 of 1)

	1977	1980	1983	1986	1989	1992	1995	1998	2001
				AFSC Triennial Trawl Survey CPUE					
Assessed species									
Petrale sole	0.410	0.450	0.602	0.616	0.993	0.495	0.602	0.845	0.940
English sole	0.466	0.893	1.849	2.836	3.240	2.889	2.468	3.833	4.084
Arrowtooth	5.598	3.380	3.666	6.330	12.136	2.845	6.462	6.118	7.517
Unassessed species									
Sanddab	0.278	0.593	2.504	3.505	7.768	4.760	9.114	6.095	11.173
Rex sole	2.088	1.329	3.375	3.253	4.228	3.865	5.429	8.285	9.689
Curlfin sole	0.001	0.007	0.008	0.048	0.041	0.038	0.056	0.063	0.075
Starry flounder	0.000	0.018	0.055	0.004	0.029	0.024	0.003	0.025	0.032
Butter sole	0.000	0.005	0.000	0.003	0.003	0.010	0.000	0.002	0.007
Rock sole	0.018	0.032	0.086	0.082	0.172	0.164	0.151	0.000	0.000
				3-year Average Commercial Landings, Around Survey Year					
Assessed species									
Petrale sole			2,184	1,929	2,022	1,661	1,640	1,635	1,830
English sole			2,284	2,146	2,138	1,804	1,138	1,185	963
Arrowtooth			2,267	2,575	3,773	3,744	2,626	3,597	2,607
Unassessed species									
Sanddab			585	671	753	709	1,154	1,053	867
Rex sole			1,489	1,274	1,097	944	873	680	565
				Ratio of Survey CPUE to Average Landings[a/]					
Assessed species									
Petrale sole			0.6	0.6	1.0	0.6	0.7	1.0	1.0
English sole			1.6	2.6	3.0	3.2	4.3	6.5	8.5
Arrowtooth			3.2	4.9	6.4	1.5	4.9	3.4	5.8
Unassessed species									
Sanddab			8.6	10.4	20.6	13.4	15.8	11.6	25.8
Rex sole			4.5	5.1	7.7	8.2	12.4	24.4	34.3

a/ Higher values suggest lower relative exploitation, provided that survey CPUE is proportional to stock biomass.

TABLE 4-5. GMT calculations of recommended ABC and OY specifications for the Other Flatfish complex using historical catch data. (Page 1 of 1)

	Rex Sole	Sanddabs	Rex Sole + Sanddabs	Remaining "Other Flatfish" Species	Total Other Flatfish
Commercial Landed Catch (mt)[a/]	1,741	1,364		304	
(Year)	(1982)	(1995)		(1994-98)	
Discard Rate From:					
Pikitch	40%				
EDCP		57%		60%	
Total Catch (ABC)	2,902	3,172	6,074	707	6,781
Precautionary Reduction			25%	50%	
OY Recommendation (Catch)			4,555	353	4,909
Percent Contribution to Total Catch			93%	7%	
Approximate Expected Discard			28%	28%	28%
Approximate Potential Landed Catch (mt)			3280	255	3,534
1999 - 2003 Average Landed Catch (mt)					
Annual Average			1,487	241	1,728
Largest Single Year			1,802	287	

a/ Landed catches for rex sole and sanddabs reflect the largest annual landings during 1981-2003. For the remaining "Other Flatfish" species, the landed catch reflects the annual average for the identified five-year period.

TABLE 4-6a. Bycatch ratios [species catch (lb)/target species catch (lb)] for overfished groundfish species using selective flatfish trawls.[a/] All data are shown by area, depth strata, and various temporal strata. (Page 1 of 3)

			FLATFISH TRAWL RATES							
			SHOREWARD FATHOMS				SEAWARD FATHOMS			
SPECIES	SUBAREA	PERIOD	50	60	75	100	150	180	200	250
Lingcod	N of 40°10	1	0.00135	0.00255	0.01483	0.02459	0.05826	0.00159	0.00128	0.00000
		2	0.00135	0.00255	0.01483	0.02459	0.01011	0.00017	0.00018	0.00000
		3	0.00506	0.00737	0.01996	0.01918	0.01718	0.00055	0.00035	0.00000
		4	0.00506	0.00737	0.01996	0.01918	0.01718	0.00055	0.00035	0.00000
		5	0.00506	0.00737	0.01996	0.01918	0.01718	0.00017	0.00018	0.00000
		6	0.00135	0.00255	0.01483	0.02459	0.05826	0.00159	0.00128	0.00000
	38°- 40°10'	1	0.02849	0.02300	0.02354	0.02942	0.01243	0.00926	0.00112	0.00017
		2	0.02849	0.02300	0.02354	0.02942	0.00171	0.00116	0.00079	0.00001
		3	0.00487	0.03126	0.03289	0.03790	0.00024	0.00024	0.00022	0.00016
		4	0.00487	0.03126	0.03289	0.03790	0.00024	0.00024	0.00022	0.00016
		5	0.00487	0.03126	0.03289	0.03790	0.00171	0.00116	0.00079	0.00001
		6	0.02849	0.02300	0.02354	0.02942	0.01243	0.00926	0.00112	0.00017
	S of 38°	1	0.02849	0.02300	0.02354	0.02942	0.01243	0.00926	0.00112	0.00017
		2	0.02849	0.02300	0.02354	0.02942	0.00171	0.00116	0.00079	0.00001
		3	0.00487	0.03126	0.03289	0.03790	0.00024	0.00024	0.00022	0.00016
		4	0.00487	0.03126	0.03289	0.03790	0.00024	0.00024	0.00022	0.00016
		5	0.00487	0.03126	0.03289	0.03790	0.00171	0.00116	0.00079	0.00001
		6	0.02849	0.02300	0.02354	0.02942	0.01243	0.00926	0.00112	0.00017
Canary	N of 40°10	1	0.00000	0.00003	0.00068	0.00187	0.00007	0.00007	0.00000	0.00000
		2	0.00000	0.00003	0.00068	0.00187	0.00006	0.00003	0.00000	0.00000
		3	0.00000	0.00003	0.00059	0.00084	0.00012	0.00012	0.00000	0.00000
		4	0.00000	0.00003	0.00059	0.00084	0.00012	0.00012	0.00000	0.00000
		5	0.00000	0.00003	0.00059	0.00084	0.00006	0.00003	0.00000	0.00000
		6	0.00000	0.00003	0.00068	0.00187	0.00007	0.00007	0.00000	0.00000
	38°- 40°10'	1	0.00027	0.00034	0.00014	0.00026	0.00000	0.00000	0.00000	0.00000
		2	0.00027	0.00034	0.00014	0.00026	0.00000	0.00000	0.00000	0.00000
		3	0.00000	0.00024	0.00103	0.00086	0.00000	0.00000	0.00000	0.00000
		4	0.00000	0.00024	0.00103	0.00086	0.00000	0.00000	0.00000	0.00000
		5	0.00000	0.00024	0.00103	0.00086	0.00000	0.00000	0.00000	0.00000
		6	0.00027	0.00034	0.00014	0.00026	0.00000	0.00000	0.00000	0.00000
	S of 38°	1	0.00027	0.00034	0.00014	0.00026	0.00000	0.00000	0.00000	0.00000
		2	0.00027	0.00034	0.00014	0.00026	0.00000	0.00000	0.00000	0.00000
		3	0.00000	0.00024	0.00103	0.00086	0.00000	0.00000	0.00000	0.00000
		4	0.00000	0.00024	0.00103	0.00086	0.00000	0.00000	0.00000	0.00000
		5	0.00000	0.00024	0.00103	0.00086	0.00000	0.00000	0.00000	0.00000
		6	0.00027	0.00034	0.00014	0.00026	0.00000	0.00000	0.00000	0.00000
Widow	N of 40°10	1	0.00000	0.00000	0.00000	0.00000	0.00020	0.00014	0.00005	0.00000
		2	0.00000	0.00000	0.00000	0.00000	0.00026	0.00024	0.00024	0.00000
		3	0.00000	0.00000	0.00000	0.00000	0.00004	0.00003	0.00004	0.00000
		4	0.00000	0.00000	0.00000	0.00000	0.00004	0.00003	0.00004	0.00000
		5	0.00000	0.00000	0.00000	0.00000	0.00026	0.00024	0.00024	0.00000
		6	0.00000	0.00000	0.00000	0.00000	0.00020	0.00014	0.00005	0.00000
	38°- 40°10'	1	0.00000	0.00001	0.00000	0.00002	0.00002	0.00001	0.00000	0.00000
		2	0.00000	0.00001	0.00000	0.00002	0.00005	0.00001	0.00000	0.00000
		3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		5	0.00000	0.00000	0.00000	0.00000	0.00005	0.00001	0.00000	0.00000
		6	0.00000	0.00001	0.00000	0.00002	0.00002	0.00001	0.00000	0.00000
	S of 38°	1	0.00000	0.00001	0.00000	0.00002	0.00002	0.00001	0.00000	0.00000
		2	0.00000	0.00001	0.00000	0.00002	0.00005	0.00001	0.00000	0.00000
		3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		5	0.00000	0.00000	0.00000	0.00000	0.00005	0.00001	0.00000	0.00000
		6	0.00000	0.00001	0.00000	0.00002	0.00002	0.00001	0.00000	0.00000

TABLE 4-6a. Bycatch ratios [species catch (lb)/target species catch (lb)] for overfished groundfish species using selective flatfish trawls.[a/] All data are shown by area, depth strata, and various temporal strata. (Page 2 of 3)

			FLATFISH TRAWL RATES							
			SHOREWARD FATHOMS				SEAWARD FATHOMS			
SPECIES	SUBAREA	PERIOD	50	60	75	100	150	180	200	250
Bocaccio	N of 40°10	1	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		2	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		6	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	38°- 40°10'	1	0.00308	0.00716	0.00541	0.01137	0.00398	0.00201	0.00000	0.00000
		2	0.00308	0.00716	0.00541	0.01137	0.00042	0.00035	0.00000	0.00000
		3	0.00000	0.00060	0.00304	0.01299	0.00000	0.00000	0.00000	0.00000
		4	0.00000	0.00060	0.00304	0.01299	0.00000	0.00000	0.00000	0.00000
		5	0.00000	0.00060	0.00304	0.01299	0.00042	0.00035	0.00000	0.00000
		6	0.00308	0.00716	0.00541	0.01137	0.00398	0.00201	0.00000	0.00000
	S of 38°	1	0.00308	0.00716	0.00541	0.01137	0.00398	0.00201	0.00000	0.00000
		2	0.00308	0.00716	0.00541	0.01137	0.00042	0.00035	0.00000	0.00000
		3	0.00000	0.00060	0.00304	0.01299	0.00000	0.00000	0.00000	0.00000
		4	0.00000	0.00060	0.00304	0.01299	0.00000	0.00000	0.00000	0.00000
		5	0.00000	0.00060	0.00304	0.01299	0.00042	0.00035	0.00000	0.00000
		6	0.00308	0.00716	0.00541	0.01137	0.00398	0.00201	0.00000	0.00000
Cowcod	N of 40°10	1	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		2	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		6	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	38°- 40°10'	1	0.00000	0.00034	0.00034	0.00044	0.00008	0.00002	0.00000	0.00000
		2	0.00000	0.00034	0.00034	0.00044	0.00000	0.00000	0.00000	0.00000
		3	0.00000	0.00002	0.00002	0.00038	0.00000	0.00000	0.00000	0.00000
		4	0.00000	0.00002	0.00002	0.00038	0.00000	0.00000	0.00000	0.00000
		5	0.00000	0.00002	0.00002	0.00038	0.00000	0.00000	0.00000	0.00000
		6	0.00000	0.00034	0.00034	0.00044	0.00008	0.00002	0.00000	0.00000
	S of 38°	1	0.00000	0.00034	0.00034	0.00044	0.00008	0.00002	0.00000	0.00000
		2	0.00000	0.00034	0.00034	0.00044	0.00000	0.00000	0.00000	0.00000
		3	0.00000	0.00002	0.00002	0.00038	0.00000	0.00000	0.00000	0.00000
		4	0.00000	0.00002	0.00002	0.00038	0.00000	0.00000	0.00000	0.00000
		5	0.00000	0.00002	0.00002	0.00038	0.00000	0.00000	0.00000	0.00000
		6	0.00000	0.00034	0.00034	0.00044	0.00008	0.00002	0.00000	0.00000
Yelloweye	N of 40°10	1	0.00000	0.00000	0.00005	0.00015	0.00000	0.00000	0.00000	0.00000
		2	0.00000	0.00000	0.00005	0.00015	0.00000	0.00000	0.00000	0.00000
		3	0.00000	0.00001	0.00005	0.00005	0.00000	0.00000	0.00000	0.00000
		4	0.00000	0.00001	0.00005	0.00005	0.00000	0.00000	0.00000	0.00000
		5	0.00000	0.00001	0.00005	0.00005	0.00000	0.00000	0.00000	0.00000
		6	0.00000	0.00000	0.00005	0.00015	0.00000	0.00000	0.00000	0.00000
	38°- 40°10'	1	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		2	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		3	0.00034	0.00019	0.00019	0.00019	0.00000	0.00000	0.00000	0.00000
		4	0.00034	0.00019	0.00019	0.00019	0.00000	0.00000	0.00000	0.00000
		5	0.00034	0.00019	0.00019	0.00019	0.00000	0.00000	0.00000	0.00000
		6	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	S of 38°	1	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		2	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		3	0.00034	0.00019	0.00019	0.00019	0.00000	0.00000	0.00000	0.00000
		4	0.00034	0.00019	0.00019	0.00019	0.00000	0.00000	0.00000	0.00000
		5	0.00034	0.00019	0.00019	0.00019	0.00000	0.00000	0.00000	0.00000
		6	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

TABLE 4-6a. Bycatch ratios [species catch (lb)/target species catch (lb)] for overfished groundfish species using selective flatfish trawls.[a/] All data are shown by area, depth strata, and various temporal strata. (Page 3 of 3)

			FLATFISH TRAWL RATES							
			SHOREWARD FATHOMS				SEAWARD FATHOMS			
SPECIES	SUBAREA	PERIOD	50	60	75	100	150	180	200	250
Darkblotched	N of 40°10	1	0.00000	0.00001	0.00035	0.00163	0.00808	0.01021	0.00920	0.00000
		2	0.00000	0.00001	0.00035	0.00163	0.00291	0.00175	0.00149	0.00000
		3	0.00004	0.00001	0.00063	0.00155	0.00623	0.00606	0.00604	0.00000
		4	0.00004	0.00001	0.00063	0.00155	0.00623	0.00606	0.00604	0.00000
		5	0.00004	0.00001	0.00063	0.00155	0.00291	0.00175	0.00149	0.00000
		6	0.00000	0.00001	0.00035	0.00163	0.00808	0.01021	0.00920	0.00000
	38°- 40°10'	1	0.00000	0.00002	0.00002	0.00005	0.00808	0.01021	0.00920	0.00000
		2	0.00000	0.00002	0.00002	0.00005	0.00291	0.00175	0.00149	0.00000
		3	0.00000	0.00000	0.00000	0.00026	0.00623	0.00606	0.00604	0.00000
		4	0.00000	0.00000	0.00000	0.00026	0.00623	0.00606	0.00604	0.00000
		5	0.00000	0.00000	0.00000	0.00026	0.00291	0.00175	0.00149	0.00000
		6	0.00000	0.00002	0.00002	0.00005	0.00808	0.01021	0.00920	0.00000
	S of 38°	1	0.00000	0.00002	0.00002	0.00005	0.00029	0.00026	0.00002	0.00000
		2	0.00000	0.00002	0.00002	0.00005	0.00006	0.00006	0.00005	0.00000
		3	0.00000	0.00000	0.00000	0.00026	0.00016	0.00016	0.00017	0.00000
		4	0.00000	0.00000	0.00000	0.00026	0.00016	0.00016	0.00017	0.00000
		5	0.00000	0.00000	0.00000	0.00026	0.00006	0.00006	0.00005	0.00000
		6	0.00000	0.00002	0.00002	0.00005	0.00029	0.00026	0.00002	0.00000
POP	N of 40°10	1	0.00000	0.00000	0.00000	0.00000	0.01341	0.01182	0.01078	0.00000
		2	0.00000	0.00000	0.00000	0.00000	0.00275	0.00182	0.00163	0.00000
		3	0.00000	0.00000	0.00000	0.00000	0.01084	0.00906	0.00768	0.00000
		4	0.00000	0.00000	0.00000	0.00000	0.01084	0.00906	0.00768	0.00000
		5	0.00000	0.00000	0.00000	0.00000	0.00275	0.00182	0.00163	0.00000
		6	0.00000	0.00000	0.00000	0.00000	0.01341	0.01182	0.01078	0.00000
	38°- 40°10'	1	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		2	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		6	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	S of 38°	1	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		2	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		6	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

a/ Selective flatfish trawl bycatch ratios were determined in the ODFW EFP program (see section 4.3.2.1 for a detailed

TABLE 4-6b. Bycatch ratios [species catch (lb)/target species catch (lb)] for overfished groundfish species using conventional trawls calculated using weighted sums[a/] of catch and discard poundage from the first and second years of NMFS-observed bottom trawling. All data are shown by area, depth strata, and various temporal strata. (Page 1 of 3)

			FLATFISH TRAWL RATES							
			SHOREWARD FATHOMS				SEAWARD FATHOMS			
SPECIES	SUBAREA	PERIOD	50	60	75	100	150	180	200	250
Lingcod	N of 40°10	1	0.00558	0.01613	0.03318	0.05179	0.00162	0.00159	0.00128	0.00000
		2	0.00558	0.01613	0.03318	0.05179	0.00028	0.00017	0.00018	0.00000
		3	0.02091	0.04673	0.04467	0.04039	0.00058	0.00055	0.00035	0.00000
		4	0.02091	0.04673	0.04467	0.04039	0.00058	0.00055	0.00035	0.00000
		5	0.02091	0.04673	0.04467	0.04039	0.00028	0.00017	0.00018	0.00000
		6	0.00558	0.01613	0.03318	0.05179	0.00162	0.00159	0.00128	0.00000
	38°- 40°10'	1	0.02849	0.02300	0.02354	0.02942	0.01243	0.00926	0.00112	0.00017
		2	0.02849	0.02300	0.02354	0.02942	0.00171	0.00116	0.00079	0.00001
		3	0.00487	0.03126	0.03289	0.03790	0.00024	0.00023	0.00022	0.00016
		4	0.00487	0.03126	0.03289	0.03790	0.00024	0.00023	0.00022	0.00016
		5	0.00487	0.03126	0.03289	0.03790	0.00171	0.00116	0.00079	0.00001
		6	0.02849	0.02300	0.02354	0.02942	0.01243	0.00926	0.00112	0.00017
	S of 38°	1	0.02849	0.02300	0.02354	0.02942	0.01243	0.00926	0.00112	0.00017
		2	0.02849	0.02300	0.02354	0.02942	0.00171	0.00116	0.00079	0.00001
		3	0.00487	0.03126	0.03289	0.03790	0.00024	0.00023	0.00022	0.00016
		4	0.00487	0.03126	0.03289	0.03790	0.00024	0.00023	0.00022	0.00016
		5	0.00487	0.03126	0.03289	0.03790	0.00171	0.00116	0.00079	0.00001
		6	0.02849	0.02300	0.02354	0.02942	0.01243	0.00926	0.00112	0.00017
Canary	N of 40°10	1	0.00073	0.00138	0.00503	0.00980	0.00007	0.00007	0.00000	0.00000
		2	0.00073	0.00138	0.00503	0.00980	0.00006	0.00003	0.00000	0.00000
		3	0.00060	0.00130	0.00439	0.00441	0.00012	0.00012	0.00000	0.00000
		4	0.00060	0.00130	0.00439	0.00441	0.00012	0.00012	0.00000	0.00000
		5	0.00060	0.00130	0.00439	0.00441	0.00006	0.00003	0.00000	0.00000
		6	0.00073	0.00138	0.00503	0.00980	0.00007	0.00007	0.00000	0.00000
	38°- 40°10'	1	0.00027	0.00034	0.00014	0.00026	0.00000	0.00000	0.00000	0.00000
		2	0.00027	0.00034	0.00014	0.00026	0.00000	0.00000	0.00000	0.00000
		3	0.00000	0.00024	0.00103	0.00087	0.00000	0.00000	0.00000	0.00000
		4	0.00000	0.00024	0.00103	0.00087	0.00000	0.00000	0.00000	0.00000
		5	0.00000	0.00024	0.00103	0.00087	0.00000	0.00000	0.00000	0.00000
		6	0.00027	0.00034	0.00014	0.00026	0.00000	0.00000	0.00000	0.00000
	S of 38°	1	0.00027	0.00034	0.00014	0.00026	0.00000	0.00000	0.00000	0.00000
		2	0.00027	0.00034	0.00014	0.00026	0.00000	0.00000	0.00000	0.00000
		3	0.00000	0.00024	0.00103	0.00087	0.00000	0.00000	0.00000	0.00000
		4	0.00000	0.00024	0.00103	0.00087	0.00000	0.00000	0.00000	0.00000
		5	0.00000	0.00024	0.00103	0.00087	0.00000	0.00000	0.00000	0.00000
		6	0.00027	0.00034	0.00014	0.00026	0.00000	0.00000	0.00000	0.00000
Widow	N of 40°10	1	0.00005	0.00008	0.00016	0.00038	0.00020	0.00014	0.00005	0.00000
		2	0.00005	0.00008	0.00016	0.00038	0.00026	0.00024	0.00024	0.00000
		3	0.00000	0.00032	0.00029	0.00030	0.00004	0.00003	0.00004	0.00000
		4	0.00000	0.00032	0.00029	0.00030	0.00004	0.00003	0.00004	0.00000
		5	0.00000	0.00032	0.00029	0.00030	0.00026	0.00024	0.00024	0.00000
		6	0.00005	0.00008	0.00016	0.00038	0.00020	0.00014	0.00005	0.00000
	38°- 40°10'	1	0.00000	0.00001	0.00000	0.00002	0.00002	0.00001	0.00000	0.00000
		2	0.00000	0.00001	0.00000	0.00002	0.00005	0.00001	0.00000	0.00000
		3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		5	0.00000	0.00000	0.00000	0.00000	0.00005	0.00001	0.00000	0.00000
		6	0.00000	0.00001	0.00000	0.00002	0.00002	0.00001	0.00000	0.00000
	S of 38°	1	0.00000	0.00001	0.00000	0.00002	0.00002	0.00001	0.00000	0.00000
		2	0.00000	0.00001	0.00000	0.00002	0.00005	0.00001	0.00000	0.00000
		3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		5	0.00000	0.00000	0.00000	0.00000	0.00005	0.00001	0.00000	0.00000

TABLE 4-6b. Bycatch ratios [species catch (lb)/target species catch (lb)] for overfished groundfish species using conventional trawls calculated using weighted sums[a/] of catch and discard poundage from the first and second years of NMFS-observed bottom trawling. All data are shown by area, depth strata, and various temporal strata. (Page 2 of 3)

			FLATFISH TRAWL RATES							
			SHOREWARD FATHOMS				SEAWARD FATHOMS			
SPECIES	SUBAREA	PERIOD	50	60	75	100	150	180	200	250
		6	0.00000	0.00001	0.00000	0.00002	0.00002	0.00001	0.00000	0.00000
Bocaccio	N of 40°10	1	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		2	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		6	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	38°- 40°10'	1	0.00308	0.00715	0.00541	0.01137	0.00398	0.00201	0.00000	0.00000
		2	0.00308	0.00715	0.00541	0.01137	0.00042	0.00035	0.00000	0.00000
		3	0.00000	0.00060	0.00304	0.01299	0.00000	0.00000	0.00000	0.00000
		4	0.00000	0.00060	0.00304	0.01299	0.00000	0.00000	0.00000	0.00000
		5	0.00000	0.00060	0.00304	0.01299	0.00042	0.00035	0.00000	0.00000
		6	0.00308	0.00715	0.00541	0.01137	0.00398	0.00201	0.00000	0.00000
	S of 38°	1	0.00308	0.00715	0.00541	0.01137	0.00398	0.00201	0.00000	0.00000
		2	0.00308	0.00715	0.00541	0.01137	0.00042	0.00035	0.00000	0.00000
		3	0.00000	0.00060	0.00304	0.01299	0.00000	0.00000	0.00000	0.00000
		4	0.00000	0.00060	0.00304	0.01299	0.00000	0.00000	0.00000	0.00000
		5	0.00000	0.00060	0.00304	0.01299	0.00042	0.00035	0.00000	0.00000
		6	0.00308	0.00715	0.00541	0.01137	0.00398	0.00201	0.00000	0.00000
Cowcod	N of 40°10	1	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		2	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		6	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	38°- 40°10'	1	0.00000	0.00034	0.00034	0.00044	0.00008	0.00002	0.00000	0.00000
		2	0.00000	0.00034	0.00034	0.00044	0.00000	0.00000	0.00000	0.00000
		3	0.00000	0.00002	0.00002	0.00038	0.00000	0.00000	0.00000	0.00000
		4	0.00000	0.00002	0.00002	0.00038	0.00000	0.00000	0.00000	0.00000
		5	0.00000	0.00002	0.00002	0.00038	0.00000	0.00000	0.00000	0.00000
		6	0.00000	0.00034	0.00034	0.00044	0.00008	0.00002	0.00000	0.00000
	S of 38°	1	0.00000	0.00034	0.00034	0.00044	0.00008	0.00002	0.00000	0.00000
		2	0.00000	0.00034	0.00034	0.00044	0.00000	0.00000	0.00000	0.00000
		3	0.00000	0.00002	0.00002	0.00038	0.00000	0.00000	0.00000	0.00000
		4	0.00000	0.00002	0.00002	0.00038	0.00000	0.00000	0.00000	0.00000
		5	0.00000	0.00002	0.00002	0.00038	0.00000	0.00000	0.00000	0.00000
		6	0.00000	0.00034	0.00034	0.00044	0.00008	0.00002	0.00000	0.00000
Yelloweye	N of 40°10	1	0.00000	0.00000	0.00005	0.00015	0.00000	0.00000	0.00000	0.00000
		2	0.00000	0.00000	0.00005	0.00015	0.00000	0.00000	0.00000	0.00000
		3	0.00005	0.00004	0.00005	0.00005	0.00000	0.00000	0.00000	0.00000
		4	0.00005	0.00004	0.00005	0.00005	0.00000	0.00000	0.00000	0.00000
		5	0.00005	0.00004	0.00005	0.00005	0.00000	0.00000	0.00000	0.00000
		6	0.00000	0.00000	0.00005	0.00015	0.00000	0.00000	0.00000	0.00000
	38°- 40°10'	1	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		2	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		3	0.00034	0.00019	0.00019	0.00019	0.00000	0.00000	0.00000	0.00000
		4	0.00034	0.00019	0.00019	0.00019	0.00000	0.00000	0.00000	0.00000
		5	0.00034	0.00019	0.00019	0.00019	0.00000	0.00000	0.00000	0.00000
		6	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	S of 38°	1	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		2	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		3	0.00034	0.00019	0.00019	0.00019	0.00000	0.00000	0.00000	0.00000
		4	0.00034	0.00019	0.00019	0.00019	0.00000	0.00000	0.00000	0.00000

TABLE 4-6b. Bycatch ratios [species catch (lb)/target species catch (lb)] for overfished groundfish species using conventional trawls calculated using weighted sums[a/] of catch and discard poundage from the first and second years of NMFS-observed bottom trawling. All data are shown by area, depth strata, and various temporal strata. (Page 3 of 3)

			FLATFISH TRAWL RATES							
			SHOREWARD FATHOMS				SEAWARD FATHOMS			
SPECIES	SUBAREA	PERIOD	50	60	75	100	150	180	200	250
		5	0.00034	0.00019	0.00019	0.00019	0.00000	0.00000	0.00000	0.00000
		6	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Darkblotched	N of 40°10	1	0.00000	0.00018	0.00096	0.00275	0.00808	0.01021	0.00920	0.00000
		2	0.00000	0.00018	0.00096	0.00275	0.00291	0.00175	0.00149	0.00000
		3	0.00000	0.00022	0.00175	0.00260	0.00623	0.00606	0.00604	0.00000
		4	0.00000	0.00022	0.00175	0.00260	0.00623	0.00606	0.00604	0.00000
		5	0.00000	0.00022	0.00175	0.00260	0.00291	0.00175	0.00149	0.00000
		6	0.00000	0.00018	0.00096	0.00275	0.00808	0.01021	0.00920	0.00000
	38°- 40°10'	1	0.00000	0.00002	0.00002	0.00005	0.00808	0.01021	0.00920	0.00000
		2	0.00000	0.00002	0.00002	0.00005	0.00291	0.00175	0.00149	0.00000
		3	0.00000	0.00000	0.00000	0.00026	0.00623	0.00606	0.00604	0.00000
		4	0.00000	0.00000	0.00000	0.00026	0.00623	0.00606	0.00604	0.00000
		5	0.00000	0.00000	0.00000	0.00026	0.00291	0.00175	0.00149	0.00000
		6	0.00000	0.00002	0.00002	0.00005	0.00808	0.01021	0.00920	0.00000
	S of 38°	1	0.00000	0.00002	0.00002	0.00005	0.00029	0.00026	0.00002	0.00000
		2	0.00000	0.00002	0.00002	0.00005	0.00006	0.00006	0.00005	0.00000
		3	0.00000	0.00000	0.00000	0.00026	0.00016	0.00016	0.00017	0.00000
		4	0.00000	0.00000	0.00000	0.00026	0.00016	0.00016	0.00017	0.00000
		5	0.00000	0.00000	0.00000	0.00026	0.00006	0.00006	0.00005	0.00000
		6	0.00000	0.00002	0.00002	0.00005	0.00029	0.00026	0.00002	0.00000
POP	N of 40°10	1	0.00000	0.00000	0.00004	0.00025	0.01341	0.01182	0.01078	0.00000
		2	0.00000	0.00000	0.00004	0.00025	0.00275	0.00182	0.00163	0.00000
		3	0.00002	0.00004	0.00019	0.00083	0.01084	0.00906	0.00768	0.00000
		4	0.00002	0.00004	0.00019	0.00083	0.01084	0.00906	0.00768	0.00000
		5	0.00002	0.00004	0.00019	0.00083	0.00275	0.00182	0.00163	0.00000
		6	0.00000	0.00000	0.00004	0.00025	0.01341	0.01182	0.01078	0.00000
	38°- 40°10'	1	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		2	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		6	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	S of 38°	1	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		2	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		6	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

a/ Catch and discard poundage from the first year was weighted by 0.33 and poundage from the second year was weighted by 0.67.

TABLE 4-7. Bycatch (mortality) ratios [species mortality (lb) / species catch (lb)] for target species, calculated using weighted sums[a/] of catch and discard poundage from the first and second years of NMFS-observed bottom trawling, by area, depth strata, and various temporal strata. (Page 1 of 1)

Area	Depth	Bi-monthly Periods	Sablefish	Longspine	Shortspine	Dover Sole	Petrale Sole	Arrowtooth	Other Flatfish	Lingcod	Slope Rockfish
North of 40º10'											
	<=50 fm	1,2,6	25.0%	0.0%	0.0%	87.4%	10.8%	36.2%	21.0%	99.4%	0.0%
		3,4,5	29.9%	0.0%	0.0%	22.3%	9.8%	86.6%	19.5%	73.0%	0.1%
	<=60 fm	1,2,6	53.9%	0.0%	0.0%	33.5%	5.4%	63.9%	21.2%	75.4%	13.0%
		3,4,5	50.0%	0.0%	0.0%	11.9%	15.0%	75.0%	21.4%	81.5%	73.7%
	<=75 fm	1,2,6	71.3%	0.0%	0.0%	39.5%	14.5%	58.8%	24.0%	64.8%	68.4%
		3,4,5	58.3%	0.0%	0.0%	12.1%	15.1%	69.6%	22.5%	77.5%	65.4%
	<=100	1,2,6	52.1%	100.0%	0.0%	34.3%	12.2%	59.3%	28.3%	75.6%	79.4%
		3,4,5	51.3%	0.0%	0.0%	14.3%	15.5%	67.0%	24.3%	76.9%	65.5%
	>150 fm	1,6	43.5%	20.0%	38.0%	8.7%	0.4%	49.0%	26.5%	59.0%	65.4%
		2,5	18.3%	17.7%	47.9%	11.6%	4.8%	41.6%	28.3%	65.4%	43.4%
		3,4	23.1%	18.5%	35.0%	11.0%	0.8%	19.5%	40.6%	83.7%	48.5%
	>180 fm	1,6	41.8%	19.8%	37.4%	8.0%	0.4%	48.4%	26.1%	57.2%	61.3%
		2,5	22.2%	18.5%	34.6%	10.9%	1.0%	18.6%	42.8%	90.6%	41.7%
		3,4	18.2%	17.5%	47.9%	11.5%	4.2%	41.8%	28.8%	55.8%	38.7%
	>200 fm	1,6	38.3%	19.5%	36.1%	7.0%	0.7%	43.2%	29.6%	49.7%	61.4%
		2,5	21.8%	18.5%	34.5%	10.4%	1.2%	17.6%	43.9%	91.0%	40.4%
		3,4	17.3%	17.0%	45.8%	11.9%	7.0%	43.9%	30.5%	46.3%	31.6%
	>250 fm	1,6	32.4%	19.4%	34.8%	7.1%	3.3%	28.9%	29.8%	23.0%	18.0%
		2,5	19.4%	18.2%	34.2%	11.9%	7.3%	15.9%	50.1%	100.0%	8.4%
		3,4	14.9%	16.1%	43.0%	15.2%	1.6%	55.0%	42.7%	0.0%	14.5%
South of 40º10'											
	<=50 fm	1,2,6	13.5%	0.0%	0.0%	85.0%	26.0%	0.0%	34.5%	62.4%	0.0%
		3,4,5	90.9%	0.0%	0.0%	29.8%	6.1%	0.0%	12.0%	86.9%	0.0%
	<=60 fm	1,2,6	85.4%	0.0%	0.0%	99.2%	2.1%	0.0%	24.0%	54.0%	6.1%
		3,4,5	90.7%	0.0%	0.0%	90.7%	4.1%	3.2%	23.4%	63.9%	0.0%
	<=75 fm	1,2,6	81.4%	0.0%	0.0%	99.5%	4.8%	0.0%	23.5%	53.6%	7.6%
		3,4,5	64.4%	0.0%	0.0%	90.7%	4.0%	36.2%	20.9%	60.2%	0.0%
	<=100	1,2,6	89.6%	0.0%	0.0%	85.4%	3.3%	33.0%	24.5%	57.9%	8.2%
		3,4,5	80.1%	0.0%	0.0%	67.8%	5.2%	36.2%	23.2%	70.7%	18.4%
	>150 fm	1,6	35.7%	19.2%	35.8%	22.5%	0.5%	96.3%	28.3%	98.6%	25.1%
		2,5	29.3%	13.5%	31.0%	11.6%	10.4%	100.0%	35.7%	95.9%	16.7%
		3,4	15.9%	8.9%	23.5%	11.4%	2.6%	77.6%	32.6%	38.2%	4.5%
	>180 fm	1,6	33.9%	19.2%	35.5%	22.3%	0.3%	91.7%	28.2%	96.3%	17.1%
		2,5	27.8%	13.4%	30.9%	11.0%	10.3%	100.0%	42.5%	99.3%	17.7%
		3,4	15.9%	8.9%	23.6%	11.3%	3.0%	77.2%	33.5%	38.4%	4.2%
	>200 fm	1,6	32.2%	19.1%	35.2%	21.7%	0.3%	58.6%	27.0%	79.6%	12.4%
		2,5	28.0%	13.4%	31.0%	11.1%	0.8%	100.0%	43.6%	32.5%	19.3%
		3,4	15.9%	8.9%	23.5%	11.3%	3.2%	77.0%	33.9%	38.4%	4.1%
	>250 fm	1,6	31.2%	19.1%	34.7%	22.3%	0.7%	58.8%	29.4%	3.2%	10.0%
		2,5	26.5%	13.3%	30.6%	12.7%	0.0%	100.0%	54.9%	0.0%	14.4%
		3,4	13.2%	8.9%	23.3%	12.6%	3.0%	87.4%	46.0%	39.8%	9.8%

a/ Catch and discard poundage from the first year was weighted by 0.33 and poundage from the second year was weighted by 0.67.

TABLE 4-8. Mortality and bi-monthly limits (mt) for groundfish species comparing results using two different analytical approaches for modeling selective flatfish trawl impacts under the Council-Preferred Alternative. (Page 1 of 1)

		Mortality (mt)		
		No Select Gear Impacts	Adopted Select Gear Rate Impacts (Option 4)	Initial Select Gear Rate Impacts (Option 1)
Rebuilding Species	Lingcod	144.7	124.2	134.5
	Canary	22.3	5.2	13.1
	POP	92.9	88.2	62.7
	Darkblotched	81.5	76.0	71.9
	Widow	3.2	1.9	1.7
	Bocaccio	51.2	51.2	51.2
	Yelloweye	0.4	0.4	0.6
	Cowcod	0.5	0.5	0.5
Target Species	Sablefish	3,382	3,382	3,382
	Longspine	854	854	854
	Shortspine	894	894	894
	Dover	7,361	7,361	7,361
	Arrowtooth	2,714	2,714	2,714
	Petrale	2,661	2,661	2,661
	Other Flat	6,023	6,023	6,023
	Slope Rock	781	603	603

		RCA Boundaries		Bimonthly Cumulative Limits							
Subarea	Period	Inline	Outline	Sablefish	Longspine	Shortspine	Dover	Other Flatfish	Petrale Sublimit	Arrowtth	Slope Rock
N. 40°10	1	75	150	9,500	15,000	3,500	69,000	110,000	No Limit	No Limit	8,000
	2	100	150	9,500	15,000	3,500	69,000	110,000	42,000	150,000	8,000
	3	100	150	17,000	23,000	4,900	30,000	110,000	42,000	150,000	8,000
	4	100	150	17,000	23,000	4,900	30,000	110,000	42,000	150,000	8,000
	5	100	150	17,000	23,000	4,900	30,000	110,000	42,000	150,000	8,000
	6	75	150	8,000	15,000	3,500	69,000	110,000	No Limit	No Limit	8,000
North Selective Flatfish Trawl Limit	1	75	150	1,500	1,000	1,000	20,000	100,000	25,000	70,000	8,000
	2	100	150	10,000	1,000	1,000	35,000	100,000	35,000	70,000	8,000
	3	100	150	10,000	1,000	3,000	50,000	100,000	35,000	70,000	8,000
	4	100	150	10,000	1,000	3,000	50,000	100,000	35,000	70,000	8,000
	5	100	150	10,000	1,000	3,000	50,000	100,000	35,000	70,000	8,000
	6	75	150	1,500	1,000	1,000	20,000	100,000	25,000	70,000	8,000
40°10 to 38°	1	75	150	14,000	19,000	4,200	50,000	110,000	No Limit	No Limit	40,000
	2	100	150	14,000	19,000	4,200	50,000	110,000	42,000	10,000	40,000
	3	100	150	14,000	19,000	4,200	50,000	110,000	42,000	10,000	40,000
	4	100	150	14,000	19,000	4,200	50,000	110,000	42,000	10,000	40,000
	5	100	150	14,000	19,000	4,200	50,000	110,000	42,000	10,000	40,000
	6	75	150	14,000	19,000	4,200	50,000	110,000	No Limit	No Limit	40,000
S. 38°	1	75	150	14,000	19,000	4,200	50,000	110,000	No Limit	No Limit	40,000
	2	100	150	14,000	19,000	4,200	50,000	110,000	42,000	10,000	40,000
	3	100	150	14,000	19,000	4,200	50,000	110,000	42,000	10,000	40,000
	4	100	150	14,000	19,000	4,200	50,000	110,000	42,000	10,000	40,000
	5	100	150	14,000	19,000	4,200	50,000	110,000	42,000	10,000	40,000
	6	75	150	14,000	19,000	4,200	50,000	110,000	No Limit	No Limit	40,000

TABLE 4-9. Mortality and bi-monthly limits with select flatfish trawl under High OY. (Page 1 of 1)

		Mortality (mt)		
		North	South	Total
Rebuilding Species	Lingcod	88.9	24.8	113.7
	Canary	9.4	0.6	10.0
	POP	58.7	0.0	58.7
	Darkblotched	53.6	12.0	65.6
	Widow	1.3	0.1	1.4
	Bocaccio	0.0	35.9	35.9
	Yelloweye	0.4	0.1	0.5
	Cowcod	0.0	0.2	0.2
Target Species	Sablefish	2,699	602	3,301
	Longspine	584	285	869
	Shortspine	605	275	880
	Dover	4,721	2,002	6,723
	Arrowtooth	1,507	211	1,717
	Petrale	2,186	234	2,420
	Other Flat	4,431	1,309	5,740
	Slope Rock	203	388	592

		RCA Boundaries		Bimonthly Cumulative Limits							
Subarea	Period	Inline	Outline	Sablefish	Longspine	Shortspine	Dover	Other Flat	Petrale Sublimit	Arrowtooth	Slope Rock
N. 40°10	1	75	150	9,500	15,000	3,500	62,000	120,000	No Limit	No Limit	8,000
	2	75	150	9,500	15,000	3,500	62,000	120,000	60,000	150,000	8,000
	3	75	150	19,000	23,000	4,900	32,000	120,000	60,000	150,000	8,000
	4	75	150	19,000	23,000	4,900	32,000	120,000	60,000	150,000	8,000
	5	75	150	19,000	23,000	4,900	32,000	120,000	60,000	150,000	8,000
	6	75	150	9,500	15,000	3,500	62,000	120,000	No Limit	No Limit	8,000
North Selective Flatfish Trawl Limits	1	75	150	3,000	1,000	1,000	10,000	90,000	15,000	6,000	
	2	75	150	4,500	1,000	1,000	10,000	80,000	25,000	8,000	
	3	75	150	8,000	1,000	3,000	25,000	100,000	25,000	11,000	
	4	75	150	8,000	1,000	3,000	25,000	100,000	25,000	11,000	
	5	75	150	8,000	1,000	3,000	25,000	100,000	17,000	11,000	
	6	75	150	3,000	1,000	1,000	10,000	90,000	15,000	8,000	
S. of 40°10	1	75	150	14,200	19,000	4,200	47,000	120,000	No Limit	No Limit	40,000
	2	75	150	14,200	19,000	4,200	47,000	120,000	60,000	10,000	40,000
	3	75	150	14,200	19,000	4,200	47,000	120,000	60,000	10,000	40,000
	4	75	150	14,200	19,000	4,200	47,000	120,000	60,000	10,000	40,000
	5	75	150	14,200	19,000	4,200	47,000	120,000	60,000	10,000	40,000
	6	75	150	14,200	19,000	4,200	47,000	120,000	No Limit	No Limit	40,000

TABLE 4-10. Mortality and bi-monthly limits with select flatfish trawl under Low OY. (Page 1 of 1)

		Mortality (mt)		
		North	South	Total
Rebuilding Species	Lingcod	80.3	18.4	98.7
	Canary	9.2	0.4	9.6
	POP	53.6	0.0	53.6
	Darkblotched	48.7	11.1	59.8
	Widow	1.2	0.1	1.3
	Bocaccio	0.0	32.8	32.8
	Yelloweye	0.4	0.1	0.4
	Cowcod	0.0	0.2	0.2
Target Species	Sablefish	2,148	467	2,614
	Longspine	585	285	869
	Shortspine	606	275	881
	Dover	4,654	1,959	6,614
	Arrowtooth	1,522	211	1,732
	Petrale	2,202	234	2,436
	Other Flat	2,613	778	3,391
	Slope Rock	203	388	592

		RCA Boundaries		Bimonthly Cumulative Limits							
Subarea	Period	Inline	Outline	Sablefish	Longspine	Shortspine	Dover	Other Flatfish	Petrale Sublimit	Arrowtth	Slope Rock
N. 40°10	1	100	150	6,200	15,000	3,500	60,000	71,000	No Limit	No Limit	8,000
	2	75	150	6,500	15,000	3,500	60,000	71,000	60,000	150,000	8,000
	3	75	150	16,000	23,000	4,900	32,000	71,000	60,000	150,000	8,000
	4	75	150	16,000	23,000	4,900	32,000	71,000	60,000	150,000	8,000
	5	75	150	16,000	23,000	4,900	32,000	71,000	60,000	150,000	8,000
	6	100	150	6,200	15,000	3,500	60,000	71,000	No Limit	No Limit	8,000
North Selective Flatfish Trawl Limit	1	100	150	2,000	1,000	1,000	10,000	40,000	20,000	6,000	
	2	75	150	5,500	1,000	1,000	10,000	50,000	25,000	8,000	
	3	75	150	6,500	1,000	3,000	25,000	60,000	25,000	11,000	
	4	75	150	6,500	1,000	3,000	25,000	60,000	25,000	11,000	
	5	75	150	6,500	1,000	3,000	25,000	60,000	20,000	11,000	
	6	100	150	3,000	1,000	1,000	10,000	40,000	15,000	8,000	
S. of 40°10	1	75	150	11,000	19,000	4,200	46,000	71,000	No Limit	No Limit	40,000
	2	75	150	11,000	19,000	4,200	46,000	71,000	60,000	10,000	40,000
	3	75	150	11,000	19,000	4,200	46,000	71,000	60,000	10,000	40,000
	4	75	150	11,000	19,000	4,200	46,000	71,000	60,000	10,000	40,000
	5	75	150	11,000	19,000	4,200	46,000	71,000	60,000	10,000	40,000
	6	75	150	11,000	19,000	4,200	46,000	71,000	No Limit	No Limit	40,000

TABLE 4-11. Catch (lb) of overfished groundfish species and Pacific whiting observed in 1999-2003 whiting fisheries by year, sector, and species. (Page 1 of 1)

Year	Sector	Canary	Darkblotched	Lingcod	POP	Widow	Yelloweye	Pacific Hake
1999	Catcher Proc.	2,268	15,301	46	21,413	223,225	58	149,206,239
	Tribal	9,898	1	422	2,841	100,386		75,422,139
	Mothership	488	10,660	86	9,825	113,804		112,728,410
	Shoreside	1,345	926	1,345	16,469	423,287	44	183,583,117
2000	Catcher Proc.	1,899	8,390	347	14,490	154,248	9,062	149,505,480
	Tribal	2,060		136	74	21,628		13,781,245
	Mothership	1,236	11,350	553	6,690	332,125		103,265,104
	Shoreside	1,146	2,668	1,830	485	167,551	0	188,830,112
2001	Catcher Proc.	1,441	25,350	386	43,413	308,016		129,251,616
	Tribal	5,390		775	1,601	7,231		13,404,002
	Mothership	2,102	1,248	1,064	116	64,360		78,976,106
	Shoreside	992	1,786	1,676	88	92,594	0	161,655,966
2002	Catcher Proc.	3,515	4,832	346	3,191	253,747		80,119,007
	Tribal	6,232	162	513	470	42,029		48,045,527
	Mothership	1,790	2,061	239	4,789	45,190		58,628,095
	Shoreside	467	2	476	487	11,726	0	99,816,375
2003	Catcher Proc.	384	9,271	882	11,122	25,482	11	90,862,066
	Tribal	1,510	49	118	2,602	4,844		51,706,192
	Mothership	185	225	205	250	1,523		57,367,288
	Shoreside	268	571	892	878	19,856	7	121,349,889

TABLE 4-12. Estimated mortality (mt) of overfished species in the directed whiting fishery by sector and 2005 whiting OY alternative. (Page 1 of 1)

		Predicted Mortality Using Weighted Average Rates[a/]						
OY Alternative	Sector	Bocaccio	Canary	Darkblotched	Lingcod	POP	Widow	Yelloweye
	Shoreside	0.0	0.3	0.4	0.5	0.3	19.7	0.0
	Tribal	0.0	4.1	0.0	0.5	1.6	15.8	0.0
LOW OY	Mothership	0.0	0.6	2.7	0.2	3.6	46.2	0.1
	Catcher Processor	0.0	0.9	3.8	0.3	5.1	65.5	0.2
	Total	0.0	5.9	6.9	1.5	10.5	147.3	0.3
	Shoreside	0.0	0.6	0.8	1.0	0.6	42.2	0.0
	Tribal	0.0	5.2	0.1	0.6	2.1	20.1	0.0
MED OY	Mothership	0.0	1.4	5.8	0.5	7.7	99.2	0.3
	Catcher Processor	0.0	2.0	8.2	0.7	10.9	140.5	0.4
	Total	0.0	9.1	14.8	2.8	21.2	302.1	0.7
	Shoreside	0.0	1.2	1.6	2.2	1.2	89.3	0.0
	Tribal	0.0	5.2	0.1	0.6	2.1	20.1	0.0
HIGH OY	Mothership	0.0	2.9	12.2	1.0	16.2	209.6	0.6
	Catcher Processor	0.0	4.1	17.3	1.4	23.0	297.0	0.8
	Total	0.0	13.5	31.2	5.2	42.5	616.0	1.5

a/ The weighting scheme uses an incidental catch rate estimate based on: (.4*2003)+(.3*2002)+(.2*2001)+(.1*2000).

TABLE 4-13. 2001 annual landings (lb) in the ridgeback prawn trawl fishery. (Page 1 of 1)

Species	Trawling Depth Range (fm) 0 - 25	26 - 50	51 - 75	76 - 100	101 - 125	126 - 150	Total (lbs)	Bycatch Rate
Ridgeback prawn	60	64,777	90,232	93,866	3,372	0	252,306	
Total non-target species	179	28,415	9,728	5,403	1,034	0	44,759	0.1774
Spot prawn	104	21	42	837	492		1,495	0.0334
Butterfish		2,644	982	239	0		3,865	0.0153
Sardine		3	3	81	0		87	0.0003
Shark spp.		14	23	6	0		43	0.0002
Brown smoothhound		11	10	0	0		21	0.0001
Thresher shark		16	0	0	0		16	0.0001
Pacific angel shark		171	0	12	0		183	0.0007
Ray spp.		0	0	10	0		10	0.0000
Shovelnose guitarfish		955	266	0	0		1,221	0.0048
Skate spp.		5	41	3	0		49	0.0002
True smelt		0	0	0	6		6	0.0000
Sablefish		0	0	19	0		19	0.0001
Lingcod		0	8	0	0		8	0.0000
Sole spp.		4,322	3,485	1,493	163		9,463	0.0375
English sole		353	275	339	0		967	0.0038
Rex sole		115	121	0	0		236	0.0009
Petrale sole		1,264	184	14	0		1,462	0.0058
CA halibut		4,076	866	158	0		5,100	0.0202
Pacific sanddab	50	0	175	304	0		529	0.0021
Rockfish spp.	15	17	12	62	29		135	0.0005
Bocaccio		74	12	98	0		184	0.0007
CA scorpionfish		369	209	68	0		646	0.0026
Thornyheads		0	0	10	0		10	0.0000
White croaker		1,081	853	387	25		2,346	0.0093
Lizardfish	10	15	0	0	0		25	0.0001
Plainfish midshipman		142	229	0	2		373	0.0015
Pacific whiting		0	0	20	0		20	0.0001
Squid		32	71	231	14		348	0.0014
Octopus		8	233	126	5		371	0.0015
Sea snail		0	0	10	0		0	0.0000
Sea cucumber		12,655	1,141	321	25		14,142	0.0561
Rock crab spp.		31	271	12	27		341	0.0014
Spider crab		5	12	54	0		71	0.0003
King crab		0	31	122	50		203	0.0008
Box crab		0	58	83	0		141	0.0006
Pacific ocean shrimp		0	0	277	196		473	0.0019
Shrimp spp.		0	88	0	0		88	0.0003
Mantis shrimp		0	2	0	0		2	0.0000
Group bolina rockfish		15	0	0	0		15	0.0001
Group red rockfish		0	2	8	0		10	0.0000
Group small rockfish		0	23	0	0		23	0.0001
Fish spp.		1	0	0	0		1	0.0000

TABLE 4-14. Bycatch ratios (pounds of overfished species/pounds of target species) of overfished groundfish species in observed and unobserved trips made by the Makah trawl fleet in 2003. (Page 1 of 1)

Observed Trips		Unobserved Trips	
Bottom Trawl[a/]			
lingcod/all flatfish	canary/all flatfish	lingcod/all flatfish	canary/all flatfish
0.066	0.002	0.063	0.001
lingcod/Pacific cod	canary/Pacific cod	lingcod/Pacific cod	canary/Pacific cod
0.049	0.001	0.068	0.001
lingcod/all target spp.	canary/all target spp.	lingcod/all target spp.	canary/all target spp.
0.028	0.001	0.033	0.001
Midwater Trawl[b/]			
widow/yellowtail	canary/yellowtail	widow/yellowtail	canary/yellowtail
0.051	0.003	0.042	0.001

a/ Bottom trawl 23 observed trips out of 175, or 13%.
b/ Midwater trawl 5 observed trips out of 34, or 16%.

TABLE 4-15. Estimated groundfish bycatch in Makah trawl and troll fisheries, 2000-2003. (Page 1 of 1)

2000		2001		2002		2003	
Species	Pounds	Species	Pounds	Species	Pounds	Species	Pounds
			Midwater Trawl				
Black	0	Black	0	Black	0	Black	0
Lingcod	0	Lingcod	6	Lingcod	215	Lingcod	66
Canary	306	Canary	1,366	Canary	3,151	Canary	895
Yelloweye	0	Yelloweye	0	Yelloweye	53	Yelloweye	0
Widow	2,036	Widow	11,549	Widow	27,639	Widow	20,438
Yellowtail	67,872	Yellowtail	190,494	Yellowtail	577,510	Yellowtail	548,664
POP	0	POP	0	POP	0	POP	0
Darkblotched	0	Darkblotched	102	Darkblotched	2,898	Darkblotched	32
Ssp Thornyhead	0	Ssp Thornyhead	0	Ssp Thornyhead	0	Ssp Thornyhead	0
			Bottom Trawl				
Black	0	Black	53	Black	0	Black	23
Lingcod	7	Lingcod	508	Lingcod	9,603	Lingcod	29,544
Canary	24	Canary	0	Canary	1,068	Canary	624
Yelloweye	0	Yelloweye	0	Yelloweye	0	Yelloweye	0
Widow	0	Widow	0	Widow	0	Widow	3
Yellowtail	563	Yellowtail	505	Yellowtail	5,909	Yellowtail	31,025
POP	0	POP	0	POP	0	POP	0
Darkblotched	0	Darkblotched	0	Darkblotched	0	Darkblotched	0
Ssp Thornyhead	0	Ssp Thornyhead	0	Ssp Thornyhead	283	Ssp Thornyhead	1,364
			Troll				
Black	0	Black	0	Black	0	Black	84
Lingcod	1,958	Lingcod	773	Lingcod	2,006	Lingcod	1,935
Canary	381	Canary	607	Canary	1,189	Canary	753
Yelloweye	988	Yelloweye	43	Yelloweye	83	Yelloweye	0
Widow	0	Widow	32	Widow	0	Widow	5
Yellowtail	8,948	Yellowtail	7,060	Yellowtail	7,071	Yellowtail	17,994
POP	0	POP	0	POP	0	POP	0
Darkblotched	0	Darkblotched	0	Darkblotched	0	Darkblotched	0
Ssp Thornyhead	0	Ssp Thornyhead	0	Ssp Thornyhead	0	Ssp Thornyhead	0

TABLE 4-16. Tribal longline fisheries and associated bycatch by tribe and year, 2000-2003. (Page 1 of 2)

Target Species	Associated Bycatch	2000	2001	2002	2003
		Quinault[a/]			
Halibut		85,252	85,644	104,191	25,023
	Unspecified Rockfish	NA	49		
	Shelf	NA		19	0
	Lingcod	NA	0	0	225
	Canary	NA		4	0
	Yelloweye	NA		10	0
	Yellowtail	NA		4	0
Sablefish		309,762	288,511	114,269	253,412
	Rougheye	NA	7,964		
	Blackgill	NA	2,444		
	Shortraker	NA	3,710		
	Slope	NA		4,121	5,195
	Other (Probably Slope)	NA			1,317
	Ssp Thornyheads	NA	542	570	197
		Quileute			
Halibut		42,666	45,034	67,290	28,737
	Black	30	0	0	0
	Lingcod	144	1,599	1,074	119
	Canary	74	25	117	20
	Yelloweye	2,365	4,224	3,287	520
	Yellowtail	63	19	74	154
	Widow	0	0	0	0
	POP	0	0	0	0
	Darkblotched	0	0	0	0
	Ssp Thornyheads	0	0	0	0
Sablefish		164,016	143,591	92,438	76,352
	Black	0	0	0	0
	Lingcod	0	0	0	0
	Canary	0	0	0	0
	Yelloweye	0	0	0	0
	Yellowtail	0	0	0	0
	Widow	0	0	0	0
	POP	0	0	0	0
	Darkblotched	0	0	0	0
	Ssp Thornyheads	624	482	91	137

TABLE 4-16. Tribal longline fisheries and associated bycatch by tribe and year, 2000-2003. (Page 2 of 2)

Target Species	Associated Bycatch	2000	2001	2002	2003
		Makah			
Halibut		151,268	270,365	294,618	405,020
	Black	0	0	0	0
	Lingcod	3,434	6,138	10,793	5,963
	Canary	19,547	2,330	597	137
	Yelloweye	523	2,075	1,819	0
	Yellowtail	0	382	235	0
	Widow	3	19	0	0
	POP	0	0	0	0
	Darkblotched	0	0	0	0
	Ssp Thornyheads	0	0	0	3,365
Sablefish		490,229	464,723	227,740	493,616
	Black	0	0	0	0
	Lingcod	0	0	0	5,752
	Canary	0	0	0	794
	Yelloweye	0	0	0	0
	Yellowtail	0	0	0	690
	Widow	0	0	0	0
	POP	0	0	0	0
	Darkblotched	0	0	0	0
	Ssp Thornyheads	7,662	10,081	9,229	8,166

a/ No black rockfish, lingcod, POP, widow, or darkblotched caught for these fisheries (2000-2002) for Quinault.

TABLE 4-17. Calculation of sablefish discard mortality in tribal longline fisheries. (Page 1 of 1)

		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%	10.05%
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%	27.16%

Calculations

Year	Discard Rate[a/]	Mortality Rate[b/]
2001	0.0673	0.0135
2002	0.0915	0.0183
2003	0.1819	0.0364
Average	0.1136	0.0227

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).

TABLE 4-18. Washington recreational total boat catch (mt) by species and year - ocean areas only. (Estimates for 2002 and 2003 include released catch. Lingcod discard mortality at 5% - others at 100%. Average weight for released fish is assumed to be equal to average weight of fish retained). (Page 1 of 1)

	Year							
Species	1996	1997	1998	1999	2000	2001	2002[a/]	2003 [a/]
Black Rockfish	229	180	222	150	143	171	176	176
Blue Rockfish	1	1	2	2	1	0	0	0
Bocaccio	0	0	0	0	0	1	1	0
Cabezon	3	1	4	2	3	3	6	5
Canary Rockfish	3	4	12	5	3	2	2	2
China Rockfish	1	0	1	1	1	1	1	1
Copper Rockfish	0	0	0	1	1	1	1	1
Kelp Greenling	1	0	0	1	1	1	2	1
Lingcod	52	49	27	34	28	32	41	52
Pacific Cod	0	0	1	0	0	0	5	13
Quillback Rockfish	0	0	2	2	2	0	2	1
Yelloweye Rockfish	3	5	14	18	10	14	3	4
Yellowtail Rockfish	4	6	29	6	8	4	2	7

a/ Catches currently in RecFIN reflect total mortality for all released fish, including lingcod.

TABLE 4-19. Percent reduction in contacts for select groundfish species under a closure outside of 40 fm in the Oregon recreational fishery. [a/]

	Canary	Yelloweye	Widow	Lingcod
Contacts outside of 40 fm	22	5	9	40
Total contacts	239	18	13	290
Percent of contacts outside of 40-fathoms	9.2%	27.8%	69.2%	13.8%

a/ Based on 2003 at-sea observations and prior to any effort shifts

TABLE 4-20. Estimated mortality rate for canary rockfish under non-retention with no offshore closures and closure outside of 40 fm in the Oregon recreational groundfish fishery. [a/]

No offshore closure Depth interval (fm)	Contacts	Effort Transfer	Revised Contacts	Percent	Mortality Factor	Percent Dead	Mortality Rate %
0-10	21	0	21	8.8	0.159	1.40	
>10<=20	126	0	126	52.7	0.5	26.36	
>20	92	0	92	38.5	1.0	38.49	
All depths	239	0	239	100.0		66.25	66
Closed outside of 40-fathoms							
0-10	21	1.05	22	9.7	0.159	1.54	
>10<=20	126	1.05	132	58.1	0.5	29.03	
>20<=40	70	1.05	74	32.3	1.0	32.26	
All depths <= 40 fm	217		228	100.0		62.83	63

a/ Based on a 2003 at-sea observation study.

TABLE 4-21. Historical landings of select groundfish species in the Oregon recreational fishery, 2000-2003. (Page 1 of 2)

					Minor Nearshore Rockfish									
Month	Yelloweye	Canary	Lingcod	Widow	Black	Blue	Brown	China	Copper	Grass	Quillback	Cabezon	Kelp Greenling	Rock Greenling
						Landed Number of Fish in 2003								
Jan	3	64	148	4	1,967	196		12	15		25	41	42	
Feb	20	155	635	15	4,211	658		47	48		57	142	126	
Mar	31	204	579	20	7,062	1,858		42	25		53	146	136	
Apr	82	381	1,092	270	15,876	2,676		66	99	2	107	207	167	
May	190	1,276	4,487	525	40,208	4,391		242	295		376	1,025	952	
June	155	1,253	3,376	143	39,983	3,095	46	218	152	5	357	775	771	3
July	238	2,100	5,416	165	64,942	4,126	4	513	240	6	598	1,342	1,511	15
August	323	2,514	5,428	148	71,702	5,840	7	754	433	4	868	1,546	1,613	36
September	199	866	2,244	107	25,401	5,093	4	199	178		380	459	746	
October	101	341	983	183	10,786	3,717	2	85	83		101	193	236	
November	9	113	282	94	3,677	391		33	31		48	31	33	
December	8	0	0	8	3,898	328		29	31		42	93	102	
Total	1,359	9,267	24,670	1,682	289,713	32,369	63	2,240	1,630	17	3,012	6,000	6,435	54
						Landed Number of Fish in 2002								
Jan	9	72	139	10	2,035	201		20	18		26	53	49	
Feb	21	157	552	22	4,121	425		41	39		57	134	127	
Mar	38	369	1,047	93	15,044	1,495	3	108	83		140	295	407	
Apr	82	660	1,882	65	22,223	1,699	6	162	170		151	609	753	
May	195	1,175	3,040	119	34,976	2,044	4	318	238		298	884	688	
June	261	885	2,408	46	45,424	2,533	6	350	205	2	338	1,039	820	6
July	180	1,154	2,552	241	44,728	2,622	5	366	549		485	1,126	919	6
August	582	3,033	4,345	500	42,595	5,731		723	745	3	1,206	1,433	1,316	2
September	161	958	1,653	84	22,193	3,066	2	356	329		414	682	841	2
October	106	572	913	45	9,014	3,285		168	91	5	137	428	459	
November	15	118	252	10	3,482	372		36	34		45	36	31	
December	23	137	294	15	3,911	358		40	37		46	114	113	
Total	1,673	9,290	19,077	1,250	249,746	23,831	26	2,688	2,538	10	3,343	6,833	6,523	16

TABLE 4-21. Historical landings of select groundfish species in the Oregon recreational fishery, 2000-2003. (Page 2 of 2)

					Minor Nearshore Rockfish									
Month	Yelloweye	Canary	Lingcod	Widow	Black	Blue	Brown	China	Copper	Grass	Quillback	Cabezon	Kelp Greenling	Rock Greenling
						Landed Number of Fish in 2001								
Jan	13	86	124	14	1,737	733		17	13		16	27	34	
Feb	51	438	561	34	5,418	2,441		64	29		121	121	142	
Mar	62	742	1,166	81	17,046	5,588		122	90	2	172	312	228	
Apr	68	454	979	11	24,461	3,844		161	102		120	460	276	
May	518	1,464	3,083	42	37,865	4,255		329	282	5	371	807	827	3
June	331	1,776	2,194	520	43,738	4,543	807	458	304	2	533	909	876	3
July	415	2,059	2,190	697	48,376	5,934	71	543	271	11	602	925	1,013	
August	624	2,358	3,045	1,702	68,332	16,255	4	674	263	3	758	1,223	1,501	5
September	253	922	884	271	18,826	5,150		219	136	1	283	402	615	
October	40	111	309	564	7,760	3,117		80	45		32	160	176	
November	19	131	196	34	4,226	885	13	40	23		39	31	30	
December	26	147	219	41	4,340	785	9	45	23		43	89	103	
Total	2,420	10,688	14,950	4,011	282,125	53,530	904	2,752	1,581	24	3,090	5,466	5,821	11
						Landed Number of Fish in 2000								
Jan	22	153	130	18	1,910	1,006	61	21	21		21	74	111	
Feb	141	522	533	36	4,461	2,298		106	91		91	182	223	
Mar	91	671	554	151	12,761	5,363		70	78		116	228	346	
Apr	286	998	1,158	260	26,715	5,810		255	169	2	100	499	546	1
May	1,409	2,667	2,874	314	38,110	9,853		458	560		510	963	917	7
June	574	2,872	2,788	609	49,476	8,985	4	749	544	4	705	1,456	1,780	36
July	670	2,843	2,304	879	74,798	6,120		795	461		511	1,602	1,457	36
August	1,168	6,844	2,676	1,450	76,045	14,842		1,064	788		1,093	1,597	1,904	57
September	506	1,804	1,334	670	36,526	5,194		409	257	2	263	541	752	9
October	54	513	431	68	12,632	2,825		145	46		84	178	246	7
November	39	160	237	14	5,610	3,012		67	38		51	59	63	6
December	60	320	333	35	4,992	2,168		61	50		40	135	156	6
Total	5,020	20,367	15,352	4,504	344,036	67,476	65	4,200	3,103	8	3,585	7,514	8,501	165

TABLE 4-22. Estimated total catch mortaltity of groundfish species in the 2005 and 2006 Oregon recreational fishery. (Page 1 of 3)

Month	Yelloweye	Canary	Lingcod (2005)	Lingcod (2006)	Widow	Black	Minor Nearshore Rockfish: Blue	Minor Nearshore Rockfish: Brown	Minor Nearshore Rockfish: China	Minor Nearshore Rockfish: Copper	Minor Nearshore Rockfish: Grass	Minor Nearshore Rockfish: Quillback	Cabezon	Kelp Greenling	Rock Greenling
Landed Number of Fish (2002-2003 Average)															
Jan	6	68	144	144	7	2,001	199	0	16	17	0	26	47	46	0
Feb	21	156	594	594	19	4,166	542	0	44	44	0	57	138	127	0
Mar	35	287	813	813	57	11,053	1,677	2	75	54	0	97	221	272	0
Apr	82	521	1,487	1,487	168	19,050	2,188	3	114	135	1	129	408	460	0
May	193	1,226	3,764	3,764	322	37,592	3,218	2	280	267	0	337	955	820	0
June	208	1,069	2,892	2,892	95	42,704	2,814	26	284	179	4	348	907	796	5
July	209	1,627	3,984	3,984	203	54,835	3,374	5	440	395	3	542	1,234	1,215	11
August	453	2,774	4,887	4,887	324	57,149	5,786	4	739	589	4	1,037	1,490	1,465	19
September	180	912	1,949	1,949	96	23,797	4,080	3	278	254	0	397	571	794	1
October	104	457	948	948	114	9,900	3,501	1	127	87	3	119	311	348	0
November	12	116	267	267	52	3,580	382	0	35	33	0	47	34	32	0
December	16	69	147	147	12	3,905	343	0	35	34	0	44	104	108	0
Total	1,516	9,279	21,874	21,874	1,466	269,730	28,100	45	2,464	2,084	14	3,178	6,417	6,479	35
Scaling Factors for Offshore Closures with Retention															
Jan	0.00	0.00	1.37	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Feb	0.00	0.00	1.37	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Mar	0.00	0.00	1.37	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Apr	0.00	0.00	1.37	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
May	0.00	0.00	1.37	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
June	0.00	0.00	1.18	1.38	0.32	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
July	0.00	0.00	1.18	1.38	0.32	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
August	0.00	0.00	1.18	1.38	0.32	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
September	0.00	0.00	1.18	1.38	0.32	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
October	0.00	0.00	1.37	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
November	0.00	0.00	1.37	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
December	0.00	0.00	1.37	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

TABLE 4-22. Estimated total catch mortaltity of groundfish species in the 2005 and 2006 Oregon recreational fishery. (Page 2 of 3)

							Minor Nearshore Rockfish								
Month	Yelloweye	Canary	Lingcod (2005)	Lingcod (2006)	Widow	Black	Blue	Brown	China	Copper	Grass	Quillback	Cabezon	Kelp Greenling	Rock Greenling
Estimated Number of Landed Fish in 2005-2006															
Jan	0	0	203	237	4	1,967	196	0	12	15	0	25	41	42	0
Feb	0	0	869	1,017	15	4,211	658	0	47	48	0	57	142	126	0
Mar	0	0	793	927	20	7,062	1,858	0	42	25	0	53	146	136	0
Apr	0	0	1,495	1,749	270	15,876	2,676	0	66	99	2	107	207	167	0
May	0	0	6,142	7,186	525	40,208	4,391	0	242	295	0	376	1,025	952	0
June	0	0	3,984	4,661	46	41,982	3,250	48	229	160	5	375	814	810	3
July	0	0	6,391	7,477	53	68,189	4,332	4	539	252	6	628	1,409	1,587	16
August	0	0	6,405	7,494	48	75,287	6,132	7	792	455	4	911	1,623	1,694	38
September	0	0	2,648	3,098	35	26,671	5,348	4	209	187	0	399	482	783	0
October	0	0	1,346	1,574	183	10,786	3,717	2	85	83	0	101	193	236	0
November	0	0	386	452	94	3,677	391	0	33	31	0	48	31	33	0
December	0	0	0	0	8	3,898	328	0	29	31	0	42	93	102	0
Total	0	0	30,661	35,873	1,301	299,814	33,277	66	2,324	1,680	18	3,122	6,206	6,667	57
Landed Weight (kg)															
2002-2003 average	2.12	0.96	3.98	3.98	0.96	1.15	0.72	1.18	0.99	1.47	1.76	1.11	2.71	0.69	0.69
Jan	0	0	805	942	4	2,252	141	0	12	22	0	28	111	29	0
Feb	0	0	3,455	4,043	14	4,822	474	0	46	71	0	63	385	86	0
Mar	0	0	3,151	3,686	19	8,086	1,338	0	41	37	0	59	396	93	0
Apr	0	0	5,942	6,952	258	18,178	1,927	0	65	146	4	119	561	114	0
May	0	0	24,415	28,566	501	46,038	3,162	0	238	434	0	417	2,778	652	0
June	0	0	15,835	18,527	44	48,070	2,340	57	225	235	9	416	2,205	555	2
July	0	0	25,404	29,722	51	78,077	3,119	5	531	370	11	697	3,819	1,087	11
August	0	0	25,460	29,788	46	86,204	4,415	9	780	668	7	1,012	4,399	1,160	26
September	0	0	10,525	12,315	33	30,538	3,850	5	206	275	0	443	1,306	537	0
October	0	0	5,349	6,258	175	12,350	2,676	2	84	122	0	112	523	162	0
November	0	0	1,534	1,795	90	4,210	282	0	33	46	0	53	84	23	0
December	0	0	0	0	8	4,463	236	0	29	46	0	47	252	70	0
Ocean Boat Total	0	0	121,876	142,595	1,243	343,287	23,959	78	2,289	2,470	31	3,466	13,455	4,567	39
Inside and Shore	0	0	9,829	11,500	0	13,440	1,020	0	0	1,660	1,280	0	914	13,726	2,060

TABLE 4-22. Estimated total catch mortaltity of groundfish species in the 2005 and 2006 Oregon recreational fishery. (Page 3 of 3)

Month	Yelloweye	Canary	Lingcod (2005)	Lingcod (2006)	Widow	Black	Minor Nearshore Rockfish: Blue	Brown	China	Copper	Grass	Quillback	Cabezon	Kelp Greenling	Rock Greenling
							Total Impacts (kg)								
Total landings	0	0	131,705	154,094	1,243	356,727	24,979	78	2,289	4,130	1,311	3,466	14,369	18,293	2,099
Reduced mortality from closure of Stonewall Banks															
	121	128					minor nearshore rk total=					36,253			
Discard mortality due to non-retention in the halibut fishery															
	495	182					minor nearshore rk ocean boat total=					32,293			
Discard mortality due to non-retention in the groundfish fishery															
	2,406	5,488					minor nearshore rk ocean boat excluding blue rk total=					8,334			
Other discard mortality (angler pref. & bag limit)															
	144	1,014	2,762	3,232			black rk and blue rk ocean boat total =					367,247			
Total Impacts	2,924	6,557	134,467	157,326											

Notes, assumptions, and analytical steps (see Section 4.3.2.6):

- Data source: Oregon Recreational Ocean Boat Survey (ORBS) and MRFSS for shore and estuary.
- Based on 2003 ocean boat catch for all stocks.
- For ocean boat catch average weight data is from 2002-2003 avg. except cabezon 2003 (min. size impl.).
- Inside and shore estimates are based on MRFSS using 2000-2002 avg.
- Discard mortality is based on 2003 observer study for discard rate and average size and includes impacts from halibut fishery (mortality rate using California study= assumes 15.9% mortality for 0 fm-10 fm depth fish; 50% for >10<=20 fm depth fish; 100%>20 fm depth fish).
- Reductions from offshore closures are based on the 2003 observer study.
- 5% effort and catch increase in open areas during months closed outside of 40-fm; 17% annual increase in lingcod catch (all months with adjustments for offshore closures) based on recent Washington/Oregon trend (stock is rebuilding).

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TABLE 4-23. A summary of the contribution from each year to the “base year” calculation under the 0.7 approach decay function used to weight the annual recreational catch estimates in the California recreational impact projection model. (Page 1 of 1)

Year	0.7 weighting factor	Percent Contribution	Cumulative Contribution
2003	100.0	30.0%	30.0%
2002	70.0	21.0%	51.1%
2001	49.0	14.7%	65.8%
2000	34.3	10.3%	76.1%
1999	24.0	7.2%	83.3%
1998	16.8	5.1%	88.4%
1997	11.8	3.5%	91.9%
1996	8.2	2.5%	94.4%
1995	5.8	1.7%	96.1%
1994	4.0	1.2%	97.3%
1990	2.8	0.8%	98.2%
1989	2.0	0.6%	98.8%
1988	1.4	0.4%	99.2%
1987	1.0	0.3%	99.5%
1986	0.7	0.2%	99.7%
1985	0.5	0.1%	99.8%
1984	0.3	0.1%	99.9%
1983	0.2	0.1%	100.0%
Sum	332.8	100.0%	

TABLE 4-24. Summary of expected 2005 and 2006 California recreational total annual catch (mt) of selected groundfish species and species complexes by region under Action Alternatives 1-3. (Page 1 of 2)

Species/Management Region		Total Mortality (mt)	
Bocaccio			
40°10' N. lat. to Pigeon Point (37°11' N. lat.)		0.7	
Pigeon Point (37°11' N. lat.) to Point Conception (34°27' N. lat.)		1.0	
Point Conception (34°27' N. lat.) to U.S./Mexico Border		50.1	
	Total Catch		**51.8**
Canary			
CA-OR Border to 40°10' N. lat. (near Cape Mendocino)		0.5	
40°10' N. lat. to Pigeon Point (37°11' N. lat.)		5.4	
Pigeon Point (37°11' N. lat.) to Point Conception (34°27' N. lat.)		2.8	
Point Conception (34°27' N. lat.) to U.S./Mexico Border		0.0	
	Total Catch		**8.7**
Cowcod			
CA-OR Border to 40°10' N. lat. (near Cape Mendocino)		0.0	
40°10' N. lat. to Pigeon Point (37°11' N. lat.)		0.2	
Pigeon Point (37°11' N. lat.) to Point Conception (34°27' N. lat.)		0.2	
Point Conception (34°27' N. lat.) to U.S./Mexico Border		0.0	
	Total Catch		**0.4**
Lingcod			
CA-OR Border to 40°10' N. lat. (near Cape Mendocino)		36.0	
40°10' N. lat. to Pigeon Point (37°11' N. lat.)		150.9	
Pigeon Point (37°11' N. lat.) to Point Conception (34°27' N. lat.)		108.5	
Point Conception (34°27' N. lat.) to U.S./Mexico Border		38.8	
	Total Catch		**334.3**
Shallow Nearshore Rockfish			
CA-OR Border to 40°10' N. lat. (near Cape Mendocino)		---	
40°10' N. lat. to Pigeon Point (37°11' N. lat.)		22.0	
Pigeon Point (37°11' N. lat.) to Point Conception (34°27' N. lat.)		57.4	
Point Conception (34°27' N. lat.) to U.S./Mexico Border		10.4	
	Total Catch		**89.8**
Deeper Nearshore Rockfish			
CA-OR Border to 40°10' N. lat. (near Cape Mendocino)		---	
40°10' N. lat. to Pigeon Point (37°11' N. lat.)		180.0	
Pigeon Point (37°11' N. lat.) to Point Conception (34°27' N. lat.)		134.8	
Point Conception (34°27' N. lat.) to U.S./Mexico Border		31.2	
	Total Catch		**345.9**
Scorpionfish			
Pigeon Point (37°11' N. lat.) to Point Conception (34°27' N. lat.)		0.0	
Point Conception (34°27' N. lat.) to U.S./Mexico Border		43.0	
Total Catch		**43.0**	
Black Rockfish			
CA-OR Border to 40°10' N. lat. (near Cape Mendocino)		95.5	
40°10' N. lat. to Pigeon Point (37°11' N. lat.)		39.6	
Pigeon Point (37°11' N. lat.) to Point Conception (34°27' N. lat.)		29.6	
Point Conception (34°27' N. lat.) to U.S./Mexico Border		6.9	
	Total Catch		**171.6**

TABLE 4-24. Summary of expected 2005 and 2006 California recreational total annual catch (mt) of selected groundfish species and species complexes by region under Action Alternatives 1-3. (Page 2 of 2)

Species/Management Region	Total Mortality (mt)	
Widow		
CA-OR Border to 40°10' N. lat. (near Cape Mendocino)	0.0	
40°10' N. lat. to Pigeon Point (37°11' N. lat.)	0.2	
Pigeon Point (37°11' N. lat.) to Point Conception (34°27' N. lat.)	0.1	
Point Conception (34°27' N. lat.) to U.S./Mexico Border	0.0	
Total Catch		**0.3**
Yelloweye		
CA-OR Border to 40°10' N. lat. (near Cape Mendocino)	0.1	
40°10' N. lat. to Pigeon Point (37°11' N. lat.)	1.2	
Pigeon Point (37°11' N. lat.) to Point Conception (34°27' N. lat.)	0.2	
Point Conception (34°27' N. lat.) to U.S./Mexico Border	0.0	
Total Catch		**1.5**

TABLE 4-25. Estimated California recreational groundfish catch by region in 2003-2006.[a/] (Page 1 of 1)

RLMA	Bocaccio	Canary	Cowcod	Lingcod	Shallow Nearshore Rockfish	Deeper Nearshore Rockfish	CA Scorpion-fish	Black	Widow	Yelloweye	Total
2003											
North	0.0	2.8	0.0	247.1	---	---	---	432.0	0.0	0.9	682.8
Central	0.0	15.2	0.0	652.3	146.0	631.5	0.0	224.3	0.1	2.7	1,672.1
South	10.8	0.2	0.0	100.7	13.9	55.4	87.5	0.0	0.0	0.0	268.4
Total	10.8	18.2	0.0	1,000.1	159.9	686.9	87.5	656.3	0.1	3.7	2,623.4
2004 (No Action)											
North	0	0.7	0.0	33.6	---	---	---	104.0	0.0	0.1	138.4
Central	0.2	6.0	0.3	89.2	71.7	275.5	0.0	60.6	0.2	1.7	505.4
South	56.8	1.0	0.6	26.9	18.1	72.4	61.4	0.0	0.5	0.1	237.8
Total	57.0	7.7	0.9	149.7	89.8	347.9	61.4	164.6	0.7	1.9	881.6
2005-2006 (Council-Preferred with a 24 in. lingcod min. size limit)											
North	0.0	0.5	0.0	34.4	---	---	---	87.0	0.0	0.1	122.0
Central	0.3	7.2	0.3	278.0	---	403.0	---	88.0	0.3	1.6	778.6
South	43.2	0.5	0.3	35.7	---	68.0	---	0.0	0.7	0.0	148.4
Total	43.4	8.3	0.6	348.1	---	471.0	---	175.0	0.9	1.7	1049.0
2005-2006 (Council-Preferred with a 26 in. lingcod min. size limit)											
North	0.0	0.5	0.0	23.9	---	---	---	87.0	0.0	0.1	111.5
Central	0.3	7.2	0.3	193.2	---	403.0	---	88.0	0.3	1.6	693.8
South	43.2	0.5	0.3	24.8	---	68.0	---	0.0	0.7	0.0	137.5
Total	43.4	8.3	0.6	241.9	---	471.0	---	175.0	0.9	1.7	942.9

a/ Projected landings based upon 0.7 Decay Model for season that reflects inseason actions approved by the Council through May 2004. Black rockfish projections for 2004 are reduced to account for no retention in May and September-December in the North Rockfish/Lingcod Management Area (RLMA). Lingcod projections for 2004 are modified to reflect a Nov.-Dec. spawning closure and a 30" min. size and 1 bag limit. Shallow nearshore projections for 2004 are reduced by 2.4 mt (8 mt * 30% contribution from 2003) in the Central RLMA to account for a 50% reduction in bycatch from 2003 due to elimination of the shallow nearshore rockfish sub-bag limit.

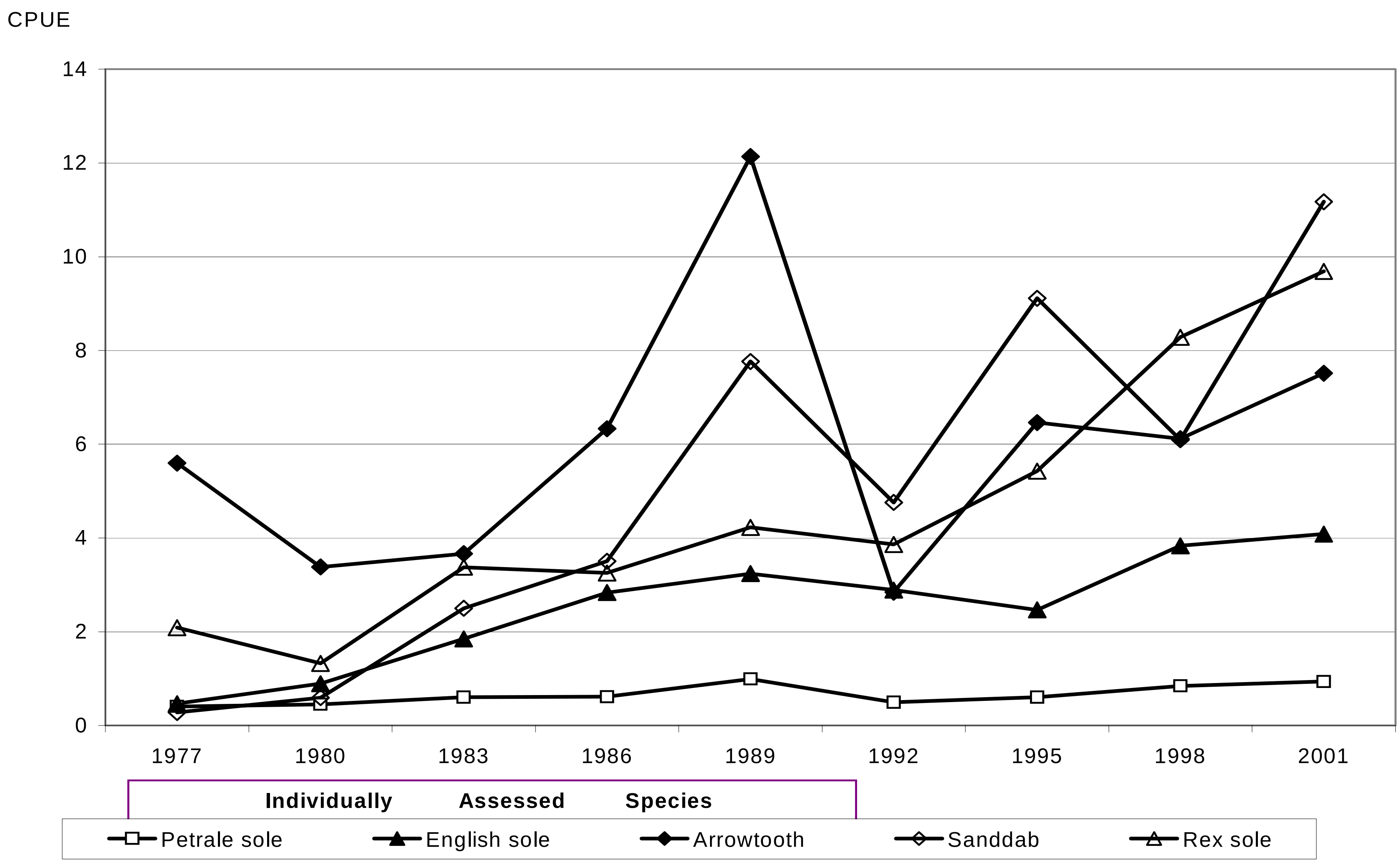

FIGURE 4-1. Catches per unit of effort of major flatfish species in triennial surveys, 1977-2001.

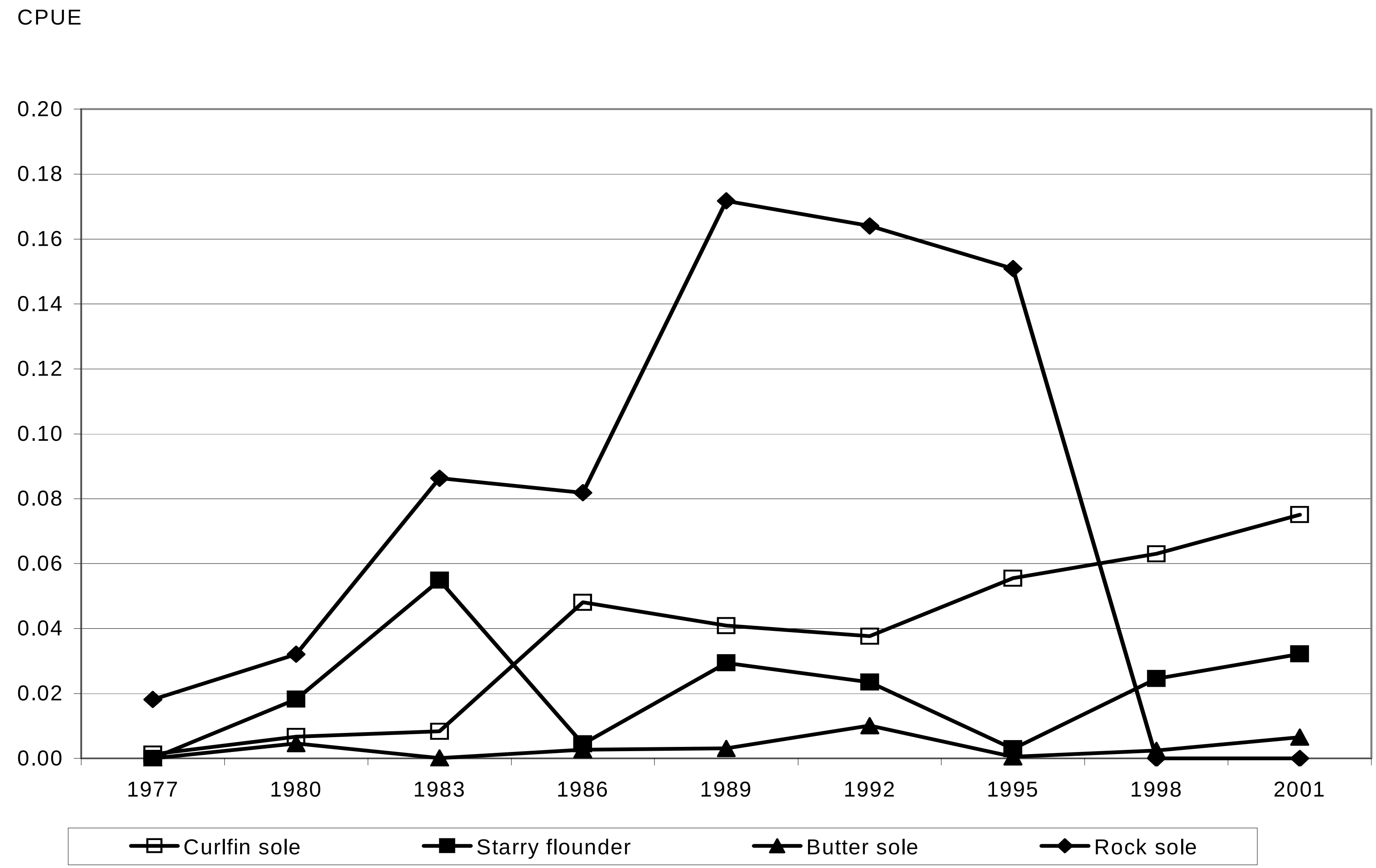

FIGURE 4-2. Catches per unit of effort of major flatfish species in triennial surveys, 1977-2001.

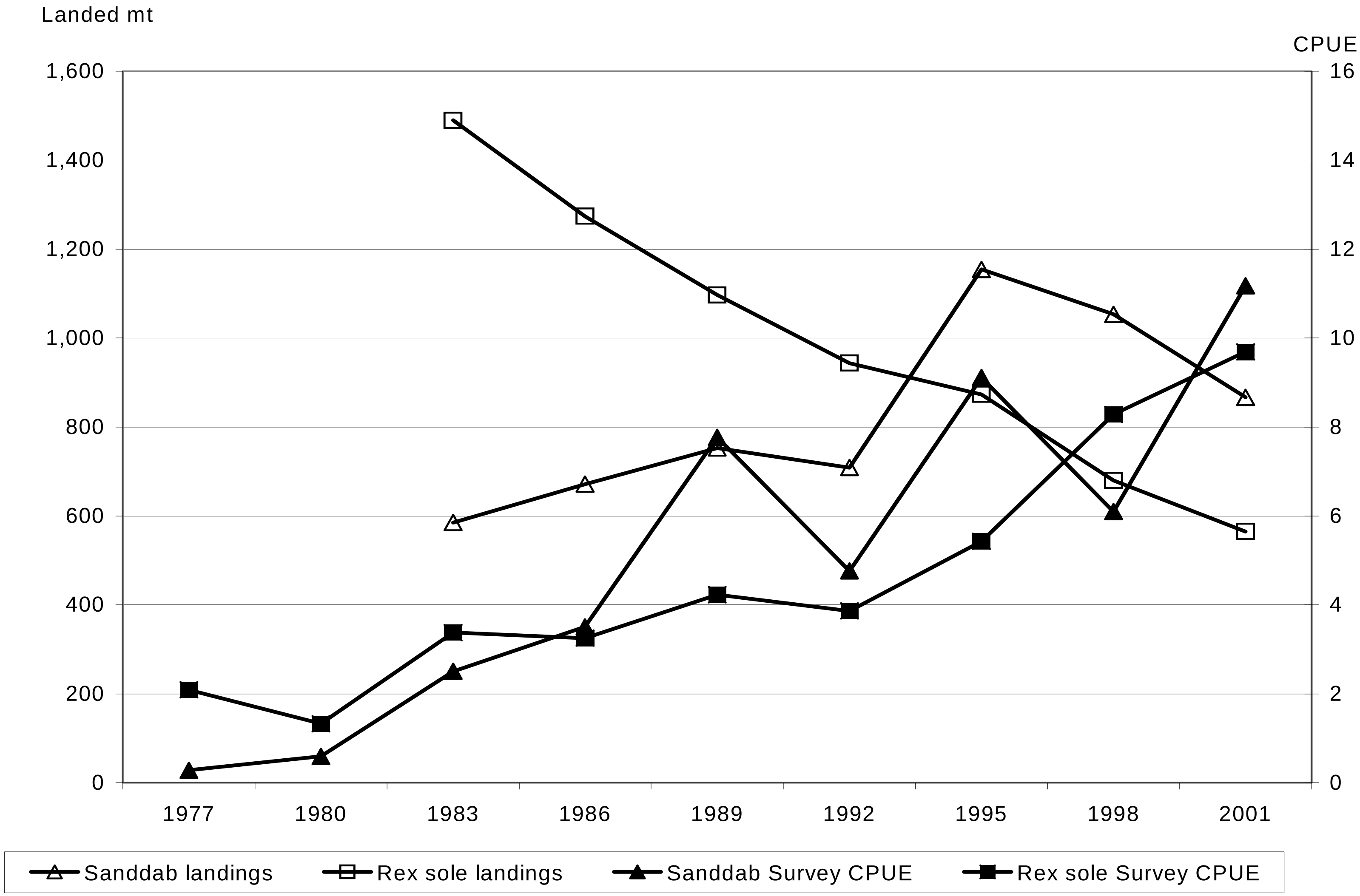

FIGURE 4-3. Catches per unit effort in Alaska Fisheries Science Center triennial surveys, 1977-2001, and three-year average commercial landings of sanddab and rex sole around survey years, 1983-2001.

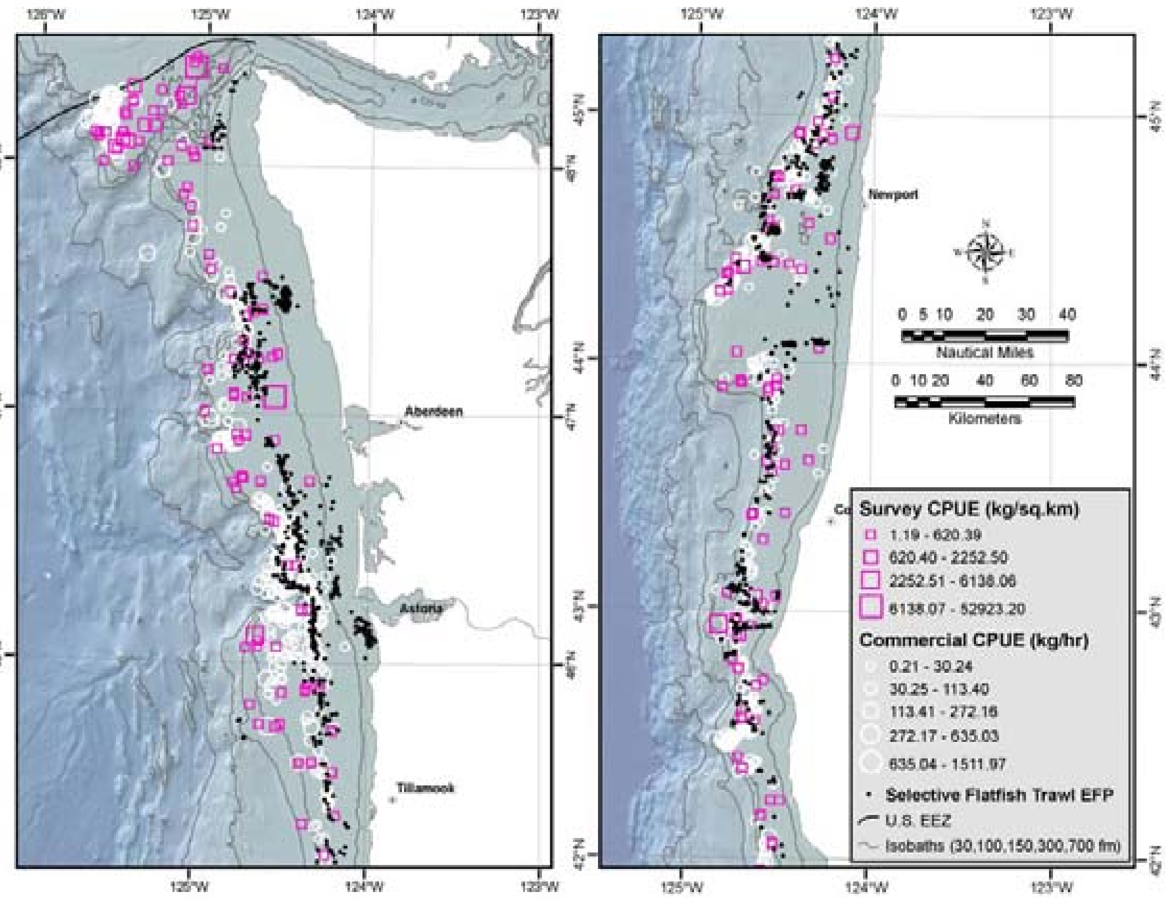

FIGURE 4-4. Two charts of the West Coast Exclusive Economic Zone north of 42° N latitude depicting relative canary rockfish abundance based on NMFS trawl survey catch rates and trawl logbook data, as well as areas where the ODFW selective flatfish trawl EFP study was conducted.

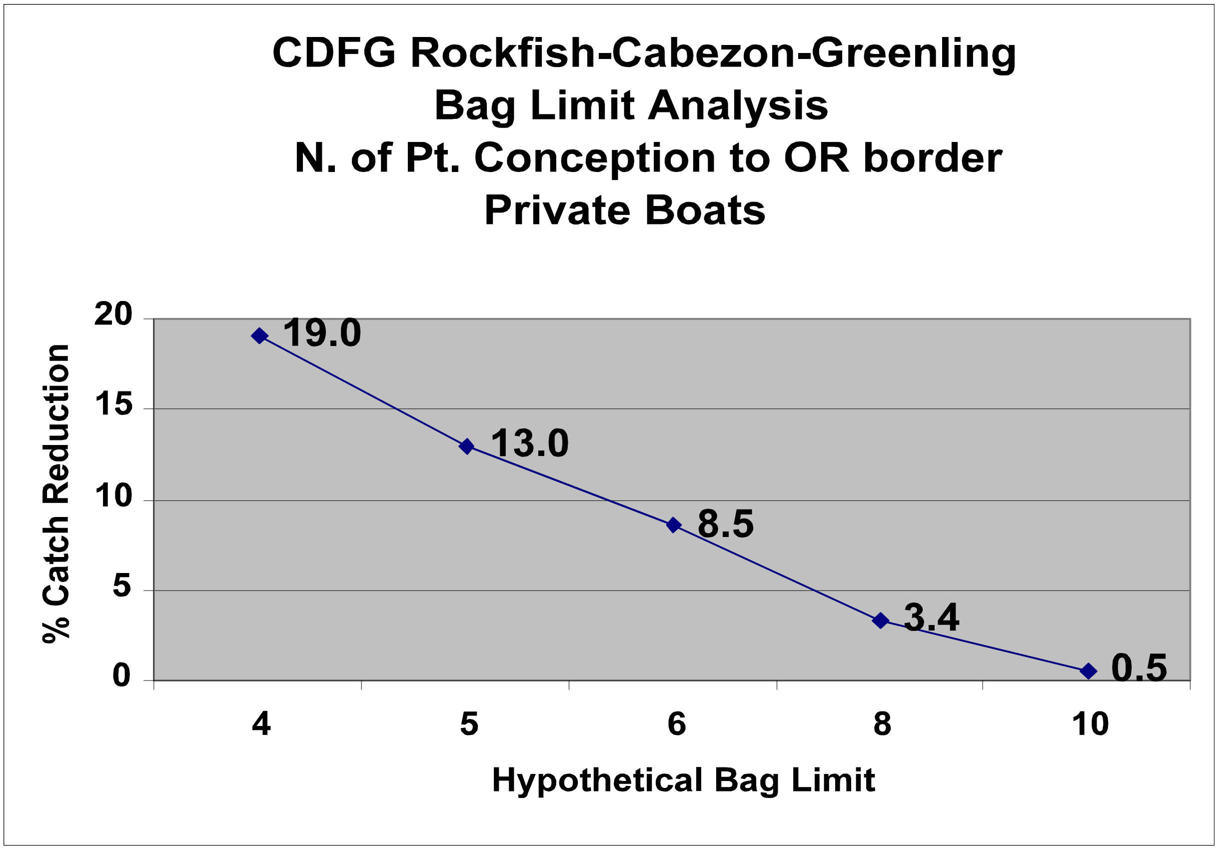

FIGURE 4-5. A description of the CDFG rockfish-cabezon-greenling bag limit analysis for private boat anglers north of Point Conception to the California/Oregon border.

5.0 NONGROUNDFISH SPECIES

Nongroundfish species and fisheries targeting them often need to be considered in groundfish management for two reasons. First, they may be caught incidentally in fisheries targeting groundfish. Thus, management measures that change total fishing effort in groundfish fisheries could increase or decrease fishing mortality on incidentally-caught species. Second, those fisheries targeting nongroundfish species may be affected by management measures intended to reduce or eliminate incidental catches of overfished groundfish species in these fisheries. This section describes these species and associated fisheries. See Appendix A, Chapter 3 for more information on nongroundfish species and fisheries.

5.1 Affected Environment: Nongroundfish Species

The principle species that either co-occur with groundfish species or have fisheries directed on them that incidentally take groundfish are summarized in the table below.

Principle Species Co-occurring with Groundfish

California halibut (*Paralichthys californicus*)	Pacific pink shrimp (*Pandalus jordani*)
California sheephead (*Semicossyphus pulcher*)	Pacific halibut (*Hippoglossus stenolepis*)
Costal Pelagic Species (CPS)	Ridgeback prawns (*Sicyonia ingentis*)
• Northern anchovy (*Engraulis mordax*)	**Sea Cucumbers**
• Pacific sardine (*Sardinops sagax*)	• California sea cucumber (*Parastichopus californicus*)
• Pacific (chub) mackerel (Scomber japonicus)	• Warty sea cucumber (*Parastuchopus parvimensis*)
• Jack mackerel (*Trachurus symmetricus*),	**Salmon**
• Market squid (Decapoda spp.)	• Chinook (*Oncorhynchus tshawytscha*)
Dungeness crab (*Cancer magister*)	• Coho *(Oncorhynchus kisutch*)
Highly Migratory Species (HMS)	• Pink (*Oncorhynchus gorbuscha*)
• Tunas, Billfish, Dorado, Sharks	Spot prawn (*Pandalus platyceros*)
Ocean whitefish (*Caulolatilus princeps)*	White seabass (*Atractoscion nobilis*)

A complete description of nongroundfish species and nongroundfish fisheries potentially affected by the alternatives is available in Appendix 1, Chapter 3.

5.2 Criteria Used to Evaluate Impacts

The same criteria used to evaluate impacts to nonoverfished groundfish stocks (Chapter 4) are used for those nongroundfish stocks affected by the proposed and alternative 2005-2006 actions. For nongroundfish stocks and fisheries, this may be expressed as the relative effectiveness of alternative management measures (including trip limits, seasonal closures, size and bag limits, and RCAs) to control fishing-related mortality to nongroundfish stocks in groundfish fisheries as well as mortality to groundfish stocks in fisheries targeting nongroundfish species.

5.3 *Discussion of Direct and Indirect Impacts*

5.3.1 Salmon

Groundfish catch is not a significant component in salmon troll fisheries, although some incidental groundfish catch is landed. None of the 2005-2006 alternatives are expected to affect salmon stocks, except in cases where diminished groundfish fishing opportunities might result in effort shifts into salmon fisheries. The result of this possible effort shift would potentially be earlier salmon quota attainment. Salmon vessels are subject to groundfish landing prohibitions when trolling within the nontrawl RCA. An exception exists under the No Action alternative for yellowtail rockfish north of 40°10' N. latitude None of the action alternatives at this time deviate from the yellowtail rockfish incidental retention provisions specified in 2004.

Relatively low numbers of salmon are incidentally taken during trawl fishing operations for groundfish. Between September 2001 and August 2002, 9,413 pounds of salmon were incidentally taken by the limited entry groundfish trawl fleet with observer coverage during that period (about 10% of landings) off the Pacific Coast (NMFS 2003b). The incidental capture of salmon is generally a rare event with most tows containing no salmon and a few tows containing many salmon. Variation in the incidental take of salmon appears to be influenced by the time of year, area, depth of fishing, and general salmon abundance. Knowledge of these variations shared between fishers can sometimes be used to help limit the incidental take of salmon in the groundfish fishery, especially in the whiting fishery. Because of the timing and location of the whiting fishery, the salmon species predominantly taken in the fishery is chinook. Pink, chum, and coho salmon may also contribute to a significant proportion of the catch in the midwater trawl fishery, depending on the year and location of the fishery. In 2003, 2,872 individual salmon were incidentally taken in the non-tribal whiting fishery (at-sea and shore-based sectors combined).

The 1992 Biological Opinion analyzing the effects of the Pacific Coast groundfish fishery on salmon stocks listed under the ESA, requires the Pacific Council to provide for monitoring of the salmon incidentally taken in the midwater trawl whiting fishery but not in the bottom trawl fishery. Gear is fished within the water column in the midwater trawl whiting fishery and it is fished near and/or on the ocean floor in the bottom trawl fishery. Because salmon are most often present in the water column, as opposed to being associated with the ocean floor, and because there is a spatial/temporal overlap between the whiting fishery and salmon distribution, there is an opportunity to take more salmon in the whiting fishery than in the bottom trawl fishery. For the bottom trawl fishery, the Pacific Council must provide an annual summary that characterizes that fishery and which can be used to assess any changing trends in that fishery that may jeopardize a listed salmon stock. Currently, the need for monitoring in the whiting fishery is based on not jeopardizing the existence of several salmon species listed under the ESA, including the Snake River fall chinook, lower Columbia River chinook, upper Willamette River chinook, and Puget Sound chinook. For additional information on ESA-listed salmon stocks, refer to Chapter 6. Monitoring needs could change if additional salmon species are listed or additional incidental take data are needed for other management purposes.

5.3.2 Pacific Halibut

The Pacific halibut fishery is affected by RCA depth restrictions. The proposed action to rebuild canary rockfish and yelloweye rockfish are anticipated to severely limit fishing effort on the continental shelf. These actions could substantially affect opportunity for Pacific halibut because commercial halibut fishing is prohibited within the nontrawl RCA. Action Alternative 1 would have the greatest impact because the seaward boundary is specified at 150 fm coastwide; Action Alternative 2 would be intermediate with a seaward boundary at 125 fm; and least under Action Alternative 3 with a seaward boundary at 100 fm. Alternative 3 is the most similar to the No Action Alternative where the seaward boundary of the nontrawl

RCA boundary is 100 fm north of 40°10' N. latitude and 150 fm south of 40°10' N. latitude. The YRCA closure off northern Washington will also limit recreational Pacific halibut catch; however, the alternatives analyzed do not vary the size of this closed area.

5.3.3 Coastal Pelagic Species

Coastal pelagic species (CPS) are taken incidentally in the groundfish fishery. Incidental take is well documented in the at-sea and shore-based whiting fishery. Preliminary data for 2001 indicates approximately 80 mt of squid was incidentally taken in the at-sea whiting fishery through October. 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.

5.3.4 Highly Migratory Species

Highly migratory species (HMS), such as tunas and billfish, are largely pelagic, open-ocean species infrequently caught in groundfish-directed fisheries. None of the alternatives analyzed should affect HMS species.

5.3.5 Dungeness Crab

Dungeness crab, which are typically harvested using traps (crab pots), ring nets, by hand (scuba divers), or dip nets, are incidentally taken or harmed unintentionally by groundfish gears. Very little bycatch of rockfish and other overfished West Coast groundfish species has been noted in pot and trap fisheries, including those targeting Dungeness crab. It is not anticipated this fishery would need to be constrained or modified to rebuild any of the overfished West Coast groundfish species of concern.

One effect of the large RCA under Action Alternative 1 is that smaller vessels forced to fish shoreward of the RCA would be limited to depths shallower than 75 fm year-round and shallower than 60 fm during the summer Periods 3 through 5 (May-October) in the north. 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.

5.3.6 Greenlings, 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 a target species by recreational groundfish areas, California often takes state regulatory action for these species when recreational fisheries for federal groundfish fisheries are closed or limited. This occurred in 2004 and is part of the No Action Alternative for recreational groundfish fisheries in California.

5.3.7 Exempted Trawl Fisheries

Exempt trawl fisheries, such as the West Coast trawl fisheries targeting California halibut, sea cucumbers, and ridgeback prawns, are open access and exempt from the FMP gear and permit restrictions regulating most West Coast trawl efforts. However, since the advent of depth-based management of West Coast groundfish fisheries in late 2002, exempt trawl fisheries have been subject to the depth/area restrictions imposed with the establishment of the trawl RCA. Therefore, in addition to reduced incidental groundfish landing allowances, limited access to traditional fishing areas for nongroundfish species under changing trawl RCA configurations may be a significant impact.

The ridgeback prawn fishery is managed by the state of California and, similar to spot prawn and pink shrimp, is considered an exempted trawl gear in the federal open access groundfish fishery, entitling the fishery to groundfish trip limits. An exemption is proposed under the Council-preferred Alternative to allow the ridgeback prawn trawl fishery to operate within the trawl RCA to 100 fm when the shoreward boundary of the trawl RCA is at 75 fm. The ridgeback prawn fishery operates primarily between 35fm and 90 fm, with an average fishing depth of 75 fm. Trawl log data show that 99% of ridgeback prawns are caught in depths of 101 fm or less. Therefore, in Periods 2 through 5 of 2005-2006 when the shoreward boundary of the trawl RCA is at 100 fm, the fishery will be able to continue operating over traditional fishing grounds. However, the fishery may be significantly impacted when the shoreward boundary of the trawl RCA is at 75 fm in Periods 1 and 6. Trawl data evaluated from 2001 showed that 40% of the annual catch occurred in depths of 75 fm to 100 fm. An exemption to the RCA closure between 75-100 fm will allow the fishery to continue fishing operations in traditional fishing grounds in sandy habitats without impact to the overfished rockfish stocks the RCA is intended to protect.

5.3.8 Pink Shrimp

Pacific shrimp fisheries are managed by the states of Washington, Oregon, and California. The pink shrimp fishery is managed by the states of Washington, Oregon, and California. The season runs from April 1 through October 31, and pink shrimp may be taken for commercial purposes only by trawl nets or pots. Most of the pink shrimp catch is taken with trawl gear with minimum mesh size of one inch to three-eighths inch between knots. In some years, prior to finfish excluder requirements, the pink shrimp trawl fishery has accounted for a significant share of canary rockfish incidental catch. In 2002, finfish excluders in the pink shrimp fisheries were mandatory in California, Oregon, and Washington.

The pink shrimp trawl fishery is exempted from RCA boundaries because of state-required bycatch excluders that effectively reduce bycatch of rockfish. Other regulatory provisions including groundfish landing restrictions do not differ between the action alternatives, the Council-preferred Alternative, or the No Action Alternative.

5.3.9 Nongroundfish Recreational Fisheries

Nongroundfish recreational fisheries, such as those targeting salmon and HMS species, are generally not restricted by season or area closures as a result of groundfish management measures. Exceptions include closures to state managed co-occurring species discussed in Section 5.3.6 and closures to recreational fisheries targeting Pacific halibut within the YRCA. However, groundfish retention is prohibited in any recreational fishery in waters otherwise closed to groundfish fishing. There are provisions for angler trips with multiple targeting strategies but, anglers need to plan their target strategies carefully because possession of groundfish species is prohibited when fishing in areas closed to groundfish.

5.4 Discussion of Cumulative Impacts

Cumulative impacts result from the combination of past, present, and future direct and indirect impacts of management measures combined with the effects of other activities. Past, present, and likely future actions to minimize impacts to overfished groundfish stocks and reduce groundfish fleet capacity may impact nongroundfish stocks. Reduced fishery opportunities directed on groundfish stocks may create an incentive for fishery participants to shift their effort to nongroundfish species. However, the trawl capacity reduction program limited this transfer of fishing capacity by requiring participating vessels to forfeit all permits, including permits for nongroundfish species, and retire the vessel from further participation in any fishery.

6.0 PROTECTED SPECIES

6.1 Affected Environment: Protected Species

Protected species fall under three overlapping categories, reflecting four mandates: the ESA, MMPA, MBTA, and EO 13186. Chapter 5 in Appendix A describes species that occur off the West Coast and are protected under these mandates.

The ESA protects species in danger of extinction throughout all or a significant part of their range and mandates the conservation of the ecosystems on which they depend. "Species" is defined by the Act to mean a species, a subspecies, or—for vertebrates only—a distinct population. Under the ESA, a species is listed as "endangered" if it is in danger of extinction throughout a significant portion of its range and "threatened" if it is likely to become an endangered species within the foreseeable future throughout all, or a significant part, of its range. Bycatch of ESA-listed wild chinook salmon stocks by the whiting fishery is the most well-document impact of groundfish fisheries on protected species. Limits on chinook bycatch in the whiting fishery were established as result of the September 27, 1993, Biological Opinion issue pursuant to the ESA. This opinion established the bycatch rate of 0.05 chinook salmon/mt of whiting with an 11,000 fish threshold for the entire whiting fishery (at-sea and shore-base sectors combined). Re-initiation of the Biological Opinion is required if both the bycatch rate and bycatch limit are exceeded (NMFS 2003a). (Table 5-3 in Appendix A shows the incidental annual catch of chinook salmon for all sectors of the whiting fleet combined from 1991 to 2001.)

Other ESA-listed species that may interact with West Coast groundfish fisheries are sea turtles. Four of the six species found in U.S. waters have been sighted off the West Coast. These species include: loggerhead *(Caretta caretta*), green (*Chelonia mydas),* leatherback (*Dermochelys coriacea*), and olive ridley (*Lepidochelys olivacea*). Little is known about the interactions between sea turtles and West Coast fisheries. Directed fishing for sea turtles in West Coast groundfish fisheries is prohibited because of their ESA listings; however, incidental take of sea turtles by longline or trawl gear may occur. (Green, leatherback, and olive ridely sea turtles are listed as endangered; loggerheads are listed as threatened.) The management and conservation of sea turtles is shared between NMFS and the U.S. Fish and Wildlife Service (USFWS). Section 5.1.2 in Appendix A describes the range and occurrence of these species.

In addition to the ESA, the federal MMPA guides marine mammal species protection and conservation policy. Under the MMPA, on the West Coast NMFS is responsible for the management of cetaceans and pinnipeds, while the USFWS manages sea otters. Stock assessment reports review new information every year for strategic stocks and every three years for non-strategic stocks. (Strategic stocks are those whose human-caused mortality and injury exceeds the potential biological removal.) Marine mammals, whose abundance falls below the optimum sustainable population, are listed as "depleted" according to the MMPA.

Fisheries that interact with species listed as depleted, threatened, or endangered may be subject to management restrictions under the MMPA and ESA. NMFS publishes an annual list of fisheries in the *Federal Register* separating commercial fisheries into one of three categories based on the level of serious injury and mortality of marine mammals occurring incidentally in that fishery. The categorization of a fishery in the list of fisheries determines whether participants in that fishery are subject to certain provisions of the MMPA, such as registration, observer coverage, and take reduction plan requirements. West Coast groundfish fisheries are in Category III, denoting a remote likelihood of, or no known, serious injuries or mortalities to marine mammals. Section 5.2 in Appendix A describes 25 marine mammal species known to occur of the West Coast. Of these, 16 may interact with groundfish fisheries. Three of these 16 species—the

Guadalupe fur seal, Stellar sea lion, and southern sea otter—are listed as threatened under the ESA (see Table 5-4 in Appendix A).

The USFWS is the primary federal agency responsible for seabird conservation and management. Four species found off the West Coast are listed under the ESA. (See Table 5-5 in Appendix A.) In 2002, the USFWS classified several seabird species that occur off the Pacific Coast as "Species of Conservation Concern." These species include: black-footed albatross (*Phoebastria nigripes*), ashy storm-petrel (*Oceanodroma homochroa*), gull-billed tern (*Sterna nilotica*), elegant tern (*Sterna elegans*), arctic tern (*Sterna paradisaea*), black skimmer (*Rynchops niger*), and Xantus's murrelet (*Synthliboramphus hypoleucus*).

The MBTA implements various treaties and conventions between the U.S. and Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. Under the Act, taking, killing, or possessing migratory birds is unlawful. In addition to the MBTA, an EO, Responsibilities of Federal Agencies to Protect Migratory Birds, (EO 13186), directs federal agencies to negotiate Memoranda of Understanding with the USFWS that would obligate agencies to evaluate the impact on migratory birds as part of any NEPA process. The USFWS and NMFS are working on a Memorandum of Understanding concerning seabirds.

In February 2001, NMFS adopted a National Plan of Action (NPOA) to Reduce the Incidental Take of Seabirds in Longline Fisheries. This NPOA contains guidelines that are applicable to relevant groundfish fisheries and would require seabird incidental catch mitigation if a significant problem is found to exist. As part of NPOA implementation, NMFS assessed the incidental take of seabirds in longline fisheries. During the first year of the WCGOP (September 2001 through October 2002), observers did not document any incidental seabird takes by in the limited entry groundfish longline fleet. (During the assessment period, approximately 30% of landings by the limited entry fixed gear fleet had observer coverage.) Section 5.3 in Appendix A describes 60 seabird species occurring off the West Coast. Three of these species—the short-tailed albatross, California brown pelican, and California least tern—are listed as endangered under the ESA. One species, the marbled murrelet, is listed as threatened.

6.2 Criteria Used to Evaluate Impacts

Presumably, effects on protected species correlate with changes in the level of fishing effort. Increased fishing effort could lead to an increase in interactions between fishing vessels and protected species while a decrease in fishing effort would have the opposite effect. Thus, changes in fishing effort could be one way to evaluate the relative effects of the alternatives. However, as discussed in Chapter 3 in connection with habitat and ecosystem impacts, there are limited data available on the distribution, intensity, and duration of fishing effort associated with the groundfish fisheries. Furthermore, different gear types would affect protected species differently, so the relative level of fishing effort by gear type would have to be accounted for. Even if such data were available, this distribution and intensity level of fishing effort would have to be correlated with the distribution of protected species. Finally, the effects of resulting interactions (aside from observed mortality) need to be better understood. Given these limitations, the different alternatives, which represent different harvest levels, are used as proxies for fishing effort in order to assess the relative potential effects of the alternatives on protected species.

When an agency is evaluating reasonably foreseeable significant adverse effects, there is incomplete or unavailable information, and the costs of obtaining it are exorbitant or the means unknown, the agency must: (1) so state, (2) describe the importance of the unavailable information to the assessment, (3) summarize any existing scientific information, and (4) evaluate impacts based on generally accepted scientific principals (40 CFR Part 1502.22), which may accord with the best professional judgement of agency staff. NMFS acknowledges that the information necessary to fully evaluate impacts to protected species, as described in the preceding paragraph, cannot be reasonably obtained at this time. Necessary information may become available at a future date. Beginning in 2004, NMFS implemented a VMS program for limited entry groundfish vessels, which will gather information on the location of vessels. This information may become available to resource managers, allowing a better assessment of the distribution of fishing effort. NMFS is also preparing an EIS addressing the identification and protection of EFH. A predictive risk assessment model is being developed for this project, which includes a fishing effort component (see Chapter 3). When completed, it may be possible to adapt this model to predict likely protected species interactions. The WCGOP is currently gathering data on interactions with protected species. As more data are gathered, the spatial and temporal distribution of interactions will be better understood.

Given the available information, and the requirements of NEPA regulations, the remainder of this section describes the available scientific information on interactions, and based on the best professional judgement of agency staff, qualitatively assesses the predicted environmental impacts of the proposed action and alternatives on protected species, based on the best professional judgement of NMFS and Council staff.

6.3 Discussion of Direct and Indirect Impacts

Increased fishing effort could result in an increase in interactions between groundfish fisheries and protected species. Adverse impacts of these interactions could include death due to capture by or entanglement in fishing gear, changes in the availability of prey species, and changes in behavior that reduce the fitness or reproductive capacity of a protected species. There is some information on gear-related mortality from fishery observers. There is insufficient information to determine what effect, if any, groundfish fisheries have on the availability of prey species and behavioral changes.

Incidental capture of ESA-listed wild salmon stocks is the best documented interaction between protected species and groundfish fisheries. The impacts of incidental catches in the whiting fishery are managed through the Biological Opinion (BO) mentioned above. Catch amounts and rates below the thresholds established in the BO indicate the impacts are minor. (See Section 5.1.1 in Appendix A for a discussion of these thresholds.) If they are consistently exceeded, consultations would be reinitiated and additional measures implemented to reduce impacts.

The groundfish bycatch mitigation draft programmatic EIS (DPEIS) (NMFS 2004a; NMFS 2004c, Section 4.3.3) describes impacts to sea turtles, marine mammals, and seabirds by West Coast groundfish fisheries.

Although incidental capture of sea turtles in various fisheries is a significant source of mortality (see cumulative effects, below), the area of operation and gear types used in West Coast groundfish fisheries make it unlikely that sea turtles are incidentally caught. To date, incidental catch of sea turtles has not been documented in the Pacific Coast groundfish fishery.

The groundfish bycatch mitigation DPEIS enumerates fishery-related mortality estimates for marine mammals on the West Coast. Most observed mortality has occurred in setnet, gillnet, and trammel net fisheries, which are not groundfish FMP fisheries. Table 6-1 lists marine mammal interactions observed during the first year of the WCGOP. Lethal interactions occurred in both the trawl and longline fisheries, although the highest mortality was of California sea lions taken by trawl gear, with seven individuals. Trawlers also took two Stellar sea lions and an unidentified sea lion. One unidentified pinniped was taken by a longline vessel. (Seals and sea lions are pinnipeds.) Because marine mammals are diving animals and strong swimmers, they are more likely to be taken by trawl gear than longline gear. They are generally too large to be taken in traps (pots). (Sea otters, which are smaller animals, are an exception in this respect.)

Other marine mammals noted as having been taken in West Coast groundfish fisheries are the harbor seal, sea otter, Dall's porpoise, white-sided dolphin, and short-beaked dolphin.

In the North Pacific, where seabird interactions are better documented, seabirds are most commonly incidentally-caught by longline vessels (USFWS 2003). This typically occurs during gear deployment. Seabirds like to forage for discarded offal and bait thrown overboard during fishing operations; they are then attracted to the baited hooks as the line is shot from the vessel. If they become hooked, they can be dragged under the water and drown. Some mortality may occur in trawl fisheries when seabirds may become entangled in cables running from the vessel to sonar gear attached to the net, causing them to drown (USFWS 2003). Similar impacts could occur in West Coast groundfish trawl fisheries. To date, the WCGOP has documented few seabird deaths. Table 6-2 shows observations from the first year of the program, September 2001 to October 2002. Approximately 10% of the coastwide limited entry trawl landed weight and 30% of the limited entry fixed gear landed weight was observed during this period. As shown in the table, five seabirds were taken and nine non-lethal interactions were documented. All the mortality was observed on a trawl vessel, which is unusual. Interactions also occurred on vessels using rod-and-reel, pot, and longline gear.

6.4 Discussion of Cumulative Impacts

The FEIS for the HMS FMP (PFMC 2003d), recently implemented by the Council discusses effects of those fisheries on the range of protected species discussed here, except for ESA-listed salmon. An EIS evaluating the Western Pacific region pelagic fisheries FMP (URS Corporation 2001) presents a comprehensive treatment of cumulative effects to many of the same categories of protected species. Sea turtle stocks affected by those fisheries are the same as potentially interact with West Coast groundfish fisheries. Many of the marine mammals and seabirds affected by Western Pacific pelagic fisheries are different than those occurring off the West Coast, but similar external factors would interact cumulatively with groundfish fisheries to affect protected species. These sources are used to describe cumulative impacts to protected species potentially interacting with West Coast groundfish fisheries.

6.4.1 Cumulative Impacts–ESA-listed Salmon

The EA for 2003 West Coast ocean salmon fisheries (PFMC 2003c) describes cumulative impacts to salmon stocks. From the perspective of groundfish management, take in salmon fisheries themselves represents a factor contributing to cumulative impacts. 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. In addition to factors affecting other fish species, such as fishing mortality and the effect of environmental conditions on stock productivity, 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 is 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 2000a).

6.4.2 Cumulative Impacts–Sea Turtles

The Western Pacific pelagic fisheries FMP FEIS referenced above identifies these external factors contributing to cumulative effects: (1) fisheries effects (marine and shoreline), (2) impacts on the nesting environment, (3) impacts on the marine environment, and (4) the current and future regulatory regime. This FEIS points out that fishery-related mortality has a particularly strong effect because older, more reproductively important age classes are removed from the population.

Sea turtle populations—particularly loggerheads and leatherbacks—overlap in the eastern and western Pacific, making them vulnerable to a variety of, mainly pelagic, fisheries. However, sea turtles' patchy distribution in time and space makes it difficult to predict which fisheries will most impact them. The BO for the Oregon/California drift gillnet fishery (NMFS 2000a) describes fisheries affecting sea turtles. These include longline and purse seine pelagic fisheries prosecuted by both U.S. and foreign vessels, North Pacific driftnet fisheries before 1993, and a range of commercial and artisanal fisheries off the Pacific coast of Latin America. Until recently, sea turtle fisheries were legal in most Pacific coast Latin American countries. Illegal directed take of sea turtles, along with incidental mortality in Baja California, Mexico, is a major source of mortality. West Coast fisheries known to take sea turtles include the California/Oregon drift gillnet fisheries (subject of the referenced BO), California set gillnet fisheries, the West-Coast-based pelagic longline fishery, and the albacore troll fishery. According to the Western Pacific pelagic longline FMP FEIS, shoreline recreational fisheries in Hawaii also affect primarily green sea turtles due to hook ingestion and line entanglement.

Sea turtles nest above the upper high tide mark on beaches, an area often heavily used by humans. They are vulnerable when nesting onshore because of directed take, habitat disturbance, and nest predation. A variety of effects can disturb the nesting environment: increased human presence, including vehicles; coastal construction and other development activities; artificial lighting; shoreline erosion and subsequent sand replenishment; and exotic vegetation. In the marine environment a variety of human activities and natural events can affect sea turtles. Marine debris are a major problem; sea turtles may become entangled and drown or ingest material leading to intestinal blockage and starvation. Coastal and nearshore development activities, such as oil exploration and development, marinas and docks, dredging, power plant cooling, construction blasting, and environmental contaminants, can lead to injury or death. Degradation of marine habitats important to sea turtles—sea grass beds and coral reefs, for example—can limit food sources or refugia. Natural disasters and climate events such as El Niño also harm sea turtles (URS Corporation 2001).

Regulatory regimes under U.S. law are intended to reduce the incidental take of sea turtles. The BO for the Oregon/California driftnet fishery mandated several measures to reduce leatherback and loggerhead take in this fishery. The Hawaii-based and West Coast-based longline fisheries have been subject to controversy over sea turtle take. Litigation (*Center for Marine Conservation* v. *NMFS* (D. Haw.) Civ. No. 99-00152 DAE) and a subsequent BO imposed a range of measures (closed areas, gear restrictions, prohibitions) to limit sea turtle take in the Hawaii-based longline fishery.[1/] Shallow-set longline fishing, which targets swordfish, has been the major source of sea turtle take, and regulations have focused on limiting or eliminating this fishery. In response to subsequent litigation, new regulations (along with a regulatory

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1/ As a result of further litigation in Federal Court (HLA v. NMFS, Civ No. 01-765 slip op. at 51-62, August 31, 2003), that BO and associated regulations were subsequently found unlawful and vacated by the Court. However, in a subsequent October 6, 2003, opinion, the Court ordered that the existing regulations stay in place until April 1, 2004, during which time NMFS prepared a new BO (NMFS 2004b) and issued revised regulations while the Western Pacific Fishery Management Council prepared a regulatory amendment to their pelagic fisheries FMP.

amendment to the Western Pacific pelagic fisheries FMP) were implemented on April 2, 2004 (69 FR 17329, also see footnote). This new regime substitutes effort limitation, gear modifications (use of circle hooks and different bait), and sea turtle conservation measures for the area closures and shallow-set prohibitions currently in place for pelagic longline fisheries west of 150º W longitude. The new HMS FMP developed by the Council proposed two different management regimes for the high seas pelagic longline fishery east and west of 150º W longitude. West of 150º W longitude, longline vessels fishing under the HMS FMP are prohibited from using shallow sets and required to follow procedures to reduce impacts to sea turtles and sea birds. East of 150º W longitude the Council proposed allowing a shallow set, swordfish targeted fishery, which would also be subject to procedures to reduce impacts to sea turtles and sea birds. NMFS approved the former (west of 150º W longitude) and disapproved the latter (east of 150º W longitude), based on a BO for West Coast HMS FMP fisheries (NMFS 2004a). NMFS promulgated regulations under ESA authority to prohibit a shallow set pelagic longline fishery east of 150º W longitude. This action, combined with FMP provisions for longline fishing west of 150º W longitude, effectively prohibits shallow set pelagic longline fishing by vessels operating under the HMS FMP. The Council is currently considering development of an amendment to the HMS FMP to make it consistent with ESA requirements in the aforementioned HMS FMP BO (NMFS 2004a).

Population viability is another issue related to cumulative impacts. As population declines, productivity may be reduced due to density dependent effects, including skewed sex ratios. There are also genetic risks; with a smaller gene pool a population may be less able to evolutionarily adapt to changing environmental conditions. Below a certain point—the minimum viable population—a small population may enter an "extinction spiral" from which recovery is not possible even if mortality is reduced (NMFS 2000a).

6.4.3 Cumulative Impacts–Marine Mammals

Some of the same external factors affecting sea turtles are also relevant to marine mammals. The Western Pacific pelagic fisheries FMP FEIS (URS Corporation 2001) identifies fisheries incidental take, environmental fluctuations, ship traffic and anthropogenic noise, and marine debris as external factors cumulatively affecting marine mammals. According to available data (Table 6-1) it appears that California sea lions and Stellar sea lions are most likely to interact with groundfish gear. California sea lions are not listed under the ESA or listed as strategic under the MMPA. Total human-caused mortality is below the Potential Biological Removals threshold (see Section 5.2.2.1 in Appendix A). The eastern Stellar sea lion stock, which occurs in West Coast waters, is listed as threatened under the ESA, depleted under the MMPA, and is classified as a strategic stock. However, total take-related mortality to this stock is below the Potential Biological Removal threshold (see Section 5.2.2.6 in Appendix A). The Oregon/California drift gillnet BO (NMFS 2000a) notes that this stock has been in decline. Although the causes are unknown, the BO suggests decreased prey availability, due to fisheries and environmental factors, may play large role. Fisheries interactions also may be a factor. The BO provides annual mortality estimates for the following fisheries: Southeast Alaska salmon drift gillnet, Alaska salmon troll, British Columbia aquaculture predator control program, northern Washington tribal setnet fishery, West Coast Pacific whiting trawl fishery, and the Oregon/California drift gillnet fishery, which is the subject of the BO. This gives an indication of the range of other fisheries, in addition to West Coast groundfish fisheries, that may be cumulatively affecting Stellar sea lions.

6.4.4 Cumulative Impacts–Seabirds

As noted in the description of direct and indirect impacts, fishery-related seabirds mortality is most commonly due to birds striking baited hooks as they are being deployed from longline vessels. The birds become snagged or ingest the hook, are dragged underwater, and drown. Both the Western Pacific pelagic fisheries FMP FEIS (URS Corporation 2001) and the West Coast HMS FMP FEIS (PFMC 2003d) identify three albatross species with interactions in the pelagic longline fisheries: the black-footed albatross (*Phoebastria nigripes*), the most common albatross in West Coast waters; the Laysan albatross (*P. immutabilis*), more common in the Central and Western Pacific; and the short-tailed albatross (*P. albatrus*), which is listed as endangered. The short-tailed albatross is of particular concern because they are severely depleted, with a population estimated at about 1,700 individuals and only two known breeding colonies on small islands off of Japan. These three albatross species have also been observed around West Coast groundfish vessels (Table 6-2). Albatrosses are wide-ranging in the Pacific, and the Western Pacific pelagic fisheries FMP FEIS (URS Corporation 2001) describes a range of foreign high seas longline fisheries that may contribute substantially to mortality of these species. In addition, the USFWS has issued BOs addressing incidental take in both the Hawaii-based pelagic longline fishery (FWS 2000), and Alaska demersal longline fisheries and trawl fisheries (USFWS 2003). Section 5.3 in Appendix A describes many other seabird species occurring off the West Coast; five of those species are listed under the ESA (see Appendix A, Table 5.5). Many of these species may minimally or modestly interact with West Coast groundfish fisheries or other fisheries but are subject to other factors affecting them cumulatively. The Western Pacific pelagic fisheries FMP FEIS (URS Corporation 2001) identified fluctuations in the oceanic environment, extermination, loss of nesting habitat, marine debris and waste disposal, and air strikes as factors in addition to fisheries take affecting seabirds. Fluctuations in the oceanic environment, such as the PDO and El Niño (discussed in Chapter 3), affect many marine species, including West Coast groundfish. This FEIS describes past military development on Midway atoll in the Northwest Hawaiian Islands as basis for the extermination of seabird species nesting there. This kind of development also may result in the loss of nesting habitat. Short-tailed albatross nesting habitat, which is confined to two small Japanese islands, is threatened by natural events such as volcanic eruptions and mud slides. The marbled murrelet, listed as threatened, ranges from southern Alaska to Northern California and nests in old growth coniferous forest. Further loss of this habitat could affect the species' reproductive success. This species forages in coastal waters. Salmon gillnet fisheries interact with this species (NMFS 2000a). The effects of groundfish fisheries on the marbled murrelet are unknown.

6.5 Summary of Impacts

The impacts of the alternatives on protected species are evaluated in the same way as impacts on habitat and ecosystem. Because there are limited data describing interactions between the Pacific Coast groundfish fisheries and protected species, the intensity, duration, and distribution of fishing effort is used as a basis for predicting impacts on protected species. Therefore, for the purpose of this analysis, fishing effort is used as a proxy to evaluate the potential for interactions between the Pacific Coast groundfish fisheries and protected species. As more information about the spatial and temporal overlap of groundfish fisheries and protected species populations along the Pacific Coast is gathered, a more comprehensive understanding of protected species/fishery interactions is possible, and additional management measures may be taken to mitigate the effects of Pacific Coast groundfish fisheries if necessary.

6.5.1 No Action Alternative

Under the No Action Alternative, harvest levels for 2005-2006 represent the mid-range of harvest levels proposed for 2005 - 2006. Using harvest levels as an estimate of fishing effort, the intensity and duration of fishing activities would represent the mid-range of fishing effort proposed for 2005-2006. The greater the intensity and duration of fishing activities during 2005-2006, the greater the likelihood of interactions between groundfish fisheries and protected species. The No Action Alternative also represents the mid-range of management measures proposed for 2005-2006. Gear specific RCAs, areas closed to fishing for groundfish, would be in place under the No Action

Alternative. In areas and during seasons with RCAs, the potential for interactions between groundfish fisheries and protected species would be minimized. Under the No Action Alternative, differential trawl trip limits encourage a shift in trawling to areas seaward of the RCA. This effort shift should benefit protected species found in nearshore areas while increasing the likelihood of interactions between groundfish fisheries and protected species that occur in offshore areas. Under the No Action Alternative, fishing effort by the fixed gear and recreational fleets should be comparable to levels predicted under the Action Alternatives 2 and 3. The incidental take of salmon species in the Pacific whiting fishery is already regulated under a BO; therefore, any increase in incidental salmon take would be dealt with through that process. There is no evidence that Pacific Coast groundfish fisheries interact with sea turtles. Additionally, there is no expectation that take limits established in other relevant BOs, or potential biological removal thresholds under the MMPA would be exceeded as a result of the No Action Alternative.

6.5.2 The Action Alternatives

When evaluating the impacts of the Action Alternatives on protected species, Action Alternative 1 represents the most conservative combination of harvest levels and management measures for 2005-2006, followed by Action Alternative 2, and then Action Alternative 3. The Council-preferred Alternative is projected to result in the highest harvest levels of the alternatives. If the correlation between projected catch and total fishing effort is valid, then this alternative would have the highest likelihood of interactions between fishing vessels and protected species, which could include incidental take of these species.

Alternative 1. The Action Alternative 1 constrains fishing effort and the distribution of fishing effort more than any other alternative. Fishing effort would be minimized to reduce the harvest of canary rockfish, an overfished species. RCAs would be most expansive under this alternative, which may encourage a shift in fishing effort to areas shoreward and seaward of the RCA. It is unknown whether large RCAs would decrease potential interactions between groundfish fisheries and protected species or simply increase interactions outside the boundaries of the RCAs. One substantial change from the No Action Alternative would be the trawl fleet's use of selective flatfish gear in the area between the U.S. border with Canada and 40º10' N latitude and shoreward of 100 fm. It is unknown how this gear will affect the bycatch of marine mammals or seabirds, but the 100% observer coverage on these vessels should help generate information on the interactions between the trawl fishery and protected species.

Alternative 2. Because the harvest levels and management measures under Action Alternative 2 represent the mid-range of those projected for 2005-2006, the potential interactions between groundfish fisheries and protected species under the Action Alternative 2 should be similar to those under the No Action Alternative. Under Action Alternative 2, the trawl fleet fishing in the area between the U.S./border with Canada and 40º10' N latitude and shoreward of 100 fm would be required to use selective flatfish gear. It is unknown how this gear will affect the bycatch of marine mammals or seabirds, but with only 10% observer coverage, less information about the interactions between the trawl fishery and protected species will be generated than under Action Alternative 1.

Alternative 3. Harvest levels projected for 2005-2006 are higher under Action Alternative 3 than under No Action and Alternatives 1 and 2; similarly, management measures are generally less restrictive than under all other alternatives. Therefore, interactions between groundfish fisheries and protected species have the potential to be highest under this alternative. Much like Action Alternative 2, the use of selective flatfish gear will be required for those vessels trawling in the area between the U.S. border with Canada and 40º10' N latitude and shoreward of 100 fm and approximately 10% of vessel with observer coverage. In general, RCAs are less extensive under this alternative than under No Action and Alternatives 1 and 2.

The Council-preferred Alternative. The Council-preferred Alternative is projected to have the highest harvest levels of all the alternatives in 2005-2006. As adopted by the Council at the June meeting, it had the smallest trawl RCA of all the alternatives (see Table 3-1) and generally higher trawl trip limits. However, at the September 2004 meeting, after the DEIS was published, the Council modified the RCA boundaries for 2005-2006, extending the seaward boundary to 200 fathoms north of 38° N latitude. The resulting RCA is larger than under Alternatives 2 and 3 although still smaller than under Alternative 1 and No Action. The fixed gear and open access RCA does not differ from the No Action Alternative. To the degree that higher harvest limits correlate with greater fishing effort, there is a greater likelihood under this alternative for interactions between protected species and groundfish vessels. If these interactions result in a higher incidental take, then this alternative would have the greatest impact on protected species in comparison to the other alternatives. Like the other action alternatives, the use of selective flatfish gear requirement is implemented north of 40º10' N latitude with approximately 10% of vessels with observer coverage.

Based on data collected by the WCGOP, significant differences in the impacts on protected species between Action Alternatives proposed for 2005-2006 are not predicted. There is little information on interactions between recreational groundfish vessels and protected species; however, significant differences between recreational alternatives are not predicted. Under any of the Action Alternatives, there is no expectation that take limits established in relevant BOs, or potential biological removal thresholds under the MMPA would be exceeded as a consequence of the proposed action.

TABLE 6-1. Interactions between marine mammals and the Pacific Coast groundfish fisheries documented by West Coast Groundfish Observers between September 2001 and October 2002.[a/]

Species	Gear Type	Type of Interaction
California Sea Lion (*Zalophus californianus*)	Trawl	7 Individuals Taken
Unidentified Pinniped	Longline	1 Individual Taken
Unidentified Sea Lion	Trawl	1 Individual Taken
Steller sea Lion *(Eumetopias jubatus*)	Trawl	2 Individuals Taken
California Sea Lion (*Zalophus californianus*)	Both Trawl and Longline	Feeding on Discard
Steller sea Lion *(Eumetopias jubatus*)	Both Trawl and Longline	Feeding on Discard
Pacific white-sided Dolphin (*Lagenorhynchus obliquidens*)	Trawl	Feeding on Discard

a/ Between September 2001 and October 2002, approximately 10% of the coastwide limited entry trawl landed weight and 30% of the limited entry fixed gear landed weight was observed.

TABLE 6-2. Interactions between seabirds and the Pacific Coast groundfish fisheries documented by West Coast Groundfish Observers between September 2001 and October 2002.[a/]

Species	Gear Type	Type of Interaction
Unidentified Gull (*Larus species)*	Trawl	1 Individual Taken
Unidentified Seabird	Trawl	4 Individuals Taken
Short-tailed Albatross (*Phoebastria albatrus*)	Longline and Trawl	Feeding on Discard
California Brown Pelican (*Pelecanus occidentalis californicus*)	Rod and Reel	Feeding on Discard
Marbled Murrelet (*Brachyramphus marmoratus*)	Trawl	Landed on Deck
Black-footed Albatross (*Phoebastria nigripes*)	Trawl, Longline, and Pot	Feeding on Discard
Leach's storm-petrel *(Oceanodroma leucorhoa*)	Trawl	Landed on Deck
Cassin's auklet *(Ptychoramphus aleuticus)*	Trawl	Landed on Deck
Pigeon guillemots *(Cepphus columba*)	Pot	Feeding on Discard
Laysan albatross *(Phoebastria immutabilis)*	Pot	Feeding on Discard
Unidentified Cormorant (*Phalacrocorax species)*	Rod and Reel	Feeding on Discard
Unidentified Storm Petrel (*Oceanodroma species*)	Longline	Landed on Deck
Unidentified Shearwater (*Puffinus species*)	Pot	Feeding on Deck

7.0 THE FISHERIES MANAGEMENT REGIME

This chapter addresses policy, science, and management entities directly affected by changes to the current management regime, but does not include participants in the fishery or the fishing communities of the West Coast (see Chapter 8 for a description of the socioeconomic environment). The management regime is an important issue because it generates direct and indirect impacts. The regime is also itself affected by changes in law and policy, which can cumulatively affect the environment. This section discusses stock assessments, catch accounting, observer programs and research fisheries, all crucial components in the process of determining sustainable fishery yields; uncertainty, which underlies the range of alternatives evaluated in this EIS; and enforcement, which affects the efficacy of prescribed management measures. For additional information on the management cycle and legal authorities and jurisdictions, which also directly affect the management regime, see Appendix A, Chapter 1.

Uncertainty in fishery management and constraining OYs combine to create a potentially intensive inseason management burden on the management regime. As discussed in this chapter, ongoing research, existing observer programs, innovative area management concepts, and revised fishery sampling programs could provide a wealth of new information during the 2005-2006 management cycle. Entities and documents including the Pacific Coast Groundfish FMP, the Council and its Ad Hoc Groundfish Information Policy Committee, and NEPA all provide rules and guidance on inseason use of new information.

7.1 Affected Environment

7.1.1 Management Data Systems

7.1.1.1 Catch Monitoring and Accounting

Various state, federal, and tribal catch monitoring systems are used in West Coast groundfish management. These are coordinated through the Pacific States Marine Fisheries Commission (PSMFC). PacFIN (Pacific Fisheries Information Network) is the commercial catch monitoring database, and RecFIN (Recreational Fishery Information Network) is the database for recreational fishery catch monitoring. There are two components to total catch, (1) catch landed in port, and (2) catch discarded at sea. Discards occur for regulatory reasons (i.e., catch in excess of trip and/or landing limits) and market reasons (i.e., catch of unmarketable species or size). A description of the relevant data systems used to monitor total catch and discards in commercial, recreational, and research fisheries follows.

Monitoring Commercial Landings

Sorting requirements are now in place for all species with trip limits, harvest guidelines, or OYs, including all overfished species. This provides accounting for the weight of landed overfished species when catches are hailed at sea or landed. Limited entry groundfish trawl fishermen are also required to maintain logbooks to record the start and haul locations, time, and duration of trawl tows, as well as the total catch by species market category (i.e., those species and complexes with sorting requirements). Landings are recorded on state fish receiving tickets. Fishtickets are designed by the individual states, but there is an effort to coordinate record-keeping requirements with state and federal managers. Poundage by sorted species category, area of catch, vessel identification number, and other data elements are required on fishtickets. Landings are also sampled in port by state personnel to collect species composition data, otoliths for ageing, lengths, and other biological data. Sample rates vary between fishery and state, but there is an effort to sample about 20% of the landed catch. A suspension of at-sea sorting requirements coupled with full retention of catch is allowed in the whiting fishery (by FMP Amendment 10 and an annual EFP in the Shoreside Whiting sector). The at-sea whiting fishery has 100% on-board observer coverage, while the shoreside whiting sector brings most of their catch to port for sampling. Landings, logbook data, and state port sampling data are reported inseason to the PacFIN database managed by the PSMFC (www.psmfc.org/pacfin/index.html). The GMT and PSMFC manage the Quota Species Monitoring (QSM) dataset reported in PacFIN. All landings of groundfish stocks of concern (overfished stocks and stocks below B_{MSY}) and target stocks and stock complexes in West Coast fisheries are tracked in QSM reports of landed catch. The GMT recommends prescribed landing limits and other inseason management measures to the Council to attain, but not exceed, total catch OYs of QSM species. Stock and complex landing limits are modified inseason to control total fishing-related mortality; QSM reports and landed catch forecasts are used to control the landed catch component.

Monitoring Recreational Catch

Recreational catch is monitored by the states as it is landed in port. These data are compiled by the PSMFC in the RecFIN database. The types of data compiled in RecFIN include sampled biological data, estimates of landed catch plus discards, and economic data. The most recent available data are readily available to managers, assessment scientists, and the general public in prepared reports accessible on the at www.psmfc.org/recfin/index.html.

The MRFSS is an integral part of the RecFIN program. Traditionally, there are two primary components of the survey; field intercept surveys (administered under supervision of PSMFC) and a random phone survey of coastal populations (administered by a third party contracted by NMFS). The field intercept surveys are used to estimate catch, and the phone survey was used to estimate effort. The results of these two efforts are combined in the RecFIN data system maintained by PSMFC, and estimates of total effort and fishing mortality are produced along with other data potentially useful for management and stock assessments. However, MRFSS was not designed to estimate catch and effort at the level of precision needed for management or assessment; it was designed to provide a broad picture look of national fisheries. Comparison with independent and more precise estimation procedures has shown wide variance in catch estimates. Inseason management of recreational fisheries using MRFSS has been compromised by huge inseason variance of catch estimates. In recent years, efforts have been made to improve MRFSS. For instance, in 2001 PSMFC, with support from NMFS, began a new survey to estimate party/charter boat (CPFV) fishing effort in California. This survey differed from the traditional MRFSS telephone survey of anglers to determine CPFV trips by two-month period. The survey sampled 10% of the active CPFV fleet each week to determine the number of trips taken and the anglers carried on each trip. This 10% sample is then expanded to make estimates of total angler trips for southern California and northern California. To improve catch estimates, California increased field sampling of CPFVs in 2003 and 2004. However, it not yet been determined that this additional sampling provides the requisite precision for managing for the low OYs of overfished species like canary rockfish and bocaccio.

Washington and Oregon use the MRFSS system as a supplement to their extensive port sampling programs from which most of their recreational catch estimates are derived. California has a greater dependence on MRFSS to estimate their recreational catch. One outcome of this dependence is uncertain catch estimates of California recreational catch. Because these data are imprecise and highly variable, particularly for rare or non-retained species, it has been difficult to control total mortality of recreational groundfish species in California, such as bocaccio and canary rockfish. Another outcome is an observed lack of credibility in the MRFSS program on the West Coast. In response to concerns by constituents and policy representatives from the West Coast who recommended the development of a new program, staff from CDFG and the PSMFC designed a new program for sampling California's recreational fisheries, incorporating both the comprehensive coverage of the MRFSS program and the high quality sampling (for the private vessel mode) of the Ocean Salmon Project. This new program, the California Recreational Fisheries Survey (CRFS), specifically includes the following:

- Integration of California's current marine recreational sampling programs into one program.
- Reporting of catch and effort at a finer geographical resolution.
- Estimation of private/rental vessel effort using an on-site approach.
- Estimation of beach/bank and private access angler effort using an angler license database with the frame built from one out of every 20 licenses.
- Continuation of the CPFV phone survey with effort.
- Augmentation of CPFV phone surveys with effort data collected directly from the landings and CPFV logbooks.
- Increased creel sampling for Private/rental and CPFV vessels.
- Estimation of effort and catch on man-made structures using instantaneous angler counts, roving effort (pressure) surveys, and creel surveys.
- Reporting of effort and catch estimates for all modes at monthly intervals.
- Sufficient sampling of Private/rentals to meet ocean salmon management data requirements, including the collection of coded wire tags.

The primary goal of the program is to produce in a timely manner marine recreational, fishery-based data needed to sustainably manage California's marine recreational fishery resources. The changes proposed in this plan should increase the timeliness and accuracy of recreational fisheries data so they can be more effectively used for inseason monitoring, estimating take for species of concern, developing harvest guidelines, producing stock assessments, and providing other information critical to management decisions. The initial focus of the program will be to produce timely catch estimates with reasonable confidence limits for those groundfish stocks declared overfished by NMFS and for those stocks with a directed harvest. The PSMFC and CDFG initiated implementation of the CRFS plan beginning in January 2004.

Management Response to Catch Monitoring

Management measures are normally imposed, adjusted, or removed at the beginning of the biennial fishing period, but may, if the Council determines it necessary, be imposed, adjusted, or removed at any time during the period. As described in Section 6.2 of the Groundfish FMP, four different categories of management actions are authorized, ranging from automatic actions initiated by NMFS to full rulemaking actions requiring a minimum of two Council meetings. Inseason adjustments typically fall under the category of notice actions that are routine (as defined by the FMP) in nature and usually require one Council meeting and one *Federal Register* notice. Federal and/or state responses to management goals varies according to the specification of the harvest targets and are largely governed by the definitions in the FMP and federal regulations as follows:

> <u>*Acceptable Biological Catch (ABC)*</u> *is a biologically based estimate of the amount of fish that may be harvested from the fishery each year without jeopardizing the resource. It is a seasonally determined catch that may differ from MSY for biological reasons. It may be lower or higher than MSY in some years for species with fluctuating recruitment. The ABC may be modified to incorporate biological safety factors and risk assessment due to uncertainty. Lacking other biological justification, the ABC is defined as the MSY exploitation rate multiplied by the exploitable biomass for the relevant time period.*
>
> <u>*Optimum yield*</u> *means the amount of fish which will provide the greatest overall benefit to the U.S., particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems, is prescribed as such on the basis of the maximum sustainable yield from the fishery as reduced by any relevant economic, social, or ecological factor; and in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the maximum sustainable yield in such fishery (Federal regulations adds final sentence: OY may be expressed numerically (as a harvest guideline, quota, or other specification) or non-numerically).*
>
> <u>*Quota*</u> *means a specified numerical harvest objective, the attainment (or expected attainment) of which causes closure of the fishery for that species or species group. Groundfish species or species groups under this FMP for which quotas have been achieved shall be treated in the same manner as prohibited species*
> *(the second sentence is not included in Federal Regulations).*
>
> <u>*Harvest guideline*</u> *is a specified numerical harvest objective which is not a quota. Attainment of a harvest guideline does not require closure of a fishery. (Identical language in Federal Regulations 50 CFR Part 660, Subpart G).*

California

California has three possible courses of regulatory action for recreational fisheries when a harvest limit is reached.

1. Closure of recreational fisheries for any federal groundfish, greenlings (of the genus *Hexagrammos*), California sheephead, and ocean whitefish when a federal annual harvest limit for lingcod, rockfish, cabezon, or a subgroup of rockfish, and/or California scorpionfish has been exceeded or is projected to be exceeded (Section 27.82 of Title 14, California Code of Regulations).

   The CFGC has given CDFG the authority to close the following recreational fisheries when an annual harvest limit (OY or harvest guideline) established in regulation by NMFS for lingcod, rockfish, cabezon, or a subgroup of rockfish, and/or California scorpionfish has been exceeded or is projected to be exceeded: lingcod, rockfish, a subgroup of rockfish, California scorpionfish, cabezon, greenlings (of the genus *Hexagrammos*), California sheephead, ocean whitefish, and any federal groundfish. Closures may encompass all state waters or specific areas, and may be for all or part of the calendar year. The CDFG must provide the public with a notice of the closure (via press release) at least 10 days before the closure is to take effect.

2. Closure of recreational fisheries for California sheephead, cabezon or greenlings (of the genus *Hexagrammos*) when a state-established total allowable catch (TAC) or allocation is reached or is projected to be reached (Section 52.10 of Title 14, California Code of Regulations).

   Statewide TACs are established in regulation for California sheephead, cabezon, or greenlings (of the genus Hexagrammos). The regulation sets allocations for recreational and commercial fisheries. CFGC has given the CDFG the authority to close the recreational and commercial fisheries for these species when an allocation or TAC is reached or is projected to be reached prior to the end of the calendar year. For the closure of a recreational fishery, CDFG is required to provide the public with at least 10 days notice (via press release) prior to the closure.

3. Emergency action by CFGC (Section 240 of the Fish and Game Code).

   The California State Legislature has authorized CFGC to adopt or repeal regulations on an emergency basis, provided the action is necessary for (1) the immediate conservation, preservation, or protection of birds, mammals, reptiles, or fish, including, but not limited to, any nests or eggs thereof, or (2) the immediate preservation of the public peace, health and safety, or general welfare. CFGC may adopt emergency regulations for recreational fisheries and for those commercial fisheries the Legislature has given CFGC the authority to regulate.

   The law requires CFGC hold at least one hearing before taking emergency action, and the action is subject to the review of the Office of Administrative Law (OAL). Once CFGC takes action and submits the rulemaking file to OAL, OAL has 10 days to review the file and approve or disapprove the regulation. If OAL approves the regulation, then it is filed with the Secretary of State and is in effect for 120 days (unless the regulation specifies a shorter time period).

Emergency regulation lapses by operation of law unless CFGC files a completed rulemaking for a permanent regulation with OAL or OAL approves a re-adoption of the emergency regulation. The rulemaking for the permanent regulation must follow the normal rulemaking provisions of the Administrative Procedures Act. This includes a 45-day public notice.

Oregon

The Oregon State Legislature granted the Oregon Fish and Wildlife Commission (OFWC) the authority to adopt regulations under the Oregon Administrative Rules (OAR). The OFWC delegates the authority to adopt temporary rules to the Director of ODFW (Director). Temporary rules may be considered for various reason, including the achievement of quotas, optimum yields, harvest limits or harvest guidelines, and to conform to federal regulations. Temporary regulations can be adopted, filed and in effect within a single business day, but in practice, 72 hours public notice is usually provided. A temporary rule approved by the Director is ratified by the OFWC at its next meeting, usually within 30 days.

Once filed, copies of the temporary rule are distributed to all marine related ODFW and Oregon State Police offices. The ODFW information and education program creates and distributes a general public news release. Additionally, specific industry notices are developed distributed throughout local fishing communities.

Once adopted, temporary regulations are in effect for 180 days. If the regulations needs to remain in place for a longer duration, ODFW can adopt a permanent rule through the full OFWC process. This two-meeting process includes public notice of the intent for rulemaking, an economic analysis, and adequate public review.

Washington

The Washington State Legislature has granted the Washington Fish and Wildlife Commission (WFWC) the authority to adopt emergency regulations under the Revised Code of Washington (RCW) 77.04.090. WFWC has delegated the authority to adopt emergency regulations to the Director of WDFW. Emergency regulations may be considered for various reasons, including the achievement of quotas, optimum yields, harvest limits or harvest guidelines, and to conform with federal regulations. The parameters for approving emergency regulations are not specified in the authority language. Emergency regulations can be adopted, filed, and in effect within 24 hours of being drafted.

Once adopted, emergency regulations are in effect for 120 days. During this time, if the regulation needs to remain in place for a longer duration, WDFW may consider adopting a permanent rule. Depending on the nature of the rule, it may have to go through the WFWC approval process. Once the permanent rule process has been initiated, a second emergency regulation may be filed to extend the time period. For example, an emergency regulation filed on March 1 that must remain in effect for the calendar year would expire on June 28. Provided a permanent rule process has been initiated, a subsequent emergency regulation can be filed on June 29 that would remain in effect through October 26, in order to accommodate the time needed for the permanent rule process to be finalized.

Washington Administrative Code (WAC) 220-28-010 strengthens state's the ability to enforce emergency regulations, by stating, "It shall be unlawful to take, fish for or possess food fish or shellfish taken contrary to the provisions of any special season or emergency closed period prescribed in this chapter." A note at the end of the rule language also clarifies, "The department of fish and wildlife frequently adopts emergency rules of limited duration that relate to seasons, closures, gear, and other special matters concerning the industry...."

Once filed, copies of the emergency regulation are faxed to all WDFW regional offices and enforcement staff. WDFW also uses its Outreach and Education Program to inform the public of emergency regulations. Typically, a Fishing Rule Change Notice is distributed to local media and WDFWs sportfishing hotlines are updated within 24 hours of the rule adoption.

7.1.1.2 Standardized Bycatch Reporting Methodologies

West Coast Groundfish Observer Program

Establishing a standardized bycatch reporting methodology and limiting bycatch to the extent practicable are MSA mandates. Effective bycatch accounting and control mechanisms are also critical for staying within target total catch OYs. The first element in limiting bycatch is accurately measuring bycatch rates by time, area, depth, gear type, and fishing strategy. The WCGOP includes the Observer Team and collaborators from the PSMFC that direct the program, train new observers, and manage and analyze the bycatch data. On May 24, 2001, NMFS established the WCGOP to implement the *Pacific Coast Groundfish Fishery Management Plan* (50 CFR Part 660). This regulation requires all vessels that participate in commercial groundfish fisheries to carry an observer when notified to do so by NMFS or its designated agent. These observers monitor and record catch data, including species composition of retained and discarded catch. Observers also collect critical biological data such as fish length, sex, and weight. The program currently deploys observers coastwide on the permitted trawl and fixed-gear groundfish fleet, as well as on some vessels that are part of the open-access groundfish fleet. Observers improve our understanding of fishing activities and help provide accurate accounts of total catch, bycatch, and discard associated with different fisheries and fish stocks.

The WCGOP is designed to provide estimates of fleet-wide discards in commercial fisheries; fishtickets are the mandated landings accounting mechanism. Logbook data need to be available to fully use observer data because observers initially record hail weights and logbook data for retained catch, and these values need to be adjusted by fishticket information to achieve total catch estimates. One difficulty is the need for a statistically significant number of observations of discard across all strata to determine representative bycatch rates for these strata. Implementation of depth-based management further exacerbated the data-sparseness of observations, since areas where many observations occurred in the first year of the WCGOP are now closed to fishing.

NMFS first implemented the WCGOP in August 2001 to make direct observations of commercial groundfish discards. Observer coverage initially extended to about 10% of the West Coast limited entry fleet effort, but increased to about 20% by the summer of 2002 (Elizabeth Clarke, NMFS NWFSC, pers. comm.). Given the skewed distribution of bycatch in West Coast groundfish fisheries, many observations in each sampling strata (i.e.,target effort by gear type by area) are needed to estimate representative bycatch rates of overfished groundfish species. The seasonality of bycatch is an important management consideration. Target opportunities for healthy flatfish and DTS species vary seasonally and geographically. It is reasonable to expect bycatch rates of overfished groundfish species to vary in accordance with the co-currence of target species and overfished species. In November 2001, the Council adopted the trawl bycatch model to use for bycatch accounting and control starting in 2002. In 2002, the bycatch rates used in the trawl bycatch model were restratified by depth (using tow start locations in 1999 trawl logbooks) in anticipation of the new depth-based management regime. Depth-based bycatch rates from the trawl bycatch model are applied to landed weight of the target species in the target fisheries to estimate seasonal bycatch of the overfished groundfish species subject to rebuilding plans evaluated in this EIS.

The Council decided in April 2003 to modify the trawl bycatch model by using bycatch rates derived from direct observations of trawl efforts in the WCGOP for 2003 inseason management decision making. These data were filtered using starting and ending tow locations to emulate, to the extent possible, observations from areas outside currently closed trawl Rockfish Conservation Areas (RCAs). The data limitations required aggregation of observations to strata north and south of Cape Mendocino and deeper and shallower than the trawl RCA. Therefore, the seasonal and target strategy strata are collapsed in the trawl bycatch model, and only the trawl fishery was modeled for bycatch accountability.

In September, 2003, the trawl bycatch model was expanded to include observed discard rates for target species to complement the bycatch rates for overfished species already in the model. This new model configuration was used to evaluate the limited entry trawl management measure alternatives for 2004.

The second year of the WCGOP began in September 2002 and ended in August 2004. The program continued to sample the trawl fleet at a rate of approximately 20% and continued to expand coverage of the limited entry fixed-gear and open access sectors. Scientists at the NMFS Northwest Fisheries Science Center
worked over the winter to analyze the second year of data and to update the trawl bycatch model. Perhaps the most significant result of incorporating the new data into the trawl model was the development of seasonal bycatch rates. In modeling 2003 fisheries, the combination of limited observer data from the first year of the program and the need to evaluate bycatch on a depth-specific basis resulted in discontinued use of seasonal bycatch rates. Additionally, a new bycatch model for the fixed-gear fishery has been developed using data collected in the first two years of the WCGOP. Both trawl and the fixed-gear bycatch models were presented to the SSC at the Council meeting in March 2004. These models were approved for use during the April Council meeting for inseason modeling of 2004 fisheries as well as developing management measures for fisheries in 2005 and 2006.

The first report on the WCGOP, released in January 2003, entitled "Northwest Fisheries Science Center West Coast Groundfish Observer Program Initial Data Report and Summary Analyses," describes the analysis of observer data for various species collected during the first year of the program. Preliminary reports and summary analyses of the second year of data were released in early 2004 and include results from both the limited entry trawl fishery as well as for sablefish-endorsed fixed gear permits. These reports and background materials on the WCGOP are available on the Northwest Fisheries Science Center website at: www.nwfsc.noaa.gov/research/divisions/fram/observer/index.cfm.

At-Sea Pacific Whiting Observer Program

To increase the utilization of bycatch otherwise discarded as a result of trip limits, Amendment 13 to the Groundfish FMP implemented an increased utilization program on June 1, 2001, which allows catcher/processors and motherships in the whiting fishery to exceed groundfish trip limits without penalty, providing specific conditions are met. These conditions include provisions for 100% observer coverage, non-retention of prohibited species, and either donation of retained catch in excess of cumulative trip limits to a bona fide hunger relief agency or processing of retained catch into mince, meal, or oil products.

Vessels participating in the at-sea Pacific whiting fisheries have been carrying observers voluntarily since 1991. NMFS made observer coverage mandatory for at-sea processors in July 2004 (65 FR 31751). These provisions have not only given fishery managers the tools necessary to allow the At-Sea Pacific Whiting Program to operate efficiently while meeting management goals, but have also provided scientists, through the observer coverage, an extensive amount of information on bycatch species. This dataset has not only provided valuable information in the management of Pacific whiting, but has also been used as a data source for the assessment of widow rockfish. Widow rockfish and Pacific whiting are co-occurring species, which means that widow rockfish bycatch often occurs in the midwater trawl nets used for Pacific whiting. However, like other fishery-dependent datasets, it is believed that changes to the management regime since 1999 have a greater influence than widow rockfish abundance on the widow rockfish CPUE in the at-sea Pacific whiting fishery (He, *et al.* 2003b).

Shore-based Pacific Whiting Observation Program

The Shoreside Whiting Observation Program (SWOP) was established in 1992 to provide information for evaluating bycatch in the directed Pacific whiting fishery and for evaluating conservation measures adopted to limit the catch of salmon, other groundfish, and prohibited species. Though instituted as an experimental monitoring program, it has been continued annually to account for all catch in targeted whiting trip landings, enumerate potential discards, and accommodate the landing and disposal of non-sorted catch from these trips. Initially, the SWOP included at-sea samplers aboard shore-based whiting vessels. However, when an ODFW analysis of bycatch determined no apparent difference between vessels with and without samplers, sampler coverage was reduced to shoreside processing plants. In 1995, the SWOP's emphasis changed from a high observation rate (50% of landings), to a lower rate (10% of landings), and increased emphasis on collection of biological information (e.g., otoliths, length, weight, sex, and maturity) from Pacific whiting and selected bycatch species (yellowtail rockfish, widow rockfish, sablefish, chub (Pacific) mackerel (*Scomber japonicus*), and jack mackerel (*Trachurus symmetricus*). The required observation rate was decreased as studies indicated that fishtickets were a good representation of what was actually landed. Focus shifted again due to 1997 changes in the allocation of yellowtail rockfish and increases in yellowtail bycatch rates. Since then, yellowtail and widow bycatch in the shoreside whiting fishery has been dramatically reduced because of increased awareness by fishermen of the bycatch and allocation issues involved in the SWOP program.

The SWOP is a cooperative effort between the fishing industry and state and federal management agencies to sample and collect information on directed Pacific whiting landings at shoreside processing plants. Participating vessels apply for and carry an EFP issued by NMFS. Permit terms require vessels to retain all catch and land unsorted catch at designated shoreside processing plants. Permitted vessels are not penalized for landing prohibited species (e.g., Pacific salmon, Pacific halibut, Dungeness crab), nor are they held liable for overages of groundfish trip limits. Participants in the SWOP are mid-water trawlers carrying EFPs, designated shoreside processing plants in California, Oregon, and Washington, the Council, NMFS, PSMFC, ODFW, CDFG, and WDFW. (Excerpt from latest ODFW report on the shore-based Pacific Whiting program review (Wiedoff and Parker 2002), for additional information and complete reports go to: http://hmsc.oregonstate.edu/odfw/finfish/wh/index.html.

Since inception, an EFP has been adopted annually allowing suspension of at-sea sorting requirements in the shore-based whiting fishery enabling full retention and subsequent port sampling of the entire catch. However, EFPs are intended to provide for limited testing of a fishing strategy, gear type, or monitoring program that may eventually be implemented on a larger fleet-wide scale and are not a permanent solution to the monitoring needs of the shore-based Pacific whiting fishery. A permanent monitoring program for the shore-based Pacific whiting fleet is being developed because of the specification in the Pacific Coast Salmon and Groundfish FMPs and the 1992 BO analyzing the effects of the groundfish fishery on salmon stocks listed under the ESA. The issue of salmon retention in the groundfish trawl fisheries was brought before the Council in 1996 in the form of Amendment 10 to the *Pacific Coast Groundfish FMP* and Amendment 12 to the *Pacific Coast Salmon FMP*. Based on an Environmental Assessment drafted to analyze these amendments, the Council recommended the exempted fishery permit (EFP) process be used temporarily until a permanent monitoring program could be developed and implemented in the shore-based Pacific whiting fishery.

The National Marine Fisheries Service (NMFS) is developing a preliminary draft Environmental Assessment that includes a range of alternative monitoring systems for the shore-based Pacific whiting fishery. The alternatives currently focus on the following major issues: (1) tracking attainment of the Pacific whiting allocation (2) establishing retention and monitoring requirements; (3) verifying full retention of catch; (4) sampling prohibited and overfished species; (5) tracking disposition of overage or donation fish, and; (6) funding of the monitoring program. It is anticipated the permanent monitoring program will be implemented in 2005. NMFS and the GMT have expressed concerns about the current EFP program and its adequacy of ensuring full retention and total catch accounting. This is particularly of concern in regards to the rebuilding of widow rockfish.

NMFS is requiring onboard video cameras for EFP participants in the summer of 2004 to test cameras as a tool for verifying total retention in 2005 and beyond.

Central California Marine Sport Fish Project

The CDFG has been collecting angler catch data from the CPFV industry intermittently for several decades in order to assess the status of the nearshore California recreational fishery. The project has focused primarily on rockfish and lingcod angling and has not sampled salmon trips. Reports and analyses from these projects document trends by port area in species composition, angler effort, catch, and, for selected species, CPUE, mean length, and length frequency. In addition, total catch and effort estimates are made based on adjustments of logbook data by sampling information.

Before 1987, catch information was primarily obtained on a general port basis from dockside sampling of CPFVs, also called party boats. This did not allow documentation of specific areas of importance to recreational anglers and was not sufficient to assess the status of rockfish populations at specific locations.

CPFV operators are required by law to record total catch and location for all fishing trips in logbooks provided by the CDFG. However, the required information is too general for use in assessing the status of the multi-species rockfish complex on a reef-by-reef basis. Rockfish catch data are not reported by species and information on location is only requested by block number (a block is an area of 100 square miles). Many rockfishes tend to be residential, underscoring the need for site-specific data. Thus, there is a strong need to collect catch information on board CPFVs at sea. However, locations of specific fishing sites are often not revealed for reasons of confidentiality.

In May 1987 the Central California Marine Sport Fish Project began on-board sampling of the CPFV fleet. Data collection continued until June 1990, when state budgetary constraints temporarily precluded further sampling, resumed in August 1991, and continued through 1994. The program depends on the voluntary cooperation of CPFV owners and operators. Angler catches on board central and northern California CPFVs were sampled from fourteen ports, ranging from Crescent City in the north to Port San Luis (Avila Beach) in the south. For additional information on this program, see the PSMFC website at: (www.psmfc.org/recfin/ccmsp.htm).

Oregon Marine Recreational Observation Program

In response to overfished species declarations and increasing concerns about fishery interactions with these species, ODFW started this program to improve understanding of recreational impacts. There were three objectives to this program; (1) document the magnitude of canary rockfish discard in the Oregon recreational fishery; (2) improve the biological database for several rockfish and groundfish species; and (3) gather reef location information for future habitat mapping. A seasonal sampler was stationed in each of the ports of Garibaldi, Newport, and Charleston to ride recreational groundfish charter vessels coastwide in Oregon from July through September, 2001. The Garibaldi sampler covered boats out of Garibaldi, the Newport sampler covered both Newport and Depoe Bay, and the Charleston sampler covered Charleston, Bandon, and Brookings charter vessels. During a typical day the sampler would ride a five to eight hour recreational groundfish charter trip and spend the remainder of the day gathering biological and genetic data dockside from several rockfish and groundfish species for which little is known mostly due to their infrequency in the catch. When allowed by the captain, the sampler also obtained Global Positioning System (GPS) locations of fishing sites for future use by the Habitat Mapping Project of the ODFW Marine Resources Program. Results from this program have been incorporated into recreational fishery modeling by ODFW. This program has continued and expanded to document the magnitude of discard of all groundfish species, not just canary rockfish. For more information on this program as well as other fishery research and survey programs see the ODFW Marine Program website at: hmsc.oregonstate.edu/odfw/reports/finfish.html.

WDFW Groundfish At-Sea Data Collection Program

The WDFW At-Sea Data Collection Program was initiated in 2001 to allow fishery participants access to healthier groundfish stocks while meeting the rebuilding targets of overfished stocks and to collect bycatch data through an at-sea sampler program. The data collected in these programs could assist with future fishery management by producing valuable and accurate data on the amount, location, and species composition of the bycatch of rockfish associated with these fisheries, rather than using calculated bycatch assumptions. These data could also allow the Council to establish trip limits in the future that maximize fishing opportunities on healthy stocks while meeting conservation goals for depleted stocks.

Over the past four years, WDFW has implemented its At-Sea Data Collection Program through the use of federal EFPs. In 2001, 2002, 2003, and 2004, WDFW sponsored and administered a trawl EFP for arrowtooth flounder and petrale sole, and in 2002, WDFW also sponsored a midwater trawl EFP for yellowtail rockfish. The primary objective for these experimental fisheries was to measure bycatch rates for overfished rockfish species associated with these trawl fisheries. Fishery participants were provided access to healthier groundfish stocks and were constrained by individual vessel bycatch caps. State-sponsored samplers were used to collect data on the amount of rockfish bycatch caught on a per tow basis and to ensure the vessel complied with the bycatch cap; therefore, vessels participating in the EFP were required to have 100% sampler coverage. In 2003 and 2004, WDFW sponsored a longline EFP for spiny dogfish that also required 100% sampler coverage to measure the bycatch rate of overfished rockfish species associated with directed dogfish fishing.

Initially, the costs associated with these sampler programs were covered with federal Disaster Relief funds. The majority of those funds have been spent. However, WDFW has continued its At-Sea Data Collection Program in 2003 and 2004 with having the fishery participants share the costs of the sampler program. The average costs associated with providing sampler coverage (including salaries, safety equipment, sampling supplies) is approximately $4,000 to $4,500 per month sampled. However, there are additional costs incurred by WDFW in providing staff time to administer the sampler program and analyze the data.

Monitors were hired as temporary employees of the WDFW and were assigned to a duty station based on the vessel's home port. WDFW monitors completed a two-week training course, consistent with the NMFS's Observer Training Manual. Training exercises include U.S. Coast Guard safety training–including survival suit immersion test and vessel safety, and WDFW training on fish identification, random sampling theory, data collection methods, current groundfish management issues, and additional safety measures.

WDFW fishery managers and biologists were involved in hiring and training the samplers as well as administering and monitoring the program. WDFW scientific technicians sampled the catch dockside, collected biological data, and entered the data into an electronic database. Research scientists have analyzed the preliminary data from the 2001, 2002, and 2003 EFPs and have finalized summary reports.

WDFW Ocean Sampling Program

In addition to the At-Sea Data Collection Program, WDFW collects at-sea data through the Ocean Sampling Program. The at-sea portion is not intended to be an observer program for the purposes of enumerating the bycatch alone, but is coupled with shore-based sampling of anglers to calculate an estimated discard weight. At-sea samplers record biological information from discarded species. Shore-based creel surveys of anglers provide the estimate of total number of discards. Combining these two data sources yields estimates of the weight of total fishery discard by species.

Tribal Observer Program

Tribal directed groundfish fisheries are subject to full rockfish retention. 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 (i.e., Pacific halibut, sablefish, and yellowtail rockfish). These trip limits are intended to constrain direct catches while allowing for small incidental catches. Incidental catch and discard of overfished species is minimized through the use of full rockfish retention, shore based sampling, observer coverage, and shared information throughout the fleets regarding areas of known interactions with species of concern. Makah trawl vessels often participate in paired tows in close proximity where one vessel has observer coverage. If landings on the observed vessel indicate higher than anticipated catches of overfished species, the vessels relocate and inform the rest of the fleet of the results (Steve Joner, Makah Fisheries Management, pers. comm., February, 2004). Fleet communication in order to avoid overfished species is practiced by all tribal fleets.

7.1.1.3 Research Fisheries

The reduction in directed fisheries and overall landings has resulted in less information available to fishery managers compromising efforts to assess stock abundance and recovery. There is an increasing reliance on fishery-independent sources of information such as research fisheries and surveys. This is particularly true for overfished species such as widow rockfish, cowcod, bocaccio, and canary rockfish as fisheries are designed to avoid areas inhabited by these species. There is a relatively sparse amount of data available for widow rockfish because widow rockfish directed fisheries have been essentially eliminated and the Pacific whiting sectors have modified their behavior to avoid encounters with widow rockfish. The latest widow assessment (He, *et al.* 2003b) highlighted the need for long-term datasets for this species and questioned the reliance on bottom trawl logbook data that has diminished with decreased fishing opportunities since 1999 and an index of juvenile rockfish abundance that surveys a small proportion of widow rockfish range. Additionally, future widow rockfish assessments may look to expand use of existing fishery-dependent data such as the observer data in the Pacific whiting fisheries (see Section 7.1.3.2). Assessment scientists will continue to rely on research fisheries as landings, age composition, and logbook catch rate data from many fishery sources decreases. A summary of long-term research fisheries and resource surveys can be found in Appendix A, Section 1.1.1.3.

7.1.1.4 The Stock Assessment Process

The Council process for setting groundfish harvest levels and other specifications depends on periodic assessments of the status of groundfish stocks, rebuilding analyses of those stocks that are overfished and managed under rebuilding constraints, and a report from an established assessment review body or a STAR Panel. As appropriate, the SSC recommends the best available science for groundfish management decision-making in the Council process. The SSC reviews new assessments, rebuilding analyses, and STAR Panel reports and recommends the data and analyses that should be used to set groundfish harvest levels and other specifications for the following biennial management period.

New stock assessments for cabezon and lingcod and a new lingcod rebuilding analysis were prepared in 2004 for the 2005-2006 management cycle. These assessments were reviewed by a STAR Panel and were considered by the Council in November 2003 for use during the 2005-2006 management period. However, the SSC did not recommend adoption of these assessments until models were revised with additional input data and modified assumptions. Specifically, the SSC took issue with the specifications for a parameter in the lingcod model that set recruitment variability and the lack of available 1947-1959 California CPFV logbook data in the cabezon model. At the March 2005 Council meeting, revised lingcod and cabezon stock assessments were adopted for use in 2005-2006 management decision making. The lingcod stock assessment indicates the coastwide population is more abundant than previously thought and near the MSY level that would remove the stock from the overfished designation (Jagielo, *et al.* 2004). The cabezon stock assessment indicates the population is not overfished, but below the MSY level (in the precautionary zone) (Cope, *et al.* 2004). For additional information on stocks with new assessments see Section 2.1.

NMFS is currently planning the next round of stock assessments for completion and review in 2005 for use in developing management measures and harvest specifications for the 2007-2008 biennial management cycle. Rebuilding plans and stock assessments for overfished species are subject to review every two years. The list of species planned for updated assessments contains over 20 species. NMFS will also hold a series of workshops in 2004 focusing on data needs and available data sources for the ambitious list of stock assessments being considered for 2005. Additionally, the SSC is currently working on standards for the required review of rebuilding analyses. These reviews are required every two years for species under rebuilding plans. More information on the stock assessment process can be found in Appendix A, Section 1.1.1.1.

7.1.2 Enforcement

Enforcement of fishery regulations has become increasingly complex with the addition of large closed areas, smaller cumulative trip limits and bag limits, and depth-based closures for commercial and recreational fisheries. At the same time, decreased OYs and the need to rebuild overfished stocks has placed additional importance on controlling and monitoring fishery related mortality. Enforcement agencies continue to use traditional methods to ensure compliance with groundfish fishery regulations including dockside sampling, at-sea patrols, and air surveillance. Recent declines in enforcement agency budgets, combined with increased regulatory complexity, have stressed the ability to adequately monitor fisheries for regulatory compliance. In response, NMFS implemented a VMS, which includes satellite tracking of vessel positions and a declaration system for those vessels legally fishing withing an RCA. VMS was implemented on January 1, 2004 and is required on all vessels participating in the groundfish fishery with a limited entry permit. Expansion of the program to other sectors is currently being considered. VMS dramatically enhances, rather than replaces, traditional enforcement techniques. A more detailed description of fishery monitoring and enforcement is included in Appendix A, Section 1.1.5.

7.1.3 Managing with Risk and Uncertainty

Uncertainty in fishery management exists for many reasons including imperfect sources of data from the past, inaccurate or inadequate monitoring of current fisheries, and unknown future environmental conditions. All of these factors contribute to the risks associated with the assessment of stock status, the estimation of impacts to fish stocks due to fishery management measures, and the projections of future stock health under varying long-term management alternatives. A detailed discussion of short-term costs versus long-term risk may be found in Appendix A, Section 1.2.1. For more information on the assessment of risk in long-term stock population projections see Appendix A, Section 1.1.1.2.

7.1.4 License Limitation, Capacity Reduction, and Fleet Rationalization

Declining fishing opportunity and increased importance in stock rebuilding and sustainable fisheries since the late 1990s have created the need for smaller, more efficient fishing fleets and more responsive management tools and monitoring programs. A full discussion of these long-term management strategies is presented in Appendix A, Section 1.2.4.

7.2 Criteria Used to Evaluate Impacts

Managing fisheries in a cost-effective manner while balancing risks to the resource with socioeconomic benefits is often the objective of public agencies charged with fishery management and enforcement. Therefore, costs, enforcement feasibility, risk to the resource, and reliance on fishery data are the criteria used in the following qualitative evaluation of the impacts to the management regime. Effects on the management regime correlate with changes in the level of regulatory complexity. Regulatory complexity affects the public costs of implementing a management regime by increasing the burden of monitoring, enforcing, and adjusting fisheries to meet but not exceed intended impact levels. Thus, costs to governmental entities associated with increased regulatory complexity could be one way to evaluate the relative effects of the alternatives on the management regime. Intrinsic to the costs to the management regime is the assessment of risk to the resource. Management alternatives with a high degree of regulatory complexity or a substantial reliance on accurate and timely inseason fishery data not only increase the expense of enforcement and monitoring, they also increase the risk of non-compliance and overfishing.

7.3 Discussion of Direct and Indirect Impacts

7.3.1 Impacts to Fishery Management

7.3.1.1 Constraining OYs and Monitoring

The No Action Alternative, as well as all of the action alternatives, include restrictive OYs for overfished species that have wide ranging constraining effects along the entire coast and across many fisheries. Alternatives with projected impacts that completely utilize or exceed the available OY are considered to be more costly from a fishery management perspective. State, federal, and tribal agencies charged with monitoring fishery-related impacts have increased responsibilities in terms of inseason catch accounting, bycatch projection, and timely reporting. This is particularly true when the amount of available OY is low and is attributable to bycatch rather than landed catch. Bycatch accounting often requires costly and time-consuming at-sea observation, shore-based sampling, and logbook programs. Incorporating new data sources into fishery management inseason involves costs to the management regime due to additional analytical requirements to understand how data can be used to improve management, additional regulatory burden of implementing and publishing the recommended inseason fishery adjustments, and additional enforcement challenges under revised regulatory requirements.

Alternatives with projected impacts, which meet the available OY for constraining species, such as canary rockfish, require careful monitoring and frequent inseason management actions and have relatively high costs and risk when compared to alternatives with projected impacts below the OY. Alternatives not expected to fully utilize the OYs for constraining species, such as canary rockfish, including the Council-preferred Alternative, can utilize the remaining OY as safeguard against the cost of intensive inseason management and the risk of exceeding the OY. The effects of the alternatives to the management regime are evident in the expense of inseason fishery monitoring, as well as the risks associated with uncertainty.

Bycatch accounting and control has been one of the weaker elements in groundfish management. However, bycatch accounting in the commercial and recreational sectors is improving rapidly. With the advent of data from the WCGOP, it is anticipated that more accurate bycatch accounting for the limited entry trawl, limited entry fixed gear, and directed open access sectors will soon be available for management. Washington and Oregon have implemented observer programs for recreational fisheries to record the size of discards for more accurate recreational bycatch estimates. Additionally, staff from CDFG and the PSMFC designed the CRFS program for sampling California's recreational fisheries, incorporating both the comprehensive coverage of the MRFSS program and the high quality sampling of the Ocean Salmon Project. These new and evolving monitoring systems will allow much more accurate catch and bycatch estimation and will be progressively integrated into the models currently used to project total catch under alternative management measures.

The WCGOP has completed three years of at-sea observation of the limited entry trawl and fixed gear fisheries, and trawl logbooks have been in place for several years. Although valuable to resource management, these data require extensive analysis and are not designed for real-time, inseason tracking of impacts. Until the recent development of an observer program, it has been difficult to effectively monitor discards, confounding the ability to accurately estimate total catch. The first data report from the first year of the WCGOP (September 2001 through August 2002) was used for 2003 inseason management, and analyses demonstrated higher-than-anticipated bycatch rates for overfished species (Hastie [2003]; NMFS 2003b). Application of the observer-based bycatch rates led the Council to adopt extensive inseason changes to commercial trawl fisheries, including modifying RCAs to increase the areas closed to trawl fishing, limiting nearshore open periods, and altering trip limits. Not without adverse socioeconomic effects, decreased fishing opportunity will result in decreased fishery-related mortality, and increased likelihood of rebuilding.

In addition to bycatch rates for overfished species, observer-based discard rates for trawl non-overfished, target species were incorporated from the first year of the program. Target species' discard rates were also higher for several species than what had been previously modeled. These new rates were incorporated into modeling preliminary trawl management measures for the 2004 annual specifications.

The second year's observer data (September 2002 through August 2003), was reviewed and incorporated into fishery management in March 2004. The WCGOP was expanded considerably from the first year and is anticipated to include sufficient data to provide insight into bycatch in the limited entry fixed gear fleet in addition to adding another year of new information on the trawl fleet. About 10% of the limited entry trawl and fixed gear trips were observed in the first few months of the program. Observations increased to about 20% of limited entry trips and expanded to portions of the directed groundfish open access fleet. Accumulation of additional years of data and expanded sampling will further improve the accuracy of bycatch rates and estimates of total mortality.

There have been concerns about the orderly use of this new information for active fishery management decision making. To help gain a higher degree of order and stability in the use of new observer information, the Council has considered a proposed long-term schedule showing when new observer data will be available for decision-making during the first multi-year management cycle. Further, the Council requested the Ad Hoc Groundfish Information Policy Committee (GIPC) prepare a report on policy regarding the use of new information from the observer program (and other sources) for fisheries management. The Council approved the recommendations of the GIPC including the following schedule for incorporation of new data from the WCGOP into management. As occurred in 2003 and 2004, inseason adjustments in response to new data from the WCGOP are anticipated.

Proposed Observer Data and Bycatch Model Schedule for Multi-Year Management

Date	Fishing Year	Observer Data Period	Groundfish Bycatch Models	Actions
April 2004	2004	9/2002 - 8/2003	Limited Entry (LE) Trawl, LE Fixed Gear (new)	2004 inseason 2005-2006 preseason
April 2005	2005	9/2003 - 8/2004	Open Access (OA) (new)	2005 inseason
Nov. 2005	2006	1/2004 - 12/2004 [a/]	LE Trawl, LE Fixed Gear, OA	2005 inseason 2006 2nd season [b/] 2007-2008 preseason
Nov. 2006	2007	1/2005 - 12/2005	LE Trawl, LE Fixed Gear, OA	2006 inseason 2007 update [c/]
Nov. 2007	2008	1/2006 - 12/2006	LE Trawl, LE Fixed Gear, OA	2007 inseason 2008 2nd season 2009-2010 preseason
Nov. 2008	2009	1/2007 - 12/2007	LE Trawl, LE Fixed Gear, OA	2008 inseason 2009 update
Nov. 2009	2010	1/2008 - 12/2008	LE Trawl, LE Fixed Gear, OA	2009 inseason 2010 2nd season 2011-2012 preseason

a/ Note shift in observer data period.
b/ “2nd season” denotes the second year of a multi-year management cycle.
c/ “Update” denotes check and possible refinement of management measures after adoption of the multi-year management measures and harvest specifications, but prior to the first season of a multi-year management period.

Management strategies should always use the best available estimates of bycatch, and managers should always seek to improve bycatch accounting and control mechanisms. Data and resulting analyses from the WCGOP have already demonstrated an ability to provide valuable knowledge where limited information and difficult assumptions have existed in the past. Improved understanding of bycatch rates and total mortality will improve fishery modeling by replacing assumptions and surrogate values with fishery-related mortality estimates from direct observation. Additionally, historic catch data could be adjusted to incorporate new methods of estimating bycatch. Stock assessments and rebuilding analyses will benefit from more accurate sources of data on total fishery removals over time. Reducing the uncertainty in stock status and rebuilding projections will more effectively support sound harvest policy and sustainable fishery resource management.

Measures such as full retention of bycatch and/or bycatch caps could significantly reduce fishing-related mortality of overfished groundfish species. The WCGOP could be linked with a program of mandatory full retention of rockfish (or other overfished species that would otherwise be discarded dead at sea) during commercial fishing activities to increase accuracy in estimating total catch. This could ensure rebuilding total catch OYs are not exceeded while attempting to access harvestable groundfish species. Mandatory rockfish retention and observer coverage might allow greater flexibility for managers to consider fishing opportunities that might otherwise be considered risky. As long as total catch controls are reliable and responsive to rapid changes in the fishery, such explorations may be acceptably risk-averse. Full rockfish retention would incur a cost to the processing sector since unmarketable rockfish, due to size or condition, would need to be handled and disposed. Bycatch accounting of retained species that would otherwise be discarded at sea may be considered an additional marginal cost, since dockside sampling of landed catch occurs anyway. Sampling the fully retained catch would add to the time and effort involved in dockside sampling, but would not require the implementation of a new sampling system and could provide valuable data on the catch of overfished species.

A management strategy of bycatch caps (the fishery is closed once landings plus bycatch reach a critical threshold, notably, the total catch OY) would probably entail the need for a significantly higher observer coverage rate, perhaps 100%, if the caps were imposed at the vessel and not the fleet-wide level[1/]. This is because the distribution of fishing efforts resulting in significant bycatch is skewed to a few efforts. Given the nature of highly variable bycatch by time, area, gear, and fishing strategy, the allocational aspects of a management system relying on bycatch caps creates potentially serious repercussions. Such a system might promote derby fisheries where fishermen would compete to get their fish first before a fleet-wide cap is attained. This creates safety risks, a poor supply and demand marketing situation, and a contracted stream of fishery-dependent data (landings and bycatch information) that might be difficult to assimilate and react to in a timely fashion. One mitigative measure to consider in rationalizing a management strategy that depends on bycatch caps may be to develop Individual Quotas (IQs) for the overfished groundfish species. An IQ system could be used to buy and sell overfished species' OY, which could leverage more healthy target species landings while maintaining better accounting and control of overfished species' bycatch. The Congressional IQ ban was lifted enabling the Council and NMFS to explore such a strategy.

The CDFG anticipates preliminary recreational catch and effort estimates for the period of January through May 2004 will be available for the September 2004 Council meeting and has suggested that this may be the opportunity to compare CRFS estimates to OYs and harvest guidelines for consideration of inseason adjustments. Beginning late fall 2004, the new CRFS estimates of catch and effort will be compared with the previous MRFSS estimates with the goal of calibrating the existing MRFSS dataset. Inseason management adjustment considerations in 2005-2006 are anticipated in response to new CRFS data. If results from the CRFS differ substantially from anticipated fishery impacts, it is possible that inseason adjustments, with their associated costs to the management regime, would be recommended by the Council and implemented by NMFS. These initial fishery adjustments in response to the first set of CRFS data would likely be followed by considerable analytical endeavors to calibrate the MRFSS dataset and revise modeling methodologies.

The Council-preferred Alternative specified a canary rockfish set aside for the Pacific whiting directed commercial fisheries in 2005-2006. Although effective, real-time monitoring programs are in place for the Pacific whiting fisheries (see Section 7.1.1.2), there will be a regulatory burden of developing and implementing a regulatory mechanism to allow NMFS to carry out an inseason closure of Pacific whiting fisheries as part of routine management in response to bycatch concerns.

1/ The current management regime essentially manages for the total catch OY and includes best estimates of landings and discard. This management strategy may be likened to a bycatch cap on a fleet-wide basis.

7.3.1.2 Data Collection

The availability of data is critical to the effective management of fishery resources. Fishery impact modeling, stock assessments, and socioeconomic analyses are not directly affected by the management alternatives, but rely on long-term data sources. Longstanding, fishery-dependent data sources are compromised as OYs decrease and directed groundfish fishing opportunities diminish. Loss of fishery- dependent data is a cost to fishery management agencies through increased uncertainty in resource analyses, such as stock assessments and the added expense of developing new data collection methods and analytical tools. Fishery-independent data sources, such as the research fisheries, are anticipated to continue in 2005-2006 under all of the action alternatives.

7.3.1.3 Regional Management

The Council has discussed regional management for selected species based on results of stock assessments that indicate a biological difference between stocks or portions of a coastwide stock. In the case of black rockfish, genetic differences have been noted between the northern and southern stocks, and lingcod has also demonstrated biological differences north and south. For both of these species, the Council has indicated a preference for managing two regions: black rockfish stocks are delineated at the Washington/Oregon border (46°16' N latitude) and lingcod at the Oregon/California border (42° N latitude). The rationale for managing these stocks on a regional basis is to allow differences in management measures, contingent upon the abundance or health of the stock within a particular area. The new lingcod assessment indicates that the lingcod stock has achieved its rebuilding objective of $B_{40\%}$ in the north, but was at $B_{31\%}$ in the south and is estimated to reach B_{40} in 2009. However, the adopted lingcod rebuilding plan specifies a coastwide rebuilding objective. Therefore, a regional management approach provides the opportunity to have different management objectives by area, depending on the health of the stock, without exceeding a coastwide OY.

Black rockfish stocks are managed under separate OYs, with harvest guidelines specified for each state within the southern OY. These harvest guidelines apply to both commercial and recreational fisheries in the southern region. Lingcod are managed under a rebuilding plan on a coastwide basis; therefore, the Council has approved a coastwide OY for lingcod, with recreational harvest guidelines north and south of the border between Oregon and California. Development of two harvest guidelines is based in part on findings of differential stock health north and south of 43° N latitude in the most recent stock assessment (see Section 2.1). The lingcod harvest guidelines apply only to recreational fisheries.

The Council has also indicated a preference for regional management of some stocks for which biological differences have not been demonstrated by region, specifically canary rockfish and yelloweye rockfish. The Council is proposing to manage the recreational fisheries for these species under harvest guidelines; commercial fisheries would continue to be managed on a coastwide basis. Both of these species have very low OY alternatives in 2005 (<50 mt for canary rockfish and 26 mt for yelloweye rockfish). The recreational portions of these OYs are about 18 mt for canary rockfish and 12 mt for yelloweye rockfish. Managing to such extremely low numbers is difficult. One purpose of regional management of these stocks is for each region to be responsible for managing their respective fisheries to ensure harvest targets are not exceeded.

As discussed in the following sections by state, regional management adds complexity to the management regime by defining management areas beyond the traditional coastwide approach with associated harvest guidelines for each region. The Council considered state specific regions and harvest guidelines, but recommended a two-region approach divided north and south of the Oregon/California border. Fine scale regional management with a large number of area specific regions along the coast would create regulatory and monitoring complexity. Each region would require separate harvest provisions, sampling protocols, and potentially, management responses if catch levels proceed ahead of projections. The Council-preferred Alternative of creating two regional management areas with respect to recreational harvest of lingcod, canary rockfish, and yelloweye rockfish provides greater flexibility than alternatives with more specific area management (i.e., state-specific harvest guidelines). Although each state will have an increased burden of closely monitoring and regulating recreational fisheries, new fishery monitoring programs such as CRFS, more timely, state level management response, and specific definition of harvest guidelines in federal regulations, provide reasonable assurances that each region will be able to achieve, but not substantially exceed, harvest guidelines.

California

The federal regulations allow NMFS and the Council to modify certain regulations inseason to adjust harvest levels for any groundfish species projected to exceed allowable harvest (harvest guidelines, targets, or OYs). In addition, the CFGC has given the CDFG authority to close the recreational fishery for lingcod, rockfish, a subgroup of rockfish, cabezon, greenlings, California scorpionfish, California sheephead, ocean whitefish, and/or other federal groundfish species in all or part of a RLMA for all or part of the year when CDFG determines a harvest limit (OY or harvest guideline) for lingcod, rockfish, a subgroup of rockfish, cabezon, or California scorpionfish has been exceeded or is projected to be exceeded prior to the end of the year.

Species with harvest guidelines

If a harvest guideline for canary rockfish, yelloweye rockfish, lingcod, or black rockfish specified for California for 2005-2006 is projected to be exceeded, the CDFG may take action to close all or part of the recreational fishery in all or part of the state regions in all or part of the remainder of the year as was described above (see exception for Northern RLMA below). However, in the northern RLMA (north of 40°10' N latitude to the Oregon/California border), in the case of canary rockfish or yelloweye rockfish, the CDFG may take action to close all or part of the recreational fishery deeper than the 30-fm depth contour as specified in federal regulations.

CDFG is proposing that under specific conditions (triggers), inseason changes to size limits, retention allowances (bag limits), and fishing seasons, depths, or areas be made. When the projected catch is below a trigger, the fishing regulations could become less restrictive to allow access to stocks. When the projected catch is above a trigger, the fishing regulations could become more restrictive to lower the harvest rate. Responses to triggers may take place outside the Council process, with state action and subsequent conforming action by NMFS.

Rockfish-Cabezon-Greenling Bag Limits

If the harvest guideline or harvest target for any nearshore rockfish species within the Rockfish-Cabezon-Greenling (RCG) complex is projected to be exceeded, state action may be taken to reduce the bag limit from 10 fish (status quo) to a number less than 10 fish according to analysis provided below (see Section 4.3.2.7). The proposed reduction in bag limit may apply specifically to the private boat, shore-based, and diving modes, resulting in a differential bag limit for these modes and the CPFV mode due to economical implications for CPFVs when a bag limit is reduced below 10 fish. A separate option is to include CPFVs in a bag limit reduction. This management response may be particularly effective for nearshore rockfish species, such as black rockfish, where limiting depth may not be the most effective tool.

Process for Inseason Catch Evaluation and Criteria to Trigger Management Responses

CDFG intends to track recreational landings throughout the season with the intention of identifying conditions when inseason management response is necessary to stay within prescribed harvest allowances (OYs or harvest guidelines). A statewide projection of monthly recreational landings, and a statewide cumulative landings distribution built from this projection, may be generated for canary rockfish, yelloweye rockfish, lingcod, and black rockfish using the Council-adopted season and depth management structure for 2005-2006. An example of the statewide cumulative landings distribution with zones for specific actions is provided in Figure 7-1.

This graph displays a line reflecting projected cumulative landings bracketed by a shaded zone of no action. Landings within this no-action zone are within the expected variability of the catch estimates and require no action at that time. The area above the no-action zone defines a precautionary zone. Catches within this dark-shaded zone may trigger posting a notice on the CDFG website informing the public that catches are running higher than expected and may initiate a state preventative management response. If landings fall within the lighter shaded areas above the precautionary zone or below the no-action zone (i.e., the lighter shaded area on the graph), then either a preventative management response or a less restrictive management response may be triggered. The criteria used to determine whether landings fall inside or outside of this shaded area are as follows.

1. When estimated landings from the first open month of fishing become available, these landings and the projected landings for the second month (if available) may be evaluated for the above species to determine whether the estimated landings from the first month or the cumulative total of the landings from the first month and the projected landings from the second month are 25% or more above the statewide cumulative landings distribution for those months. If these conditions are met for a species, then this may trigger the implementation of more restrictive management measures (as described above).

2. When estimated landings from each subsequent month become available, then these may be evaluated along with projected landings for the month following (if available) for the above species to determine whether the cumulative estimated landings from these months or the

cumulative estimated landings plus the projected landings are 15% or more above the statewide cumulative landings distribution for those months. If these conditions are met for a species, then this may trigger the implementation of more restrictive management measures (as described above).

3. When the cumulative estimated landings for a month or cumulative estimated landings and the projected landings for the subsequent month (if available) reach 50% of the harvest target, these may be evaluated to determine whether they are:

   - 15% or more above the statewide cumulative landings distribution for those months. If these conditions are met for a species, then this may trigger the implementation of more restrictive management measures (as described above); or
   - 20% or more below statewide cumulative landings distribution for these months. If this condition is met for a species, then this may trigger the implementation of less restrictive management measures (as described below) with the following condition: less restrictive management measures shall not be implemented if they result in projected landings of the other species listed above exceeding their harvest limits.

4. Once cumulative estimated landings for a month or cumulative estimated landings plus the projected landings for the subsequent month (if available) reach 80% of the harvest target, then these may be evaluated for the above species to determine whether:

   - The cumulative estimated landings from these months or the cumulative estimated landings plus the projected landings are 10% or more above the statewide cumulative landings distribution for these months; or
   - the cumulative estimated landings from these months and the cumulative estimated landings plus the projected landings are 15% or more below statewide cumulative landings distribution for these months.
   - If the first condition is met for a species, then the implementation of more restrictive management measures may be triggered (as described above). If the second condition is met, then this may trigger the implementation of less restrictive management measures (as described above) with the following condition: less restrictive management measures may not be implemented if they result in projected landings of the other species listed above exceeding their harvest limits.

5. If, in any evaluation period, 90% of the harvest target has been landed or is projected to be landed, CDFG may initiate action to close all or part of the fishery by the time the catch is projected to reach the harvest guideline or recreational target.

Oregon and Washington

Washington and Oregon have responsive monitoring programs and regulatory processes in place and have committed to tracking their respective recreational fisheries inseason. If a recreational harvest guideline for canary, yelloweye, or lingcod specified for the area north of the California/Oregon border is projected to be exceeded, WDFW will consult with ODFW, and either or both states may take action inseason to close all or portions of the recreational fishery deeper than 30 fm (20 or 30 fm in Oregon), or adjust seasons, bag limits, or size limits, as needed. For purposes of consistency and clarification, actions taken by WDFW or ODFW would be specified in federal regulations.

7.3.2 Impacts to Fishery Enforcement

Prior to 2000, groundfish management mainly regulated the amount of landed fish, based on cumulative trip limits. This type of measure has the advantage that monitoring and enforcement can be shore-based because limits are based on landings. But this approach is problematic because discarded bycatch cannot be directly monitored from shore. Depth-based closed areas are part of the No Action Alternative and are proposed in all of the action alternatives as a way to reduce bycatch by keeping vessels out of areas where overfished groundfish species occur. However, depth-based management introduces a new set of enforcement issues because compliance must occur at sea, requiring additional, more costly at-sea monitoring and enforcement methods. The efficacy of management measures hinges on the degree to which fishery participants comply with them. Environmental impacts associated with enforcement, therefore, mainly result from the degree to which catch levels are exceeded because of non-compliance. Furthermore, management of overfished groundfish relies on depth-based closures to minimize bycatch of these species. Illegal fishing activity in closed conservation areas could result in increased bycatch. The degree to which these catches in excess of limits or in closed areas remain unmonitored or under-reported is of crucial importance to effective management. While recognizing that most fishery participants comply with the rules, the overall level of compliance is influenced by the tradeoff between risk and reward. Fisheries enforcement generally seeks to deter fishery participants from violating the rules through severe penalties because the cost of constant and comprehensive monitoring using conventional means is high. This strategy relies on a sufficient level of monitoring and enforcement, so the tradeoff between the risk of being caught and severely penalized, and the benefits from harvesting fish illegally is tipped in favor of compliance for the great majority of fishery participants.

7.3.2.1 Geographic Extent of Closed Areas

Groundfish Conservation Areas, which include the RCA, YRCA, and Cowcod Conservation Areas CCAs, prevent vessels from operating in waters where overfished species are commonly found, reducing the overall incidental take of overfished species. If the integrity of the closed areas are not adequately maintained, harvest assumptions could be inaccurate, resulting in indirect effects, such as unaccounted for removals. Incursions into the conservation areas and the use of prohibited gear types could result in higher than anticipated catch of overfished or target species and the OYs could unknowingly be exceeded.

The geographic extent and the number of the GCAs can have a profound effect on regulatory complexity. Their boundaries are complex, involving hundreds of points of latitude and longitude to delineate nearshore and offshore fathom curves (Figure 7-2 and Figure 7-3). The areas are vast, extending along the entire West Coast from Canada to Mexico, and weather and sea conditions are frequently harsh. As a result, ensuring the integrity of conservation areas using traditional enforcement methods (such as aerial surveillance, boarding at sea via patrol boats, landing inspections, and documentary investigation) is difficult. The extent of the RCAs, the largest and most complex of the closed areas, are similar between the No Action and Action Alternative 1 and are substantially smaller under Action Alternative 2, and Action Alternative 3, and are the smallest under the Council-preferred Alternative (Table 3-1). However, regulatory complexity and costs to the management regime, due to the size of commercial closed areas and their distance offshore, are not anticipated to differ substantially between the alternatives because implementation of VMS has decreased enforcement reliance on at-sea patrols. Recreational fishery alternatives propose use of depth-based closed areas for 2005-2006 (see Chapter 2). One relatively new aspect of these recreational closures is the establishment of waypoints specified by latitude and longitude defining large closed area boundary lines. Previous depth-based closures in the recreational fisheries have only specified a depth contour as a boundary or had established waypoints for a relatively small geographic area (i.e., the YRCA). Although many recreational vessels carry the necessary electronic equipment to chart their location relative to the closed area, it is uncertain what effect expanding the use of specified boundary lines in recreational fisheries will have on recreational fishery compliance.

Increased reliance on depth-based closed areas in recreational fisheries adds regulatory complexity and costs to the management regime. Development of closed areas requires significant analyses to determine historic fishing patterns and species distributions. Determination of specific latitude and longitude coordinates is often a public process, which tries to balance the conservation needs of overfished species while preserving fishing opportunities for harvestable target stocks. Adoption and publication of hundreds of coordinates is a considerable regulatory task and efficient and accurate publication of coordinates involves the creation of written and electronic listings. Shore-based enforcement techniques are not sufficient and increased at-sea patrols are required to ensure angler compliance with closed areas.

VMS is a tool commonly used to monitor vessel activity in relationship to geographical defined management areas where fishing activity is restricted. VMS transceivers installed aboard vessels automatically determine the vessel’s location and transmit that position to a processing center via a communication satellite. One of the major benefits of VMS is its deterrent effect. If fishing vessel operators know they are being monitored and a credible enforcement action will result, then the likelihood of a vessel using a prohibited gear in a conservation area is significantly diminished.

7.3.2.2 Development and Enforcement of New Trawl Gear Requirements

All of the Action Alternatives for the non-whiting limited entry trawl fisheries require all trawl fishing north of 40°10' N latitude and shoreward of 100 fm to use a selective flatfish trawl to reduce bycatch of shelf rockfish. ODFW has worked closely with enforcement personnel to develop ways to identify the newly required gear type during at-sea patrols. Trawl gear tested in the selective flatfish EFP met the definition of legal small footrope bottom trawl gear, but included specific design criteria not currently required by regulation (see Section 2.2.3.1). Provisions in the action alternatives, including the Council-preferred Alternative, would require increased regulatory specification and complexity to enforce the necessary gear modifications. This effort would be most intensive in the first year of implementation and would become routine in future years as the fishery adjusts to the new regulations. Ensuring the use of selective flatfish trawl gear is imperative to realizing reduced bycatch of shelf rockfish and increased opportunity for target flatfish species adding an enforcement burden to the management regime.

7.4 Discussion of Cumulative Impacts

Cumulative impacts to the management regime result from the combination of past, present, and future direct and indirect impacts of management measures combined with the effects of other activities. Ongoing and dramatic changes in the management, enforcement, and monitoring of groundfish fisheries in response to substantial reductions in the amount of available resources have combined to force management agencies to consider changes to the management regime.

7.4.1 Specific Area Management

Current groundfish regulations close broad depth intervals along the coast for both trawl and nontrawl gears as a means to reduce the take of overfished species. These closures or RCAs, take the approach of restricting fishing essentially throughout the major depth distribution of the species of concern. However, most fish, and certainly most rockfish, are not homogeneously distributed, but rather occur in patchy distributions, often associated with key habitat features. Restricting fishing in "hotspot" areas where overfished species are most concentrated, or focusing fishing in hotspot areas where target species are most concentrated, recognizes the true nature of fish distributions and might be a more direct management approach.

Current RCA management recognizes changing fish distributions to some extent by stratifying bycatch information from the WCGOP by time, depth, and geographic area. Therefore, RCA management might be considered hotspot management because restricted areas are determined using general species distribution information. As more information becomes available from the WCGOP, further refinement of these strata will likely be possible.

Depth based area management has been applied to recreational as well as commercial fisheries. Depth based restrictions have been adopted off California and Oregon seasonally limiting recreational fisheries to shallower waters for much or all of their coasts to minimize impacts to overfished species such as bocaccio and canary rockfish. Additionally, the CCAs off California and the YRCA off Washington either prohibit or substantially limit recreational and commercial fishing in key areas of high abundance of the species of concern. A conservation closure has also been established for commercial and recreational fisheries around the Cordell Banks off California. Additionally, WDFW EFP programs have established specifically defined areas within RCAs where arrowtooth flounder and spiny dogfish might be more cleanly targeted rather than considering the entire northern RCA as a single homogeneous area of uniform bycatch. Specific areas of concentrations of petrale sole have also been excluded from RCA restrictions in winter months to allow more cleanly targeting this species to achieve OYs. The ODFW has conducted an analysis of information collected from the shoreside whiting EFP that identifies areas where widow rockfish and canary rockfish bycatch in the fishery is highest. While these areas have not been restricted through regulation, the information has been made available to the whiting industry to facilitate voluntary action to reduce widow bycatch.

One advantage of this hotspot approach is that desired conservation savings might be attained for a species without closing areas that are much lower in abundance, even though they may fall within the depth distribution typically inhabited by the species. Also, ocean bathymetry is such that a line drawn along the coast to approximate a fathom contour might fail to include isolated areas of higher relief or key habitat for the species of concern. Focusing management areas more specifically on such key habitats could encompass these areas while presenting the potential to exclude from restriction areas within RCA depth contours that don't contain habitats or concentrations of the species or species complexes of concern.

A major problem with establishing a conservation hotspot is assembling the requisite information to demonstrate a conservation benefit to a particular species or species group. Lack of this information is much of the reason the current RCAs are based broadly on the primary depth intervals occupied by the species being addressed as measured by triennial survey and trawl logbook catch information. However, data sources are emerging that might provide for more specific siting of management areas than current RCAs. The WCGOP is continuing to collect information on a tow-by-tow basis for trawl gear and for individual sets for line gears. High (and low) catch rates from this program for individual species have the potential to be aggregated at a very area-specific level. Efforts associated with the development of the EFH EIS have produced much more refined definitions of key habitat areas along the coast than were previously available as well as summarized information on fish distributions. There have also been a number of submersible surveys conducted along the West Coast observing both fish distributions and habitat. Results from these surveys could prove useful in area management by establishing relationships between habitat areas and species assemblages. Some of these surveys are designed to produce quantified results, such as the WDFW survey off Cape Flattery, Washington, designed to produce estimates of abundance in trawlable versus untrawlable habitats. Tow-by-tow and set locations from state EFP programs also provide species-specific catch areas. The set line survey conducted by the IPHC is an additional source of information on the distribution of a number of species. The IPHC survey records information on the species composition of the catch by precise set locations. Qualitative information from the fisheries is another possible source of information. Catch information from recreational and commercial fishery participants was instrumental in crafting both the YRCA and the winter petrale trawl areas. Incorporation of information from the above sources into a GIS data base might provide a useful tool to assist in designing specific area management options.

Examples of Available Data Sources to Facilitate Specific Area Management

- Federal Observer Program
- Trawl Logbooks
- State Sponsored EFPS
- Detailed Habitat Mapping (EFH)
- Survey Data
  - Trawl Surveys
  - Submersible Surveys
  - Hook and Line Surveys (e.g., IPHC)
- Tribal Observer Information
- Observations from Commercial and Recreational Fisheries

Implementation of specific area management, conservation areas, or hotspots is not without costs to the management regime. Benefits of reduced bycatch and increased opportunity for target species are weighed against the management costs of researching, regulating, and enforcing these concepts. As described in Section 7.3.2.1, identification of new area management concepts can add complexity to regulatory and enforcement efforts. Although not ready for inclusion in the action alternatives under consideration in this EIS, additional area management concepts included in the sections below are currently being studied and may be proposed for inseason action in 2005-2006, but additional analyses and NEPA documentation may be required for implementation.

7.4.1.1 Widow Rockfish

Research conducted by ODFW has explored the potential area management strategies for minimizing widow rockfish bycatch in the limited entry Pacific whiting trawl fishery (see Section 4.3.2.1 and Appendix C). Analyses conducted have identified four hotspots of relatively high widow rockfish bycatch while targeting

Pacific whiting. This concept of closing widow rockfish hotspots to the Pacific whiting fishery is under continued development and could be considered as a tool for the 2005 whiting fisheries if additional analyses are completed. Area management in the whiting fishery has implications for the reduction of bycatch of other rockfish species of concern, such as canary rockfish.

7.4.1.2 Spiny Dogfish

One specific example of area management, which seeks to focus fishing in an area of high catch rates of target species and low bycatch rates of overfished species, is the EFP fishery for spiny dogfish off the Washington coast. This EFP was conducted in 2003 using longline gear in very specific areas (Figure 7-4). During 2003, the vessel operating in this EFP made 78 longline sets (71,680 total hooks) with a resultant catch of 175,000 pounds of spiny dogfish and a bycatch of 129 pounds of yelloweye rockfish and 35 pounds of canary rockfish. During this EFP, a WDFW monitor was onboard for 100% of the fishing effort and full rockfish retention was required.

This EFP is currently being repeated with the expectation that information from the program can be used to promulgate regulations to accommodate a targeted hook and line dogfish fishery within acceptable bycatch impacts on overfished species.

7.4.1.3 Area Management in Recreational Fisheries

The effect of changes in the structuring of the recreational fishery for 2004 (offshore closures, harvest guidelines, etc.) will not be known at the time of adopting 2005 and 2006 management measures. The following are suggested management measures that could be implemented inseason if the 2004 (or 2005) fishery does not proceed as expected. Concepts discussed in this section were not developed enough for incorporation into the 2005-2006 management cycle at this time, but are reasonably foreseeable changes to the management regime inseason or in the next biennial cycle.

Although retention of canary rockfish and yelloweye rockfish in recreational fisheries is prohibited, bycatch mortality of released fish is still large enough so that conservation concerns constrain the fishery to protect other overfished groundfish species. The large offshore recreational RCA closure is an example of how these recreational fisheries are affected by bycatch of overfished species, especially yelloweye rockfish and canary rockfish. To help alleviate this constraint without increasing bycatch mortality, perhaps the large offshore recreational RCA closures could close hot spots of known canary rockfish and yelloweye rockfish concentrations or open “cold spots” of areas known to have no or low concentrations of canary rockfish and yelloweye rockfish. Identification of potential areas for hot spots or cold spots depends on adequate information about the distribution and abundance of these species. Review of NMFS historical triennial surveys, IPHC surveys, a pilot study conducted by CDFG mapping recreational angler effort with canary rockfish occurrence, and other data sources may provide such information.

Similarly, other means to reduce bycatch mortality, especially of overfished species, may include gear restrictions and/or release techniques. For example, the ODFW is presently studying the effects of sub-surface release on survival of rockfish. If successful techniques are developed and accepted, their use may alleviate the current constraints from bycatch mortality on recreational fisheries. Other examples could include modifications of terminal gear, perhaps hook size or shape, to avoid or reduce capture of overfished species.

7.4.2 Implementation of Exempted Fishing Permits Into Regulations

EFPs allow fishing activities that would otherwise be prohibited. As an example, EFPs provide a process for testing innovative fishing methods for prosecuting sustainable and risk-averse fishing opportunities. The Council has signaled its intent to make greater use of EFPs in the new groundfish management regime of depth restrictions and widespread area closures to reduce harvest of overfished species. However, there are potential drawbacks to significant EFP proliferation. Low OYs for overfished species force hard allocation decisions between allowing immediate fleet-wide fishing opportunities in directed and incidental groundfish fisheries versus the longer term potential benefits ascribed to gaining new information from EFPs.

From 2000 through 2003, ODFW, working cooperatively with industry, Oregon State University, and NMFS, developed and tested a modified flatfish trawl, comparing its performance to a typical West Coast sole trawl using an alternate haul sampling design (King, *et al.* 2004). This experiment showed reductions in bycatch for several overfished species and many of the results and provisions of these experiments have been incorporated into the action alternatives for 2005-2006 management measures (see Section 2.3.2.1).

Although not ready for inclusion in the action alternatives under consideration in this EIS, the following EFPs included in this section are currently being considered for implementation in regulations and may be proposed for inseason action in 2005-2006. Additional analyses and NEPA documentation may be required before any regulatory changes are made effective.

7.4.2.1 California Selective Flatfish Trawl

The California Selective Flatfish Trawl EFP is being continued in 2004 and contemplated for 2005. If adequate data is collected, the EFP may be concluded in the fall of 2004. Therefore, the results necessary to implement this EFP into regulations were not available during the preseason planning of management measures for 2005-2006. The GMT has recommended consideration of EFP results and selective flatfish trawl provisions off California south of 40°10' N latitude inseason in 2005 or 2006. Alternative trawl measures south of 40°10' N latitude could be similar to those being considered north of 40°10' N latitude under the action alternatives in this EIS as the California EFP was patterned after the research and EFP work conducted by Oregon (see Section 2.2.3.1).

7.4.2.2 Oregon Deepwater Complex Fishery Reduced-Discard Strategy

The ODFW Trawl Discard Reduction EFP for the DTS fishery is being conducted in 2004. The purpose of this EFP is to test a discard reduction strategy for the deepwater complex trawl fishery for Dover sole, shortspine thornyhead, and sablefish (DTS). The strategy uses written vessel-processor, state-vessel and state-processor agreements to reduce economic incentives for discarding, mandate more complete or possibly full retention of DTS species, and create modest incentives for retention of DTS. The incentives created promote reduced discard, fewer tows, higher economic efficiency, and may be scalable to the West Coast fishery as a whole. The GMT supports the approval of this EFP because the primary objective is bycatch reduction, and it will not impact canary rockfish. Pending review of the results of the data collected, the GMT has recommended consideration be given to the potential for converting this EFP into regulation inseason for 2006.

7.4.2.3 Arrowtooth Flounder Trawl

The WDFW proposed consideration of implementing provisions of their sponsored arrowtooth trawl EFP in regulations for 2005-2006. Provisions of the EFP considered for regulatory implementation include some access to the existing trawl RCA with discrete canary rockfish hotspots closed to fishing, full retention of all rockfish, 100% sampler coverage, and overfished species' bycatch caps for each participant in the fishery (see Appendix B, Proposed Arrowtooth Flounder- Rockfish Conservation Area (AT-RCA) Trawl Fishing Program: Scoping Document). The NMFS has subsequently informed WDFW and the Council that the action to convert this EFP into regulations is beyond the scope of the Council actions contemplated for June 2004 to decide 2005-2006 management measures (and analyzed herein) and would require additional analysis of the consequences of some of the proposed regulatory provisions. Additional analysis beyond what is provided in this EIS would be needed to convert this EFP into regulations during the 2005-2006 management period (see Section 2.2.3.2). In particular, the full rockfish retention and 100% observer coverage provisions need further analysis since such provisions are not part of the current Groundfish FMP. Therefore, WDFW is proposing delaying a final decision on amending federal regulations to implement these provisions pending further analysis.

The net effect of implementing these provisions may be consequential to the management regime. Pending the results of ongoing analysis, there could be a regulatory burden to the management regime associated with converting this EFP into regulations. Fishery managers will need to weigh the costs of implementing these new concepts into the regulatory framework versus the potential fishery benefits of sustainable target species harvest with minimized bycatch of overfished species. The administrative burdens of implementing and monitoring the EFP under the No Action Alternative also need to be considered.

7.4.3 VMS Expansion

Enforcement methods of patrolling sea areas either by airplane or ship (carried out primarily by the U.S. Coast Guard, although state agencies have some capacity in this regard), and using fishery observers to monitor vessel position, can be used to monitor and enforce closed areas. However, VMS is a superior enforcement technology because the position of vessels with transmitting units can be tracked at all times. NMFS, in consultation with the Council and the Ad Hoc Vessel Monitoring Committee (VMSC), published a final rule in the *Federal Register* on November 4, 2003 that requires VMS on all limited entry trawl and limited entry fixed gear vessels beginning January 1, 2004. A complete analysis of the alternatives considered for this program can be found in the Environmental Analysis/Regulatory Impact Review/Regulatory Flexibility Analysis for A Program to Monitor Time-Area Closures in the Pacific Coast Groundfish Fishery (available online at: www.nwr.noaa.gov/1sustfsh/groundfish/VMS/VMS_EA_Final.pdf)(NMFS 2003b).

The risk of exceeding OYs due to non-compliance would be greater without the VMS monitoring program in place. Enforcement relying on monitoring by airplanes and ships to identify incursions into the closed areas would not be as effective as VMS. A lot of time and considerable cost would have to be spent investigating any vessel appearing on enforcement radar, whether they are legitimately fishing in an area or not. This would reduce the ability of enforcement vessels to cover a large proportion of the closed area in a timely manner, reducing total monitoring and deterrence.

The risk of exceeding OYs would be less if VMS were implemented under any of these alternatives. One of the major benefits of VMS is its deterrent effect. If fishery participants know they are being monitored, and a credible enforcement action could result, they are less likely to fish illegally in closed areas. In addition, the data collected with a VMS system can be used to better understand the distribution of fishing effort, which is likely to be affected by closed areas.

Depth-based management started in 2002 and became a major tool in the management of overfished groundfish species. Moving fisheries away from areas critical to the health of rebuilding stocks has quickly become a central aspect of West Coast groundfish management. The need to maintain the integrity of groundfish conservation areas through effective monitoring and enforcement is critical if fishery management agencies aim to provide fishing opportunity for healthy stocks while rebuilding overfished species in the future. The cumulative effect of declining fishery resources, increasing reliance on depth-based closed areas, and the long rebuilding time frames for overfished rockfish species have led management agencies to consider expansion of VMS to fishery sectors beyond limited entry fleets. The VMSC met in October, 2003 to develop criteria and objectives for identifying key fishery sectors to consider for VMS expansion (summary minutes of the VMSC report can be found at the Council website at: www.pcouncil.org). The Council considered the VMSC report on program expansion objectives at its November 2003 Council and is expected to pursue program expansion in the fall of 2004. NMFS is expected to keep the Council updated on the status of the existing VMS program as NMFS and Council and develop options for program expansion.

7.4.4 Impacts to Fishery Monitoring and Biennial Management

Fishery management tools recently implemented, such as depth restrictions for recreational fisheries if caps on impacts to overfished species are attained, and tools considered for the future, such as individual quotas or bycatch caps, require timely, inseason catch and bycatch information. A cumulative effect of decreasing fishing opportunity, area specific regional management, and regulations that rely on inseason tracking of fishery impacts is development of timely and accurate data sources. Currently, handheld computers are used by ODFW in dockside sampling of recreational fisheries, which eliminates the need for data entry, and thus, shortens the time needed to produce catch estimates. Proliferating the use technology that saves time and improves data availability becomes increasingly important with low harvest levels, specific area management, and retention restrictions. Among the tools being developed or considered are electronic logbooks to improve the speed and ease of incorporating at-sea fishery data into management, redesigning the MRFSS program in California by putting an emphasis on dock-side sampling for more effective inseason use, and expanding the WCGOP. As these data sources expand and our knowledge of the stocks and fisheries improve, management agencies will need to consider mechanisms for incorporating this new information into biennial management. The Council has formed the GIPC to look into the use of these new data during a two-year management cycle. Fishery management agencies strive to use the best available science when establishing fishery resource policy, but frequent adjustments to the harvest specifications or management measures could erode the benefits of biennial management.

7.4.5 Fleet Reduction and Fishery Rationalization

Fleet reduction and fishery rationalization have been considered by state and federal management agencies since the 1980's. Overcapitalization of the fishery and optimistic expectations of groundfish stock productivity led to overfished species and compromised fishing industries and communities. In response, the Council and NMFS implemented a fixed gear permit stacking program through Amendment 14 to the FMP. NMFS has also completed a trawl vessel buyback program to reduce the size of the limited entry fleet. Additionally, the Council has begun to explore the potential for individual quotas, in part, as a means of providing regulatory flexibility and economically viable fishing communities. The cumulative effects of past management practices, current fishery crises, and the foreseeable need to rebuild overfished species and strengthen coastal economies have combined to make these dramatic changes to the management regime attractive to the fishery regulatory agencies.

7.5 Summary of Impacts

7.5.1 The No Action Alternative

Estimated impacts under the No Action Alternative are similar to the impacts associated with Action Alternative 1. The Council applied the concept of a buffer in the management of canary rockfish in 2004 and could do so again under either the No Action or the first two action alternatives. Regional management concepts for constraining species such as canary rockfish, yelloweye rockfish, and lingcod are not specified for the No Action Alternatives but are being considered for recreational fisheries in all of the action alternatives. Regional management strategies increase fishery monitoring and regulatory burdens, but they can also reduce the scope, complexity, and charge of inseason management.

The size and complexity of the GCA's under the No Action alternative are similar to Action Alternative 1 and are larger than those proposed under Action Alternative 2 and Action Alternative 3. The implementation of VMS in 2004 will decrease the enforcement challenges of preserving the integrity of conservation areas minimizing the differential impacts between the alternatives. Perhaps more important to the enforcement of conservation areas than their size and configuration is the number of restricted areas and their relation to each other. Several new concepts for specific area management are being studied or proposed for possible implementation in 2005-2006. New area management concepts, which do not replace or enhance existing GCA's, may add regulatory and enforcement complexity.

The implementation of selective flatfish trawl gear is a new concept and is not part of the No Action alternative. The No Action Alternative includes differential regulations for large and small footrope trawl gear but does not have the regulatory and enforcement complexity of new gear specifications.

7.5.2 Action Alternative 1

All of the action alternatives have the increased burden on the management regime of constraining OYs and the need for complex regulations and active monitoring of fisheries. Projected impacts to constraining species, principally canary rockfish, are lowest under this alternative. Therefore, this alternative provides the greatest opportunity for the use of a buffer against going over the adopted OY for 2005-2006.

Selective flatfish trawl gear is required under all of the action alternatives. There are regulatory and enforcement impacts to the management regime through the development of specific trawl gear modifications and monitoring of vessel activity in areas restricted to selective flatfish trawl gear. This effort would be most intensive in the first year of implementation and would become routine in future years as the fishery adjusts to the new regulations. An additional impact unique to Action Alternative 1 is the requirement of 100% observer coverage in the selective flatfish trawl fishery. This requirement could draw trained observers away from the WCGOP, thereby decreasing the program's ability to sample a wider variety of groundfish fisheries.

7.5.3 Action Alternative 2

Impacts to constraining species for this alternative are intermediate to Action Alternative 1 and Action Alternative 3. Impacts to canary rockfish under this alternative are not likely to leave a substantial buffer.

Alternative management strategies for limiting widow rockfish bycatch in the Pacific whiting fishery are discussed under this alternative. Concepts such as specific area management, establishing an RCA, and penalizing vessels with high widow rockfish bycatch with reduced fishing time are all being considered. All of these concepts have impact implications for the management regime.

7.5.4 Action Alternative 3

Projected impacts to constraining species, principally canary rockfish, are highest under this alternative. Management measures under this alternative are anticipated to achieve or exceed the canary rockfish OY. This alternative provides the least management flexibility, as there is no OY available for setting aside OYs as a buffer against fisheries exceeding impact expectations and frequent inseason adjustments.

7.5.5 Council-Preferred Alternative

Alternatives not expected to fully allocate the OYs for constraining species such as canary rockfish, including the Council-preferred Alternative would allow the Council to utilize the remaining OY as safeguard against the cost of intensive inseason management and the risk of exceeding the OY. Additionally, the Council-preferred Alternative recommends two regional management areas with respect to recreational harvest of lingcod, canary rockfish, and yelloweye rockfish providing greater flexibility than alternatives with more specific area management (i.e., state-specific harvest guidelines). Although each state will have an the increased burden of closely monitoring and regulating recreational fisheries, new fishery monitoring programs such as CRFS, more timely state-level management response, and specific definition of harvest guidelines in federal regulations, provide reasonable assurances that each region will be able to achieve but not substantially exceed harvest guidelines.

The Council-preferred Alternative specified a canary rockfish set aside for the Pacific whiting directed commercial fisheries in 2005-2006. Although effective, real-time monitoring programs are in place for the Pacific whiting fisheries (see Section 7.1.1.2), there will be a regulatory burden of developing and implementing a regulatory mechanism to allow NMFS to carry out an inseason closure of Pacific whiting fisheries as part of routine management in response to bycatch concerns.

Impacts to the management regime due to the extent of the RCAs, the largest and most complex of the closed areas, are potentially smaller under the Council-preferred Alternative than the other action alternatives or the No Action Alternative, because it reduces the size of the closed areas in need of enforcement. However, regulatory complexity and costs to the management regime due to the size of commercial closed areas and their distance offshore are not anticipated to differ substantially between the alternatives because implementation of VMS has decreased enforcement reliance on at-sea patrols. Under the Council-preferred Alternative, recreational fishery regulations rely on the use of depth-based closed areas and specified management lines for 2005-2006 increasing enforcement burdens and compliance uncertainties. Additionally, recreational depth-based closed areas in California south of 36° N latitude under the Council-preferred Alternative introduce increased complexity by limiting recreational fisheries to areas between two depth-based management lines. Previously, recreational depth-based restriction generally allowed angling in areas shallower than an adopted management line. These new provisions in California specify two management lines between which fishing is allowed and shoreward of the shallow line and seaward of the deep line fishing is restricted. This introduces regulatory complexity and creates additional opportunity for noncompliance and increased enforcement burdens.

Provisions in the Council-preferred Alternative would require increased regulatory specification and complexity to enforce the necessary gear modifications in the selective flatfish trawl fishery established north of Cape Mendocino. This effort would be most intensive in the first year of implementation and would become routine in future years as the fishery adjusts to the new regulations. Ensuring the use of selective flatfish trawl gear is imperative to realizing reduced bycatch of shelf rockfish and increased opportunity for target flatfish species, adding an enforcement burden to the management regime.

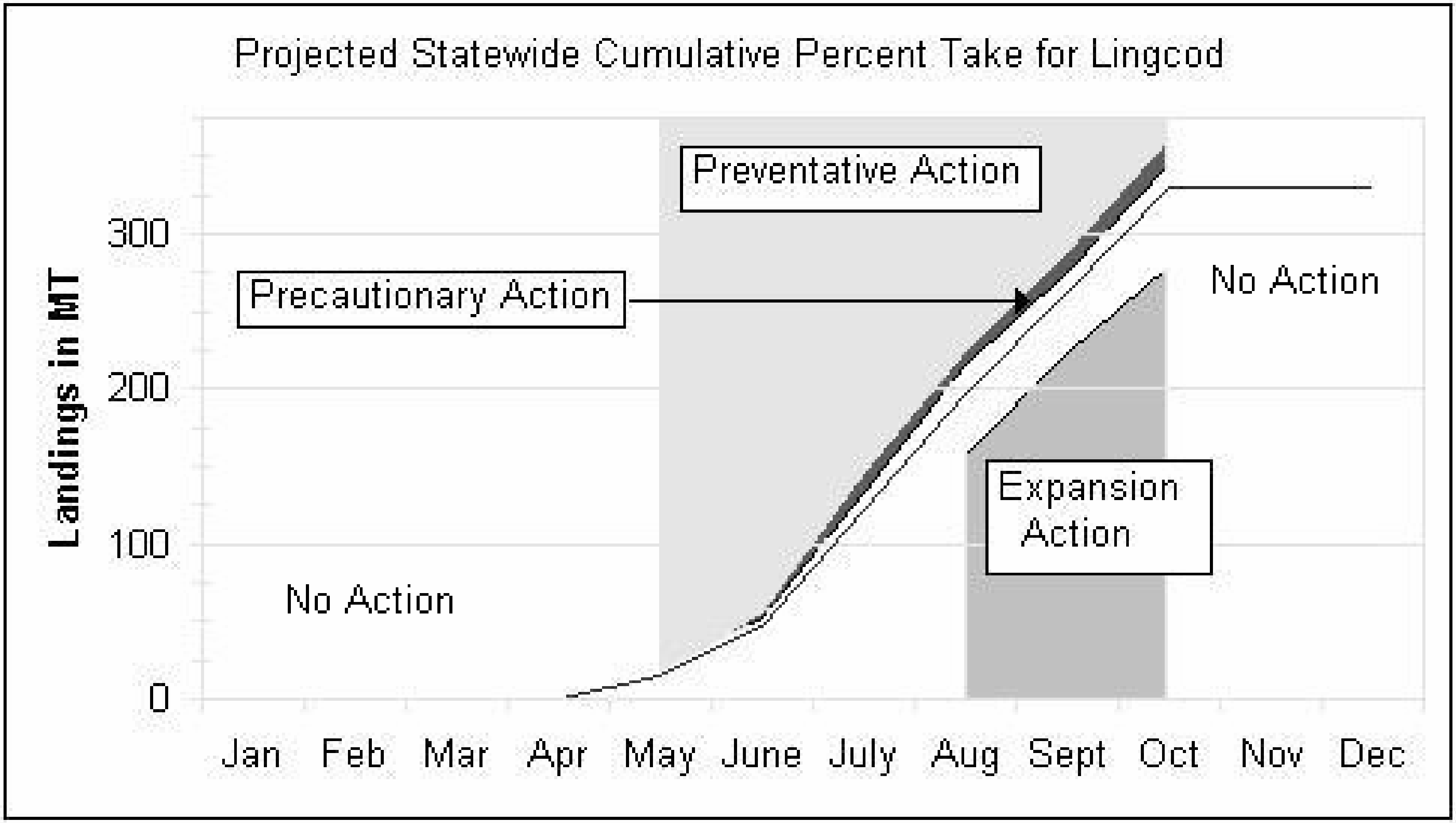

FIGURE 7-1. Example of California recreational fishery tracking with zones for specific inseason actions.

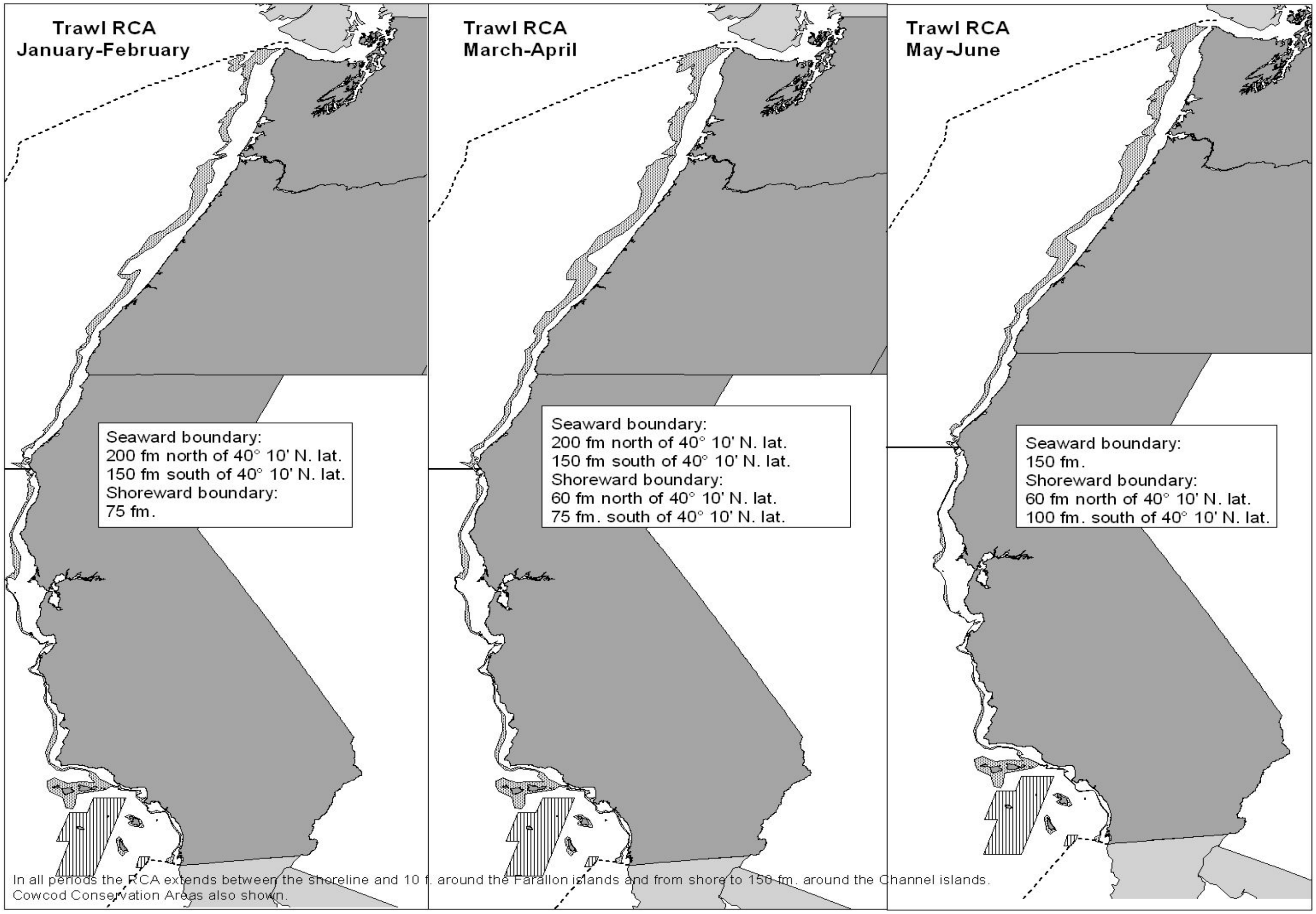

FIGURE 7-2. Trawl Rockfish Conservation Area closures in the first six months of 2004.

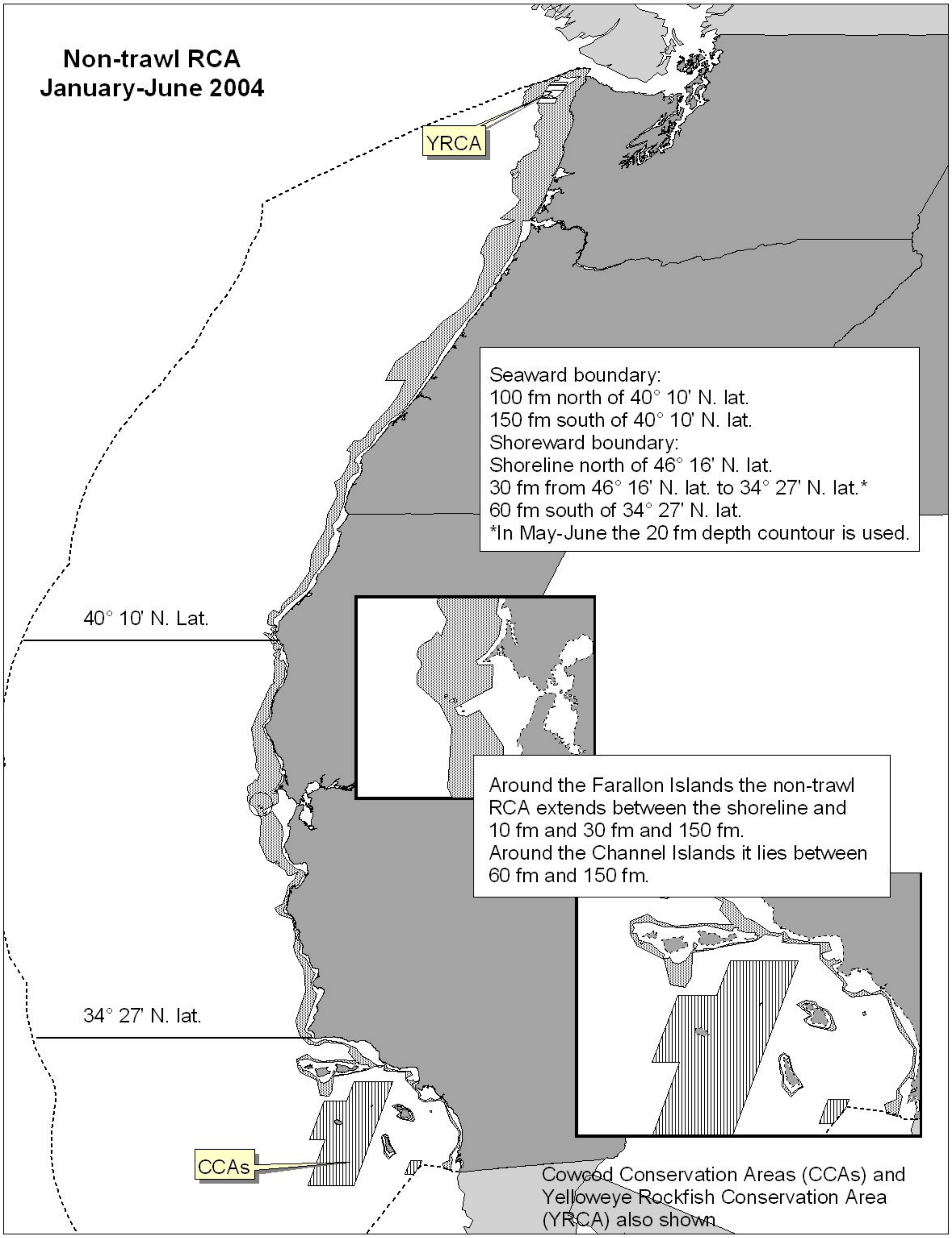

FIGURE 7-3. Nontrawl Rockfish Conservation Area closures in the first six months of 2004.

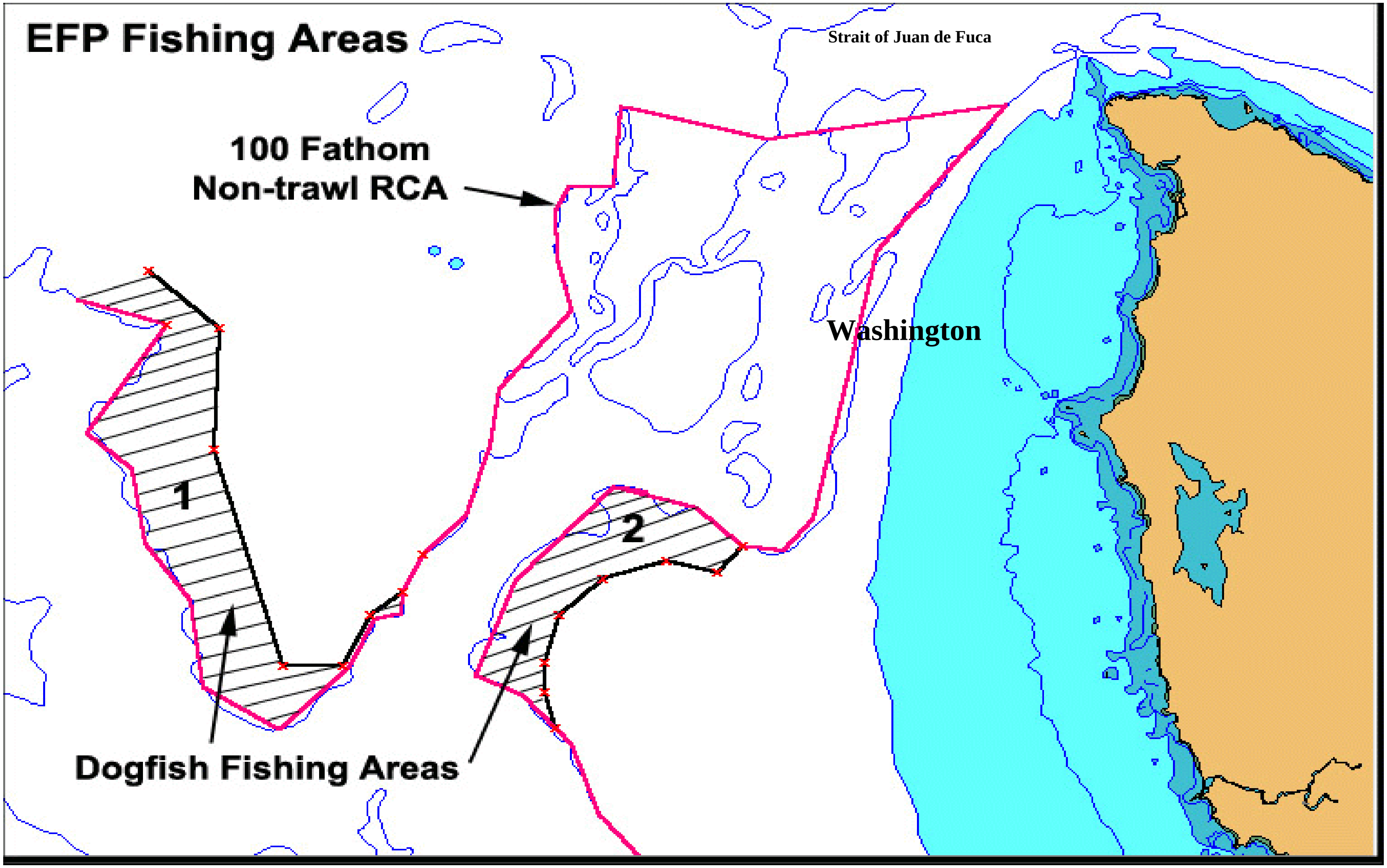

FIGURE 7-4. Spiny dogfish fishing areas in the 2004 WDFW sponsored exempted fishing permit.

8.0 SOCIOECONOMIC ENVIRONMENT

8.1 Affected Environment

The Pacific Coast groundfish fishery is a multi-species fishery that takes place off the coasts of Washington, Oregon, and California. Maintaining year-round fishing opportunities for groundfish has been one of the primary management objectives for the fishery. Pacific Coast groundfish support or contribute to a wide range of commercial, recreational, and tribal fisheries. These activities have a secondary impact on the fish buyers and processors, suppliers of recreational fishing equipment and services, and ultimately the fishing-dependent communities where vessels dock and fishing families live. For a more extensive description of West Coast groundfish fisheries the reader is referred to Appendix A of this document. Key points and updates of that discussion are also summarized below.

According to PacFIN data, of 4,579 vessels active during November 2000 through October 2001, 37% landed some groundfish. These vessels accounted for nearly half of the value of all West Coast landings (groundfish and nongroundfish species). Commercial fisheries targeting groundfish are, for the most part, regulated under a limited entry program implemented in 1994. Other fisheries, which either target groundfish or catch them incidentally, but do not hold groundfish limited entry permits, are considered "open access" fisheries although these vessels may possess limited entry licenses for other, state-managed nongroundfish fisheries. The Council sets overall OYs and allocates harvest limits between different regulatory and fishery sectors, including limited entry and open access fisheries.

Marine recreational fisheries consist of both charter and private vessels. Charter vessels are larger vessels for hire, which typically can fish farther offshore than most vessels in the private recreational fleet. Fishing opportunity both in nearshore areas and farther out on the continental shelf are important for West Coast recreational groundfish fishermen.

Indian tribes in Washington, primarily the Makah, Quileute, and Quinault, also harvest groundfish in the EEZ. There are set tribal allocations for sablefish and Pacific whiting, while the other groundfish species' allocations are determined through the Council process in coordination with the tribes, states, and NMFS.

8.1.1 Commercial Fisheries

In 1994, NMFS implemented Amendment 6 to the Groundfish FMP, a license limitation program intended to restrict vessel participation in the directed commercial groundfish fisheries off Washington, Oregon, and California. The limited entry permits that were created through that program specify the gear type a permitted vessel may use to participate in the limited entry fishery and the vessel length associated with the permit.

Most of the Pacific Coast non-tribal commercial groundfish harvest is taken by the limited entry fleet. The groundfish limited entry program includes most vessels using trawl, longline, and trap (or pot) gears. There are also several open access fisheries that take groundfish incidentally or in small amounts. Participants in those fisheries may use, among other gear types, longline, vertical hook-and-line, troll, pot, setnet, trammel net, shrimp and prawn trawl, California halibut trawl, and sea cucumber trawl. These vessels do not hold groundfish limited entry permits yet may target groundfish or catch them incidentally. Although their groundfish landings are much smaller than the limited entry fleet, they are part of the economic make-up for West Coast groundfish vessels

In March, 2002, there were 450 vessels with Pacific Coast groundfish limited entry permits, of which approximately 243 were trawl vessels, 180 were longline vessels, and 27 were trap vessels. The number of vessels registered for use with limited entry permits has since decreased because of the implementation of the permit stacking program for sablefish-endorsed limited entry fixed gear permits in 2001, and the limited entry trawl vessel buyback program, completed in late 2003. The trawl program bought back 91 vessels, including 91 limited entry trawl permits, 121 state crab and shrimp permits and 27 other Federal fishing permits. As of April 2004, there were 406 Federal groundfish limited entry fishing permits and 312 registered vessels operating with Federal fishing permits on the West Coast. (Seventeen trawl permits, 8 longline permits and 1 trap permit were not associated with any particular vessel.) Of the total permits, 176 were endorsed only for limited entry trawl, 194 were endorsed for longline only, 27 were endorsed for trap gear only, 4 were endorsed for both trawl and longline gear, 1 was endorsed for both trawl and trap gear, and 4 were endorsed for both longline and trap gear. Of the total longline and trap permits, 164 were endorsed for sablefish; 28 of these were tier 1 permits, 42 were tier 2 permits, and 94 were tier 3 permits.

Limited entry permits may be sold and leased out by their owners, so the distribution of permits between the three states often shifts. In 1999, the distribution of permits was approximately 41% for California, 37% for Oregon, and 21% for Washington. In 2002, roughly 23% of the limited entry permits were assigned to vessels making landings in California, 39% to vessels making landings in Oregon, and 37% to vessels making landings in Washington. The change in state distribution of limited entry permits between 1999 and 2002 may be partly due to the consolidation under the sablefish permit stacking program, as vessels operating from northern ports may have purchased or leased sablefish-endorsed permits from vessels that had been operating out of California ports. As of April 2004, 35% of limited entry permits were registered to California operators, 37% to Oregon operators and 27% to Washington operators. The shift in distribution of permits since 2002 is almost exclusively due to the buyback of trawl permits in late 2003.

Tables 8-1a, 8-1b, and 8-1c list 1981 through 2003 commercial landings by round weight, exvessel revenue in current dollars, and exvessel revenue in inflation-adjusted dollars for commercially important species on the West Coast. Tables 8-2a, 8-2b, and 8-2c summarize these commercial groundfish landings by state and also north and south of Cape Mendocino in round weight and exvessel value terms. Table 8-3 lists historical landings separately for the limited entry trawl, limited entry fixed gear, and open access fleets.

Table 8-1a shows the large volume of Pacific whiting landings and the emergence of shore-based processing in the early 1990s. (Note that the at-sea sector includes joint venture fisheries occurring in the 1980s. "Americanization" ultimately replaced foreign processors with domestic ones.) While total groundfish landings peaked in 1994, landings of species other than whiting continued a long-term declining trend during this period. Total groundfish landings measured by weight peaked in 1994 at 305,312 mt and have declined by nearly half since. Flatfish, sablefish, and rockfish landings all peaked in 1982, the first full year under Groundfish FMP management. (Note that some decline in landings is to be expected as standing stocks are "fished down" to MSY biomass.) Landings in all groundfish species categories declined steeply after 1998, when species began to be designated overfished. Rockfish landings fell by about three-quarters from 1998 to 2002.

Table 8-1b shows total groundfish exvessel value peaking in 1997 at $101.2 million, three years after the peak in total groundfish landings. The difference between these trends is partly explained by the observed run up in exvessel prices for sablefish between 1994 and 1997 at a time when total sablefish landings were pretty stable. Total exvessel value of groundfish landings declined 43% to about $58 million in 2003.

Table 8-1c adjusts the values in Table 8-1b for inflation, allowing a more direct comparison of the real value of landings between years. Low-value whiting is a much less prominent component of landings when measured this way. Measured in constant 2003 dollars, the change in the value of rockfish landings between

1998 and 2003 fell by more than two thirds. The inflation-adjusted value of sablefish and flatfish landings remained fairly stable during this period. Measured in constant 2003 dollars, total groundfish landings value was greatest in the late 1980s, peaking in 1989 at almost $132 million. By 2003, the inflation adjusted value of total groundfish landings had fallen by more than half.

8.1.1.1 Limited Entry Trawl Sector

West Coast limited entry trawl vessels use midwater gear to target Pacific whiting, and bottom gear for targeting flatfish species on the continental shelf and slope, or DTS species (Dover sole, thornyhead and sablefish complex) in deep water. Some continental shelf and slope rockfish species have also been important targets in the limited entry trawl fishery. Although trawlers catch a wide range of species, in recent years the following species account for the bulk of landings (other than Pacific whiting) measured by weight: Dover sole, arrowtooth flounder, petrale sole, sablefish, thornyheads, and yellowtail rockfish. Although some rockfish species were important component of landings in the past, management measures intended to reduce the directed and incidental catch of overfished rockfish and other depleted species have significantly reduced the rockfish catches in recent years.

Trawlers take the vast majority of the groundfish harvest measured by weight, but a somewhat lesser share if measured by value. In 2003, groundfish trawlers landed 97% of total groundfish harvest by weight, but only 78% by value (Table 8-3). In contrast, nontrawl vessels realized greater average value per landed weight, primarily due to relatively large landings of high-value sablefish. Pacific whiting, although accounting for a large share of groundfish landings (84% by weight in 2003) is a relatively low-priced product, accounting for 27% of groundfish exvessel revenue in that year. Since whiting are caught almost exclusively by limited entry trawl vessels, they skew the overall value per unit weight calculations for this sector.

Table 8-4 shows groundfish and nongroundfish limited entry trawl landings in major species categories north and south of 40°10' N latitude. This line of latitude, about 20 miles south of Cape Mendocino, is the primary latitudinal demarcation used in groundfish management. Cumulative trip limits, for example, usually differ north and south of this line. For management purposes this line supplanted the boundary between the Eureka and Monterey groundfish management areas at 40°30' N latitude. Because important fishing grounds straddle that boundary, using a line slightly to the south simplifies management and enforcement.

Most limited entry trawl groundfish landings occur north of 40°10' N latitude—134,574 mt of groundfish in 2003, or 97% of that year’s groundfish landings. Again, Pacific whiting account for a large share of these landings since that fishery occurs almost exclusively in the north. Excluding whiting, limited entry trawlers landed 16,466 mt of groundfish in the north, worth $22.4 million, compared to 4,510 mt, worth $5.6 million, in the south. The main groundfish bottom trawl fisheries include the deepwater DTS fishery, and trawling on the continental shelf for flatfish—principally arrowtooth flounder, petrale sole and Dover sole—and other bottom-dwellers. Trawl fisheries targeting rockfish, while important in the past, have been greatly diminished due to management restrictions put in place to prevent overfishing and rebuild overfished stocks. In 2003, rockfish accounted for 21% of non-whiting landings in the south versus only 12% in the north. In 1998, before overfishing declarations triggered more restrictive management measures, these shares were 55% in the north versus 46% in the south.

8.1.1.2 Limited Entry Fixed Gear Sector

Vessels deploying longlines and traps (pots) comprise the limited entry fixed gear sector. These gear types also may be used by vessels in the open access sector, but preferential harvest limits favor license holders.

High-value sablefish have been the principal target for these vessels. This species accounts for a large share of landings and exvessel value. As shown in Table 8-5, sablefish generated \$3.9 million in revenues in 2003, about 62% of the \$6.3 million in groundfish landings generated by this sector during the year. This sector has been plagued by overcapacity, although a series of management initiatives have largely addressed the problem. In the early to mid 1990s the fishery was a “derby” managed by very short seasons of two weeks or less. Two Groundfish FMP amendments have helped to alleviate the symptoms of over capacity in the fixed gear sablefish fishery, effectively eliminating the short, derby season. Amendment 9 required a permit endorsement to participate in the primary sablefish fishery, and Amendment 14 introduced permit stacking. Permit stacking allows up to three sablefish-endorsed permits to be used per vessel. Through a tier system, landing limits vary with the number and type of permits held. According to Table 8-5, in 2003 total groundfish landings by this sector were more than four times greater in the north than in the south. However rockfish landings in the south were double what they were north of 40°10' N latitude, making these species a much more important component of catches in the south.

8.1.1.3 The Open Access Sector

The open access sector comprises vessels that target or incidentally catch groundfish, but either do not hold a federal limited entry groundfish permit, or that do have a limited entry permit that is not endorsed for the particular gear they are using. Vessels in the open access sector may also hold limited entry permits issued by the federal or state governments for participation in other nongroundfish fisheries. Hence this category is more of a catch-all or residual classification than a regulatory sector *per se*. However, groundfish catches by these vessels are regulated under the Groundfish FMP. Open access vessels must comply with cumulative trip limits established for this sector and are subject to the other operational restrictions imposed in the regulations, including general exclusion from the RCAs.

Fishery managers divide the open access sector into directed and incidental categories. The directed fishery comprises vessels targeting groundfish, while the incidental fishery category applies to vessels targeting species other than groundfish but landing some groundfish in the process. While trawl gear cannot be used to target groundfish without a permit, there are some trawl fisheries in California where incidental catch of groundfish does occur (for example, the California halibut fishery). In practice, it can be difficult to segregate vessels into the directed or incidental categories because, ultimately, the choice depends on the intention of the fisher (which the manager does not know). Over the course of a year—or even during a single trip—a fisher may engage in several different strategies, switching between the directed and incidental categories. Such changes in strategy are likely the result of a variety of factors, but especially the potential economic return from landing a particular mix of species.

Because of these complexities, managers typically distinguish directed from incidental open access vessels by applying a value threshold to the composition of landings for a particular vessel (or trip, depending on the kind of analysis): open access vessels with more than half of their total landings value composed of groundfish are assigned to the directed fishery, while the remainder (those with no more than half of their total landings value composed of groundfish) are assumed to have landed groundfish incidentally while targeting other species. Based on this criterion, between 1995 and 1998 there were 2,723 vessels coastwide that targeted groundfish in the directed open access fishery, and 2,024 vessels that landed groundfish as incidental catch. There were 1,231 vessels that participated in both categories (SSC Economic Subcommittee 2000).

Fisheries are distributed along the coast governed by factors such as location of target species, proximity of ports with processing facilities and supporting marine supplies and services, and restrictions or regulations imposed by state and federal governments. The bulk of landings by the directed groundfish fishery, by weight, occur in California, while Oregon shows the next highest landings, followed by Washington.

Washington also shows the lowest groundfish landings in the incidental category (Hastie 2001). Participation in the open access fishery is much greater in California than in Oregon and Washington combined. In 1998, 779 California boats, 232 Oregon boats, and 50 Washington boats participated in the directed open access groundfish fishery; and 520 California boats, 305 Oregon boats, and 40 Washington boats participated in the incidental open access fishery (SSC Economic Subcommittee 2000).

Hook-and-line gear, the most common open access gear type, is generally used to target sablefish, rockfish, and lingcod. Pot gear is used to target sablefish and some thornyheads and rockfish. Though largely restricted from use under current regulations, in the past setnet gear was used in southern and central California to target rockfish, including chilipepper, widow rockfish, bocaccio, yellowtail rockfish, and olive rockfish, and to a lesser extent, vermillion rockfish.

Although most groundfish landed by open access fishers are typically landed and sold dead, higher prices for live fish have stimulated landings in this category. Live fish harvests are a recent but growing component of the directed fishery: in 2001, 20% of fish landed (by weight, coastwide) by directed open access fishers were alive, compared to only 6% in 1996.[1/] In the live-fish fishery, the fish are caught using pots, stick gear, and rod-and-reel, and kept aboard the vessel in a seawater tank, to be delivered to food fish markets—such as the large Asian communities in California—that pay a premium for live fish. Currently, Oregon and California are drafting nearshore fishery management plans that would move management of some species of groundfish landed in the live fish fishery from federal to state control.

Many fishers catch groundfish incidentally when targeting other species because of the kind of gear they use and the co-occurrence of target and groundfish species in a given area. Fisheries targeting pink shrimp, spot prawn, ridgeback prawn, California and Pacific halibut, Dungeness crab, salmon, sea cucumber, coastal pelagic species, California sheephead, highly migratory species, and the mix of species caught in the gillnet complex comprise this incidental segment of the open access sector.

Table 8-6 shows open access landings by major species groups north and south of 40°10' N latitude. The table shows that groundfish landings in this sector are generally more important in the south, measured by both landings and revenue. Open access fishers in the south generally earned more per pound of landed groundfish, reflecting more lucrative markets—especially for live fish—in that region. Total open access groundfish landings in 2003 (1,279 mt) were comparable to 1998 (1,162 mt). But the total masks a decline in landings over this period in the south and a gain in the north. The net result is that the landings differential between the two regions is now less dramatic. In 1998 vessels in the south landed almost three and a half times as much groundfish as those in the north. By 2002 it was less than one and half times as much, and in 2003 the totals are almost equal. Rockfish were an important component of open access groundfish landings in the south—75% of landings by weight in 1998. Limits imposed because of overfishing declarations for certain rockfish species, bocaccio and cowcod in particular, explain the steep drop in rockfish landings in the south.

1/ Managers are faced with a difficulties in determining landings in the live fish fishery. While landings records do distinguish live fish sales, but the price information suggests that this classification is inaccurate. Therefore, in practice, only those sales of species other than sablefish that garner a landed price above $2.50 per pound are classified in the live fish sector (see Table 3.5.2-10 in PFMC 2004b for a price breakdown).

8.1.2 Buyers, Processors, and Seafood Markets

The seafood distribution chain begins with deliveries by the harvesters (exvessel landings) to the shoreside networks of buyers and processors, and includes the linkage between buyers and processors and seafood markets. In addition to shoreside activities, processing of certain species (e.g., Pacific whiting and pollock) also occurs offshore on factory ships. Several thousand entities have permits to buy fish on the West Coast. Of these 1,780 purchased fish caught in the ocean area and landed on Washington, Oregon, or California state fishtickets in the year 2000 (excluding tribal catch) and 732 purchased groundfish (Appendix A Table 7-1).[2/]

Larger buyers tend to handle groundfish more than smaller buyers. (Appendix A Table 7-2). The larger buyers also tend to handle trawl vessels more than smaller buyers. (Appendix A Tables 7-1 and 7-3). Mid-size buyers tend to have greater importance for nontrawl vessels than for trawl vessels.

Absent data on processor revenue and costs, gross exvessel value of purchases is used as an indicator of processor dependence on groundfish purchases. Large buyers of groundfish tend to have a lesser percentage of their overall purchases from groundfish than smaller buyers (Appendix A Table 7-4).

8.1.2.1 Live Fish Markets

An important and growing share of groundfish harvest is delivered live. These deliveries help feed the growing trade in live seafood consumed in restaurants. Groundfish delivered live were primarily nearshore rockfish and perch, but also included thornyheads, sablefish and lingcod. About 86% of live fish landings were in California with the remainder in Oregon (PFMC 2004b). There were no recorded live fish landings in Washington. Significantly higher exvessel price was paid for live product. The coastwide average price for live product was nearly four dollars per pound, compared with under one dollar for other deliveries of the same species.

8.1.2.2 Seasonality

Groundfish buyers (particularly larger buyers) tend to have more of a year-round presence in the fishery than nongroundfish buyers (Appendix A Table 7-5).

8.1.2.3 West Coast Groundfish and the World Market

West Coast groundfish compete in a global market, not only with similar species produced in other regions of the world, but also with other fish species such as salmon and tuna. In addition, fish compete with other sources of protein in consumers' budgets. More than 4.7 million mt of fish and other seafood were landed in the U.S. in 2000, approximately the same amount landed in each of the prior two years (DOC 2001). West Coast groundfish contributed about 0.14 million mt, 0.13 million mt, and 0.12 million mt to this total in 1998, 1999 and 2000, respectively. Pacific whiting, a relatively abundant but low price species, comprises about two-thirds of West Coast groundfish landings by weight, but only around 10% of groundfish exvessel revenue.

2/ A "buyer" was defined here by a unique combination of Pacific Coast Fisheries Information Network (PacFIN) port code and state buyer code on the fishticket. For California, a single company may have several buying codes that vary only by the last two digits. In PacFIN, these last two digits are truncated, and so were treated as separate buying units only if they appear for different ports.

Production of farm-raised fish has increased rapidly in recent years. In 2000, more than 0.4 million mt of cultured fishery products were produced in the U.S., and more than 45 million mt were raised worldwide. Salmon aquaculture demonstrates the emerging importance of farmed species. While commercial salmon harvest is still near the 1980 to 1997 annual average, world salmon supply has tripled since 1980 due to a ninefold increase in farmed salmon to 1.5 million mt in 2000.

An objective of groundfish management has been to spread harvest of the annual OY over as much of the year as possible. Consequently, groundfish harvesting occurs in every month, although beginning in the late 1990s, it took on increased importance during the summer months when sablefish harvest peaked during the primary limited entry fixed gear fishery. The bulk of whiting fishery also occurs during the summer (Appendix A Table 7-7).

Groundfish have historically provided West Coast commercial fisheries participants with a relatively steady source of income over the year, supplementing the other more seasonal fisheries. Although groundfish contributed only about 17% of total annual exvessel revenue in 2000, seasonally groundfish played a more significant role, providing one-fifth to one-third of monthly exvessel revenue coastwide during April and the three summer months. The peak value contribution by the groundfish fishery in 2000 was sablefish during August (20% of exvessel revenue). Flatfish harvest supplied between 3% and 9% of monthly exvessel revenue throughout the year, and rockfish contributed an additional 2.5% to 6.8% to monthly exvessel revenue. For northern parts of the coast, groundfish is particularly important just before the start of the December crab fishery.

8.1.2.4 Exvessel Prices

Table 8-7 shows average annual West Coast commercial exvessel prices for major species groups from 1981 to 2003. In 2002 and 2003, exvessel prices for groundfish species groups were generally above their 1998-2003 averages, with the exception of "other groundfish." This was due in part to the expansion of the high-value live fish fishery in recent years. Nongroundfish species notably below their 1998 through 2003 average prices include pink shrimp and Dungeness crab. It is worth noting that a large number of West Coast groundfish fishers also participate in seasonal fisheries for pink shrimp and Dungeness crab.

8.1.2.5 Exprocessor and Wholesale Prices

While producer prices for groundfish products have not fared quite as badly as for other frozen fish (including salmon), they still are significantly below recent highs. The trend may be flat or still lower in the future (Appendix A Table7-9). Increasing production of farmed salmon is partly responsible for a continuing slump in salmon commodity prices. Producer prices for meat products in general have been relatively weak, thereby helping to hold down prices for competitive fish protein. Preliminary 2003 estimates of producer price indices for fish and meat products were higher than seen in recent years, possibly due to the continuing improvement in the world economic outlook.

8.1.2.6 Trade and Domestic Demand

Most West Coast groundfish compete in the fresh and frozen fish product markets. In 2000 the U.S. imported 1.8 million mt of edible fishery products, including 1.5 million mt of edible fresh and frozen fish products. In 2000 the U.S. exported about one million mt of edible fishery products, including 190,000 mt of edible, fresh or frozen flatfish and groundfish products. One third of edible fishery exports were to Japan. While surimi was the single largest component of total fresh and frozen exports by weight, salmon was the most valuable export, generating $353 million on the 100,000 mt of fresh and frozen product shipped, and another $146 million from exports of canned product. Asia was the largest export region, absorbing 61% of U.S. fishery exports by volume. Japan alone bought 34% of total fishery exports, and South Korea and China took 11% and 10%, respectively (Appendix A Section 7.1).

From 1910 through the early 1970s, annual per-capita fish consumption in the U.S. generally ran between 10 pounds and 12 pounds edible weight. Beginning in the early 1970s, per-capita consumption increased, and in the mid 1980s began shifting upward again to the 15-pound to 16-pound range where it has generally remained since 1985. In 2000 annual per-capita U.S. fish consumption was estimated to be 15.6 pounds. Internationally the U.S. ranks just above average in terms of per-capita fish consumption along with countries like the United Kingdom, Italy, Russia, and Canada, and not far below China, but less than half the level of Japan and South Korea (Appendix A Section 7.1).

8.1.3 Tribal Fisheries

West Coast treaty tribes have formal allocations for sablefish, black rockfish, and Pacific whiting. Members of the four coastal treaty tribes participate in commercial, ceremonial, and subsistence fisheries for groundfish off the Washington coast. Participants in the tribal commercial fisheries use similar gear to non-tribal fishers. Groundfish caught in the tribal commercial fishery are distributed through the same markets as non-tribal commercial groundfish catch.

There are several groundfish species taken in tribal fisheries for which the tribes have no formal allocations. Rather than try to reserve specific allocations of these species, the tribes annually recommend trip limits for these species to the Council, which tries to accommodate these fisheries. Tribal trip limits for groundfish species without tribal allocations are usually intended to constrain direct catch and incidental retention of overfished species in the tribal groundfish fisheries.

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.

The bulk of tribal groundfish landings occur during the March through April Pacific halibut and sablefish fisheries. Most continental shelf species taken in the tribal groundfish fisheries are taken during the halibut fisheries, and most slope species are similarly taken during the tribal sablefish fisheries. Approximately one-third of the tribal sablefish allocation is taken during an open competition fishery, in which vessels from the four tribes on the Washington coast 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 between the tribes according to a mutually agreed-upon allocation scheme. Specific sablefish allocations are managed by the individual tribes. The fishery begins in March and goes until some time in the autumn, depending on the number of vessels participating in the fishery. Participants in the halibut and sablefish fisheries tend to use hook-and-line gear, as required by the IPHC. For equity reasons, the tribes have agreed to also use snap-line gear in the fully competitive halibut and sablefish fisheries. So a vessel that participated in a fully competitive sablefish fishery, but that did not land any halibut (and therefore was not subject to IPHC requirements), would still be required by tribal regulations to use snap-line gear.

In addition to these hook-and-line fisheries, the Makah tribe annually harvests a whiting allocation using mid-water trawl gear. Since 1996, a portion of the U.S. whiting OY has been allocated to the Pacific Coast treaty tribes. The tribal allocation is subtracted from the whiting OY before allocation to the nontribal 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 fished on the tribal whiting allocation. Makah vessels fitted with mid-water trawl gear have also been targeting widow rockfish and yellowtail rockfish in recent years.

The following table shows the distribution of vessels engaged in Tribal groundfish fisheries.

Treaty Tribe	Number of Vessels in Groundfish Fishery			Port
	Longline (length in ft)	Trawl (length in ft)	Total	
Makah	35 (33'-62')	10 (49'-62')	41[a/]	Neah Bay
Hoh	1	-	1	La Push
Quileute	7	-	7	La Push
Quinault	10	-	10	West Port
a/ Four Makah vessels participate in both longline and trawl fisheries.				

Table 8-8 shows recorded landings of groundfish species by treaty tribes from 1995 to 2003. Since 1996, Pacific whiting have comprised the vast bulk of tribal landings, even though in 2000 and 2001 whiting landings were relatively low due to reduced coastwide allocations. As shown in Table 8-9, in terms of exvessel revenue, sablefish landings provided well over half of total tribal groundfish revenue each year except 1998, 1999, 2002 and 2003; and over 30% of total revenue in those year.

8.1.4 Recreational Fisheries

The distribution of resident and non-resident ocean anglers among the West Coast states in 2000, 2001 and 2002 is shown in Table 8-10. The table demonstrates the importance of recreational fishing, especially in southern California. The estimated number of resident recreational marine anglers in southern California was more than double the number in the next most numerous region, Washington State. While most of the recreational anglers were residents of those states where they fished, a significant share were also non-residents. Oregon had the largest share of non-resident ocean anglers in all three years.

Fishing effort is related to weather, with relatively more effort occurring in the milder months of summer, and relatively less in winter (Table 8-11). As might be expected, this effect is more pronounced in higher latitudes, although the reasons include opportunity as well as climate. Salmon seasons are longer in California than in Oregon, which in turn are longer than in Washington. Until recently, groundfish seasons were also more restrictive in Washington, with the lingcod season being closed from November through March.

Recreational fishing in the open ocean has generally been on an increasing trend since 1996 (see Table 8-12); however, charter effort has decreased while private effort increased during that period. Part of this increase is likely the result of longer salmon seasons associated with increased abundance. Some effort shift from salmon to groundfish likely occurred prior to 1996 when salmon seasons were shortened. Groundfish are both targeted and caught incidentally when other species, such as salmon, are targeted. While the contribution of groundfish catches to the overall incentive to engage in a recreational fishing trip is uncertain, it seems likely that the possibility or frequency of groundfish catch on a trip adds to overall enjoyment and perceived value.

8.1.4.1 Recreational Charter Industry

The distribution of West Coast charter vessels engaged in ocean fishing in 2001 is shown in Appendix A Table 6-10. More than half of the charter vessels listed operated from California ports, demonstrating the importance of recreational fishing industry in that state.

8.1.4.2 Private Vessels and the Recreational Fishing Experience Market

Just as West Coast commercial groundfish is only one segment of a broader food market, the groundfish recreational fishery represents only one segment of a broader recreational market. Other types of marine recreational angler trips, freshwater angling, and other recreational activities are, to varying degrees, potential substitutes for ocean groundfish fishing.

Demand for recreational trips and estimates of the economic impacts resulting from recreational fishing are related to numbers of anglers. Reliable data are not available on the number of West Coast anglers targeting specific species. However, data are available on the total number of saltwater anglers, and it is evident the presence of opportunities to catch species other than directly targeted ones increases the propensity of anglers to fish and the value of the overall recreational fishing experience. In the U.S., over 9 million anglers took part in 76 million marine recreational fishing trips in 2000. The West Coast accounted for about 22% of these participants and 12% of trips. Seventy percent of West Coast trips were made off California, 19% off Washington, and 11% from Oregon (Gentner 2001).

Table 8-12 shows that in three of the four West Coast regions, groundfish catch, either targeted or incidental, accompanied a significant share of both charter and private recreational trips. This effect was greatest in Oregon where groundfish catch was consistently associated with over half the recreational trips each year. Only in southern California did groundfish appear to be a relatively minor part of regional marine recreational effort.

8.1.5 General Public

8.1.5.1 Market and Non-market Consumer Goods

For goods exchanged in markets where a consumer price can be determined (for example seafood), price and quantity information can be used to estimate the benefits consumers derive from consumption activities. A given regulatory action may have little or no impact on consumers if changes in the quantity of fish available are insufficient to have an effect on prices. This is especially true if imports or other protein substitutes are readily available. In the market for recreational experiences, individuals pay fees to participate in recreational fishing trips on charterboats. Price and quantity information from these trips might allow estimation of the benefits participants derive from this type recreational fishing. However, charter trips may often be purchased as part of a bundle of goods and services that include nonfishing recreational activities. Therefore, the estimation of benefits from recreational charter activities is less straightforward than for marketed consumer goods.

For other consumer goods, especially bundles of goods and services such as a recreational fishing trip taken on a private vessel, the prices and quantities associated with each transaction are much more difficult to determine. For the private recreationalist, the amount spent on fishing gear, licenses, and other goods necessary to carry out a particular fishing trip is difficult to isolate. The term “private” is used here to designate a recreational fisher fishing from a private vessel, the shore, bank or a public pier, as opposed to using a charter vessel. Depending on the value a particular individual places on alternatives to fishing, the maximum benefit associated with a fishing trip may far exceed actual trip expenditures.

8.1.5.2 Consumptive versus Nonconsumptive Activities

The sectors benefitting from a resource can generally be placed into one of three groups: consumptive users (e.g., recreational fishers, commercial harvesters, and processors), nonconsumptive users (e.g., wildlife viewers), and nonusers (e.g., members of the general public who derive value from knowing that a species is being maintained at a healthy biomass level). The following table displays the general relationship between use/non-use and consumptive/nonconsumptive types of activities.

Relationship between Use/Nonuse and Consumptive/Nonconsumptive Activities

	Consumptive	Nonconsumptive
Use	Commercial and Recreational Fishing, Processing.	Wildlife Viewing
Nonuse	N/A	Existence Value, Options Value, Bequeathal Value

In economic terms, renewable resource management entails a fundamental tradeoff between current and future costs and benefits. When management needs call for a substantial reduction in allowable harvests, additional costs may be born by the direct consumptive users, who may be left with much smaller harvests than they had been accustomed to. While this near-term sacrifice may create much greater harvest opportunities in the future once the stock has been replenished—depending on the duration of the rebuilding period—many fishers and processors may be unable to weather a long down period, opting instead to go out of business.

Nonconsumptive users may benefit from the use and nonuse values provided by the resource. Wildlife viewing and the derivation of secondary benefits from ecosystem services are examples of non-consumptive use values. One or more of the following nonuse benefits may accrue from the preservation of fish stocks at higher levels of abundance: (1) existence value derived from knowing a fish population or ecosystem is protected without intent to harvest the resource; (2) option value placed on knowing a fish population, habitat, or ecosystem has been protected and is available for use, regardless of whether the resources are actually used; and (3) bequeathal value placed on knowing a fish population, habitat, or ecosystem is protected for the benefit of future generations. Offsite nonconsumptive uses of resources are public in nature in that no one is excluded from deriving the identified benefits, and one person's enjoyment does not affect another's potential benefit.

The existence of coastal fishing communities in themselves may have intrinsic social value. For example, the Newport Beach (California) dory fishing fleet, founded in 1891, is a historical landmark designated by the Newport Beach Historical Society. The city grants the dory fleet use of the public beach in return for the business and tourism this unique fishery generates.

Value may also be placed on biological diversity. The value of biological diversity may be part of the total value placed on a site by nonconsumptive users (onsite or offsite). Three levels of biological diversity have been identified, (1) genetic diversity within a species, (2) species diversity (richness, abundance, and taxonomic diversity), and (3) ecosystem diversity. Ecosystem diversity encompasses the variety of habitats, biotic communities, and ecological processes (Caribbean Fishery Management Council 1998). Healthy ecosystems characterized by high biological diversity are generally able to provide a wider range of ecosystem services than are available from damaged or less diverse ecological communities. Examples of such ecosystem services include the nutrient recycling and filtering capabilities of wetlands, and the CO_2 sequestration function provided by the ocean (which is an important carbon sink).

The total societal value placed on offsite nonconsumptive use of a stock or component of the ecosystem will also depend on: (1) the size of the human population, (2) the level of income, (3) education levels, and (4) environmental perceptions and preferences (Caribbean Fishery Management Council 1998).

The above relationships imply that as human populations and the affluence of those populations increase, and as fish stocks and their ecosystems are depleted, nonconsumptive values associated with maintaining ocean resources are likely to increase. Another implication of these relationships is that once the basic integrity of ecosystem processes and marine fisheries components are preserved, the likely additional benefit from incremental increases biomass will decrease.

8.1.6 Communities

Fishing communities, as defined in the MSA, include not only the people who actually catch the fish, but also those who share a common dependency on directly related fisheries-dependent services and industries. In commercial fishing this may include boatyards, gear manufacturers, fish handlers, processors and ice suppliers. Similarly, entities that depend on recreational fishing may include tackle shops, small marinas, lodging facilities catering to out-of-town anglers, and tourism bureaus advertising charter fishing opportunities. People employed in fishery management and enforcement make up another component of fishing communities.

Fishing communities on the West Coast depend on commercial and/or recreational fisheries for many species. Participants in these fisheries employ a variety of fishing gears and combinations of gears. Naturally, community patterns of fishery participation vary coastwide and seasonally, based on species availability, the regulatory environment, and oceanographic and weather conditions. Communities are characterized by the mix of fishery operations, fishing areas, habitat types, seasonal patterns, and target species. While each community is unique, there are many similarities. For example, all face safety issues, dwindling resources, and complicated state and federal regulations.

Chapter 8 of Appendix A to this document provides an overview of West Coast fishing communities organized around regions comprising port groups. The PacFIN ports have been further aggregated into 18 port groups. Figure 8-1 in Appendix A maps the general location ports and port groups, and Table 8-1 lists the PacFIN ports included in each port group. Chapter 8 of Appendix A further aggregates the port groups into seven larger regions, each comprising one or more port groups. The regions identified are: Puget Sound, the Washington coast, the northern Oregon coast, the southern Oregon coast, northern California, central California, and southern California.

The reader is referred to Appendix A for detailed information on fleet characteristics by port group and region. The following tables from Appendix A are derived from PacFIN landings data:

Table 8-2a: Landings at each port by species group in 1998.
Table 8-2b: Landings at each port by species group in 2002.
Table 8-3a: Exvessel revenue at each port by species group in 1998.
Table 8-3b: Exvessel revenue at each port by species group in 2002.
Table 8-4: Number of vessels by primary port and species group in 2001.
Table 8-5: Number of vessels by primary port and vessel length class in 2001.
Table 8-6: Number of processors/buyers by primary port in 2001.
Table 8-7: Number of processors/buyers by purchase value of raw product by port group.

Detailed socioeconomic and demographic information by port group and region are also shown in Appendix A. The following tables from Appendix A are derived from information obtained from the 2000 U.S. Census, U.S Bureau of Economic Analysis and U.S. Bureau of Labor Statistics:

Table 8-8: Income and employment from commercial fishing activities in 2001.
Table 8-9: Effort, personal income, and jobs related to recreational fishing on the West Coast in 2001.
Table 8-10: Urban and rural population at state, regional, and port levels in 2000.
Table 8-11: Racial composition at state, regional, and port levels in 2000.
Table 8-12: Hispanic population at state, regional, and port levels in 2000.
Table 8-13: Age distribution of the population at state, regional, and port levels in 2000.
Table 8-14: Educational attainment of the population at state, regional, and port levels in 2000.
Table 8-15: Unemployment and employment in natural-resource-related resource occupations at state, regional, and port levels in 2000.
Table 8-16: Median income, average income and poverty rate at state, regional, and port levels in 2000
Table 8-17a and 8-17b: County-level economic profile.
Table 8-18: County unemployment rates, 2002.

8.2 Criteria Used to Evaluate Impacts

When an agency is evaluating reasonably foreseeable significant adverse effects, there is incomplete or unavailable information, and the costs of obtaining it are exorbitant or the means unknown, the agency must (1) so state, (2) describe the importance of the unavailable information to the assessment, (3) summarize any existing scientific information, and (4) evaluate impacts based on generally accepted scientific principals, which may accord with the best professional judgement of agency staff (40 CFR Part 1502.22). NMFS acknowledges that the information necessary to fully evaluate net national benefits associated with socio-economic impacts described below cannot be reasonably obtained at this time. Available information includes historic data on commercial vessel landings and exvessel revenue gleaned from fishtickets, projections of limited entry trawl vessel participation (landings and revenue) under the alternatives provided by the GMT's trawl bycatch model, rough projections of nontrawl fisheries response (landings and revenue) under the alternatives produced by the Council's commercial fisheries data model, tribal fisheries projections (landings and revenue) under the alternatives provided by the GMT, estimates of recreational angler trips in recent years and under the alternatives provided by the GMT, and estimates of local personal income and employment impacts resulting under the alternatives generated using the Council's commercial and recreational fisheries economic assessment models (FEAM)[3/].

Additional information that is necessary to perform the required net benefits analysis includes production cost information for vessels; production cost, product volume and price information for processors; trip cost, trip volume and price information for charter operators; and angler willingness to pay information for recreational fishing experience. As noted below, efforts are underway to collect representative production cost information from participating commercial fishing vessels. However that information will not be available in time for use in this analysis, nor will the other information mentioned in this paragraph. Therefore the following evaluation is based on best professional judgement of NMFS and Council staff.

3/ FEAM includes estimates of industry (commercial vessels, processors and recreational angling businesses) cost and output parameters that have been adopted from informal surveys over the past 20 years. The Council's economic modeling methodologies are discussed below and in Appendix D.

8.2.1 Commercial Fisheries

Changes in exvessel revenue are used to indicate the directions of change expected in net economic benefits derived from harvest by the commercial seafood vessels. Subgroups of the groundfish fleet are examined to determine if any particular group is experiencing greater effects than others. The primary divisions are between the limited entry trawl, limited entry fixed gear and open access fishery.

A complete assessment of the expected change in net revenue requires an assessment of changes in fishing costs[4/]. Comprehensive information on fishing costs for the West Coast groundfish fishery is not currently available. An effort is underway by NMFS and PSMFC to fill this gap by collecting data on fixed and variable cost structures of vessels engaged in groundfish and other major West Coast fisheries. A simple analysis of expected change in vessel cost structure associated with implementation of selective flatfish trawl fishery is included. Changes in operational flexibility resulting from regulatory constraints will be addressed qualitatively as an indicator of impacts on production costs. Effects on human health and safety will be discussed primarily in terms of the effect of revenue changes on vessel maintenance and the effect of changes in the RCA on travel distances to fishing ports.

The discussion of cumulative impacts will include the effects of the trawl vessel buyback program and possible future implementation of an ITQ program. These regulatory changes will be discussed in terms of their likely effects on vessel revenue and operational costs. Changes in revenue will also be used as an indicator of the magnitude of likely harvest pressure that may affect adjacent fisheries as a result of changes in opportunity in the groundfish fishery.

8.2.2 Buyers, Processors, and Seafood Markets

Due to the lack of data on prices, costs and profitability of buyers and processors, much the same indicators as used for the harvesting sectors are used for comparing impacts on the buyer/processing sector. Specifically, as a proxy for profits, exvessel revenue is used as an indicator of activity level. From the buyers' perspective, exvessel revenue represents expenditures for a primary production input. Projected change in exvessel revenue under the alternatives can be stratified by different categories to examine impacts by buyer/processors' relative size and level of involvement in or dependence on groundfish purchases.

Substitutability of other products, or the same product imported from elsewhere, greatly affects regional seafood markets. Flatfish are generally lower priced than rockfish, and production is more constrained by markets than by availability of the resource itself. Rockfish are higher priced in West Coast fresh markets. However, similar products from South America, Mexico, Canada, and Alaska readily substitute for West Coast production. Whiting, which is processed into surimi, a generic fish product, competes with other sources of supply such as Alaska pollock.

The likelihood that the projected impacts on regional buyers and processors will affect the functioning of regional seafood markets is discussed in Section 8.3.2.

4/ In order to estimate net economic benefits, fishing costs must be adjusted by appropriate shadow prices to determine real opportunity costs. For example, expenditures for crew would not count as an economic opportunity cost if the labor would otherwise have been unemployed. Or if the labor would have been employed, but at a lower wage, then the difference between the wages in the fishery and the wage in the next best alternative employment would not be counted as an economic cost (i.e., only the next best available wage is counted as a cost).

8.2.3 Tribal Fisheries

The criteria used to compare 2005-2006 management alternatives for the tribal groundfish fisheries are total annual projected groundfish landings and resulting exvessel revenue (assuming average 2003 exvessel prices), compared with 2003 and projected 2004 landings and revenue.

8.2.4 Recreational Fisheries

8.2.4.1 Private Recreational Anglers

Recreational experiences generate economic value for individual anglers, as determined by their willingness to pay for the experience. The sum of anglers' net willingness to pay (minus actual expenditures) represents the net economic value contributed by the recreational fishery to the national economy. However estimates of these parameters are not currently available. As a proxy, partial estimates of the change in total trips and indicators of the probable direction and degree of change in the average value per trip are considered. The following discussion highlights some of the issues involved in estimating the net economic value of the recreational fishing experience.

Estimating Net Economic Value

The net value of a recreational fishing trip is a function of the willingness of potential anglers to pay for the experience.[5/] While expected catch (species, number and size) probably doesn't affect the value of a trip once it is undertaken, it may affect the likelihood of taking a given trip in the first place. Reduced bag limits, while reducing the number of trips per time period, may also allow for a longer season and an increased total number of angler trips. This could provide angling opportunities to a greater number of anglers, potentially increasing the marginal value of each fish. While the marginal value per angler of each additional fish caught decreases with increasing bag limits, so too does the cost per unit of catch. So the net effect of a change in bag limit on the value of recreational experiences is ambiguous.

While a loss of fishing opportunity may translate into a direct reduction in trip-related expenditures, the resulting change in net economic value will be considerably less than the change in expenditure. Presumably the recreationalist will still pursue another activity, even though this alternative experience may be somewhat inferior than what the person originally had in mind. Substitution of one activity for another in time and/or place may still involve a similar level of expenditures, although not of the same kind or necessarily in the same place. While analysis of the local impact would interpret the reduction in revenue of the recreational fishing-related businesses as a direct loss in local income, analysis of net economic value would treat only the difference in the intrinsic value to the individual between the two types of experience as a net change in value.

An ideal model would allow us to measure the effect on total recreational effort (quantity and location of trips) and marginal value per trip resulting from changes in different management variables. Unfortunately, the data to populate such a model are lacking because the specific surveys to collect the required data have not been done.

5/ Arguments that might be used to estimate willingness to pay include, among others, attractiveness of the location and distance traveled by the fisher.

Change in Recreational Effort

Conceptually, effort may change in response to caps on total landings (although if a cap is non-binding it may have no direct effect), change in seasons, or change in area or depth closures. Estimates of the change in the number of angler trips in each state's recreational ocean fishery under each management alternative are derived. Also considered are the proposed closure periods compared with the seasonal effort pattern observed in 2003 and 2004, and the effect of shifts in the inshore closed area under the alternatives.

It should be noted that these estimates probably do not adequately project the effect of management changes on the distribution of effort, nor do they incorporate the impact of other changes on demand for recreational fishing experience. However this is the best available approach for evaluating impacts given the data limitations.

Change in Quality (Value) of Trips

Management measures may affect the perceived value of the recreational experience as well as the amount of effort. Those anglers forced to change their desired fishing patterns will probably experience a reduction in economic value from the trip. While change in bag limits probably does affect the decision of whether or not to fish, historically West Coast groundfish managers have observed little change in recreational effort in response to changes in bag limits. However continued reductions in bag limits would be expected to eventually lead to reduced demand and lower levels of angler participation once some critical threshold had been crossed.

Change in Quantity of Trips

Greater restrictions (e.g., lower bag limits) on individual trips may allow a greater number of anglers to fish by spreading the recreational harvest out over a longer season. However if current bag limits are constraining retained catch, then lower bag limits may also reduce the likelihood that a given individual will choose to go fishing in the first place. An increase in the number of trips results in increased total expenditures by recreational anglers. However, especially in the short term, these expenditures may represent dollars taken away from other places and other types of activities rather than "new" activity. Therefore even though net benefits may be unchanged, there may be a redistribution of expenditures among local businesses.

8.2.4.2 Charter Boat Businesses

Demand for charter trips is affected by some of the same factors that affect demand for private recreational fisheries, including bag limits, weather conditions during open seasons, and coincidental timing of open seasons with traditional vacation periods. For example, a closure during the months of July and August, the peak summer vacation period, will have a more adverse impact on charter operators than will closures during any other two-month period of the year. Impacts on charter boats under the alternatives are assessed based on estimated changes in total effort and timing of closure periods.

8.2.5 General Public

Directly measuring individuals' nonconsumptive and nonuse values for a marine resource is beyond the scope of this analysis. The metric used as a proxy is relative size of the RCAs. At current relative biomass levels for sensitive fish species this measure is assumed to be proportional to enhanced nonconsumptive and nonuse values.

8.2.6 Communities

8.2.6.1 Commercial Fisheries Impacts

Projected commercial landings under the alternatives are compared against recent landings to estimate change in landings by port area. Income multipliers generated by the FEAM and differentiated by species, vessel category, gear type, processing mode, and landing port are applied to the projected landings to estimate change in total personal income impacts resulting from the estimated change in harvest and processing activity under each alternative. A description of FEAM is found in (Jensen 1996). A recent update to the model is described in (Davis 2003). Also see Appendix D to this document for further discussion of income impact estimating methodology.

8.2.6.2 Recreational Fisheries Impacts

Annual recreational fishing effort under the alternatives is estimated by region and compared against recent data. Change in effort is assumed to be roughly proportional to the change in estimated harvest. Regional income multipliers derived from the recreational FEAM, and average trip expenditures for recreational fishers in the four regions derived from a recent study (Gentner 2001) are applied to the estimated change in effort to generate the change in regional income resulting from the level of recreational fishing activity expected under each alternative.

8.2.6.3 Safety

Changes in vessel net income can have effects beyond economic effects. Reduced investment in maintenance and safety equipment can increase hazard associated with fishing. Reduced income opportunity could cause dislocation for crew members and their families. Individuals willing to work for lower paying jobs are generally less skilled and have fewer alternative employment opportunities. In addition to reduced operational efficiency, these factors could lead to deterioration in vessel safety conditions.

Safety of fishing vessels is also affected by the seasons and depth zones or areas open to fishing under the alternatives. Seasonal closures that push commercial and/or recreational vessels out to sea during poor weather months will increase the likelihood of safety problems for those vessels.

RCA boundaries and depth or area closures that pack vessels into shallow nearshore areas will also increase the likelihood of safety problems. Limits that push commercial and recreational fleets to fish in the same waters increase the risk of collisions, especially in bad weather. Recreational boaters tend to be less experienced and have less safety equipment than commercial skippers, and are often unfamiliar with bottom contours, wave dynamics, tides, and currents. This combination of increased vessel density, the inherent risks of navigating shallow waters, and relatively inexperienced skippers, increases the risks to vessels.

Effects on vessel safety under the alternatives are evaluated by comparing revenue earning opportunities for commercial vessels, and the pattern of season and depth/area closures for both commercial and recreational vessels.

8.3 Discussion of Direct and Indirect Impacts

8.3.1 Commercial Fisheries

Effects on exvessel revenue under the management alternatives for the limited entry trawl fleet were estimated using the results from the trawl bycatch model run by the GMT, assuming a "medium" whiting OY level.[6/] The estimated exvessel revenue under the alternatives is compared with 2003 historical data and current 2004 season projections (No Action).

For nontrawl limited entry sablefish vessels, changes in landings and revenue were estimated based on changes in the sablefish management measures (OY and size of the nontrawl RCA) under each alternative, compared with the 2003 and 2004 projections (No Action).

For the remainder of the limited entry and open access fleets, effects on landings and revenue under the alternatives are estimated based on changes in the Pacific whiting OY, black rockfish caps, seasonal closures, and changes in the boundaries of the nontrawl RCA relative to the 2003 and 2004 seasons. To model the effects of the RCA, species and species groups were assigned to primary depth strata (shallow nearshore, deeper nearshore, shelf and slope). Because species stray from the depth area with which they are primarily associated, the regulations generally allow the retention of small amounts of the species in order to reduce discards. Differences in retention limits between the base period and the proposed management alternative were applied to historic catch information. This approach to estimating effects on nontrawl exvessel revenue has a number of shortcomings. For example, a vessel that is only taking half the limit during the base period will not be affected by reducing the trip limit by 50%. For this vessel, a factor based on the ratio of trip limits would overestimate the reduction in catch. On the other hand, vessels harvesting close to the trip limits may choose to stop all participation in response to substantial reduction in the trip limits. For these vessels, the approach used here will underestimate the response to the reduction in trip limits. While these two effects may offset each other, there is room for substantial improvement in the modeling of regulatory impacts for the nontrawl fishery. Therefore these results are more likely to be appropriate for groups of vessels, or entities affected by changes for groups of vessels (i.e., buyers/processors and communities), rather than the individual vessels themselves.

Table 8-13 shows projected exvessel revenue for different groupings of commercial fisheries under the alternatives, and the change in exvessel revenue relative to No Action. The table shows fairly small changes in projected exvessel revenue between the alternatives, with nearly all of the difference resulting from changes in projected groundfish revenue. Projected revenue declines slightly under Alternative 1, and increases slightly under Alternative 2, Alternative 3, and the Council-preferred Alternative. The largest increase in exvessel revenue is projected under the Council-preferred Alternative.

Table 8-15 shows the equivalent estimates for the limited entry trawl fleet in terms of landed weight (thousand mt) rather than revenue. The table shows reductions in projected landings under all the alternatives for most categories shown in the table (except non-whiting fisheries) resulting from an assumed reduction in whiting landings relative to No Action. The smallest reduction in landings is projected under the Council-preferred Alternative.

6/ While the actual decision on whiting OY will occur in a separate action in early 2005, and will be based on a whiting stock assessment to be completed before that time, the choice of a Medium OY for whiting is a reasonable proxy for the actual whiting OY that will be chosen in early 2005..

8.3.1.1 Limited Entry Trawl

Table 8-14a shows the distribution of exvessel revenue derived from landings in 2003 by the limited entry trawl fleet by species group and PacFIN port (PCID) in thousands of dollars. Note that this table and the subsequent five tables (8-14b through 8-14f) include only vessels that weren't removed from the limited entry trawl fleet in the recent buyback program. Tables 8-14b, 8-14c, 8-14d, 8-14e, and 8-14f show estimated changes in the distribution of limited entry trawl fleet revenue under the alternatives: No Action, Alternative 1, Alternative 2, Alternative 3, and the Council-preferred Alternative, respectively. (Tables 8-16a, 8-16b, 8-16c, 8-16d, 8-16e, and 8-16f show the corresponding estimates for the non-buyback limited entry trawl fleet in terms of landed weight mt.) Tables 8-17a, 8-17b, 8-17c, 8-17d, and 8-17e display the average change in exvessel revenue for the non-buyback limited entry trawl fleet under the alternatives (relative to 2003) by subsector of the limited entry trawl fleet (whiting and non-whiting) and by direction (higher or lower) and magnitude (< 20% or > 20% change) of the estimated average change. Table 8-17f displays the projected change in trawl vessel exvessel revenue under the Council-preferred Alternative including the modifications to certain management measures adopted at the September 2004 Council meeting.

Table 8-14a shows total exvessel revenue earned by the limited entry trawl fleet in 2003 was about $16.5 million. Under the No Action Alternative, limited entry trawl revenue is estimated to be $36.3 million, about the same amount as currently projected for the 2004 fishery (Table 8-14b). Average exvessel revenue for limited entry trawl vessels is projected to increase by 92% relative to 2003 (Table 8-17a).

Under Alternative 1, limited entry trawl revenue is projected to be $2.8 million lower than under No Action (Table 8-14c). Average exvessel revenue for limited entry trawl vessels is projected to decrease by about $14,000 relative to No Action (Table 8-17b).

Under Alternative 2, limited entry trawl revenue is projected to be about $1 million lower than under No Action (Table 8-14d). Average exvessel revenue for limited entry trawl vessels is projected to decrease by about $3,000 relative to No Action (Table 8-17c).

Under Alternative 3, limited entry trawl revenue is projected to fall by about $0.4 million relative to No Action (Table 8-14e). While average exvessel revenue for limited entry trawl vessels is projected to increase by about $1,000, average revenue for whiting vessels is about $7,000 lower than No Action (Table 8-17d).

Under the Council-preferred Alternative, limited entry trawl revenue is projected to increase by about $0.6 million relative to No Action (Table 8-14f). Average exvessel revenue for limited entry trawl vessels is projected to increase by about $3,600, even though average revenue for whiting vessels is about $7,000 lower than No Action (Table 8-17e). Including the management measure modifications adopted at the September 2004 Council meeting, average exvessel revenue for limited entry trawl vessels is projected to remain about the same as under No Action, although average revenue for whiting vessels is about $10,000 lower than under No Action (Table 8-17f).

8.3.1.2 Limited Entry Fixed Gear Sablefish

Table 8-18 shows projected impacts on the limited entry fixed gear sablefish fleet under the alternatives. Note that these projected impacts on total exvessel revenue assume that the entire allocation is landed and sold at prices prevailing during the 2003 season.[7/]

7/ In fact, landings data (Table 8-5) show that in 2003, of the 2,019 mt landed catch target worth an (continued...)

Table 8-18 shows that the range of projected aggregate impacts under the alternatives for the limited entry sablefish fleet are comparable, with fairly small differences in potential exvessel revenue. Relative to No Action, total potential exvessel revenue falls slightly under the action alternatives. The reduction in potential revenue is greatest under Alternative 1, and least under the Council-preferred Alternative (which is identical to Alternative 1A in Table 8-18).

8.3.1.3 Other Commercial Fishing Sectors

The same nontrawl RCAs described in Section 2.2.4.2 under the alternatives for limited entry fixed gear also would apply for those open access fisheries that are not exempt from the RCA restrictions. Likewise the same minor nearshore species trip limits, seasonal restrictions, and permitting requirements described under the alternatives for limited entry fixed gear also apply to the open access sector.

Compared with No Action, impacts to the open access groundfish and nontrawl, non-sablefish limited entry sectors are expected to be slight. Table 8-19 compares the relative size of trawl and nontrawl RCAs under the alternatives. An increase in the size of the RCA ("+") denotes a reduction in the area remaining open to fishing relative to No Action. A reduction in the size of the RCA ("-") denotes an increase in the area remaining open to fishing relative to No Action. The table shows an increase in size of the non-trawl RCA north of 40°10' N latitude under Alternatives 1 and 2, but no change under Alternative 3 or the Council-preferred Alternative. South of 40°10' N latitude, Table 8-19 shows reductions in size of the RCA under Alternatives 2 and 3, but no change under Alternative 1 or the Council-preferred Alternative.

Consequently, compared with No Action, impacts on the non-limited entry, nontrawl fishery sectors may be slightly negative (reduced landings and revenue) under Alternatives 1 and 2, and about the same as No Action under Alternative 3 and the Council-preferred Alternative. Note that while modifications to the Council-preferred Alternative that were adopted in September 2004 reset the bimonthly cumulative trip limits for longspine thornyheads and shortspine thornyheads back to the No Action levels (these had been erroneously increased in the Council-preferred Alternative that was adopted June 2004), the changes did not affect the non-trawl RCA.

8.3.1.4 Whiting Fishery and Widow Rockfish Constraints

Fishery economic impacts were estimated assuming a Medium OY of 362,000 mt for Pacific whiting in 2005 and 2006. However widow rockfish bycatch constraints may not allow full attainment of this OY. So for modeling purposes, total whiting landings and at sea deliveries were assumed to be constant at approximately 230,000 mt under all the action alternatives, compared with 234,000 mt under No Action and 141,000 mt in 2003.

For the whiting fishery, a weighted average of the 2000 through 2003 bycatch rates is used to estimate bycatch. Bycatch rates in the 2003 fishery were lower than previous years, purportedly because of higher abundance of whiting, resulting in easier targeting on concentrations with lower co-occurrence of other species, as compared to the years immediately preceding 2003.[8/]

7/ (...continued)
estimated $8 million, limited entry fixed gear vessels landed only about 1,000 mt of sablefish and realized about $3.9 million in exvessel revenue.

8/ While whiting stock abundance was also high in the late 1990s, fishers were not as actively trying to avoid the overfished species that are currently the subject of bycatch problems.

Bycatch rates are substantially influenced by the rare occurrence of a "disaster tow" (a tow composed largely of one or more overfished species other than whiting). The whiting fisheries occur at different times of the year, with the shoreside season opening first. There is concern that a few disaster tows might easily use up all of the overfished rockfish impacts planned for a given sector. Decisions on these and other issues affecting the whiting fishery will be part of the Council action next spring when it sets the whiting OY. Any reductions in whiting OY to reduce widow rockfish impacts will also affect the tribal allocation.

8.3.1.5 Operation Costs

As discussed above, a complete assessment of the expected change in fishing costs under the alternatives requires access to data that is currently not available. Therefore the following discussion is confined to a simple analysis of expected change in vessel cost structure under the selective flatfish trawl and a qualitative discussion of the indirect impacts on production costs resulting from changes in operational flexibility under the regulatory constraints embodied in the alternatives.

Requirements for Selective Flatfish Trawl

All of the 2005-2006 action alternatives for limited entry trawl require the use of selective flatfish trawl gear shoreward of the trawl RCA and north of 40°10' N latitude. The No Action Alternative retains the status quo differential limits, depending on whether small or large footrope gear is used during a bimonthly period. Requiring selective flatfish trawl gear would likely increase costs for vessels fishing in these areas relative to the No Action Alternative. In addition, action Alternative 1 would require 100% observer coverage for vessels participating in the selective flatfish trawl fishery. While some of the increase in observer costs would be covered under the existing WCGOP, an undetermined portion would be borne by the vessels themselves. However the relatively greater access to shallow depth target species and Pacific cod afforded by the lower bycatch rates associated with selective flatfish gear should at least partially offset the additional cost of the new fishery.

Estimates of costs associated with retrofitting small footrope vessels with selective flatfish trawl gear range from "minimal," if a two-seam net is already being used, to $8,000 and above for a new net. Under normal conditions, a selective flatfish trawl net would be expected to last several years. It is also likely that CPUE will be higher using the selective flatfish trawl since vessels will be able to fish out to more prime fishing areas approaching the 100 fm depth contour. This should translate into lower average vessel operating costs.

Comparing No Action with the Council-preferred Alternative shows that for the 44 non-whiting vessels that made landings of no more than $100,000 in exvessel revenue in 2003 (i.e., the class of smaller vessels most likely to participate in the selective flatfish trawl fishery), average annual revenue in 2005 under the Council-preferred Alternative would be $102,842 (Table 8-17e). This is $5,233 more than the average revenue projected for these vessels under the No Action Alternative without the selective flatfish trawl ($97,609, Table 8-17a). This increase in average revenue coupled with the likely reduction in vessel costs indicates that on average, a participating vessel should be able to recover the cost of a new selective flatfish trawl net within two years.

RCA Boundary Lines

Vessel costs and safety are affected by the configuration of the RCA. If RCAs are expanded, costs may increase due to increased in transit distance and/or reduced catch per unit effort by fishing in less productive grounds. If CPUE declines, effort-related costs for vessels to bring in the same amount of catch would increase. Revenues may also decline if vessels are unable to take their full limits in the relatively less productive areas remaining open. Closed areas may also affect vessel safety if vessels must transit greater distances to fishing grounds or must fish in shallower nearshore areas. Table 8-19 compares the size and configuration of RCAs under the action and No Action Alternatives.

Trawl RCAs

For trawl vessels south of Cape Mendocino, the No Action eastern boundary varies from 75 fm in Periods 1 (Jan and Feb), 2 (Mar and Apr), 5 (Sep and Oct) and 6 (Nov and Dec); to 100 fm in Periods 3 (May and Jun) and 4 (Jul and Aug), and the western boundary is steady at 150 fm. Under the action alternatives the trawl RCA eastern boundary varies between 75 fm and 100 fm, depending on the alternative and season, and the western boundary is 150 fathoms, except for the modifications adopted by the Council in September 2004, which push the western trawl RCA boundary out to 200 fathoms for the area between Cape Mendocino (40°10' N latitude) and 38° N latitude.

North of Cape Mendocino the No Action eastern boundary varies between 60 fm and 75 fm, depending on season, and the western boundary is set at 150 fm. Under the action alternatives, in Periods 1, 2 and 6 the eastern boundary of the trawl RCA will be 75 fm. During Periods 3, 4 and 5, the eastern boundary is set at 60 fm in Alternative 1, or 100 fm in Alternative 2 and Alternative 3.

Under the Council-preferred Alternative as adopted June 2004, trawl RCA boundaries are the same north and south of Cape Mendocino. Western lines are set at 150 fm all year, the same as under all the other alternatives. Also like the other alternatives, the eastern RCA boundaries are set at 75 fm during Periods 1 and 6. But unlike the other alternatives, the eastern RCA boundaries are set at the deepest available under any of the alternatives (100 fm) for the longest time period (March through October). In September 2004, the Council-preferred Alternative was subsequently modified to move the western RCA boundary north of and 38° N latitude out to 200 fm.

In general, trawl RCAs were smallest under the June 2004 Council-preferred Alternative, and smaller than No Action due to the deeper eastern RCA boundary most of the year. As a result, vessel costs resulting from transit distances and/or exclusion from prime fishing grounds were minimized under the June 2004 Council-preferred Alternative compared with the other alternatives and No Action. However the changes in the Council-preferred Alternative adopted in September 2004 created the largest trawl RCA for areas north of 38° N latitude. Consequently vessel costs attributable to the size of the RCA are probably greater under the Council-preferred Alternative adopted in September 2004 than under the other alternatives and No Action.

Nontrawl RCAs

For the nontrawl fisheries under No Action, the western RCA boundary south of Cape Mendocino is set at 150 fm and the eastern boundary is 30 fm. Under the action alternatives for 2005-2006, the eastern boundary is fixed at 30 fm, but the western boundary varies between 150 fm and 100 fm.

North of Cape Mendocino under No Action, the western nontrawl RCA boundary is set at 100 fm, and the eastern boundary extends to 30 fm in northern California and Oregon , and to the shoreline in Washington. Under the action alternatives for 2005-2006, the eastern boundaries are the same as No Action, but the western boundary varies between 150 fm and 100 fm.

Compared with No Action, nontrawl RCAs are smallest coastwide under Alternative 3, and largest under Alternative 1. Compared with No Action, vessel costs resulting from transit distances or exclusion from prime fishing grounds should be lowest under Alternative 3, highest under Alternative 1, and no different than No Action (but lower than Alternative 2) under the Council-preferred Alternative. Note that changes to the Council-preferred Alternative that were adopted in September 2004 did not affect the non-trawl RCA.

8.3.2 Buyers, Processors, and Seafood Markets

This section examines potential impacts on buyers and processors of groundfish resources under the alternatives. Data for this analysis are from West Coast fish landing receipts (fishtickets). These record buyer license numbers, but do not distinguish buyers from processors. Therefore, the analysis is restricted to examining buyers and processors in aggregate. While some buyers have landing or processing facilities in each port where they buy, many others do not. For the purposes of this analysis, a simplifying assumption has been made that each unique combination of buyer code and PacFIN port area represents a different buying unit. This assumption exaggerates the number of entities affected, since a single firm operating in different ports is treated as several different buying units.

8.3.2.1 Input Purchases

The projected change in the purchase of key inputs by seafood buyers and processors mirrors the change in exvessel revenue (Table 8-13). Therefore groundfish purchases by buyer/processors are expected to be somewhat higher than No Action under all of the action alternatives except Alternative 1. The lowest level of groundfish purchases is expected under Alternative 1, with the highest under the Council-preferred Alternative and Alternative 3.

8.3.2.2 Operating Costs

Processor output is expected to vary roughly in proportion to input levels. However, the effect on net revenues will depend on changes in prices for final products or the prices for material inputs and labor. Unfortunately, data on product volume, wholesale prices and processing/wholesaling costs required to assess the effects of harvest changes on processor gross or net revenue are not generally available.

Processors have advocated year-round fishing in order to help maintain consistent groundfish supplies, even if this means low periodic landing limits for fishing vessels. If a processing plant is forced to shut down because of inconsistent or insufficient raw materials, the semi-skilled labor may find employment elsewhere, making it difficult to re-hire them when fish are again available. Prolonged absence from markets may also necessitate additional expenditures to regain access to those markets in the future.

Ranked according to flexibility afforded by the season structure and year-round availability of areas open to groundfish fishing, the Council-preferred Alternative offers the greatest scope for flexibility, followed by Alternative 3. Both alternatives are more flexible than No Action. Alternatives 1 and 2 may be less flexible than No Action.

8.3.2.3 Markets

Because of the availability of substitutes for West Coast groundfish products in the regional food distribution chain, differential effects on regional seafood markets under the management alternatives are expected to be minor. Most supermarkets and restaurants do not rely on local supplies to stock their shelves or prepare menus. Locally caught products that are no longer available could generally be replaced with close substitutes for the local products that are obtained from elsewhere in the global supply chain. As such, we do not anticipate a discernable effect on the structure or functioning of regional markets for seafood products under any of the alternatives. The action alternatives should maintain a similar level and distribution of projected fishing activity and deliveries along the coast as under No Action.

A possible exception is the live fish market, which relies more on locally-caught product for delivery to local outlets (e.g., restaurants). From the perspective of harvesting and marketing of live fish, the Council-preferred Alternative offers the greatest scope for success by generally allowing larger areas open to fishing shoreward of the RCAs during a longer portion of the season.

Since the regulations that would result under the management alternatives do not impose distortions, such as tariffs, or impose other barriers on regional markets, no significant change in the competitive position of West Coast buyer/processors vis a vis foreign ones, or large buyer/processors versus smaller ones is expected as a result under any of the alternatives.

8.3.3 Tribal Fishery

Tribal allocations of sablefish and whiting are specified by negotiated agreements, with 10% of the north of 36° N latitude U.S. sablefish harvest guideline allocated to the tribes, and a whiting allocation consistent with the court-approved proposal in *United States v. Washington*, subproceeding 96-2. For species taken in tribal fisheries for which there is no formal allocation, the tribes recommend trip limits for these species that accommodate modest tribal fisheries. Trip limits are usually intended to constrain direct and incidental mortality of overfished species taken in the tribal groundfish fisheries.

Table 8-20 displays projected tribal harvests under the management alternatives for the 2005 and 2006 fisheries, compared with historic harvests for 1998, 2002, 2003, and estimated 2004 harvests. A medium OY Pacific whiting tribal allocation of 35,000 mt is assumed under the alternatives for 2005. (No projected whiting OY is offered in the table for 2006.) The difference in estimated landings between the alternatives is due to differences in lingcod targeting in the longline and trawl fisheries. Under Alternative 1 and the No Action Alternative, 25 mt of lingcod is assumed to be landed. This rises to 50 mt under Alternative 2, and 100 mt under Alternative 3 and the Council-preferred Alternative. Otherwise the landings for other species are assumed to be the same as No Action. The estimated 2004 harvest levels represent the best estimate of impacts under the No Action Alternative.

Exvessel value of the harvest levels in Table 8-20 is shown in Table 8-21. Average prices observed in 2003 were used to value estimated harvests in 2004 (No Action) and in 2005 and 2006 under the alternatives. Table 8-20 shows the highest total projected revenues from tribal groundfish fisheries occurring under the Council-preferred Alternative (which is the same as Alternative 3).

8.3.4 Recreational Fishery

The recreational fishing management alternatives being considered for 2005 and 2006 retain the basic characteristics of the time and area closures in place during 2004.

While time/area closures may impose a loss on the individual angler forced to change from his or her optimal fishing plans, such closures are intended to extend fishing opportunities over a longer period coastwide. Increased fishing opportunity allows for more angler trips and, depending on complementary regulations, a greater ocean catch. From a national perspective, a loss to the individual angler in terms of recreational experience may be compensated by an increase in the total number of anglers able to participate in the ocean fishery.

With the exception of the state of Washington, there is no limit on the total number of charter vessels offering services. Even the limits in Washington are set at levels far above those required to meet current demand in the recreational fishery. Thus the effects on markets for guided or charter fishing activities under the alternatives will be driven by the same demand-related factors affecting the value of recreational experience overall: change in the quantity of available trips (season length) or the quality of the average trip taken (trip limits and time of the year).

8.3.4.1 Modeling the Effects of Recreational Management Measures

Washington

Season and depth restrictions under all the management alternatives for 2005 and 2006 Washington ocean recreational fishery are the same as in 2004, i.e., open year round (except for lingcod) with no depth restrictions unless the harvest guideline is attained, in which case the fishery is closed outside of 30 fm. There is no difference in management measures or projected impacts between the alternatives. The 2004 and 2005-2006 effort projection for Washington is based on an average of estimated groundfish effort in 2001, 2002, and 2003.

Oregon

Season and depth restrictions under all the management alternatives for 2005 and 2006 Oregon ocean recreational fishery are the same as in 2004, i.e., closed offshore of 40 fm June through September and closed offshore of 30 fm if a harvest guideline is attained anytime during the year. There is no expected differential impact between the alternatives.

Angler groundfish effort in 2003 for the ocean boat fishery was 57,000 angler trips.[9/] Annual angler effort in 2004, 2005, and 2006 is assumed to be the same as in 2003.

California

Angler effort under the management measure alternatives for the California recreational fishery was projected by CDFG using a decay function model. In the model, historic RecFIN effort estimates from 2000 through 2003 were averaged using a 0.7 weighting factor, factoring the more recent years in the series more heavily than the earlier years. See section 4.3.2.7 in this document for a more detailed discussion of the decay function model. The resulting estimates were assumed to describe angler effort in 2004, 2005, and 2006.

8.3.4.2 Change in Total Recreational Catch and Effort

Section 4.3.2.6 describes the estimated distribution of recreational catch for important species and species groups under the 2005-2006 management measures. There is no difference in expected recreational catch between the No Action and action alternatives for Washington, Oregon, and California.

Table 8-23 shows estimated annual recreational groundfish effort (angler trips) for the three West Coast states in 2005 and 2006 under the management measures. These estimates are based on catch and effort models developed by the states and described above.

9/ Estimated by ODFW.

Change in Quality of trips

Impacts on markets for recreational experience include both formal markets for guided or charter fishing experiences, and non-market measures of willingness-to-pay for recreational fishing experience. While there is insufficient data to directly measure the willingness to pay for recreational fishing experiences under the alternatives, the following discussion qualitatively compares the value of recreational experience expected under the alternatives.

Size limits and bag limits for Washington and Oregon are consistent between the alternatives, and virtually identical to No Action. Therefore there is no difference between the alternatives in the quality of recreational fishing experience available, and no difference between the alternatives and No Action.

For California, there is some difference between the alternatives in bag limits for rockfish and size and bag limits for lingcod. This may have an effect on the quality of the recreational experience available under the alternatives. The rockfish bag limit under Alternative 1 (5 fish) is one-half the rockfish bag limit under Alternative 2, Alternative 3, and the Council-preferred Alternative (10 fish). The lingcod minimum size limit is largest under No Action (30 inches) and smallest under Alternative 3 and Council-preferred Alternative (24 inches). The lingcod bag limit is one fish under No Action and Alternative 1, and two fish under Alternative 2, Alternative 3 and the Council-preferred Alternative.

In ranking the quality of recreational experience under the alternatives for California, Alternative 2, Alternative 3, and Council-preferred Alternative all offer the highest quality experience. These are also probably potentially higher than under No Action. Alternative 1 offers the lowest potential quality experience.

Change in Quantity of Trips

There is no difference in proposed management measures under the alternatives for the Washington and Oregon recreational fisheries. There is also little difference between the alternatives for California. The differences between the alternatives for California are not sufficient for managers to predict differential effort response under the 2005-2006 management alternatives. Therefore there is no difference in the projected number of recreational angler trips between the alternatives, and no difference in the projected number of angler trips between any of the action alternatives and No Action.

Adjacent Fisheries

Compared with No Action, there is no change in projected recreational groundfish effort in Washington, Oregon, or California under any of the 2005-2006 management alternatives. This consistency may help slow increasing pressure on adjacent fisheries (e.g., Pacific halibut, salmon, California finfish) that may have absorbed effort displaced in the recent past by management restrictions to protect overfished groundfish species.

Demand for Charter Boat Services

Since there is no difference in season structure between the alternatives for Washington and Oregon, there is no difference between the alternatives with respect to demand for charter boat trips in Washington or Oregon, and no difference compared with No Action. There is little difference in season structure between the alternatives for California during the summer months when demand for charter boat trips is highest. Compared with No Action, the season structure under the alternatives may induce greater demand for groundfish charter trips on the central and southern California coast.

8.3.5 General Public

This section compares non-consumptive values between the alternatives. The metric used is relative size of the RCAs as indicated in Table 8-19. At current relative biomass levels for sensitive fish species, the added protection afforded to overfished and other sensitive species by a larger RCA is assumed to enhance nonconsumptive and nonuse values.

Nonconsumptive Users: Increased fish stocks may indirectly enhance the value of wildlife viewing experience for nonconsumptive users. Presumably alternatives based on lower harvest levels will enhance these benefits more than alternatives based on higher harvests. While there is little difference in total expected harvest between the alternatives, Alternative 1 describes the largest RCAs, and so may have the highest value to nonconsumptive users. Following in order of decreasing relative value to nonconsumptive users are Alternative 2, Alternative 3, and the Council-preferred Alternative.

Nonusers: In the long run, increased stocks may enhance nonuse values. Increases in existence value, options value or bequeathal value for nonusers may be proportional to the unharvested biomass. While there is little difference in total expected harvest between the alternatives, Alternative 1 describes the largest RCAs, and so may have the highest value to nonusers. Following in order of decreasing relative value to nonusers are Alternative 2, Alternative 3, and the Council-preferred Alternative.

8.3.6 Fishing Communities

In this section, fishing communities are defined in a broad sense as collections of ports and processing facilities that are grouped based on geographical proximity and similarity of available commercial fishery opportunities and the applicable management regime. The PacFIN ports comprising each commercial fishery port area are described in Chapter 8 of Appendix A. Due to data limitations and statistical uncertainty, recreational fisheries are differentiated at a broader, regional level: the state level for Washington and Oregon, and northern (north of Point Conception) and southern components for California recreational fisheries.

8.3.6.1 Direct and Indirect Impacts

Direct impacts consist of the changes in commercial landings, exvessel revenue and recreational effort expected under the different alternatives. Income impacts go beyond these direct impacts by measuring the total change in income received by participants in the local economy as a result of the direct effects. Income impacts (generated using FEAM) incorporate the indirect (change in suppliers and the distribution chain) and induced (change in spending by households) effects on the regional economies. (See Appendix D for further discussion of income impact estimating methodology.)

Commercial Landings Income Impacts

Table 8-24 shows the estimated annual income in thousands of current U.S. dollars that would be generated from commercial fishery activities in 2005 and 2006 under the five management alternatives (No Action, Alternative 1, Alternative 2, Alternative 3 and Council-preferred Alternative). Table 8-25 shows these impacts as the dollar change from the No Action Alternative. Note that both tables exclude at-sea fisheries.

From Table 8-24, excluding the at-sea fisheries, coastwide total commercial fisheries income under the No Action Alternative is $649 million. Of this, $151 million is generated by non-tribal groundfish fisheries, of which $98 million is attributable to limited entry trawl and $53 million to other groundfish gear. Tribal groundfish fisheries contribute another $6 million to this total.

Under Alternative 1, total income falls by $2 million compared with No Action (Table 8-25). Income from limited entry trawl groundfish falls by $4.5 million, while other income from groundfish gear increases by $2.5 million. Total commercial fisheries-related income is unchanged or decreases slightly for all port areas except Newport.

Under the other 2005-2006 action alternatives, total coastwide income increases slightly, although not uniformly and not for each port area. However total income from limited entry trawl groundfish falls by $1.5 million under Alternative 2, and by $0.5 million under Alternative 3.

Under the Council-preferred Alternative, total fisheries-related income increases by $3 million coast wide. Income from limited entry trawl groundfish increases by $1.2 million. Income from other groundfish gear increases by $1.6 million. Income from tribal groundfish increases by $0.18 million.

Compared with the other alternatives, the Council-preferred Alternative generates the highest overall income impacts and is no worse for any port area than the No Action Alternative.

Recreational Fishing Income Impacts

Table 8-26 shows estimated income and employment impacts resulting from the proposed changes in recreational fisheries under the management alternatives. The table shows no expected change in recreational fishing income impacts relative to the No Action Alternative for any region's recreational fisheries under any of the other alternatives. Since recreational effort models are not sensitive enough for managers to impute differential effort response under the 2005-2006 management alternatives, there is no difference in the projected number of recreational angler trips between the alternatives, and no difference in the projected number of angler trips between any of the action alternatives and No Action.

Commercial Landings Employment Impacts

Table 8-27 translates the total income impacts from commercial fishing shown in Table 8-24 into total employment impacts by dividing by an estimate of average annual wage in each port area. Under Alternative 1, the table shows total employment falling slightly coastwide and for most port areas compared with the No Action Alternative. The exception is Newport, which is shown gaining under Alternative 1. While coastwide employment rises slightly under Alternatives 2 and 3, nearly half of port areas show slight declines, including port areas in Washington and California. While the greatest coast wide employment increase is shown under the Council-preferred Alternative, two port areas show slight employment declines: south and central Washington Coast and San Francisco. Neither of these port areas are better off under any of the action alternatives than No Action.

Recreational Fishing Employment Impacts

The right hand column of Table 8-26 shows estimated change in the number of jobs resulting from changes in recreational fishing under the management alternatives. These estimates are generated by dividing the income impacts shown in the same table by an expected average annual wage for each area.

Since there is no difference in the number of estimated angler trips between the alternatives, the table shows no change in employment impacts from the No Action Alternative for any of the areas under any of the alternatives. Under all the alternatives the table shows total employment impacts generated by recreational of 703 jobs in Washington, 1,024 jobs in Oregon, 2,785 jobs in north and central California and 7,185 jobs in southern California, for a West Coast total of 8,913 jobs.

Impacts on Vessel Safety

Commercial Vessels

Compared with the No Action Alternative, the impact of the Council-preferred Alternative on trawl vessel safety is somewhat ambiguous. While the Council-preferred Alternative since it is least likely to push vessels into shallow areas, as modified in September 2004, this alternative is also most likely to push trawl vessels fishing north of 38° N latitude into deeper and more distant water. Alternatives 2 and 3 would generally have neutral to moderately positive impacts on trawl vessel safety. Alternative 1 would likely push some nearshore vessels into shallower water.

For nontrawl vessels, Alternatives 3 would have neutral to positive impacts, while Alternatives 1 and 2 would tend to force vessels fishing north of Cape Mendocino into deeper water than under No Action. The Council-preferred Alternative is the same as No Action, but slightly less amenable to nontrawl vessel safety than Alternative 3.

Recreational Vessels

In Washington and Oregon, the same season and depth restrictions are in place under each alternative. There is no difference between the management alternatives in terms of safety considerations for recreational fishers.

In California, season and depth restrictions are constant under the alternatives. There is no difference between the management alternatives in terms of safety considerations for recreational fishers.

8.4 Discussion of Cumulative Impacts

It is generally not possible to distinguish differences in cumulative impacts among alternatives. The following cumulative impacts would be present under all alternatives.

8.4.1 Commercial Vessels

Trawl Buyback

The trawl buyback program removed 91 vessels from the groundfish limited entry trawl fishery along with 240 combined fishing permits associated with those vessels. These vessels account for 35% of total groundfish trawl permits and between 1% and 40% of the total number of permits in each of the six fee-share fisheries. These vessels also account for 46% of total gross groundfish trawl revenues (excluding whiting) and from 1% to 30% of similar revenues in each of the six other fee-share fisheries. All together these 91 vessels generated annual gross revenues of a little over $20 million.

Other things being equal, the successful trawl buyback program allows for more efficient use of capital, higher trip limits and higher exvessel revenue than was the case prior to the program, although vessels remaining in the fisheries must repay the $36 million loan through an assessment on future landings.

VMS Implementation

Implementing a VMS system in 2004 imposed additional costs on limited entry vessels. VMS allows shoreside personnel to remotely track vessel locations and determine vessel compliance with depth-based restrictions. Depth-based restrictions, necessary to reduce bycatch of overfished species, are a fundamental aspect of the current groundfish management regime. Depth restrictions have provided significantly greater fishing opportunity than would have been allowed under a system without depth-based restrictions. VMS units cost around $800 per vessel, and cost between $1.50 and $5 per day to operate. VMS units may also have some safety benefits in helping to locate vessels in trouble at sea.

In the future, VMS will likely be required on additional vessels in other regulatory classes. This will impose some additional costs on those vessels, but should also enhance management of groundfish fisheries and extend possible safety benefits.

Individual Quotas

The Council will be considering individual quotas for the trawl fishery. While such a program will not be implemented for some time, substantial economic effects may be anticipated when the program is in place. The first issue is initial allocation of individual quotas. Depending on how initial quotas are allocated, recipients may receive large windfalls if they are not required to pay market rates for their initial quota allocations. However this windfall may not be realized until or unless the quota is sold. As time goes by under a transferable quota system we would expect to see several trends in the groundfish fishery, including consolidation of harvest among fewer vessels, increasing concentration and profitability of harvesting businesses, increased flexibility in operation and safety, fewer but potentially better paying jobs, migration of vessel support services to and from certain local communities, and an increase in costs associated with the monitoring of catch and landings.

Impacts on Adjacent Fleets

In recent years, adjacent fleets have been impacted when vessels seek to make up lost fishing opportunity in the groundfish fishery by increasing effort in other fisheries. Adjacent fisheries may also benefit if an expansion in the groundfish fishery absorbs effort that might otherwise occur in the adjacent fisheries. The 2005-2006 management alternatives generally provide greater opportunities to harvest groundfish than were available in recent years. Compared with the recent past, these increased opportunities, coupled with the trawl buyback, should help reduce pressure on adjacent fisheries resulting from vessels and effort displaced by restrictions on groundfish fisheries.

8.4.2 Buyers and Processors

As noted in Section 8.1, prices for fish products have generally been on a downward trend, in spite of increasing demand. This is in part due to competition between and substitutability of different products. For example, wild-caught domestic salmon compete directly against imported or cultured supplies. Most consumers do not differentiate or attach a price premium to wild fish caught in sustainable fisheries, making it difficult for fishers to receive higher prices. Aquaculture producers have recently turned their attention to whitefish, with aquaculture production of Pacific halibut becoming a reality, and intensive development of production techniques for cod and other ocean species under way (Loy 2002). Continuing competition against a more consistent supply of imported and aquacultured products produced at lower cost will continue to exert downward pressure on West Coast seafood prices despite improved management.

8.4.3 Tribal Fisheries

Tribal groundfish are an important component of the Washington coastal economy. Opportunities for tribal fisheries under the 2005-2006 management alternatives are generally improved compared with recent years. This should help contribute to enhanced stability and opportunity for tribal fisheries participants and other Washington Coastal residents.

8.4.4 Recreational Fisheries

Periodic ocean and atmospheric phenomena that bring warm water closer to the West Coast north of Cape Mendocino can have a significant impact on recreational fisheries. During such periods, local sport fishers get to experience fishing for species usually only found much further south, and local charter operators enjoy increased local demand for their services. Occurrence of such phenomena during the 2005-2006 management cycled may reduce pressure on recreational groundfish and other local fisheries.

8.4.5 General Public

Independent, ongoing processes to identify groundfish EFH and to designate marine protected areas may increase and enhance protection afforded West Coast living marine resources. Progress in these areas will affect the impact of fisheries management measures on nonconsumptive and nonuse values. For example, as stocks of sensitive species recover, then the aggregate nonuse values associated with those stocks will increase, although the marginal values associated with protecting (or not harvesting) an additional fish will probably fall.

8.4.6 Communities

8.4.6.1 Cumulative Impacts on Income and Employment

Many coastal fishing communities are also historically dependent on the wood products industry and tourism. Both industries have suffered in recent years for different reasons. Wood products employment has generally been falling since the 1980s as a result of technological change in the industry (automation) and harvest restrictions on public land to protect critical habitat of threatened and endangered species. Tourism has suffered more recently as a result of the slow national economy and the perceived terror-related travel risk. Somewhat increased commercial and recreational fishing opportunities under the 2005-2006 management alternatives should help mitigate some of these negative impacts experienced by coastal communities in recent years.

8.4.6.2 Cumulative Impacts on the Built Environment in Fishing Communities

While few coastal communities depend exclusively on fishing; harvesting, processing, and related support industries (fuel, docks, ice, gear repair, etc.) interact with other economic activities such as sport fishing, whale watching, tourism, and other recreational activities. Commercial and recreational fishers contribute financially to the businesses and infrastructure that serve and support them. Communities such as Newport, Oregon, celebrate their fishing industry, having turned the port waterfront into a major tourist attraction. This is also true for many other historic ports in Washington, Oregon, and California. Maintenance of port facilities for the fishing fleet helps provide access for other user groups, such as recreational fishers and boaters, and draws tourists who are attracted to the sights and smells of a working fishing port.

Management alternatives that reduce commercial and/or recreational fishing opportunity may reduce revenue and tax streams, thereby adversely affecting the ability of these ports to expand or maintain waterfront facilities and public infrastructure. However, compared with recent years, the somewhat increased opportunities under the 2005-2006 management alternatives should help sustain the participation and revenue needed by coastal communities to maintain and enhance their waterfront facilities and public infrastructure.

8.5 Summary of Impacts

8.5.1 Commercial Fisheries

Aggregate annual impacts on commercial fishery vessels under the alternatives are shown in the table below.

	Alternatives					
	No Action (Status Quo, 2004)	*Alt 1*	*Alt 2*	*Alt 3*	*Council-preferred (June 2004)*	*Council-preferred (Sep 2004)*
Commercial Groundfish Exvessel Revenue (millions of dollars, 2003 prices, no inflation adjustment)						
Total groundfish exvessel revenue	$86.3	$86.0	$88.1	$88.8	$88.8	
- At-sea whiting	$10.5	$10.5	$10.5	$10.5	$10.5	
- LE Trawl	$36.4	$33.6	$35.5	$36.0	$37.0	
- LE fixed gear sablefish a/	*$9.8*	*$9.8*	*$9.7*	*$9.8*	*$9.8*	
- Other groundfish	$23.4	$25.9	$26.2	$26.2	$25.2	
Other Compliance Costs (change from No Action)						
- Selective Flatfish Trawl Gear (Estimated additional gear cost per participating vessel.)	No change	$8,000 + increased observer costs	$8,000	$8,000	$8,000	$8,000
- RCA (Additional costs imposed by compliance with RCA exclusion and transit provisions.)	No change	Higher compliance costs than No Action	Lower compliance costs for trawl, higher compliance costs for non-trawl than No Action	Somewhat lower compliance costs than No Action	Lower compliance costs than No Action	Higher compliance costs than No Action
Safety	No change	Nontrawl: negative; Trawl: neutral to negative; Recreational: neutral	Nontrawl: negative; Trawl: neutral to positive; Recreational: neutral	Nontrawl: neutral to positive; Trawl: neutral to positive; Recreational: neutral	Nontrawl: neutral; Trawl: positive; Recreational: neutral	Nontrawl: neutral; Trawl: ambiguous; Recreational: neutral
Cumulative Effects						
VMS	Capital and operation costs are incurred with the requirement. Enhanced management and safety. May be extended to additional portions of the groundfish fleet in coming years.					
Buyback	Industry costs of approximately $36 million. Allows higher trip limits to be shared among fewer remaining vessels than would be otherwise.					
ITQs	Under consideration in the long-term. May result in consolidation within the fleet and increased efficiency. There will be monitoring and enforcement costs, some of which will likely be born by industry.					
- Impact on Adjacent Fisheries (Costs imposed on other fisheries by changes in groundfish management.)	No change	Possibly higher pressure from displaced groundfish vessels.	Possibly lower pressure from displaced groundfish vessels.	Possibly lower pressure from displaced groundfish vessels.	Possibly lower pressure from displaced groundfish vessels.	Possibly lower pressure from displaced groundfish vessels.

a/ Total value of projected sablefish landed catch OY.

8.5.2 Buyers, Processors, and Seafood Markets

Aggregate annual impacts on buyers and processors under the alternatives are shown in the table below.

Buyer/processor Impacts	*No Action (Status Quo, 2004)*	*Alt 1*	*Alt 2*	*Alt 3*	*Council-preferred (June 2004)*	*Council-preferred (Sep 2004)*
Total groundfish raw material purchases (change from No Action in $ million)	$86.3	-$0.3	+$1.9	+$2.5	+$2.5	
Operating costs	unknown	unknown	unknown	unknown	unknown	unknown
Markets and balance of trade	no effect	no effect	no effect	no effect	no effect	no effect
Cumulative Effects	Continued downward pressure on seafood prices and profitability due to competition from cultured and imported supplies.					

8.5.3 Tribal Fishery

Aggregate annual impacts on tribal fisheries under the alternatives are shown in the table below.

Tribal Groundfish Harvest	*No Action (Status Quo, 2004)*	*Alt 1*	*Alt 2*	*Alt 3*	*Council-preferred (June 2004)*	*Council-preferred (Sep 2004)*
landings (mt)	26,897	36,913	36,937	36,987	36,987	36,987
revenue ($ million) a/	$6.9	$8.1	$8.2	$8.3	$8.3	$8.3
Cumulative Effects	Improvement in groundfish fishing and processing opportunities will improve income earning opportunities in disadvantaged coastal communities.					

a/ Assuming average 2003 exvessel prices.

8.5.4 Recreational Fisheries

Aggregate annual impacts on recreational fisheries under the alternatives are shown in the table below.

Recreational Fishery Impacts	Indicator [a/]	*No Action (Status Quo, 2004)*	*Alt 1*	*Alt 2*	*Alt 3*	*Council-preferred (June 2004)*	*Council-preferred (Sep 2004)*
Estimated effort							
All Trips	(000 trips)	4,309	4,309	4,309	4,309	4,309	4,309
GF Trips	(000 trips)	1,219	1,219	1,219	1,219	1,219	1,219
Quality of trips							
WA	(-,0,+)	0	0	0	0	0	0
OR	(-,0,+)	0	0	0	0	0	0
CA	(-,0,+)	0	-	+	+	+	+
Effect on adjacent fisheries	(-,0,+)	0					
Operational safety							
WA	(-,0,+)	0	0	0	0	0	0
OR	(-,0,+)	0	0	0	0	0	0
CA	(-,0,+)	0	0	0	0	0	0
Demand for charters	(-,0,+)	0	0	0	0	0	0
Cumulative Effects	Potentially increased recreational opportunities for non-local species due to periodic ocean warming phenomenon.						

a (-, 0, +)=Indicates decrease, no change, and increase respectively, with respect to conditions present in the No Action recreational fishery.

8.5.5 General Public

Relative impacts on the general public under the alternatives are shown in the table below.

Impacts on nonconsumptive users and nonusers (relative value of benefits [a/]	*No Action* (Status Quo, 2004)	*Alt 1*	*Alt 2*	*Alt 3*	*Council-preferred (June 2004)*	*Council-preferred (Sep 2004)*
Nonconsumptive users	0	+	+	-	-	+
Non users	0	+	+	-	-	+
Cumulative Effects	Aggregate nonconsumptive and nonuse values associated with recovering stocks will increase with increasing biomass, although marginal values associated with protecting (or not harvesting) an additional fish will fall.					

a/ "+" indicates higher value, "-" indicates lower value, and "0" indicates no change in value with respect to the value of expected benefits to non-consumers and non-users under the No Action alternative.

8.5.6 Communities

Aggregate annual income and employment impacts on coastal communities under the alternatives resulting from commercial fishing and recreational fishing activities are shown in the table below.

Community Impacts	*No Action* (Status Quo, 2004)	*Alt 1*	*Alt 2*	*Alt 3*	*Council-preferred (June 2004)*	*Council-preferred (Sep 2004)*
Commercial fishing community impacts:						
income impact ($ million)	$648.8	$646.8	$650.3	$651.4	$651.8	
employment impact (thousand jobs)	24.5	24.5	24.6	24.6	24.6	
Recreational fishing community impacts:						
income impact ($ million)	$235.5	$235.5	$235.5	$235.5	$235.5	$235.5
employment impact (thousand jobs)	8.9	8.9	8.9	8.9	8.9	8.9
Cumulative Effects						
Impacts on income and employment	Somewhat increased commercial and recreational fishing opportunities should help offset negative impacts experienced by coastal communities in recent years.					
Impacts on built environment	Somewhat increased opportunities should help the participation and revenue needed by coastal communities to maintain waterfront facilities and public infrastructure.					

8.5.7 Environmental Justice Considerations

8.5.7.1 Identifying Communities of Concern

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, requires federal agencies to identify and address "disproportionately high adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations in the United States." Fishery management actions promulgated by the Pacific Council and implemented by NMFS can have environmental and socioeconomic impacts over a very wide area; the affected area of many actions covers all West Coast waters and adjacent coastal communities involved in fishing. This makes it difficult to identify minority and low-income populations that may be disproportionately affected.

Section 8.5 in Appendix A to this document describes a methodology, using 2000 U.S. Census data, to identify potential "communities of concern" because their populations have a lower income or a higher proportion of minorities than comparable communities in their region. West Coast ports identified in the PacFIN database were examined in this way. These ports were evaluated using five criteria: the percentage nonwhite population, percentage Native American population, percentage Hispanic population, average income, and the poverty rate. Data were evaluated for both census places and census block groups corresponding to the area around these census places. (Several ports are not identified as census places; in these cases only data from block group approximating the extent of the port community could be evaluated.) The values for these statistics were compared to the average value for one of three regions, covering coastal block groups in Washington, Oregon, and northern California; central California; and southern California. For each of the five statistics, Table 8-20 in Appendix A summarizes the results by showing potential communities of concern. These are communities that have a significantly higher percentage minority population and poverty rate or lower average income than the surrounding reference region. (See Appendix A, Section 8.5 for a more detailed discussion of the qualification threshold.)

About two-thirds of the port communities listed in Appendix A Table 8-20 are above the cutoff threshold for one or more of the statistics, measured either by the census place value or the equivalent block groups. This suggests that additional criteria need to be applied to more realistically identify which ports should be of concern. It should be noted that the population affected by the proposed action, which would be predominantly fishers and those involved in allied industries (e.g., marine supplies, fish processing, recreational charter and equipment) is a small percentage of the population in most communities. It stands to reason that in larger communities and more urban areas, fishery participants are a smaller and potentially less representative component of the population. In isolated rural communities there are usually fewer alternative employment alternatives, making it harder to find work or switch from one occupation to another in response to changes in one economic sector such as fisheries. Given these conditions, another criterion to focus on communities of concern would be population size and urbanization. (Appendix A, Table 8-10 lists the percent of the population classified as urban in the census.) Eliminating ports with a population greater than 50,000, and of those ports with a population less than 50,000, those for which the block group area is more than 75% urban leaves the following ports as potential communities of concern:

Name	Qualifying Demographic Criteria
Blaine, Washington	poverty rate
La Conner, Washington	% Hispanic
Neah Bay, Washington	% nonwhite, % Native American, average income, poverty rate
La Push, Washington	% nonwhite, % Native American, poverty rate
Copalis Beach, Washington	income
Westport, Washington	income, poverty rate
Willapa Bay	income, poverty rate
Salmon River, Oregon	% Native American
Siletz Bay, Oregon	% Native American
Waldport, Oregon	income
Winchester Bay, Oregon	income, poverty rate
Port Orford, Oregon	income, poverty rate
Brookings, Oregon	% Native American, income
Trinidad, California	% Native American, income, poverty rate
Fort Bragg, California	% Hispanic
Albion, California	% Hispanic

Name	Qualifying Demographic Criteria
Point Arena, California	% Native American, % Hispanic
Moss Landing, California	% Native American, % Hispanic

Only the statistics for the equivalent block group areas were considered in identifying these ports. This is a more consistent basis for comparison, because a common demographic unit is used (the block group). Also, for ports in rural areas block groups were chosen to include the region surrounding the census place on the premise that fishery participants, and the local economy in general, draws on population over a wider area.

It should be noted that fishery participants usually make up a small component of the population and fisheries may be a small part of the local economy in many places. Thus, even if a community has a high proportion of minority or low income residents, these people might not participate in fisheries and are thus minimally affected by the proposed action. Furthermore, within the affected population some segments are more likely to be low income and minority than others. For example, employees in a fishing processing plant may be predominantly from a minority group, and crew on vessels are likely to have a lower earnings than the skipper or vessel owner, making them more likely to be low income. Unfortunately, the kind of detailed population data necessary to determine the characteristics of the population affected by the proposed action are not available. For this reason, the ports identified above represent an initial screening. In the future NMFS may be able to collect more information about the characteristics of fishery participants in these communities (in contrast to the general population).

8.5.7.2 Effect of the Proposed Action on Communities of Concern

The direct source of stress on these communities resulting from the proposed action would be any decline in employment and related personal income in response to additional restrictions placed on groundfish fisheries. For those most directly affected—for example, by loss of a job—this could have secondary effects stemming from income declines and unemployment. At the extreme, vulnerable members of a family that depends on fishing income could suffer health effects due to a shift to a poorer diet. Unemployment can also engender psychological stress due to uncertainty and loss of self esteem and self identity.

There is very little difference in projected impacts to commercial fisheries and no difference in recreational impacts between the alternatives. Therefore alternative management measures for 2005-2006 are unlikely to have a disproportionate effect on the communities of concern identified above. Impacts on Indian tribes living on the Pacific coast in Washington who participate in groundfish fisheries are likely to be positive and somewhat better than No Action under all of the action alternatives. The differences between the alternatives in projected community income impacts for other communities of concern are minimal and not disproportionate.

8.6 Social Net Benefit Analysis

EO 12866 (Regulatory Impact Review) 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, and based on this analysis, should choose approaches that maximize net benefits to society (unless a statute requires another regulatory approach.) This determination is made as part of a combined summary analysis in Section 11.3 of this document.

The following net benefit analysis is provided in support of this requirement. Net benefit analysis takes costs and benefits into account from a national perspective. The minimum standard for a cost-benefit analysis is a qualitative listing of positive and negative impacts. From there, an attempt is made to quantify or provide some indicators of the scale of the impacts and, if possible, to assign a monetary value to those changes.

8.6.1 Overall Approach

Cost-benefit analysis is conducted to evaluate net social benefits attributed to taking a particular action as opposed to not taking the action. With respect to regulatory actions, changes in net benefits are measured as the difference in the present value of the discounted stream of costs and benefits that would accrue with the regulatory action compared with the stream that would have accrued without the action. The alternatives are compared with respect to how the relative differences will affect commercial and tribal fishers, buyers and processors, recreational fishers, non-consumptive users, nonusers and public sector expenditures for enforcement and monitoring.

8.6.1.1 Social versus Private Costs and Benefits

Cost-benefit analysis conducted for public decisions, such as fishery management, generally assess net social benefits. Social costs and benefits differ from private costs and benefits in that social costs and benefits include total economic costs and benefits, while private costs and benefits measure only those effects that show up on the balance sheet of a firm or agency or as a financial or consumption effect to the consumer.

The following example illustrates the difference between private and social costs. When a vessel hires crew, it incurs an accounting cost in the form of the additional wages it must pay. However there may be little or no social cost if that individual would have otherwise been unemployed. From a social perspective, no productive output was forgone in order to employ the worker, so there was no opportunity cost. On the other hand, if a worker is taken away from some other productive employment in order to work on the vessel, then the loss in production from the worker's previous role is considered a cost to society, an opportunity cost.

8.6.1.2 A Note on Quality of Results

The minimum standard for a cost-benefit analysis is a qualitative listing of positive and negative impacts. From there, an attempt is made to quantify or provide some indicators of the scale of the impacts and, if possible, to assign a monetary value to those changes. There is not sufficient information on West Coast groundfish fisheries for a complete enumeration of net economic benefits from the fishery. However, by examining the elements that go into a net benefits analysis, it is possible to show qualitatively how net social benefits are likely to be affected under different policy options. Additionally, a sense of the magnitude of the impacts can be gauged by examining quantitative information on certain components (e.g., variable amounts of fish available for harvest over time), and for some elements it may be possible to associate a dollar value with some of the quantified changes. However, the values available are usually only a partial list of the elements needed for a full quantification of costs and benefits. For example, a dollar measure frequently available is the exvessel revenue from sales to seafood handlers and processors. While this is an important item in the calculation of producer surplus, it is only one of the elements necessary for a full determination of costs and benefits.

8.6.2 Factors Considered in Assessing Net Social Benefits

Social net benefit analysis uses measures of costs and benefits to all entities affected by an action in order to assess the net effect on the nation. Net benefits from groundfish fisheries consist of producer surplus and consumer surplus accrued over time. If there are no market distortions[10/] and all goods are traded in markets, consumer surplus and producer surplus can, at least theoretically, be measured by market demand and supply curves (NMFS 2000b). Producer surplus can also be calculated from revenue and cost data using opportunity costs rather than accounting costs.

Benefits and costs may accrue to consumers or producers not only through their own direct activity, but also through changes in public expenditures (NMFS 2000b). For example, the governmental expense to administer the VMS program is ultimately covered by a transfer payment from consumers or producers to the government in the form of taxes. Thus rather than the economy producing a good demanded directly by producers or consumers, the economy produces a VMS monitoring system demanded indirectly by producers and consumers through actions taken to achieve social objectives administered by the government. In some cases, the cost of a new governmental activity is not met by a transfer through taxes, but rather by a reprogramming of existing governmental assets. For example, if budgets are not increased when there is a new regulation requiring increased enforcement effort, then the opportunity cost of increased enforcement activity may result in the loss of other existing activities.

8.6.2.1 Producer Surplus

Total producer surplus is the difference between the amounts producers actually receive for providing goods and services and the economic costs producers bear to do so. Economic costs are measured by the opportunity cost of all resources including the raw materials, physical capital, and human capital used in the process of supplying these goods and services to consumers (NMFS 2000b).

The main capital investments that must be recouped are expenditures for vessel gear and associated fishing permits. On an individual fishing business basis, producer surplus is the difference between gross revenues and all costs, including payments to labor and owners of the business. At the industry or fishery level, producer surplus is the sum of net economic rent accruing to owners who control the relatively fixed factors of production (e.g., vessels, permits, fishing rights, specific knowledge, entrepreneurial capacity). Producer surplus in the fishing sector can increase through a reduction in unit harvesting costs (improved economic efficiency) or an increase in exvessel prices received.

Vessel and the Fishing Firm

Because information is readily available on fishing vessels, but not the businesses that own those vessels, we generally use the fishing vessel as a proxy for the fishing business. For analytical purposes, the vessel is viewed as a profit center owned by the fishing business that must cover all fishing costs, including materials and equipment, payments to captain and crew, and a return to the owners.

Other Affected Producers

In addition to commercial fishing vessels, other fishery-dependent businesses that may be affected include buyers who act as intermediaries between the vessels and consumers, processors who purchase raw materials from commercial vessels to produce seafood products for shipment to regional, national and/or export markets, and charter or party vessels that provide recreational fishing experience for paying customers. A thorough accounting of net benefits would include measurement of producer surpluses accruing in these business sectors as well as the fishing vessels.

10/ The prices paid and the quantities consumed reflect the true opportunity costs of resources.

8.6.2.2 Consumer Surplus

Consumer surplus is the net value of products to the consumer, or the difference between what the consumer actually pays and what they would be willing to pay (i.e., the value to the consumer over and above the actual purchase price). Consumer surplus can increase through a reduction in prices paid, an increase in the quantities consumed, or improvement in product quality. Consumer surplus exists because, while some people would be willing to pay more than the going price, the forces of supply and demand in competitive markets determine a single price for a good at any given time. Consumer surplus can, therefore, be loosely interpreted as the extra income available for spending on other items, because some individuals pay less than they would be willing to pay. However, not all goods and services important to consumers are exchanged through markets with market prices.

Market Consumer Goods

<u>Seafood</u>: For goods sold in markets where a consumer price can be determined, for example the market for seafood, available price, and quantity, information can allow estimation of the amount consumers might be willing to pay above the purchase price. However, if a change in the quantity of fish available is not expected to change prices because of ready availability of imports or other protein substitutes, then a given regulatory action may have little or no impact on consumers.

<u>Charter and Headboat Recreational Fisher Trips</u>: Individuals pay fees to participate in recreational fishing trips on charter and headboats. Price and quantity information from markets for these trips might allow estimation of the amount consumers are willing to pay above the purchase price. However, charter trips may often be purchased as part of a bundle of goods and services that include other nonfishing recreational activities for the participant or other members of his or her party. Therefore, the consumer surplus estimation problems may be on a par with those described below for private recreational trips.

Non-Market Consumer Goods - Consumptive (Use Values)

For other consumer goods, especially bundles of goods and services, like a recreational fishing trip taken on a private vessel, the prices and quantities associated with each transaction are very difficult to quantify.

<u>Private Recreational Trips</u>: The term “private” is used to designate a recreational angler fishing from a private vessel, the shore, bank, or a public pier. This term is used to distinguish private anglers from those who take part in trips on charter vessels. For the private recreational angler, the amount spent on fishing gear, licenses and other goods necessary to carry out a particular fishing trip is difficult to separate from total annual expenditures. Additionally, depending on the value an individual places on alternatives to fishing, the consumer surplus associated with a trip may far exceed actual trip expenditures.

Non-Market Goods - Nonconsumptive and Nonuse

Nonconsumptive users may experience benefits from the use or nonuse values provided by the resource. Examples of nonconsumptive use values include wildlife viewing and the derivation of secondary benefits from ecosystem services (e.g., sewage treatment services provided by wetlands). Non-users may value resources for their own sake. The following types of non-use benefits may apply in this case: (1) existence value derived from knowing a fish population or ecosystem is protected without intent to harvest, observe, or otherwise derive direct benefits from the resource; (2) option value placed on knowing a fish population, habitat, or ecosystem has been protected and is available for use, regardless of whether the resources are actually used; and (3) bequeathal value placed on knowing a fish population, habitat, or ecosystem is protected for the benefit of future generations. These benefits may accrue to individuals as a result of the preservation of healthier, more abundant fish stocks, and may be closely related and overlap with values the general public places on wildlife and natural parks.

The existence of coastal fishing communities in themselves may have intrinsic social value. For example, the Newport Beach, California, dory fishing fleet, founded in 1891, is a historical landmark designated by the Newport Beach Historical Society. The city grants the dory fleet use of the public beach in return for the business and tourism this unique fishery generates.

8.6.3 Comparison of the Alternatives

The economic effects evaluated in the social net benefit analysis below arise from two effects: (1) impacts on current and future stock biomass and (2) the impacts on current and future harvests. Table 8-28 summarizes the following analysis of social net benefit under the 2005-2006 management alternatives.

8.6.3.1 Producer Surplus

Commercial Vessels: Harvest costs will be lower, and producer surplus greater, if CPUE increases. While there is no difference between the alternatives in this regard, there may be slightly higher near term adjustment costs associated with the lower harvest alternatives, e.g., Alternative 1.

Buyers and Processors: There may be somewhat higher adjustment costs in the near term under the lower harvest alternatives, e.g., Alternative 1.

Recreational Charter Vessels: Demand for recreational charter trips depends on income of the consumers and quality of the available experience. In Washington and Oregon there is no difference between the alternatives in the quality of recreational fishing experience available, and no difference between the alternatives and No Action. In California, there may be some difference between the alternatives in the quality of recreational fishing experience available due to slightly different size and bag limits for certain species. In ranking the probable quality of recreational experience under the alternatives for California, Alternative 2, Alternative 3 and the Council-preferred Alternative all offer the highest quality experience. These are also probably potentially higher than under No Action. Alternative 1 offers the lowest potential quality experience.

8.6.3.2 Consumer Surplus

Seafood Consumers: In general for most consumers of fresh and frozen seafood products, there is little or no difference between the alternatives, since locally-caught products have close substitutes readily available from elsewhere in the global supply chain.

Recreational Anglers: In Washington and Oregon there is no difference between the alternatives in the quality of recreational fishing experience available. In California, there may be some difference between the alternatives in the quality of recreational fishing experience available due to slightly different size and bag limits for certain species. In ranking the probable quality of recreational experience under the alternatives for California, Alternative 2, Alternative 3 and the Council-preferred Alternative offer the highest quality experience. These are also probably potentially higher than under No Action. Alternative 1 offers the lowest potential quality experience.

Nonconsumptive Users: Enhanced protection for sensitive fish stocks may indirectly enhance the value of wildlife viewing experience for nonconsumptive users. Larger stocks are most likely to occur under the Council-preferred Alternative as modified in September 2004 and Alternative 1 due to larger RCAs, although the differences between the 2005-2006 management alternatives are not expected to have differential impacts on stock size over the long run.

Nonusers: Enhanced protection for sensitive fish stocks may enhance nonuse values. Larger stocks are most likely to occur under the Council-preferred Alternative as modified in September 2004 and Alternative 1 due to larger RCAs, although the differences between the 2005-2006 management alternatives are not expected to have differential impacts on stock size over the long run.

8.6.3.3 Public Expenditures Affecting Either Consumer or Producer Surplus

Enforcement Issues: Under the Council-preferred Alternative as modified in September 2004 and Alternative 1, higher costs may be required in order to enforce larger RCAs. For the other action alternatives, enforcement costs should be almost identical and not significantly different than No Action..

Science and Monitoring Costs: Under Alternative 1, higher expenditures will be required to provide 100% observer coverage in the selective flatfish trawl fishery. For the other action alternatives, there is no difference between the alternatives.

TABLE 8-1a. Total domestic shoreside landings and at-sea deliveries (round weight mt) from West Coast (WA, OR, CA) ocean area fisheries (0-200 miles) coastwide, 1981-2003 (includes commercial tribal fisheries, based on PacFIN data and Council [1997]). (Page 1 of 2)

Year	Lingcod	Whiting, At Sea	Whiting, Shoreside	Flatfish	Sablefish	Rockfish	Other Groundfish	Total Groundfish	Total Groundfish - Less Whiting	Total Groundfish - Less At Sea Whiting	Pink Shrimp	Spot Prawn, Trawl	Spot Prawn, Pot	Ridgeback Prawn, Trawl	Pacific Halibut
1981	3,307	73,557	838	25,972	11,419	59,774	1,729	176,596	102,201	103,039	18,202	174	4	87	160
1982	3,822	67,465	1,027	32,613	18,625	61,470	1,277	61,470	1,277	61,470	12,704	162	8	61	164
1983	4,163	72,100	1,051	29,639	14,685	48,157	889	170,684	97,533	98,584	6,052	58	1	70	322
1984	4,060	78,889	2,721	27,703	14,077	40,020	1,079	168,549	86,939	89,660	4,488	29	0	259	598
1985	3,883	31,692	3,894	30,400	14,308	37,347	967	122,491	86,905	90,799	12,408	26	4	357	536
1986	1,894	81,639	3,463	26,127	13,290	37,012	661	164,086	78,984	82,447	26,330	12	13	130	748
1987	2,586	105,997	4,795	28,796	12,784	40,242	2,644	197,844	87,052	91,847	31,060	21	14	85	307
1988	2,656	135,781	6,867	27,043	10,876	40,980	3,788	227,991	85,343	92,210	32,334	23	41	55	260
1989	3,580	203,578	7,414	29,880	10,439	45,334	2,694	302,919	91,927	99,341	35,550	30	48	61	212
1990	2,932	175,685	8,115	27,701	9,179	43,265	1,813	268,690	84,890	93,005	24,553	19	101	34	153
1991	3,167	200,594	21,040	30,515	9,496	35,282	2,978	303,072	81,438	102,478	19,064	21	103	52	169
1992	1,883	148,186	56,127	24,796	9,360	37,000	3,255	280,607	76,294	132,421	35,710	35	65	27	217
1993	2,200	91,640	42,108	22,107	8,145	38,252	3,483	207,935	74,187	116,295	22,451	51	105	33	252
1994	2,834	162,923	73,611	19,284	7,661	35,361	3,638	305,312	68,778	142,389	14,981	133	66	71	179
1995	1,700	98,376	74,967	19,706	7,951	32,171	2,135	237,006	63,663	138,630	11,342	136	42	187	142
1996	1,790	123,419	85,127	20,807	8,339	30,487	2,559	272,528	63,982	149,109	13,800	178	54	264	150
1997	1,652	142,726	87,410	19,508	7,951	25,576	2,271	287,094	56,958	144,368	17,456	263	79	177	201
1998	506	142,810	88,601	16,722	4,410	22,619	2,180	277,848	46,437	135,038	4,342	257	117	197	223
1999	441	139,940	83,637	20,213	6,660	16,408	1,627	268,926	45,349	128,986	12,404	185	93	632	220
2000	145	120,411	85,843	16,315	6,296	11,702	1,498	242,210	35,956	121,799	14,653	121	81	705	223
2001	156	99,875	73,475	13,863	5,646	7,806	1,427	202,248	28,898	102,373	17,595	92	95	161	331
2002	205	84,494	45,808	13,220	3,830	5,974	2,115	155,646	25,344	71,151	25,302	99	79	215	422
2003	166	86,212	55,336	14,160	5,451	4,136	2,154	167,615	26,067	81,402	13,874	3	73	225	399
1981-2003 Avg	*2,162*	*116,000*	*39,708*	*23,352*	*9,603*	*32,886*	*2,124*	*225,835*	*70,127*	*109,835*	*18,550*	*93*	*56*	*180*	*286*
1991-2003 Avg	*1,296*	*126,277*	*67,161*	*19,324*	*7,015*	*23,290*	*2,409*	*246,773*	*53,335*	*120,495*	*17,152*	*121*	*81*	*227*	*241*
1998-2003 Avg	*270*	*112,290*	*72,117*	*15,749*	*5,382*	*11,441*	*1,833*	*219,082*	*34,675*	*106,792*	*14,695*	*126*	*90*	*356*	*303*

NOTE: For 1981-1990, at-sea whiting catch estimates are from Council 1997.

TABLE 8-1a. Total domestic shoreside landings and at-sea deliveries (round weight mt) from West Coast (WA, OR, CA) ocean area fisheries (0-200 miles) coastwide, 1981-2003 (includes commercial tribal fisheries, based on PacFIN data and Council [1997]). (Page 2 of 2)

Year	California Halibut	Salmon	Sea Cucumber	California Sheephead	Gillnet Complex	CPS Squid	CPS Wetfish	HMS	Dungeness Crab	Other Crus-taceans	Other Species	Total Non-groundfish	Total
1981	191	7,967	0	0	1,258	23,510	105,357	152,465	9,011	1,480	38,365	358,231	534,827
1982	180	8,831	63	0	1,173	16,360	79,436	115,923	7,623	1,233	46,247	290,168	476,468
1983	289	2,936	74	0	678	1,959	32,076	114,644	7,169	1,403	48,437	216,168	386,852
1984	239	2,180	24	0	829	993	38,084	85,203	6,239	1,849	37,260	178,274	346,822
1985	149	5,043	0	0	1,954	11,071	26,657	34,004	7,703	1,754	43,790	145,456	267,947
1986	197	7,384	35	0	1,801	21,290	28,817	36,916	7,402	1,567	51,113	183,755	347,841
1987	224	9,410	49	0	1,370	19,985	36,860	35,902	8,464	1,447	56,546	201,744	399,588
1988	249	12,518	72	0	1,082	37,232	37,902	36,616	16,715	1,430	59,874	236,403	464,392
1989	273	6,869	0	0	875	40,936	35,160	27,446	16,045	1,806	67,110	232,421	535,341
1990	190	4,682	67	0	775	28,447	39,198	16,088	13,529	2,223	49,672	179,731	448,422
1991	235	3,734	264	0	851	37,388	45,047	11,135	6,185	2,035	31,752	158,035	461,107
1992	272	2,049	0	0	379	13,116	39,219	13,899	15,125	1,607	26,641	148,361	428,968
1993	218	2,214	295	0	309	42,889	31,397	17,300	17,411	1,773	20,341	157,039	364,974
1994	188	1,802	298	118	208	55,489	26,669	20,349	17,682	1,221	17,421	156,875	462,186
1995	262	4,756	268	115	276	70,363	52,963	18,538	16,937	1,462	17,857	195,646	432,652
1996	306	3,306	381	115	347	80,715	49,154	29,396	24,564	1,498	18,931	223,159	495,685
1997	415	3,700	209	141	340	70,471	70,617	26,406	12,347	2,010	22,731	227,563	514,655
1998	415	1,850	349	119	255	2,931	68,576	29,640	11,748	1,720	10,671	133,410	411,294
1999	385	2,709	272	63	394	92,122	76,092	17,702	15,783	1,478	11,901	232,435	501,575
2000	218	3,707	291	79	333	117,984	103,360	14,534	13,015	1,619	13,496	284,419	526,692
2001	245	3,358	323	68	264	85,959	106,105	14,816	11,234	1,643	12,530	254,819	457,100
2002	309	4,660	426	52	353	72,958	106,754	12,908	15,505	1,465	16,639	258,146	413,791
2003	293	5,986	344	48	141	39,348	77,843	20,004	32,556	1,287	24,577	217,001	384,616
1981-2003 Avg	*258*	*4,854*	*178*	*40*	*706*	*42,762*	*57,102*	*39,210*	*13,478*	*1,609*	*32,344*	*211,707*	*437,556*
1991-2003 Avg	*289*	*3,372*	*286*	*71*	*342*	*60,133*	*65,677*	*18,971*	*16,161*	*1,601*	*18,884*	*203,608*	*450,407*
1998-2003 Avg	*311*	*3,712*	*334*	*72*	*290*	*68,550*	*89,788*	*18,267*	*16,640*	*1,535*	*14,969*	*230,038*	*449,178*

NOTE: For 1981-1990, at-sea whiting catch estimates are from Council 1997.

TABLE 8-1b. Total domestic shoreside landings and at-sea deliveries (exvessel revenue, thousands of current dollars) from West Coast (WA, OR, CA) ocean area fisheries (0-200 miles) coastwide, 1981-2003 (includes commercial tribal fisheries, based on PacFIN data and Council [1997]). (Page 1 of 2)

Year	Lingcod	Whiting, At Sea	Whiting, Shoreside	Flatfish	Sablefish	Rockfish	Other Groundfish	Total Groundfish	Total Groundfish - Less Whiting	Total Groundfish - Less At Sea Whiting	Pink Shrimp	Spot Prawn, Trawl	Spot Prawn, Pot	Ridgeback Prawn, Trawl	Pacific Halibut
1981	1,662	12,264	141	14,834	5,258	22,339	757	57,254	44,850	44,991	20,160	780	38	165	411
1982	2,088	11,863	182	19,727	10,282	26,479	695	71,315	59,271	59,452	14,278	811	87	157	433
1983	2,284	12,783	186	17,735	7,691	23,775	529	64,983	52,014	52,200	9,753	370	13	141	805
1984	2,184	11,739	406	16,361	6,684	22,111	637	60,122	47,977	48,383	4,526	217	1	327	1,105
1985	2,241	4,631	571	18,633	10,564	23,223	576	60,440	55,238	55,809	9,648	245	47	483	1,226
1986	1,321	10,605	452	17,425	10,985	25,675	479	66,943	55,886	56,338	30,975	118	117	234	2,489
1987	2,151	14,662	664	22,235	13,423	31,069	1,949	86,153	70,827	71,491	46,534	203	176	209	1,250
1988	2,137	22,440	1,136	20,796	12,499	29,323	2,241	90,572	66,996	68,132	29,129	240	444	154	1,106
1989	2,768	29,256	1,071	20,521	10,796	32,137	1,570	98,119	67,792	68,863	28,615	215	503	176	863
1990	2,290	22,583	1,049	17,253	9,661	32,496	983	86,315	62,683	63,732	26,577	159	1,101	101	905
1991	2,457	23,437	2,396	21,246	14,330	28,922	1,669	94,457	68,624	71,020	23,407	222	1,189	148	1,077
1992	1,617	17,968	5,885	16,452	13,633	31,616	1,838	89,009	65,156	71,041	27,293	433	878	131	1,037
1993	1,846	7,071	2,843	14,669	10,009	32,530	1,774	70,742	60,827	63,670	16,472	610	1,545	140	972
1994	2,421	12,931	4,904	13,069	13,970	35,811	2,023	85,130	67,294	72,198	19,326	1,713	1,000	212	908
1995	1,683	10,194	7,821	15,367	23,640	39,581	1,721	100,007	81,992	89,814	18,088	1,898	670	476	676
1996	1,821	13,604	5,107	15,597	25,897	33,805	1,940	97,770	79,060	84,167	18,171	2,578	844	777	764
1997	1,740	19,195	8,162	14,323	27,878	27,883	2,044	101,224	73,867	82,029	15,224	3,721	1,235	690	891
1998	718	13,538	4,845	12,514	11,380	24,997	2,946	70,938	52,554	57,400	5,052	3,697	1,859	762	794
1999	715	11,723	6,871	13,679	17,103	20,497	2,547	73,134	54,541	61,411	12,822	2,682	1,577	1,545	962
2000	345	10,885	7,969	13,980	20,325	17,398	2,639	73,540	54,686	62,656	12,951	2,182	1,635	1,793	1,209
2001	387	10,569	5,748	12,631	17,512	12,880	1,957	61,684	45,367	51,115	10,293	1,703	1,905	532	1,474
2002	506	9,119	4,540	11,828	11,810	11,066	2,615	51,485	37,825	42,365	15,358	1,755	1,592	633	1,818
2003	412	10,454	5,525	13,141	18,442	7,675	2,632	58,281	42,302	47,827	7,668	61	1,504	676	2,303
1981-2003 Avg	*1,643*	*14,066*	*3,412*	*16,262*	*14,077*	*25,795*	*1,685*	*76,940*	*59,462*	*62,874*	*18,362*	*1,157*	*868*	*464*	*1,108*
1991-2003 Avg	*1,282*	*13,130*	*5,586*	*14,500*	*17,379*	*24,974*	*2,180*	*79,031*	*60,315*	*65,901*	*15,548*	*1,789*	*1,341*	*655*	*1,145*
1998-2003 Avg	*514*	*11,048*	*5,916*	*12,962*	*16,095*	*15,752*	*2,556*	*64,844*	*47,879*	*53,796*	*10,690*	*2,014*	*1,679*	*990*	*1,427*

NOTE: For 1981-1990, at-sea whiting catch estimates are from Council 1997.

TABLE 8-1b. Total domestic shoreside landings and at-sea deliveries (exvessel revenue, thousands of current dollars) from West Coast (WA, OR, CA) ocean area fisheries (0-200 miles) coastwide, 1981-2003 (includes commercial tribal fisheries, based on PacFIN data and Council [1997]). (Page 2 of 2)

Year	California Halibut	Salmon	Sea Cucumber	California Sheephead	Gillnet Complex	CPS Squid	CPS Wetfish	HMS	Dungeness Crab	Other Crus-taceans	Other Species	Total Non-groundfish	Total
1981	567	31,772	0	0	2,082	5,080	14,183	199,799	18,259	3,401	28,852	325,547	382,801
1982	551	37,410	25	0	1,897	3,581	9,636	134,490	18,155	3,944	27,199	252,654	323,970
1983	929	9,090	26	0	1,161	838	5,460	117,933	23,427	3,827	28,978	202,751	267,735
1984	897	10,748	10	0	1,397	500	6,852	95,099	21,798	6,705	17,509	167,690	227,811
1985	592	20,869	0	0	2,669	4,065	4,880	42,061	24,628	4,180	22,910	138,503	198,943
1986	865	25,187	16	0	2,483	4,527	4,857	44,987	22,709	5,309	23,395	168,268	235,213
1987	1,067	46,073	23	0	2,282	3,960	5,508	49,233	25,735	5,178	29,109	216,541	302,694
1988	1,246	68,050	32	0	1,936	7,868	6,461	59,069	43,507	5,758	34,883	259,885	350,457
1989	1,340	26,754	0	0	1,919	6,962	6,020	39,944	39,896	6,308	40,777	200,290	298,409
1990	985	21,966	36	0	1,649	4,748	5,420	24,676	45,598	7,187	47,905	189,014	275,329
1991	1,247	14,203	187	0	1,766	6,086	7,063	17,225	21,446	6,860	51,898	154,024	248,481
1992	1,443	9,271	0	0	939	2,497	6,270	26,177	38,884	6,710	47,608	169,570	258,580
1993	1,146	8,931	353	0	904	10,194	3,824	31,130	42,735	5,966	38,135	163,057	233,797
1994	1,117	7,260	424	750	541	14,369	3,882	37,482	52,617	5,742	35,903	183,243	268,371
1995	1,566	15,443	416	701	797	22,342	5,368	27,140	63,482	7,567	38,784	205,413	305,419
1996	1,738	9,337	544	694	982	21,908	5,452	45,587	74,352	8,091	39,254	231,072	328,845
1997	2,180	10,105	232	860	1,315	20,707	8,259	40,516	51,854	10,528	34,802	203,120	304,343
1998	2,107	5,712	456	693	892	1,631	6,860	40,274	46,281	8,658	11,416	137,143	208,080
1999	2,080	9,688	418	452	1,482	33,405	7,408	33,021	67,236	6,167	17,862	198,807	271,944
2000	1,349	13,943	605	593	1,280	27,076	11,935	32,941	61,658	8,197	20,248	199,595	273,136
2001	1,545	10,578	581	515	1,095	16,866	12,322	31,505	51,301	8,515	17,890	168,620	230,303
2002	1,988	13,015	792	391	1,504	18,261	11,944	22,032	57,848	8,257	15,082	172,270	223,755
2003	1,920	20,906	689	381	660	23,068	8,404	33,592	113,039	7,917	37,383	260,171	318,452
1981-2003 Avg	*1,325*	*19,405*	*255*	*262*	*1,462*	*11,328*	*7,316*	*53,300*	*44,628*	*6,564*	*30,773*	*198,576*	*275,516*
1991-2003 Avg	*1,648*	*11,415*	*438*	*464*	*1,089*	*16,801*	*7,615*	*32,202*	*57,133*	*7,629*	*31,251*	*188,162*	*267,193*
1998-2003 Avg	*1,832*	*12,307*	*590*	*504*	*1,152*	*20,051*	*9,812*	*32,227*	*66,227*	*7,952*	*19,980*	*189,434*	*254,278*

NOTE: For 1981-1990, at-sea whiting catch estimates are from Council 1997.

TABLE 8-1c. Total domestic shoreside landings and at-sea deliveries (exvessel revenue, thousands of inflation adjusted 2003 dollars) from West Coast (WA, OR, CA) ocean area fisheries (0-200 miles) coastwide, 1981-2003 (includes commercial tribal fisheries, based on PacFIN data and Council [1997]). (Page 1 of 2)

Year	Lingcod	Whiting, At Sea	Whiting, Shoreside	Flatfish	Sablefish	Rockfish	Other Groundfish	Total Groundfish	Total Groundfish - Less Whiting	Total Groundfish - Less At Sea Whiting	Pink Shrimp	Spot Prawn, Trawl	Spot Prawn, Pot	Ridgeback Prawn, Trawl	Pacific Halibut
1981	2,971	21,921	252	26,516	9,398	39,930	1,353	102,340	80,167	80,419	36,035	1,394	68	296	735
1982	3,517	19,986	306	33,233	17,323	44,609	1,170	120,143	99,852	100,158	24,053	1,367	147	265	729
1983	3,701	20,716	302	28,741	12,465	38,530	857	105,311	84,293	84,595	15,806	599	22	228	1,304
1984	3,412	18,336	634	25,554	10,440	34,536	995	93,908	74,938	75,572	7,070	339	1	511	1,726
1985	3,396	7,020	866	28,245	16,014	35,203	873	91,617	83,731	84,597	14,625	371	71	732	1,859
1986	1,959	15,728	670	25,844	16,293	38,079	711	99,285	82,886	83,556	45,940	175	174	347	3,692
1987	3,105	21,167	958	32,101	19,380	44,855	2,814	124,379	102,254	103,212	67,182	293	254	302	1,805
1988	2,984	31,327	1,586	29,033	17,450	40,936	3,128	126,444	93,531	95,116	40,667	335	620	215	1,544
1989	3,723	39,355	1,441	27,605	14,522	43,231	2,112	131,989	91,193	92,634	38,492	289	676	237	1,161
1990	2,967	29,249	1,358	22,346	12,513	42,088	1,273	111,794	81,186	82,545	34,421	205	1,426	131	1,172
1991	3,075	29,329	2,998	26,588	17,933	36,194	2,088	118,204	85,877	88,875	29,292	278	1,488	185	1,348
1992	1,978	21,980	7,199	20,125	16,677	38,676	2,248	108,883	79,704	86,903	33,387	530	1,074	160	1,268
1993	2,207	8,455	3,399	17,539	11,967	38,895	2,121	84,583	72,729	76,128	19,695	729	1,847	168	1,162
1994	2,834	15,139	5,742	15,301	16,355	41,927	2,369	99,668	78,787	84,529	22,626	2,006	1,171	248	1,063
1995	1,931	11,695	8,973	17,631	27,122	45,411	1,975	114,738	94,070	103,043	20,753	2,178	768	546	776
1996	2,050	15,317	5,750	17,561	29,159	38,063	2,185	110,085	89,018	94,768	20,459	2,902	950	875	860
1997	1,927	21,259	9,039	15,863	30,875	30,881	2,264	112,108	81,810	90,849	16,861	4,122	1,368	764	987
1998	787	14,829	5,307	13,707	12,465	27,381	3,227	77,704	57,567	62,874	5,534	4,050	2,036	834	869
1999	772	12,658	7,419	14,770	18,467	22,132	2,750	78,967	58,890	66,309	13,845	2,896	1,702	1,668	1,039
2000	365	11,502	8,421	14,773	21,478	18,385	2,788	77,712	57,789	66,210	13,685	2,306	1,728	1,895	1,278
2001	399	10,910	5,933	13,038	18,077	13,295	2,020	63,673	46,830	52,763	10,625	1,758	1,966	549	1,522
2002	514	9,271	4,616	12,024	12,006	11,250	2,659	52,341	38,454	43,070	15,613	1,784	1,619	644	1,848
2003	412	10,454	5,525	13,141	18,442	7,675	2,632	58,281	42,302	47,827	7,668	61	1,504	676	2,303
1981-2003 Avg	*2,217*	*18,157*	*3,856*	*21,360*	*17,253*	*33,572*	*2,027*	*98,442*	*76,429*	*80,285*	*24,101*	*1,346*	*986*	*542*	*1,393*
1991-2003 Avg	*1,481*	*14,831*	*6,179*	*16,312*	*19,310*	*28,474*	*2,410*	*88,996*	*67,987*	*74,165*	*17,696*	*1,969*	*1,479*	*709*	*1,255*
1998-2003 Avg	*542*	*11,604*	*6,204*	*13,576*	*16,822*	*16,686*	*2,679*	*68,113*	*50,305*	*56,509*	*11,161*	*2,143*	*1,759*	*1,045*	*1,476*

NOTE: Inflation adjustment used is the U.S. GDP Deflator (http://www.bea.gov/bea/dn/home/gdp.htm). For 1981-1990, at-sea whiting catch estimates are from Council 1997.

TABLE 8-1c. Total domestic shoreside landings and at-sea deliveries (exvessel revenue, thousands of inflation adjusted 2003 dollars) from West Coast (WA, OR, CA) ocean area fisheries (0-200 miles) coastwide, 1981-2003 (includes commercial tribal fisheries, based on PacFIN data and Council [1997]). (Page 2 of 2)

Year	California Halibut	Salmon	Sea Cucumber	California Sheephead	Gillnet Complex	CPS Squid	CPS Wetfish	HMS	Dungeness Crab	Other Crus-taceans	Other Species	Total Non-groundfish	Total
1981	1,013	56,791	0	0	3,721	9,080	25,351	357,132	32,637	6,078	51,571	581,902	684,242
1982	928	63,024	42	0	3,195	6,033	16,234	226,572	30,586	6,644	45,822	425,640	545,786
1983	1,506	14,731	42	0	1,881	1,358	8,849	191,121	37,965	6,203	46,962	328,576	433,888
1984	1,401	16,787	15	0	2,182	780	10,703	148,540	34,047	10,472	27,348	261,923	355,830
1985	898	31,634	0	0	4,045	6,162	7,398	63,758	37,331	6,336	34,728	209,946	301,562
1986	1,283	37,356	24	0	3,682	6,714	7,204	66,722	33,680	7,874	34,697	249,564	348,853
1987	1,540	66,516	34	0	3,295	5,717	7,952	71,079	37,154	7,475	42,025	312,623	437,002
1988	1,739	95,003	45	0	2,702	10,984	9,020	82,464	60,738	8,039	48,699	362,816	489,261
1989	1,802	35,989	0	0	2,581	9,365	8,099	53,732	53,667	8,486	54,853	269,429	401,418
1990	1,275	28,450	47	0	2,136	6,150	7,020	31,960	59,058	9,308	62,045	244,806	356,600
1991	1,561	17,774	234	0	2,210	7,616	8,839	21,555	26,838	8,584	64,945	192,747	310,951
1992	1,765	11,341	0	0	1,149	3,054	7,670	32,021	47,566	8,208	58,238	207,431	316,315
1993	1,370	10,678	422	0	1,081	12,188	4,572	37,221	51,096	7,133	45,597	194,960	279,542
1994	1,307	8,499	496	878	633	16,823	4,545	43,883	61,603	6,722	42,034	214,537	314,204
1995	1,797	17,717	477	804	914	25,633	6,158	31,137	72,832	8,681	44,497	235,670	350,406
1996	1,956	10,513	613	781	1,106	24,667	6,139	51,329	83,717	9,110	44,198	260,177	370,265
1997	2,414	11,192	257	953	1,457	22,934	9,147	44,872	57,430	11,660	38,544	224,961	337,069
1998	2,308	6,256	500	759	977	1,786	7,515	44,115	50,695	9,483	12,505	150,222	227,926
1999	2,246	10,460	451	488	1,600	36,069	7,998	35,655	72,599	6,659	19,286	214,663	293,632
2000	1,425	14,734	639	627	1,353	28,612	12,612	34,810	65,156	8,662	21,397	210,918	288,632
2001	1,595	10,919	600	532	1,130	17,410	12,719	32,521	52,955	8,790	18,467	174,056	237,727
2002	2,021	13,232	805	397	1,529	18,564	12,143	22,398	58,810	8,394	15,332	175,134	227,474
2003	1,920	20,906	689	381	660	23,068	8,404	33,592	113,039	7,917	37,383	260,171	318,452
1981-2003 Avg	*1,612*	*26,544*	*280*	*287*	*1,966*	*13,077*	*9,404*	*76,443*	*53,530*	*8,127*	*39,616*	*259,255*	*357,697*
1991-2003 Avg	*1,822*	*12,632*	*476*	*508*	*1,215*	*18,340*	*8,343*	*35,778*	*62,641*	*8,462*	*35,571*	*208,896*	*297,892*
1998-2003 Avg	*1,919*	*12,751*	*614*	*531*	*1,208*	*20,918*	*10,232*	*33,848*	*68,876*	*8,318*	*20,728*	*197,527*	*265,641*

NOTE: Inflation adjustment used is the U.S. GDP Deflator (http://www.bea.gov/bea/dn/home/gdp.htm). For 1981-1990, at-sea whiting catch estimates are from Council 1997.

TABLE 8-2a. Total domestic shoreside landings and at-sea deliveries (round weight mt) from West Coast ocean area fisheries (0-200 miles) North and South of Cape Mendocino and by state (WA, OR and CA), 1981-2003 (includes commercial tribal fisheries, based on PacFIN data (April, 2004) and Council (1997). (Page 1 of 1)

	All Groundfish							All Species						
	At-Sea Included		Not Including At Sea					At-Sea Included		Not Including At Sea				
Year	North of Cape Mendocino	South of Cape Mendocino	WA	OR	CA	Total	Total with At-Sea	North of Cape Mendocino	South of Cape Mendocino	WA	OR	CA	Total	Total with At-Sea
1981	151,004	25,592	23,290	37,315	42,434	103,039	176,596	200,657	334,063	33,937	66,554	360,779	461,270	534,827
1982	152,292	34,007	25,200	40,999	52,635	118,834	186,299	183,276	293,142	32,915	57,250	318,838	409,003	476,468
1983	143,709	26,973	22,912	35,103	40,567	98,583	170,683	164,636	222,109	30,740	44,898	239,115	314,752	386,852
1984	141,626	26,923	20,888	28,178	40,593	89,659	168,548	158,876	187,813	26,158	36,598	205,177	267,933	346,822
1985	96,178	26,312	19,166	28,967	42,665	90,798	122,490	125,107	142,474	27,921	43,062	165,272	236,255	267,947
1986	137,395	26,692	15,939	24,883	41,625	82,448	164,087	178,713	168,874	27,489	47,623	191,090	266,202	347,841
1987	174,325	23,519	20,097	30,531	41,219	91,847	197,844	220,706	178,523	31,820	58,994	202,778	293,591	399,588
1988	208,073	19,917	20,332	32,125	39,753	92,210	227,991	266,841	197,210	39,009	62,679	226,923	328,611	464,392
1989	279,717	23,202	20,012	36,836	42,492	99,341	302,919	340,343	194,791	36,795	72,104	222,864	331,763	535,341
1990	246,481	22,210	18,329	35,509	39,168	93,006	268,691	293,533	154,619	30,679	61,455	180,603	272,737	448,422
1991	283,082	19,989	16,941	49,750	35,786	102,477	303,071	314,390	146,533	24,777	66,239	169,497	260,513	461,107
1992	260,347	20,260	15,729	81,919	34,773	132,421	280,607	320,508	108,325	29,845	114,385	136,552	280,782	428,968
1993	191,730	16,205	17,018	71,211	28,066	116,295	207,935	241,100	123,751	34,261	92,938	146,135	273,334	364,974
1994	290,828	14,483	23,558	94,096	24,733	142,388	305,311	332,743	129,364	37,800	110,440	151,021	299,262	462,186
1995	219,667	17,339	18,455	91,644	28,531	138,630	237,006	255,753	176,863	32,695	107,495	194,086	334,276	432,652
1996	254,533	17,995	25,267	95,828	28,014	149,109	272,528	305,790	189,844	43,337	118,468	210,460	372,266	495,685
1997	270,417	16,675	19,106	95,875	29,333	144,314	287,093	313,325	201,296	30,163	116,860	224,838	371,862	514,655
1998	266,072	11,775	22,094	89,899	22,816	134,809	277,847	296,576	114,582	33,611	103,710	130,739	268,060	411,294
1999	260,219	8,707	21,496	92,089	14,863	128,448	268,926	296,771	204,567	32,007	112,253	216,505	360,765	501,575
2000	235,332	6,878	19,645	85,680	16,033	121,358	242,210	288,562	237,931	35,606	118,637	251,469	405,712	526,692
2001	196,620	5,627	24,197	66,450	11,403	102,051	202,247	263,965	192,980	49,532	104,343	202,565	356,440	457,100
2002	149,348	6,118	19,300	49,861	15,220	84,381	155,646	243,531	170,027	57,899	99,966	183,794	341,659	413,791
2003	161,919	5,696	23,585	47,269	10,433	81,287	167,615	265,551	119,065	74,470	100,470	132,773	307,713	384,616

TABLE 8-2b. Total domestic shoreside landings and at-sea deliveries (total exvessel revenue in thousands of current dollars) from West Coast ocean area fisheries (0-200 miles) North and South of Cape Mendocino and by state (WA, OR and CA), 1981-2003 (includes commercial tribal fisheries, based on PacFIN data (April, 2004) and Council (1997). (Page 1 of 1)

	All Groundfish							All Species						
	At-Sea Included		Not Including At Sea					At-Sea Included		Not Including At Sea				
Year	North of Cape Mendocino	South of Cape Mendocino	WA	OR	CA	Total	Total with At-Sea	North of Cape Mendocino	South of Cape Mendocino	WA	OR	CA	Total	Total with At-Sea
1981	43,673	14,083	9,260	14,668	21,457	45,384	57,755	124,664	261,459	28,873	56,592	288,307	373,773	386,144
1982	52,488	19,467	11,499	20,311	28,175	59,985	71,955	112,705	214,126	27,604	49,663	237,638	314,906	326,875
1983	49,245	16,228	11,354	18,481	22,758	52,593	65,473	93,782	175,823	28,109	37,254	191,506	256,868	269,748
1984	43,988	16,620	10,465	15,183	23,125	48,773	60,608	79,459	149,935	21,926	30,324	165,566	217,816	229,650
1985	42,792	18,082	12,542	17,217	26,451	56,209	60,874	93,699	105,604	27,766	42,294	125,645	195,705	200,370
1986	46,710	20,733	10,805	16,920	29,033	56,759	67,443	116,557	119,748	29,218	54,216	142,853	226,287	236,972
1987	66,641	20,029	16,711	24,330	30,879	71,920	86,669	164,019	138,934	41,100	83,247	165,416	289,762	304,512
1988	73,678	17,480	15,790	24,075	28,708	68,573	91,158	180,675	170,343	49,657	79,775	200,706	330,137	352,722
1989	78,660	20,026	13,663	25,367	30,229	69,260	98,684	165,710	133,661	42,383	72,001	156,322	270,706	300,130
1990	67,143	19,627	11,560	23,358	29,150	64,068	86,770	157,006	119,100	38,322	67,567	148,189	254,078	276,780
1991	76,062	19,007	14,159	29,957	27,363	71,479	95,068	132,078	117,744	30,437	58,415	137,650	226,500	250,089
1992	69,942	19,761	11,508	31,291	28,798	71,597	89,705	156,874	103,586	38,194	71,983	132,318	242,494	260,603
1993	54,932	16,104	10,967	29,116	23,852	63,935	71,037	133,399	101,206	41,155	58,456	128,061	227,672	234,773
1994	68,657	16,845	15,075	32,768	24,672	72,515	85,502	155,262	114,126	47,434	63,620	145,508	256,562	269,549
1995	76,306	24,055	17,816	37,895	34,419	90,131	100,361	168,664	137,737	58,833	76,310	161,129	296,272	306,501
1996	73,856	24,312	16,350	34,195	33,962	84,508	98,167	187,014	143,017	60,775	81,808	173,937	316,521	330,180
1997	78,835	22,516	16,329	33,824	31,975	82,128	101,351	159,828	144,789	44,696	67,947	172,862	285,505	304,731
1998	53,942	16,985	10,831	22,807	23,609	57,248	70,928	119,165	88,726	35,858	48,969	109,490	194,316	208,050
1999	58,418	14,747	12,379	27,559	21,094	61,033	73,165	147,541	124,473	46,496	66,844	146,589	259,929	272,062
2000	59,687	13,815	11,330	29,842	21,074	62,247	73,502	154,273	118,605	46,139	77,806	137,788	261,733	272,994
2001	50,659	11,025	10,809	23,392	16,664	50,866	61,684	138,307	91,850	48,123	66,860	104,493	219,477	230,303
2002	40,596	10,856	9,398	18,020	16,410	43,827	51,485	125,241	98,325	51,411	52,675	112,011	216,097	223,755
2003	48,209	10,072	12,143	20,789	14,749	47,680	58,281	201,967	116,485	79,442	79,039	148,806	307,288	318,452

TABLE 8-3. Historical harvests by West Coast commercial fisheries sectors (landed roundweight in mt and exvessel revenue in thousands of current dollars). (Page 1 of 1)

	Limited Entry Trawl			Limited Entry Non-Trawl			Open Access			TOTAL		
	Groundfish	Non-Groundfish	Total	Groundfish	Non-Groundfish	Total	Groundfish	Non-Groundfish	Total	Groundfish	Non-Groundfish	Total
Landed Roundweight (mt)												
1998	271,882	694	272,576	4,845	310	5,156	1,162	126,594	127,756	277,889	127,598	405,487
1999	263,150	1,267	264,417	5,145	220	5,365	642	225,410	226,052	268,937	226,897	495,834
2000	237,135	464	237,599	4,594	164	4,758	455	277,349	277,804	242,183	277,978	520,161
2001	197,737	730	198,468	3,915	283	4,198	484	247,790	248,274	202,136	248,803	450,940
2002	151,646	5,583	157,228	3,233	910	4,142	472	250,954	251,426	155,350	257,446	412,796
2003	139,084	1,268	140,352	2,374	673	3,047	1,279	198,583	199,862	142,737	200,524	343,261
Exvessel Revenue ($,000)												
1998	55,216	1,833	57,050	12,332	863	13,196	2,793	130,539	133,332	70,342	133,236	203,577
1999	54,335	1,518	55,853	15,608	1,008	16,616	2,539	189,886	192,425	72,482	192,412	264,894
2000	53,678	882	54,560	16,611	891	17,502	2,686	191,658	194,344	72,975	193,432	266,406
2001	42,001	1,149	43,150	13,335	1,324	14,659	2,555	159,985	162,541	57,892	162,458	220,350
2002	37,980	1,822	39,802	10,590	2,141	12,731	2,463	166,343	168,807	51,034	170,307	221,341
2003	41,188	1,223	42,411	6,306	804	7,110	4,885	227,072	231,957	52,379	229,099	281,478

TABLE 8-4 Historical harvests of species groups by the **Limited Entry Traw**l commercial fishery sector North and South of Cape Mendocino (landed roundweight in mt and exvessel revenue in thousands of current dollars). (Page 1 of 2)

Area/ Year	Lingcod	Whiting, At Sea	Whiting, Shoreside	Flatfish	Sablefish	Rockfish	Other Groundfish	Total Groundfish	Pink Shrimp	Spot Prawn, Trawl	Spot Prawn, Pot	Ridgeback Prawn, Trawl	Pacific Halibut	California Halibut
Landed Roundweight (mt)														
North														
1998	340.4	142,938.4	88,678.4	13,504.6	1,766.3	14,490.1	1,389.2	263,107	0.0	0.0	0.0	0.0	0.0	12.8
1999	277.4	140,065.4	83,711.4	16,534.2	2,627.2	12,232.3	1,004.4	256,452	0.0	0.0	0.0	0.0	0.4	3.0
2000	66.2	120,519.2	85,919.2	13,101.6	2,292.2	9,184.1	755.7	231,838	0.0	0.0	0.0	0.0	0.7	0.3
2001	57.1	99,964.5	73,539.3	11,147.7	2,241.0	5,668.6	858.0	193,476	0.0	0.0	0.0	0.0	0.3	3.7
2002	96.2	84,494.3	45,748.3	10,222.4	1,204.0	3,571.8	1,322.6	146,660	0.0	0.0	0.0	0.0	0.1	0.1
2003	54.2	66,852.3	51,255.7	10,833.4	2,635.9	2,027.4	915.0	134,574	0.0	0.0	0.0	0.0	11.5	0.0
South														
1998	40.4	0.0	1.6	3,182.2	427.3	4,859.8	263.0	8,774	0.0	0.0	0.0	0.0	0.0	302.5
1999	44.3	0.0	0.0	3,648.8	559.1	2,331.8	114.2	6,698	0.0	0.0	0.0	0.0	0.0	271.0
2000	11.2	0.0	1.1	3,201.2	424.6	1,594.2	64.1	5,296	0.0	0.0	0.0	0.0	0.0	137.7
2001	10.4	0.0	1.1	2,682.8	372.9	1,119.3	74.8	4,261	0.0	0.0	0.0	0.0	0.0	158.8
2002	15.5	0.0	0.1	2,841.0	396.5	1,653.7	79.3	4,986	0.0	0.0	0.0	0.0	0.0	176.2
2003	9.1	0.0	0.0	2,890.7	599.9	965.1	44.9	4,510	0.0	0.0	0.0	4.1	0.0	117.2
Exvessel Revenue ($,000)														
North														
1998	389	13,538	4,844	9,665	4,388	13,245	733	??	0	0	0	0	0	56
1999	343	11,724	6,870	10,552	5,734	11,698	469	47,390	0	0	0	0	0	13
2000	130	11,177	7,968	11,002	6,198	10,528	443	47,447	0	0	0	0	0	2
2001	111	7,837	5,747	9,867	5,941	6,884	520	36,905	0	0	0	0	1	16
2002	180	9,119	4,535	9,070	2,866	5,001	1,043	31,814	0	0	0	0	0	1
2003	88	8,106	5,096	9,880	8,787	2,827	833	35,617	0	0	0	0	58	0
South														
1998	60	0	2	2,781	882	4,597	93	8,414	0	0	0	0	0	1,463
1999	70	0	0	3,052	1,046	2,738	38	6,945	0	0	0	0	0	1,374
2000	23	0	0	2,913	898	2,371	25	6,231	0	0	0	0	0	787
2001	21	0	0	2,667	794	1,586	27	5,095	0	0	0	0	0	946
2002	30	0	0	2,651	874	2,581	31	6,166	0	0	0	0	0	1,019
2003	20	0	0	2,688	1,529	1,315	19	5,571	0	0	0	10	0	627

TABLE 8-4. Historical harvests of species groups by the **Limited Entry Trawl** commercial fishery sector North and South of Cape Mendocino (landed roundweight in mt and exvessel revenue in thousands of current dollars). (Page 2 of 2)

Area/ Year	Salmon	Sea Cucumber	California Sheephead	Gillnet Complex	CPS Squid	CPS Wetfish	HMS	Dungeness Crab	Other Crustaceans	Other Species	Total Non-groundfish	Grand Total
						Landed Roundweight (mt)						
North												
1998	0.0	0.0	0.0	0.0	27.4	258.0	0.4	0.1	17.6	0.0	316	263,424
1999	3.8	0.0	0.0	0.0	17.9	913.3	1.7	2.3	1.7	0.0	944	257,396
2000	4.4	0.0	0.0	0.0	6.3	282.8	1.1	0.0	1.8	0.0	298	232,136
2001	5.1	0.0	0.0	0.0	30.2	526.5	1.2	0.1	3.5	0.0	571	194,047
2002	2.1	0.0	0.0	0.0	14.3	12.9	0.2	0.0	1.0	5,336.7	5,368	152,027
2003	7.1	0.0	0.0	0.0	16.7	82.2	0.4	10.8	0.0	984.9	1,114	135,688
South												
1998	0.0	61.5	0.0	0.0	3.8	6.5	1.1	1.8	0.3	0.0	377	9,152
1999	0.0	45.8	0.0	0.0	1.2	1.5	1.3	0.5	1.5	0.0	323	7,021
2000	0.0	27.2	0.0	0.0	0.8	0.5	0.4	0.0	0.3	0.0	167	5,463
2001	0.0	0.0	0.2	0.0	0.2	0.3	0.1	0.0	0.1	0.0	160	4,421
2002	0.0	0.0	0.0	0.0	0.6	0.0	0.7	0.7	2.6	34.3	215	5,201
2003	0.0	0.0	0.0	0.0	0.6	0.0	1.2	0.0	0.3	31.0	154	4,664
						Exvessel Revenue ($,000)						
North												
1998	0	0	0	0	2	38	0	0	164	0	261	47,063
1999	0	0	0	0	0	15	4	9	17	0	59	47,449
2000	4	0	0	0	4	29	2	0	11	0	52	47,498
2001	19	0	0	0	1	128	1	0	37	0	202	37,108
2002	6	0	0	0	1	2	0	0	1	738	748	32,562
2003	25	0	0	0	10	16	0	51	0	393	554	36,171
South												
1998	0	87	0	0	7	3	3	10	1	0	1,573	9,986
1999	0	62	0	0	2	1	1	3	17	0	1,459	8,404
2000	0	40	0	0	1	0	1	0	1	0	831	7,062
2001	0	0	0	0	0	0	0	0	0	0	947	6,043
2002	0	0	0	0	2	0	2	3	12	36	1,074	7,240
2003	0	0	0	0	1	0	2	0	1	28	669	6,240

TABLE 8-5. Historical harvests of species groups by the **Limited Entry Fixed Gear** commercial fishery sectors North and South of Cape Mendocino (landed roundweight in mt and exvessel revenue in thousands of current dollars). (Page 1 of 2)

Area/ Year	Lingcod	Whiting, At Sea	Whiting, Shoreside	Flatfish	Sablefish	Rockfish	Other Groundfish	Total Groundfish	Pink Shrimp	Spot Prawn, Trawl	Spot Prawn, Pot	Ridgeback Prawn, Trawl	Pacific Halibut	California Halibut
							Landed Roundweight (mt)							
North														
1998	46.8	0.0	0.0	2.6	1,593.7	1,056.5	34.4	2,734	0.0	0.0	0.0	0.0	73.1	0.0
1999	60.4	0.0	0.0	7.3	2,658.4	808.2	76.2	3,611	0.0	0.0	0.0	0.0	144.2	0.0
2000	35.0	0.0	0.0	5.7	2,656.8	277.9	363.0	3,338	0.0	0.0	0.0	0.0	79.7	0.0
2001	45.3	0.0	0.0	5.5	2,148.5	384.3	264.5	2,848	0.0	0.0	0.0	0.0	209.1	0.0
2002	36.0	0.0	0.0	8.9	1,599.4	256.3	474.7	2,375	0.0	0.0	0.0	0.0	309.0	0.0
2003	7.9	0.0	0.0	198.5	843.9	137.0	705.3	1,893	0.0	0.0	0.0	0.0	81.3	0.0
South														
1998	39.5	0.0	0.0	9.9	408.8	1,332.6	320.3	2,111	0.0	0.0	0.0	0.0	2.9	35.6
1999	25.4	0.0	0.4	18.0	591.4	651.3	248.0	1,534	0.0	0.0	0.0	0.0	2.0	16.4
2000	10.6	0.0	0.1	3.6	673.6	400.3	167.3	1,255	0.0	0.0	0.0	0.0	0.0	16.9
2001	12.8	0.0	0.0	14.6	584.2	348.1	107.1	1,067	0.0	0.0	0.0	0.0	0.0	14.1
2002	12.4	0.0	0.3	7.8	473.2	246.9	116.8	857	0.0	0.0	0.0	0.0	0.1	22.0
2003	0.8	0.0	0.7	0.8	162.5	275.3	41.5	482	0.0	0.0	0.0	0.0	0.0	0.8
							Exvessel Revenue ($,000)							
North														
1998	100	0	0	2	4,453	1,509	92	??	0	0	0	0	219	0
1999	141	0	0	4	8,190	1,544	146	10,025	0	0	0	0	617	0
2000	110	0	0	4	10,142	756	428	11,440	0	0	0	0	386	0
2001	118	0	0	4	7,856	1,087	359	9,424	0	0	0	0	902	0
2002	117	0	0	4	6,111	765	595	7,592	0	0	0	0	1,330	0
2003	17	0	0	250	3,412	221	632	4,533	0	0	0	0	477	0
South														
1998	90	0	0	10	1,028	3,966	1,080	6,175	0	0	0	0	10	186
1999	73	0	0	18	1,466	3,021	1,005	5,584	0	0	0	0	7	107
2000	37	0	0	7	2,166	2,254	707	5,171	0	0	0	0	0	102
2001	47	0	0	22	1,773	1,745	324	3,911	0	0	0	0	0	95
2002	34	0	0	10	1,366	1,365	224	2,998	0	0	0	0	1	128
2003	3	0	3	2	507	1,237	21	1,773	0	0	0	0	0	6

TABLE 8-5. Historical harvests of species groups by the **Limited Entry Fixed Gear** commercial fishery sectors North and South of Cape Mendocino (landed roundweight in mt and exvessel revenue in thousands of current dollars). (Page 2 of 2)

Area/ Year	Salmon	Sea Cucumber	California Sheephead	Gillnet Complex	CPS Squid	CPS Wetfish	HMS	Dungeness Crab	Other Crustaceans	Other Species	Total Nongroundfish	Grand Total
						Landed Roundweight (mt)						
North												
1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	69.7	143	2,877
1999	0.0	0.0	0.0	0.0	0.0	0.0	13.1	0.0	0.0	0.3	158	3,768
2000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	80	3,419
2001	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	209	3,057
2002	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	439.4	748	3,124
2003	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	1.3	559.8	643	2,535
South												
1998	0.0	83.8	43.7	0.0	0.0	0.0	0.0	0.0	0.1	1.5	167	2,279
1999	0.0	0.0	27.0	0.0	0.0	4.3	10.3	0.0	0.0	2.1	62	1,597
2000	0.0	0.0	20.0	41.9	0.2	4.2	0.0	0.0	0.2	0.0	83	1,339
2001	0.0	0.0	16.8	27.2	8.9	5.7	0.0	0.3	0.5	0.1	74	1,140
2002	0.0	0.0	11.0	0.0	0.4	0.0	0.2	0.0	0.4	126.9	161	1,019
2003	0.0	0.0	0.2	0.0	0.1	4.5	0.0	0.0	5.0	19.9	31	512
						Exvessel Revenue ($,000)						
North												
1998	0	0	0	0	0	0	0	0	1	70	290	6,447
1999	0	0	0	0	0	0	48	0	0	1	666	10,691
2000	0	0	0	0	0	0	0	0	3	1	389	11,829
2001	0	0	0	0	0	0	0	0	0	0	902	10,327
2002	0	0	0	0	0	0	0	0	0	275	1,604	9,196
2003	0	0	0	0	0	0	0	0	10	245	732	5,264
South												
1998	0	125	251	0	0	0	0	0	0	2	574	6,749
1999	0	0	175	0	0	9	41	0	0	2	342	5,926
2000	0	0	145	244	1	9	0	0	0	0	502	5,673
2001	0	0	123	183	2	13	0	2	3	0	421	4,332
2002	0	0	74	0	2	0	1	0	1	330	537	3,535
2003	0	0	2	0	0	18	0	0	17	30	72	1,845

TABLE 8-6. Historical harvests of species groups by the **Open Access** commercial fishery sectors North and South of Cape Mendocino (landed roundweight in mt and exvessel revenue in thousands of current dollars). (Page 1 of 2)

Area/ Year	Lingcod	Whiting, At Sea	Whiting, Shoreside	Flatfish	Sablefish	Rockfish	Other Groundfish	Total Groundfish	Pink Shrimp	Spot Prawn, Trawl	Spot Prawn, Pot	Ridgeback Prawn, Trawl	Pacific Halibut	California Halibut
Landed Roundweight (mt)														
North														
1998	19.4	0.0	0.2	7.3	14.1	214.0	6.7	262	4,347.9	0.5	0.4	0.0	20.3	0.1
1999	19.0	0.0	0.0	3.9	4.1	116.1	16.4	159	12,415.7	0.6	0.0	0.0	19.8	0.0
2000	14.8	0.0	0.0	0.7	8.5	90.9	7.1	122	13,562.4	0.0	0.0	0.0	15.8	0.0
2001	17.0	0.0	0.0	1.3	21.7	125.0	15.5	180	17,610.9	1.2	0.0	0.0	11.5	0.0
2002	28.1	0.0	0.0	1.2	13.2	109.3	45.9	198	25,302.4	0.0	0.2	0.0	112.4	3.4
2003	43.8	0.0	0.1	3.7	291.3	188.2	88.5	616	13,434.3	0.0	0.0	0.0	95.8	0.2
South														
1998	19.7	0.0	0.1	29.9	5.0	677.0	168.7	900	0.0	256.4	116.3	197.5	0.0	64.0
1999	15.0	0.0	0.0	19.2	2.8	276.2	168.8	482	0.0	185.1	92.7	632.4	0.0	94.6
2000	7.4	0.0	0.0	17.1	6.3	159.9	142.0	333	0.0	106.1	96.9	705.6	0.0	99.3
2001	11.5	0.0	0.2	23.1	6.3	154.7	107.9	304	0.0	90.8	95.2	161.1	0.4	68.3
2002	17.0	0.0	0.0	17.5	28.2	136.1	75.2	274	0.0	99.2	78.7	215.2	0.0	107.4
2003	27.5	0.0	0.1	14.7	315.2	166.1	139.6	663	439.8	3.1	72.6	220.4	0.0	174.6
Exvessel Revenue ($,000)														
North														
1998	36	0	0	7	33	299	21	??	5,054	9	2	0	69	0
1999	42	0	0	3	12	216	54	327	12,825	8	0	0	83	0
2000	28	0	0	0	29	176	32	266	11,908	0	0	0	78	0
2001	50	0	0	1	75	312	99	537	10,293	27	0	0	51	0
2002	82	0	0	1	45	321	324	772	15,358	0	1	0	487	19
2003	141	0	0	3	1,082	613	359	2,199	7,348	0	0	0	508	2
South														
1998	42	0	0	49	11	1,369	927	2,398	0	3,686	1,856	762	0	403
1999	46	0	0	49	10	1,272	835	2,212	0	2,675	1,577	1,546	0	586
2000	17	0	0	54	39	1,307	1,003	2,420	0	1,922	1,900	1,794	0	674
2001	38	0	1	69	34	1,249	628	2,018	0	1,676	1,905	532	2	489
2002	63	0	0	64	132	1,033	399	1,692	0	1,755	1,589	633	0	821
2003	109	0	0	39	937	1,072	530	2,686	320	61	1,504	666	0	1,284

TABLE 8-6. Historical harvests of species groups by the **Open Access** commercial fishery sectors North and South of Cape Mendocino (landed roundweight in mt and exvessel revenue in thousands of current dollars). (Page 2 of 2)

Area/ Year	Salmon	Sea Cucumber	California Sheephead	Gillnet Complex	CPS Squid	CPS Wetfish	HMS	Dungeness Crab	Other Crustaceans	Other Species	Total Nongroundfish	Grand Total
						Landed Roundweight (mt)						
North												
1998	715.6	0.0	0.0	0.8	4.0	1,278.9	11,374.6	10,272.0	172.6	140.7	28,329	28,590
1999	615.4	0.0	0.0	5.9	0.0	876.8	4,132.1	14,733.9	121.9	170.8	33,093	33,252
2000	624.5	0.1	0.0	0.2	22.5	14,504.3	7,536.4	12,244.9	1,311.3	559.4	50,382	50,504
2001	1,717.4	0.0	0.0	0.0	0.0	24,051.8	8,743.6	10,386.1	214.2	674.8	63,411	63,592
2002	2,038.7	0.0	0.0	0.6	0.0	39,363.3	8,426.9	11,086.0	179.1	908.1	87,421	87,619
2003	2,490.3	0.3	0.0	0.0	1.2	37,606.7	15,282.4	29,701.5	229.6	783.3	99,626	100,241
South												
1998	1,091.7	204.2	75.7	254.6	2,898.1	67,094.5	18,271.9	1,484.3	1,456.3	4,800.0	98,265	99,166
1999	2,006.6	226.6	36.5	388.6	92,186.0	74,364.1	13,553.3	725.9	1,354.0	6,470.8	192,317	192,799
2000	2,923.8	263.5	58.9	255.4	118,060.4	88,661.3	7,008.7	780.0	1,297.4	6,650.4	226,968	227,300
2001	1,484.6	322.9	51.0	237.1	85,996.5	81,616.0	6,077.6	842.3	1,336.0	5,999.1	184,379	184,682
2002	1,973.7	425.6	41.2	352.0	72,942.3	67,378.1	4,480.3	4,417.9	1,253.9	9,767.6	163,533	163,807
2003	3,221.0	344.0	47.9	140.9	39,329.2	40,149.7	4,760.4	2,199.4	1,050.5	6,803.6	98,957	99,620
						Exvessel Revenue ($,000)						
North												
1998	2,155	0	0	4	2	145	15,843	38,531	1,248	144	63,206	63,601
1999	2,035	0	0	13	0	154	7,619	61,545	982	207	85,472	85,798
2000	2,350	1	0	0	0	1,863	14,175	57,307	2,677	843	91,202	91,468
2001	4,734	0	0	0	0	2,910	16,428	46,280	1,859	946	83,529	84,066
2002	5,391	0	0	0	0	4,857	11,994	39,914	1,690	774	80,486	81,257
2003	8,654	1	0	0	1	4,508	22,239	101,869	1,476	537	147,143	149,342
South												
1998	3,472	244	441	887	1,620	6,675	24,413	7,738	7,163	7,973	67,333	69,731
1999	7,413	356	277	1,469	33,404	7,229	25,298	3,960	5,148	13,475	104,414	106,627
2000	11,192	564	448	820	27,069	10,033	18,761	4,336	6,491	14,451	100,456	102,876
2001	5,525	579	392	912	16,862	9,271	15,064	4,953	6,524	11,771	76,456	78,474
2002	5,811	792	317	1,503	18,257	7,086	10,034	17,931	6,462	12,866	85,858	87,549
2003	11,714	688	379	660	23,057	3,863	11,317	8,457	6,413	9,545	79,930	82,616

TABLE 8-7. Average annual coastwide exvessel prices for deliveries of West Coast species groups: 1981-2003 ($ per lb). (Page 1 of 2)

Year	Lingcod	Whiting, At Sea	Whiting, Shoreside	Flatfish	Sablefish	Rockfish	Other Groundfish	Total Groundfish	Total Groundfish - Less Whiting	Total Groundfish - Less At Sea Whiting	Pink Shrimp	Spot Prawn, Trawl	Spot Prawn, Pot	Ridgeback Prawn, Trawl	Pacific Halibut
1981	0.23	0.08	0.08	0.26	0.21	0.17	0.20	0.15	0.20	0.20	0.50	2.03	4.29	0.86	1.17
1982	0.25	0.08	0.08	0.27	0.25	0.20	0.25	0.17	0.23	0.23	0.51	2.27	4.96	1.17	1.20
1983	0.25	0.08	0.08	0.27	0.24	0.22	0.27	0.17	0.24	0.24	0.73	2.89	6.03	0.91	1.13
1984	0.24	0.07	0.07	0.27	0.22	0.25	0.27	0.16	0.25	0.24	0.46	3.40	0.00	0.57	0.84
1985	0.26	0.07	0.07	0.28	0.34	0.28	0.27	0.22	0.29	0.28	0.35	4.27	5.30	0.61	1.04
1986	0.32	0.06	0.06	0.30	0.38	0.31	0.33	0.19	0.32	0.31	0.53	4.47	4.10	0.82	1.51
1987	0.38	0.06	0.06	0.35	0.48	0.35	0.33	0.20	0.37	0.35	0.68	4.39	5.72	1.12	1.85
1988	0.37	0.08	0.08	0.35	0.52	0.32	0.27	0.18	0.36	0.34	0.41	4.74	4.92	1.27	1.93
1989	0.35	0.07	0.07	0.31	0.47	0.32	0.26	0.15	0.33	0.31	0.37	3.26	4.76	1.31	1.85
1990	0.35	0.06	0.06	0.28	0.48	0.34	0.25	0.15	0.34	0.31	0.49	3.79	4.95	1.36	2.68
1991	0.35	0.05	0.05	0.32	0.69	0.37	0.25	0.14	0.38	0.31	0.56	4.80	5.24	1.29	2.89
1992	0.39	0.06	0.05	0.30	0.66	0.39	0.26	0.14	0.39	0.24	0.35	5.61	6.13	2.20	2.17
1993	0.38	0.04	0.03	0.30	0.56	0.39	0.23	0.15	0.37	0.25	0.33	5.43	6.68	1.93	1.75
1994	0.39	0.04	0.03	0.31	0.83	0.46	0.25	0.13	0.44	0.23	0.59	5.85	6.88	1.35	2.30
1995	0.45	0.05	0.05	0.35	1.35	0.56	0.37	0.19	0.58	0.29	0.72	6.34	7.24	1.16	2.16
1996	0.46	0.05	0.03	0.34	1.41	0.50	0.34	0.16	0.56	0.26	0.60	6.57	7.09	1.34	2.31
1997	0.48	0.06	0.04	0.33	1.59	0.49	0.41	0.16	0.59	0.26	0.40	6.42	7.10	1.77	2.01
1998	0.64	0.04	0.02	0.34	1.17	0.50	0.61	0.12	0.51	0.19	0.53	6.53	7.21	1.76	1.62
1999	0.74	0.04	0.04	0.31	1.17	0.57	0.71	0.12	0.55	0.22	0.47	6.58	7.70	1.11	1.99
2000	1.08	0.04	0.04	0.39	1.47	0.68	0.80	0.14	0.69	0.23	0.40	8.19	9.16	1.15	2.46
2001	1.13	0.05	0.04	0.41	1.41	0.75	0.62	0.14	0.71	0.23	0.27	8.40	9.10	1.50	2.02
2002	1.12	0.05	0.05	0.41	1.40	0.84	0.56	0.15	0.68	0.27	0.28	8.03	9.15	1.34	1.96
2003	1.13	0.06	0.05	0.42	1.54	0.84	0.55	0.16	0.74	0.27	0.25	8.98	9.41	1.37	2.62
1981-2003 Avg	0.35	0.06	0.04	0.32	0.67	0.36	0.36	0.15	0.38	0.26	0.45	5.68	7.05	1.17	1.76
1991-2003 Avg	0.44	0.05	0.04	0.34	1.10	0.48	0.40	0.14	0.50	0.25	0.42	6.70	7.39	1.31	2.09
1998-2003 Avg	0.83	0.04	0.04	0.37	1.32	0.61	0.65	0.13	0.61	0.22	0.35	7.24	8.37	1.25	2.00

NOTE: For 1981-1990, at-sea whiting catch estimates are from Council 1997.

TABLE 8-7. Average annual coastwide exvessel prices for deliveries of West Coast species groups: 1981-2003 ($ per lb). (Page 2 of 2)

Year	California Halibut	Salmon	Sea Cucumber	California Sheephead	Gillnet Complex	CPS Squid	CPS Wetfish	HMS	Dungeness Crab	Other Crustaceans	Other Species	Total Nongroundfish	Total
1981	1.35	1.81	0.00	0.00	0.75	0.10	0.06	0.59	0.92	1.04	0.34	0.41	0.32
1982	1.39	1.92	0.18	0.00	0.73	0.10	0.06	0.53	1.08	1.45	0.27	0.40	0.31
1983	1.46	1.41	0.16	0.00	0.78	0.19	0.08	0.47	1.48	1.24	0.27	0.43	0.31
1984	1.70	2.24	0.19	0.00	0.77	0.23	0.08	0.51	1.59	1.65	0.21	0.43	0.30
1985	1.80	1.88	0.00	0.00	0.62	0.17	0.08	0.56	1.45	1.08	0.24	0.43	0.34
1986	1.99	1.55	0.21	0.00	0.63	0.10	0.08	0.55	1.39	1.54	0.21	0.42	0.31
1987	2.16	2.22	0.22	0.00	0.76	0.09	0.07	0.62	1.38	1.62	0.23	0.49	0.34
1988	2.27	2.47	0.20	0.00	0.81	0.10	0.08	0.73	1.18	1.83	0.26	0.50	0.34
1989	2.23	1.77	0.00	0.00	1.00	0.08	0.08	0.66	1.13	1.59	0.28	0.39	0.25
1990	2.35	2.13	0.25	0.00	0.97	0.08	0.06	0.70	1.53	1.47	0.44	0.48	0.28
1991	2.41	1.73	0.32	0.00	0.94	0.07	0.07	0.70	1.57	1.53	0.74	0.44	0.24
1992	2.41	2.05	0.00	0.00	1.13	0.09	0.07	0.86	1.17	1.90	0.81	0.52	0.27
1993	2.39	1.83	0.54	0.00	1.33	0.11	0.06	0.82	1.11	1.53	0.85	0.47	0.29
1994	2.70	1.83	0.65	2.88	1.18	0.12	0.07	0.84	1.35	2.13	0.94	0.53	0.26
1995	2.71	1.47	0.70	2.77	1.31	0.14	0.05	0.66	1.70	2.35	0.99	0.48	0.32
1996	2.58	1.28	0.65	2.74	1.29	0.12	0.05	0.70	1.37	2.45	0.94	0.47	0.30
1997	2.38	1.24	0.50	2.77	1.76	0.13	0.05	0.70	1.91	2.38	0.70	0.41	0.27
1998	2.31	1.40	0.59	2.64	1.59	0.25	0.05	0.62	1.79	2.29	0.49	0.47	0.23
1999	2.45	1.62	0.70	3.26	1.71	0.16	0.04	0.85	1.93	1.89	0.68	0.39	0.25
2000	2.81	1.71	0.94	3.41	1.75	0.10	0.05	1.03	2.15	2.30	0.68	0.32	0.24
2001	2.86	1.43	0.82	3.44	1.88	0.09	0.05	0.97	2.07	2.35	0.65	0.30	0.23
2002	2.92	1.27	0.84	3.40	1.94	0.11	0.05	0.77	1.69	2.56	0.41	0.30	0.25
2003	2.97	1.59	0.91	3.59	2.13	0.27	0.05	0.76	1.58	2.79	0.69	0.54	0.38
1981-2003 Avg	2.33	1.81	0.65	2.98	0.94	0.12	0.06	0.62	1.50	1.85	0.43	0.43	0.29
1991-2003 Avg	2.55	1.53	0.67	2.95	1.42	0.12	0.05	0.77	1.61	2.12	0.76	0.41	0.26
1998-2003 Avg	2.62	1.48	0.78	3.15	1.78	0.12	0.05	0.81	1.92	2.28	0.57	0.34	0.24

NOTE: For 1981-1990, at-sea whiting catch estimates are from Council 1997.

TABLE 8-8. West Coast groundfish catch in ocean areas by tribal fleet: 1995 through 2003 (round weight-lb.). (Page 1 of 1)

Species	1995	1996	1997	1998	1999	2000	2001	2002	2003
Arrowtooth Flounder	240	3		255	13,195	331	961	7,137	49,745
Dover Sole	1,764	2,441	1,268	4,509	11,594	2,030	4,619	35,417	72,527
English Sole		4	118	1,847	593	996	7,103	88,684	149,277
Petrale Sole		5	12	3,249	545	80	1,954	45,479	185,732
Rex Sole					26	151	1,358	6,632	10,886
Rock Sole				2,396	16		22	5,833	5,160
Unsp. Flatfish				38	775		437	8,406	6,380
Unspecified Sanddab							1,599	19,655	1,725
Sand Sole		12	40				269	2,748	62
Starry Flounder		22	54				3	301	
Butter Sole								605	0
Flatfish Total	2,004	2,487	1,492	12,294	26,744	3,588	18,325	220,897	481,494
Bocaccio				2	38	145	449	0	916
Nom. Canary Rockfish	59	171	26	609	1,033	539	4,064	7,071	
Canary Rockfish				277	252	330	1,380	0	4,712
Darkblotched Rockfish				0	36	76	226	3,273	81
Greenstriped Rockfish				1	51	16	0		0
Pacific Ocean Perch				0	110	20	16	0	2,601
Redbanded Rockfish				1	128	492	0		0
Redstripe Rockfish				1	63	131	1,510		2,333
Rougheye Rockfish				1	80	76	1,529		7
Rosethorn Rockfish				0	0		0		0
Sharpchin Rockfish				1	9	10	85		2,332
Silvergrey Rockfish				0	36	4	12		81
Unsp. Pop Group		3			104			472	0
Unsp. Rockfish	114,684	79,545	65,121	65,245	59,875	45,953			0
Widow Rockfish				54	411	2,010	16,265	0	24,670
Nom. Widow Rockfish					53	3	51	27,969	0
Yelloweye Rockfish					68	3	2	0	594
Nom. Yellowtail	519	1,297	2,471	10,448	28,671	9,585	7,598	572,996	
Yellowtail Rockfish				3,263	6,498	68,463	210,006	0	677,073
Unsp. Shelf Rockfish						3,099	20,503	23,629	2,354
Unsp. Near-shore						10	58	116	45
Unsp. Slope Rockfish						19,891	54,920	32,941	41,458
Blackgill Rockfish							19		0
Shortraker Rockfish							289		5
Rockfish Total	115,262	81,016	67,618	79,903	97,516	150,856	318,982	668,467	759,262
Spiny Dogfish		5,521			881	6,251		2,607	10,760
Lingcod	2,873	2,732	1,648	5,247	7,051	6,817	9,429	24,854	49,276
Pacific Cod	2,814	1,540	2,166	4,873	2,677	4,573	8,712	128,530	471,655
Sablefish	1,696,098	1,881,702	1,775,108	980,719	1,566,260	1,555,808	1,451,522	959,982	1,328,253
Unspecified Skate	2,517	1,689	1,017	2,031	2,169	1,920	1,407	18,635	47,158
Nom. Shrtsp. Thnyhd.	15,697	16,010	16,892	7,606	13,251	8,987	10,945	10,499	0
Shortspine Thnyhd.				471	240		27		12,703
Nom. Longsp.	1,305	538	139	28					284
Other Groundfish	1,721,304	1,909,732	1,796,970	1,000,975	1,592,529	1,584,356	1,482,042	1,145,107	1,920,089
Pacific Whiting		33,039,648	54,713,657	53,984,582	56,768,061	13,781,257	13,404,001	45,867,384	51,673,540
All Groundfish Species Total	1,838,570	35,032,883	56,579,737	55,077,754	58,484,850	15,520,057	15,223,350	47,901,855	54,834,385

TABLE 8-9. West Coast groundfish catch in ocean areas by tribal fleet: 1995 through 2003 (exvessel revenue $). (Page 1 of 1)

Species	1995	1996	1997	1998	1999	2000	2001	2002	2003
Arrowtooth Flounder	24	1		26	1,319	33	111	715	5,336
Dover Sole	570	768	393	1,478	3,817	663	1,498	11,335	23,219
English Sole		1	106	613	220	309	2,726	29,289	49,792
Petrale Sole		8	8	3,249	545	84	1,692	46,509	191,965
Rex Sole					8	51	471	2,316	3,764
Rock Sole				791	5		7	2,033	1,717
Unsp. Flatfish				13	271		145	2,773	2,103
Unspecified Sanddab							372	5,110	455
Sand Sole		9	30				204	2,084	47
Starry Flounder		7	16				1	98	
Butter Sole								206	
Flatfish Total	594	794	553	6,170	6,185	1,140	7,227	102,468	278,398
Bocaccio				1	13	64	207	0	383
Nom. Canary Rockfish	20	60	12	230	372	196	1,901	3,329	
Canary Rockfish				97	89	145	655	0	2,229
Darkblotched Rockfish				0	12	33	104	1,477	33
Greenstriped Rockfish				0	18	7	0		
Pacific Ocean Perch				0	38	9	7	0	1,150
Redbanded Rockfish				0	44	216	0		0
Redstripe Rockfish				0	22	58	689		920
Rougheye Rockfish				0	27	33	705		2
Rosethorn Rockfish				0	0		0		0
Sharpchin Rockfish				0	3	4	39		912
Silvergrey Rockfish				0	12	2	5		33
Unsp. Pop Group		1			36			212	
Unsp. Rockfish	48,130	32,345	26,723	26,575	25,334	20,737			
Widow Rockfish				19	143	883	7,801	0	11,705
Nom. Widow Rockfish					19	1	16	13,425	
Yelloweye Rockfish					24	2	0	0	885
Nom. Yellowtail Rockfish	189	438	864	3,542	10,256	3,429	3,379	274,509	
Yellowtail Rockfish				1,142	2,275	30,124	99,901		323,272
Unsp. Shelf Rockfish						1,758	13,068	9,794	1,072
Unsp. Near-shore Rockfish						4	25	14,434	21
Unsp. Slope Rockfish						8,238	22,558	55	18,325
Blackgill Rockfish							9		
Shortraker Rockfish							134		2
Rockfish Total	48,339	32,884	27,599	31,606	38,737	65,943	151,203	317,235	360,944
Spiny Dogfish		544			177	830		405	1,564
Lingcod	1,404	1,255	731	3,007	4,169	4,065	6,075	18,176	34,597
Pacific Cod	1,086	587	818	1,924	1,096	1,987	3,792	63,961	235,241
Sablefish	3,046,910	3,003,716	3,162,376	1,280,233	2,045,434	2,544,542	2,411,517	1,512,595	2,187,823
Unspecified Skate	588	120	68	136	145	129	143	2,563	6,308
Nom. Shrtsp. Thnyhd.	12,581	15,340	14,828	7,310	10,751	7,199	8,414	8,232	
Shortspine Thornyhead				425	215		20		10,605
Nom. Longsp. Thnyhd.	1,057	515	125	25					233
Other Groundfish Total	3,063,626	3,022,077	3,178,946	1,293,060	2,061,987	2,558,752	2,429,961	1,605,932	2,476,371
Pacific Whiting		1,651,982	2,735,683	2,699,229	2,838,403	551,250	536,160	2,065,122	2,773,686
All Groundfish Species	3,112,559	4,707,697	5,942,781	4,030,065	4,945,312	3,177,086	3,124,551	4,090,757	5,889,399

TABLE 8.10. Estimated number of West Coast marine anglers: 2000-2002 (thousands).

Year/State	Total	State Residents	Non-Residents	% Non-Residents
2000				
Washington	497	450	47	9.5%
Oregon	365	285	80	21.9%
Northern California	-	388	-	
Southern California	-	1,097	-	
Total California	1,705	1,485	220	12.9%
2001				
Washington	915	861	54	5.9%
Oregon	601	505	97	16.1%
Northern California	-	961	-	
Southern California	-	1,838	-	
Total California	3,084	2,799	285	9.2%
2002				
Washington	1,493	1,399	94	6.3%
Oregon	1,056	845	211	20.0%
Northern California	-	2,022	-	
Southern California	-	3,709	-	
Total California	6,406	5,731	675	10.5%

TABLE 8-11. (Revised) Total estimated west Coast recreational marine angler boat trips in 2003 by mode and region (thousands of angler trips).

State/Region	Boat Mode	Jan-Feb	Mar-Apr	May-Jun	Jul-Aug	Sep-Oct	Nov-Dec	Annual Total
Washington	Charter	0.0	1.2	16.0	37.8	6.1	0.0	61.1
	Private	22.0	19.5	57.2	32.9	5.0	0.0	136.5
	Total	22.0	20.6	73.2	70.7	11.1	0.0	197.6
Oregon	Charter	0.8	4.4	27.0	34.2	7.7	0.7	74.8
	Private	31.4	31.2	123.6	108.4	19.4	1.3	315.3
	Total	32.2	35.7	150.6	142.5	27.1	2.0	390.1
N. California	Charter	3.4	11.3	24.1	73.3	33.0	3.3	148.4
	Private	75.9	83.9	332.5	502.8	211.5	278.2	1,485.0
	Total	79.4	95.2	356.7	576.1	244.6	281.5	1,633.4
S. California	Charter	32.7	42.0	113.0	256.2	87.3	42.4	573.6
	Private	136.9	192.8	348.2	400.8	331.3	222.5	1,632.5
	Total	169.5	234.8	461.1	657.0	418.6	264.9	2,206.1
Total W-O-C	Charter	36.9	58.9	180.1	401.5	134.1	46.4	857.9
	Private	266.2	327.4	861.5	1,044.9	567.2	502.0	3,569.3

TABLE 8-12. (Revised) Trends in effort for recreational ocean fisheries in thousands of angler trips. (Page 1 of 1)

	Charter								Private							
Area	1996	1997	1998	1999	2000	2001[a/]	2002[a/]	2003[b/]	1996	1997	1998	1999	2000	2001[a/]	2002[a/]	2003[b/]
Total Angler Trips																
Washington	51	50	44	49	40	61	56	61	52	55	37	52	87	164	116	136
Oregon	54	65	57	60	87	70	62	75	57	87	213	173	330	140	130	315
North and Central CA	90	139	158	162	206	221	142	148	253	312	528	549	523	901	556	1,485
Southern CA	982	812	674	609	876	577	438	574	1,099	1,073	1,167	879	1,314	1,757	1,494	1,632
Total	1,177	1,066	933	880	1,218	927	843	858	1,461	1,527	1,945	1,653	2,219	2,886	2,587	3,569
Trips with Groundfish Target and Incidental																
Washington	24	19	23	21	25	12	9	11	24	21	54	25	30	10	10	11
Oregon	43	47	47	44	69	47	46	32	33	57	119	88	153	22	36	25
North and Central CA	63	159	58	95	101	141	53	92	110	113	160	188	120	164	253	579
Southern CA	59	23	33	45	57	204	189	189	35	11	15	30	28	252	391	343
Total	189	248	161	205	252	404	297	325	202	202	348	331	331	448	690	958

a/ The 2001 and 2002 estimates are not directly comparable to previous years due to differences in estimation methodology.
b/ Preliminary.

TABLE 8-13. Exvessel revenue from West Coast fisheries in 2003 and projected annual revenue under the No Action and Action Alternatives. (Page 1 of 1)

	2003	No Action (Projected 2004)	Alterna-tive 1	Alterna-tive 2	Alterna-tive 3	Council-Preferred Alterna-tive
Exvessel Revenue ($ million)						
All Council-Managed Groundfish (including shoreside and at-sea whiting)	58.3	86.3	86.0	88.1	88.8	88.8
All Council-Managed Groundfish Except Catcher-Processor Deliveries	53.2	81.3	81.0	83.1	83.8	83.8
All Council-Managed Groundfish Except At-Sea Deliveries	47.7	75.8	75.5	77.6	78.2	78.3
All Council-Managed Groundfish Except Whiting Deliveries	42.3	61.1	61.2	63.3	64.0	64.0
All Council-Managed Species (including shoreside and at-sea whiting)	292.8	320.1	319.8	322.0	322.6	322.6
All Council-Managed Species Landings and At-Sea Deliveries Except Catcher-Processor Deliveries	287.7	315.2	314.9	317.0	317.6	317.7
All Council-Managed Species Landings and Deliveries Except At-Sea Deliveries	281.5	309.6	309.3	311.4	312.1	312.1
All Council-Managed Species Landings and Deliveries Except Whiting Deliveries	276.8	294.9	295.0	297.2	297.8	297.8
Tribal Landings of Council Managed Groundfish	5.9	6.2	6.2	6.2	6.3	6.3
Change relative to No Action ($ million)						
All Council-Managed Groundfish (including shoreside and at-sea whiting)			-0.3	1.8	2.5	2.5
All Council-Managed Groundfish Except Catcher-Processor Deliveries			-0.3	1.8	2.5	2.5
All Council-Managed Groundfish Except At-Sea Deliveries			-0.3	1.8	2.5	2.5
All Council-Managed Groundfish Except Whiting Deliveries			0.1	2.2	2.9	2.9
All Council-Managed Species (including shoreside and at-sea whiting)			-0.3	1.8	2.5	2.5
All Council-Managed Species Landings and At-Sea Deliveries Except Catcher-Processor Deliveries			-0.3	1.8	2.5	2.5
All Council-Managed Species Landings and Deliveries Except At-Sea Deliveries			-0.3	1.8	2.5	2.5
All Council-Managed Species Landings and Deliveries Except Whiting Deliveries			0.1	2.2	2.9	2.9
Tribal Landings of Council Managed Groundfish			0.0	0.0	0.1	0.1
Change relative to No Action (percent)						
All Council-Managed Groundfish (including shoreside and at-sea whiting)			-0.3%	2.1%	2.9%	2.9%
All Council-Managed Groundfish Except Catcher-Processor Deliveries			-0.4%	2.2%	3.0%	3.1%
All Council-Managed Groundfish Except At-Sea Deliveries			-0.4%	2.4%	3.3%	3.3%
All Council-Managed Groundfish Except Whiting Deliveries			0.2%	3.7%	4.7%	4.8%
All Council-Managed Species (including shoreside and at-sea whiting)			-0.1%	0.6%	0.8%	0.8%
All Council-Managed Species Landings and At-Sea Deliveries Except Catcher-Processor Deliveries			-0.1%	0.6%	0.8%	0.8%
All Council-Managed Species Landings and Deliveries Except At-Sea Deliveries			-0.1%	0.6%	0.8%	0.8%
All Council-Managed Species Landings and Deliveries Except Whiting Deliveries			0.0%	0.8%	1.0%	1.0%
Tribal Landings of Council Managed Groundfish			0.0%	0.6%	1.9%	1.9%

TABLE 8-14a. Exvessel value of 2003 groundfish landings by species and port for the **limited entry trawl** fleet ($,000). (Note: Includes only those vessels that were not removed from the fleet by the recent buyback) (Page 1 of 1)

Port (PCID)	Lingcod	Whiting	Sablefish	POP	Widow	Canary	Chili-pepper	Yellow-tail	Short-spine	Long-spine	Slope Rockfish	Other Rockfish	Dover	Petrale	Arrow-tooth	Other Flatfish	Port Total
Blaine	1.9	0.0	71.3	6.9	0.0	0.9	0.0	6.5	3.8	0.0	6.1	1.8	46.9	350.9	53.7	11.6	562.3
Neah Bay	5.7	0.0	31.3	0.0	0.0	0.8	0.0	7.6	0.0	0.0	0.0	0.1	15.7	48.5	1.1	103.5	214.4
Westport	1.8	585.7	33.6	2.7	0.8	0.0	0.0	13.3	4.9	1.8	2.2	0.0	47.3	37.5	8.8	20.9	761.3
Ilwaco	0.0	123.8	0.0	0.0	1.9	0.0	0.0	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	127.6
Astoria	11.3	842.7	650.5	22.8	0.2	0.7	0.0	24.0	86.1	169.0	35.2	0.5	691.7	727.5	75.9	366.2	3,704.3
Garibaldi	0.4	0.0	3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1	34.3	0.2	26.4	66.8
Newport	9.1	2,060.9	566.8	18.0	0.7	0.8	4.0	6.7	79.2	92.9	20.1	3.2	302.7	148.3	19.1	50.1	3,382.6
Florence	0.6	0.0	1.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	3.6	5.1	0.0	19.9	30.3
Charleston	11.1	441.5	545.4	2.2	5.1	1.1	0.7	7.1	82.5	207.7	20.5	2.2	515.7	618.7	21.8	136.8	2,620.0
Brookings	0.0	214.8	183.0	0.1	0.0	0.0	0.0	0.1	26.8	74.7	3.0	0.0	150.5	29.1	0.9	20.7	703.6
Crescent City	0.6	0.0	70.6	0.0	0.0	0.0	0.0	0.0	8.0	48.4	1.9	0.0	65.8	11.9	1.3	33.9	242.4
Eureka Area	0.1	77.6	222.3	0.0	0.0	0.0	0.0	0.0	50.3	88.9	2.7	6.3	225.2	26.4	2.0	39.6	741.3
Fort Bragg	0.1	0.0	270.8	0.0	0.0	0.0	0.0	0.0	95.5	160.6	5.8	4.7	385.6	12.0	0.2	24.5	959.8
Bodega Bay	0.0	182.1	53.9	0.0	0.0	0.0	0.0	1.8	14.3	21.4	1.3	24.2	51.3	9.4	0.3	13.5	373.5
San Francisco	3.1	0.0	141.8	0.0	2.3	0.0	0.1	0.0	35.2	41.7	27.2	20.8	181.3	85.5	0.1	53.5	592.7
Princeton	0.6	0.0	4.5	0.0	0.0	0.0	0.6	0.0	0.3	0.3	0.0	0.7	11.1	61.5	0.0	174.4	254.0
Santa Cruz	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	2.1	2.5
Moss Landing	1.5	0.0	63.6	0.0	0.1	0.0	1.2	0.0	30.2	55.3	14.5	18.0	131.8	10.5	2.8	65.5	395.0
Monterey	0.8	0.0	57.4	0.0	0.0	0.0	1.2	0.0	22.9	61.8	3.6	9.0	83.5	4.5	0.0	38.6	283.5
Morro Bay	0.2	0.0	9.4	0.0	0.0	0.0	0.0	0.0	3.2	13.0	3.0	1.0	22.4	12.9	0.0	3.4	68.6
Avila	0.0	0.0	74.6	0.0	0.0	0.0	0.0	0.0	27.5	99.8	28.5	8.1	138.7	11.0	0.0	10.0	398.2
Species Total	48.9	4,529.1	3,055.2	52.7	11.1	4.5	7.7	69.1	570.7	1,137.3	175.7	100.8	3,072.7	2,245.6	188.1	1,215.3	16,484.6

TABLE 8-14b. Exvessel value of projected 2005 groundfish landings by species and port for the **limited entry trawl** fleet under the **No Action Alternative** ($,000). (Page 1 of 1)

Port (PCID)	Lingcod	Whiting	Sablefish	POP	Widow	Canary	Chili-pepper	Yellow-tail	Short-spine	Long-spine	Slope Rockfish	Other Rockfish	Dover	Petrale	Arrow-tooth	Other Flatfish	Port Total
Blaine	2.3	0.0	73.4	1.1	0.0	0.6	0.0	5.7	6.6	0.4	7.6	1.7	49.4	200.9	28.5	49.0	427.2
Neah Bay	5.2	0.0	67.1	0.0	0.0	1.2	0.0	2.0	1.1	0.0	0.0	0.2	17.5	84.3	2.0	233.8	414.5
Westport	2.4	1,694.8	44.0	0.2	0.0	0.5	0.0	2.0	4.2	0.9	1.6	0.0	64.4	74.1	3.2	51.8	1,944.1
Ilwaco	0.1	250.1	6.9	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.7	0.0	1.2	0.0	0.0	0.0	259.3
Astoria	15.2	2,570.5	1,230.5	26.6	0.0	3.5	0.0	26.9	179.4	170.5	59.2	2.2	1,229.4	1,441.9	102.5	707.9	7,766.3
Garibaldi	1.6	0.0	8.7	0.0	0.0	0.4	0.0	0.0	0.1	0.0	0.0	0.0	9.3	63.8	0.3	60.0	144.1
Newport	2.4	6,951.1	1,173.4	15.7	0.0	0.5	0.9	4.6	163.3	91.5	55.4	3.7	573.0	735.2	61.2	197.7	10,029.6
Florence	1.0	0.0	2.2	0.0	0.0	0.3	0.0	0.0	0.2	0.1	0.0	0.0	5.5	8.5	0.0	51.5	69.3
Charleston	4.7	923.3	984.3	24.1	0.0	1.0	0.0	3.6	151.4	177.1	36.7	1.8	827.6	1,223.9	15.5	524.6	4,899.8
Brookings	0.5	763.8	318.4	4.7	0.0	0.1	0.0	0.0	47.9	51.9	4.8	0.1	216.6	97.0	0.5	52.4	1,558.7
Crescent City	0.2	0.0	208.7	4.2	0.0	0.1	0.0	0.1	26.2	49.6	2.8	0.1	149.6	63.3	0.9	154.4	660.3
Eureka Area	1.8	235.7	504.5	9.5	0.0	0.4	0.0	1.9	94.3	110.3	12.9	0.5	426.9	285.0	5.3	194.3	1,883.4
Fort Bragg	1.5	0.0	411.0	0.0	0.0	0.1	9.0	0.0	137.7	140.2	57.9	2.5	489.1	59.7	0.3	121.4	1,430.4
Bodega Bay	0.2	575.0	89.1	0.7	0.0	0.0	0.9	0.0	20.4	24.5	10.6	2.1	64.9	30.7	0.2	38.1	857.4
San Francisco	11.3	0.0	211.1	0.2	0.0	1.1	8.3	3.5	56.3	41.5	90.7	4.3	266.7	226.6	3.4	466.8	1,391.8
Princeton	10.5	0.0	18.6	0.0	0.0	0.7	3.8	0.0	2.1	1.6	1.2	0.6	25.1	104.6	0.0	342.9	511.7
Santa Cruz	0.5	0.0	56.2	1.1	0.0	0.0	0.4	0.5	4.3	2.8	0.6	0.1	28.0	27.0	0.4	57.6	179.5
Moss Landing	3.4	0.0	117.6	0.3	0.0	0.1	4.0	0.1	46.6	44.2	52.5	2.5	203.7	82.2	3.2	176.4	736.8
Monterey	2.7	48.0	90.9	0.3	0.0	0.1	3.4	0.0	35.3	44.7	38.9	1.3	109.2	20.5	0.7	105.2	501.2
Morro Bay	0.6	0.0	9.3	0.0	0.0	0.0	0.3	0.0	5.5	6.3	9.6	0.8	20.4	37.6	0.0	26.8	117.1
Avila	0.5	0.0	104.6	0.0	0.0	0.0	0.2	0.0	59.2	65.1	130.0	2.7	162.0	43.1	0.1	27.3	594.7
Species Total	68.6	14,012.2	5,730.5	88.9	0.0	10.8	31.2	50.9	1,042.1	1,023.1	573.7	27.1	4,939.7	4,910.0	228.2	3,640.2	36,377.2

TABLE 8-14c. Exvessel value of projected 2005 groundfish landings by species and port for the **limited entry trawl** fleet under **Action Alternative 1 ($,000)**. (Page 1 of 1)

Port (PCID)	Lingcod	Whiting	Sablefish	POP	Widow	Canary	Chili-pepper	Yellow-tail	Short-spine	Long-spine	Slope Rockfish	Other Rockfish	Dover	Petrale	Arrow-tooth	Other Flatfish	Port Total
Blaine	2.8	0.0	76.4	0.3	0.0	0.6	0.0	1.5	6.4	0.4	7.7	0.3	38.3	97.4	35.1	44.1	311.2
Neah Bay	1.8	0.0	43.6	0.0	0.0	0.7	0.0	2.1	0.3	0.0	0.0	0.2	13.2	75.4	1.6	165.0	303.9
Westport	0.5	1,644.3	45.5	0.2	0.0	0.1	0.0	1.7	3.2	0.9	1.6	0.0	46.3	66.6	3.4	46.3	1,860.4
Ilwaco	0.0	242.7	6.9	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.7	0.0	0.9	0.0	0.0	0.0	251.6
Astoria	12.4	2,493.9	1,142.8	17.6	0.0	1.9	0.0	15.0	173.9	170.1	59.6	1.2	1,056.4	1,299.0	91.1	552.3	7,087.3
Garibaldi	0.4	0.0	1.9	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	4.2	50.5	0.1	44.6	101.9
Newport	8.0	6,743.9	1,118.2	9.1	0.0	1.2	0.9	1.4	159.5	91.4	54.9	2.7	513.2	705.2	58.1	162.5	9,630.4
Florence	0.2	0.0	1.7	0.0	0.0	0.1	0.0	0.0	0.2	0.1	0.0	0.0	3.0	6.2	0.0	40.2	51.7
Charleston	7.9	895.8	921.6	16.9	0.0	1.1	0.0	2.7	148.3	185.0	36.8	1.5	740.9	1,209.7	14.8	436.5	4,619.5
Brookings	2.2	741.0	299.8	2.6	0.0	0.4	0.0	0.0	46.8	51.9	4.8	0.0	194.9	98.1	0.5	46.5	1,489.6
Crescent City	2.2	0.0	198.3	1.9	0.0	0.3	0.0	0.1	25.6	49.6	2.9	0.1	133.2	66.5	0.9	143.2	624.9
Eureka Area	4.2	228.7	468.0	5.3	0.0	0.7	0.0	0.8	92.1	110.3	13.1	0.4	372.4	278.9	5.0	159.4	1,739.1
Fort Bragg	0.7	0.0	380.4	0.0	0.0	0.0	9.0	0.0	134.5	140.2	50.1	1.5	449.2	57.9	0.3	59.6	1,283.3
Bodega Bay	0.7	557.8	64.8	0.0	0.0	0.1	0.9	0.0	19.9	24.5	29.8	2.1	52.3	30.7	0.2	21.5	805.4
San Francisco	6.8	0.0	186.4	0.0	0.0	0.6	8.3	1.7	55.0	41.5	113.5	3.1	237.6	215.3	4.4	272.9	1,147.0
Princeton	8.6	0.0	17.2	0.0	0.0	0.6	3.8	0.0	2.0	1.6	1.3	0.6	24.9	111.4	0.0	240.1	411.9
Santa Cruz	0.6	0.0	54.1	0.7	0.0	0.1	0.4	0.2	4.2	2.8	0.6	0.1	25.9	27.0	0.4	45.3	162.4
Moss Landing	2.1	0.0	109.2	0.0	0.0	0.1	4.0	0.0	45.5	44.2	59.4	2.1	182.5	63.2	2.6	89.2	604.2
Monterey	1.9	46.5	84.5	0.0	0.0	0.1	3.4	0.0	34.5	44.7	49.2	0.9	98.7	10.8	0.6	68.0	443.7
Morro Bay	0.3	0.0	8.6	0.0	0.0	0.0	0.3	0.0	5.3	6.3	7.6	0.7	20.7	30.2	0.0	12.6	92.6
Avila	0.4	0.0	96.7	0.0	0.0	0.0	0.2	0.0	57.8	65.1	142.8	2.5	147.9	43.1	0.1	13.9	570.5
Species Total	64.5	13,594.6	5,326.5	54.6	0.0	8.7	31.2	27.3	1,015.3	1,030.5	636.4	20.2	4,356.6	4,543.1	219.1	2,663.8	33,592.5

TABLE 8-14d. Exvessel value of projected 2005 groundfish landings by species and port for the **limited entry trawl** fleet under **Action Alternative 2** ($,000). (Page 1 of 1)

Port (PCID)	Lingcod	Whiting	Sablefish	POP	Widow	Canary	Chili-pepper	Yellow-tail	Short-spine	Long-spine	Slope Rockfish	Other Rockfish	Dover	Petrale	Arrow-tooth	Other Flatfish	Port Total
Blaine	2.2	0.0	69.8	0.0	0.0	0.4	0.0	7.2	6.5	0.4	8.0	2.3	48.1	132.2	8.8	68.4	354.5
Neah Bay	3.7	0.0	83.4	0.0	0.0	0.9	0.0	3.2	1.5	0.0	0.0	1.0	18.2	106.9	4.6	258.9	482.3
Westport	1.4	1,644.3	59.9	0.2	0.0	0.2	0.0	3.1	4.2	0.9	1.6	0.0	58.2	79.2	4.8	55.7	1,913.8
Ilwaco	0.0	242.7	6.9	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.7	0.0	0.9	0.0	0.0	0.0	251.6
Astoria	17.6	2,493.9	1,219.7	17.7	0.0	2.4	0.0	37.1	174.1	163.9	59.6	3.3	1,160.8	1,458.4	80.2	801.0	7,689.6
Garibaldi	1.0	0.0	9.1	0.0	0.0	0.2	0.0	0.0	0.1	0.0	0.0	0.0	12.0	68.7	0.4	66.9	158.4
Newport	9.3	6,743.9	1,126.5	9.2	0.0	1.3	0.9	7.0	159.8	91.3	54.8	5.8	531.6	772.9	63.0	215.0	9,792.4
Florence	0.7	0.0	2.8	0.0	0.0	0.1	0.0	0.1	0.2	0.1	0.0	0.0	7.1	12.1	0.0	62.4	85.7
Charleston	9.4	895.8	918.2	17.4	0.0	1.3	0.0	4.1	146.3	165.0	36.8	2.6	766.7	1,250.1	15.7	581.4	4,810.7
Brookings	2.3	741.0	303.3	2.6	0.0	0.4	0.0	0.0	46.8	51.9	4.8	0.1	195.8	100.7	0.5	58.2	1,508.4
Crescent City	2.5	0.0	201.8	2.0	0.0	0.4	0.0	0.1	25.6	49.6	2.9	0.3	135.8	67.6	0.9	176.6	666.2
Eureka Area	5.2	228.7	480.1	5.4	0.0	0.8	0.0	3.2	92.1	110.4	12.9	1.8	389.2	296.7	5.7	221.1	1,853.4
Fort Bragg	1.2	0.0	381.6	0.0	0.0	0.1	9.0	0.0	134.5	140.2	50.1	2.5	452.0	59.7	0.3	74.0	1,305.2
Bodega Bay	0.8	557.8	87.6	0.1	0.0	0.1	0.9	0.0	19.9	24.5	29.8	2.1	52.3	30.7	0.2	25.9	832.6
San Francisco	8.3	0.0	201.0	0.0	0.0	0.7	8.3	6.6	55.1	41.5	113.4	4.9	244.9	243.9	5.1	357.7	1,291.6
Princeton	9.4	0.0	17.3	0.0	0.0	0.6	3.8	0.0	2.0	1.6	1.3	0.6	24.9	111.8	0.0	294.2	467.5
Santa Cruz	0.6	0.0	54.1	0.8	0.0	0.1	0.4	0.5	4.2	2.8	0.6	0.1	25.9	29.6	0.4	54.8	174.8
Moss Landing	2.6	0.0	110.9	0.0	0.0	0.1	4.0	0.1	45.5	44.2	59.4	2.5	183.3	82.2	3.2	110.2	648.2
Monterey	2.6	46.5	86.4	0.0	0.0	0.1	3.4	0.0	34.5	44.7	49.2	1.3	98.7	21.7	0.7	89.1	479.1
Morro Bay	0.4	0.0	8.6	0.0	0.0	0.0	0.3	0.0	5.3	6.3	7.6	0.8	20.7	37.6	0.0	16.8	104.5
Avila	0.4	0.0	96.8	0.0	0.0	0.0	0.2	0.0	57.8	65.1	142.9	2.7	148.0	43.1	0.1	16.7	573.8
Species Total	81.5	13,594.6	5,525.9	55.5	0.0	10.3	31.2	72.1	1,016.4	1,004.4	636.4	34.8	4,575.2	5,006.0	194.7	3,605.2	35,444.1

TABLE 8-14e. Exvessel value of projected 2005 groundfish landings by species and port for the **limited entry trawl** fleet under **Action Alternative 3** ($,000). (Page 1 of 1)

Port (PCID)	Lingcod	Whiting	Sablefish	POP	Widow	Canary	Chili-pepper	Yellow-tail	Short-spine	Long-spine	Slope Rockfish	Other Rockfish	Dover	Petrale	Arrow-tooth	Other Flatfish	Port Total
Blaine	2.4	0.0	77.1	0.0	0.0	0.5	0.0	9.6	6.7	0.4	8.0	2.6	45.4	168.2	8.8	77.8	407.5
Neah Bay	4.2	0.0	104.8	0.0	0.0	1.0	0.0	4.9	2.4	0.0	0.0	1.2	21.5	115.1	5.3	297.4	557.7
Westport	1.4	1,644.3	72.7	0.2	0.0	0.3	0.0	4.4	6.6	0.9	1.6	0.1	52.2	87.9	5.9	56.2	1,934.6
Ilwaco	0.0	242.7	7.1	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.7	0.0	0.9	0.1	0.1	0.0	251.9
Astoria	17.3	2,493.9	1,261.6	17.6	0.0	2.6	0.0	41.2	177.3	153.6	59.6	3.7	1,136.0	1,495.7	81.0	834.1	7,775.4
Garibaldi	1.0	0.0	10.5	0.0	0.0	0.2	0.0	0.0	0.1	0.0	0.0	0.0	12.7	79.3	0.4	66.9	171.3
Newport	9.7	6,743.9	1,177.3	9.4	0.0	1.4	0.9	7.5	162.0	91.4	54.8	6.7	539.6	811.9	63.7	227.6	9,907.8
Florence	0.7	0.0	5.6	0.0	0.0	0.1	0.0	0.1	0.4	0.1	0.0	0.0	9.6	12.7	0.0	68.9	98.3
Charleston	9.4	895.8	936.4	17.4	0.0	1.3	0.0	4.4	145.1	150.6	36.8	3.0	777.2	1,287.5	16.5	587.3	4,868.6
Brookings	2.3	741.0	314.0	2.6	0.0	0.4	0.0	0.0	46.8	51.9	4.8	0.1	196.2	100.8	0.5	58.3	1,519.8
Crescent City	2.4	0.0	199.3	2.0	0.0	0.4	0.0	0.1	25.6	42.3	2.9	0.4	138.4	68.6	0.9	181.0	664.2
Eureka Area	5.4	228.7	499.9	5.5	0.0	0.8	0.0	4.1	92.5	110.5	12.9	2.2	394.1	300.0	6.3	227.8	1,890.6
Fort Bragg	1.2	0.0	396.3	0.0	0.0	0.1	9.0	0.0	134.5	140.2	50.1	2.5	452.0	59.7	0.3	74.0	1,319.9
Bodega Bay	0.8	557.8	88.3	0.1	0.0	0.1	0.9	0.0	19.9	24.5	29.8	2.1	52.3	30.8	0.2	26.2	833.8
San Francisco	8.5	0.0	211.2	0.0	0.0	0.8	8.3	7.4	55.8	41.5	113.5	5.0	244.2	260.9	5.6	366.4	1,329.0
Princeton	9.4	0.0	17.9	0.0	0.0	0.6	3.8	0.0	2.0	1.6	1.3	0.6	24.9	111.8	0.0	294.2	468.1
Santa Cruz	0.6	0.0	55.1	0.8	0.0	0.1	0.4	0.5	4.2	2.8	0.6	0.1	25.9	29.6	0.4	54.8	175.9
Moss Landing	2.6	0.0	114.3	0.0	0.0	0.1	4.0	0.1	45.5	44.2	59.4	2.8	183.3	82.6	3.2	110.3	652.3
Monterey	2.6	46.5	88.7	0.0	0.0	0.1	3.4	0.0	34.5	44.7	49.2	1.3	98.7	21.7	0.7	89.1	481.4
Morro Bay	0.4	0.0	8.9	0.0	0.0	0.0	0.3	0.0	5.3	6.3	7.6	0.8	20.7	37.6	0.0	16.8	104.8
Avila	0.4	0.0	100.7	0.0	0.0	0.0	0.2	0.0	57.8	65.1	142.9	2.7	148.0	43.1	0.1	16.7	577.7
Species Total	82.8	13,594.6	5,747.7	55.7	0.0	10.9	31.2	84.1	1,025.4	972.5	636.4	37.8	4,574.2	5,205.3	200.1	3,732.0	35,990.6

TABLE 8-14f. Exvessel value of projected 2005 groundfish landings by species and port for the **limited entry trawl** fleet under **the Council-preferred Alternative** ($,000). (Page 1 of 1)

Port (PCID)	Lingcod	Whiting	Sablefish	POP	Widow	Canary	Chili-pepper	Yellow-tail	Short-spine	Long-spine	Slope Rockfish	Other Rockfish	Dover	Petrale	Arrow-tooth	Other Flatfish	Port Total
Blaine	3.3	0.0	75.1	0.1	0.0	0.4	0.0	9.6	6.8	0.4	7.2	2.6	53.0	214.8	39.4	71.6	484.3
Neah Bay	4.0	0.0	101.1	0.0	0.0	0.5	0.0	6.8	2.4	0.0	0.0	1.2	21.5	118.6	5.4	326.1	587.7
Westport	1.6	1,644.3	75.6	0.2	0.0	0.2	0.0	5.9	6.7	1.0	1.4	0.1	65.8	106.3	9.1	51.9	1,970.1
Ilwaco	0.0	242.7	6.7	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.7	0.0	0.9	0.1	0.1	0.0	251.4
Astoria	18.1	2,493.9	1,239.5	24.7	0.0	1.6	0.0	43.3	182.1	157.5	47.4	3.8	1,306.9	1,560.6	97.0	836.9	8,013.4
Garibaldi	1.0	0.0	9.9	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	12.4	103.2	0.5	61.4	188.6
Newport	9.6	6,743.9	1,136.0	15.0	0.0	0.4	0.9	8.5	166.7	94.5	45.5	7.2	596.4	844.6	64.0	232.8	9,965.8
Florence	0.7	0.0	5.3	0.0	0.0	0.1	0.0	0.1	0.4	0.1	0.0	0.1	9.4	13.6	0.0	69.0	98.7
Charleston	9.4	895.8	917.9	22.8	0.0	0.7	0.0	6.2	148.5	155.1	27.3	3.2	866.4	1,329.1	16.5	601.1	4,999.9
Brookings	2.2	741.0	303.8	4.6	0.0	0.1	0.0	0.0	47.7	53.0	3.5	0.2	209.3	102.2	0.5	58.9	1,527.0
Crescent City	2.3	0.0	195.4	3.8	0.0	0.1	0.0	0.1	26.0	43.0	2.0	0.4	145.9	70.8	0.9	175.5	666.4
Eureka Area	5.1	228.7	484.7	9.7	0.0	0.2	0.0	4.2	94.6	112.4	9.4	2.4	417.5	303.8	6.3	220.3	1,899.4
Fort Bragg	1.6	0.0	422.5	0.0	0.0	0.1	9.0	0.0	136.5	143.9	50.0	3.5	494.3	62.6	0.3	98.0	1,422.2
Bodega Bay	0.8	557.8	87.4	0.6	0.0	0.0	0.9	0.0	19.9	25.1	29.2	2.1	53.3	30.8	0.2	34.7	842.9
San Francisco	10.3	0.0	234.4	0.0	0.0	0.7	8.3	7.9	58.4	43.4	109.0	5.7	279.9	311.6	28.4	390.2	1,488.1
Princeton	8.7	0.0	20.5	0.0	0.0	0.5	3.8	0.0	2.0	1.6	1.1	0.7	27.1	118.3	0.0	272.4	456.7
Santa Cruz	0.6	0.0	53.6	1.3	0.0	0.0	0.4	0.9	4.4	3.0	0.1	0.1	28.8	29.6	0.4	63.3	186.5
Moss Landing	3.7	0.0	123.0	0.3	0.0	0.1	4.0	0.1	47.5	46.4	57.7	2.8	200.0	88.1	3.3	149.4	726.5
Monterey	2.6	46.5	91.3	0.3	0.0	0.1	3.4	0.0	35.4	45.7	46.2	1.4	106.1	22.4	0.7	94.0	496.1
Morro Bay	0.4	0.0	9.4	0.0	0.0	0.0	0.3	0.0	5.4	6.3	7.0	0.8	22.5	37.8	0.0	16.9	106.8
Avila	0.4	0.0	106.2	0.0	0.0	0.0	0.2	0.0	60.1	68.0	136.4	2.9	162.3	43.5	0.1	20.8	600.9
Species Total	86.6	13,594.6	5,699.4	83.6	0.0	6.0	31.2	93.5	1,051.7	1,000.2	581.1	41.0	5,079.7	5,512.3	273.2	3,845.2	36,979.5

TABLE 8-15. Landings from West Coast fisheries in 2003 and projected annual landings under the No Action and Action Alternatives. (Page 1 of 1)

	2003	No Action (Projected 2004)	Alterna-tive 1	Alterna-tive 2	Alterna-tive 3	Council Preferred Alternative
Landings (thousand mt)						
All Council-Managed Groundfish (including shoreside and at-sea whiting)	167.59	264.37	258.56	260.13	260.55	261.69
All Council-Managed Groundfish Except Catcher-Processor Deliveries	126.43	223.27	217.47	219.04	219.46	220.60
All Council-Managed Groundfish Except At-Sea Deliveries	81.27	178.09	172.29	173.86	174.28	175.42
All Council-Managed Groundfish Except Whiting Deliveries	26.05	29.86	28.26	29.83	30.25	31.39
All Council-Managed Species (including shoreside and at-sea whiting)	370.38	466.15	460.35	461.92	462.34	463.48
All Council-Managed Species Landings and At-Sea Deliveries Except Catcher-Processor Deliveries	329.19	425.06	419.26	420.83	421.25	422.39
All Council-Managed Species Landings and Deliveries Except At-Sea Deliveries	283.05	379.88	374.07	375.65	376.07	377.20
All Council-Managed Species Landings and Deliveries Except Whiting Deliveries	228.83	231.65	230.05	231.62	232.04	233.18
Tribal Landings of Council Managed Groundfish	24.85	25.14	25.14	25.16	25.21	25.21
Change relative to No Action (thousand mt)						
All Council-Managed Groundfish (including shoreside and at-sea whiting)			-5.80	-4.23	-3.81	-2.67
All Council-Managed Groundfish Except Catcher-Processor Deliveries			-5.80	-4.23	-3.81	-2.67
All Council-Managed Groundfish Except At-Sea Deliveries			-5.80	-4.23	-3.81	-2.67
All Council-Managed Groundfish Except Whiting Deliveries			-1.60	-0.03	0.39	1.53
All Council-Managed Species (including shoreside and at-sea whiting)			-5.80	-4.23	-3.81	-2.67
All Council-Managed Species Landings and At-Sea Deliveries Except Catcher-Processor Deliveries			-5.80	-4.23	-3.81	-2.67
All Council-Managed Species Landings and Deliveries Except At-Sea Deliveries			-5.80	-4.23	-3.81	-2.67
All Council-Managed Species Landings and Deliveries Except Whiting Deliveries			-1.60	-0.03	0.39	1.53
Tribal Landings of Council Managed Groundfish			0.00	0.02	0.07	0.07
Change relative to No Action (percent)						
All Council-Managed Groundfish (including shoreside and at-sea whiting)			-2.2%	-1.6%	-1.4%	-1.0%
All Council-Managed Groundfish Except Catcher-Processor Deliveries			-2.6%	-1.9%	-1.7%	-1.2%
All Council-Managed Groundfish Except At-Sea Deliveries			-3.3%	-2.4%	-2.1%	-1.5%
All Council-Managed Groundfish Except Whiting Deliveries			-5.4%	-0.1%	1.3%	5.1%
All Council-Managed Species (including shoreside and at-sea whiting)			-1.2%	-0.9%	-0.8%	-0.6%
All Council-Managed Species Landings and At-Sea Deliveries Except Catcher-Processor Deliveries			-1.4%	-1.0%	-0.9%	-0.6%
All Council-Managed Species Landings and Deliveries Except At-Sea Deliveries			-1.5%	-1.1%	-1.0%	-0.7%
All Council-Managed Species Landings and Deliveries Except Whiting Deliveries			-0.7%	0.0%	0.2%	0.7%
Tribal Landings of Council Managed Groundfish			0.0%	0.1%	0.3%	0.3%

TABLE 8-16a. 2003 groundfish landings by species and port for the **limited entry trawl** fleet (mt). (Note: Includes only those vessels that were not removed from the fleet by the recent buyback.) (Page 1 of 1)

Port (PCID)	Lingcod	Whiting	Sablefish	POP	Widow	Canary	Chili-pepper	Yellow-tail	Short-spine	Long-spine	Slope Rockfish	Other Rockfish	Dover	Petrale	Arrow-tooth	Other Flatfish	Port Total
Blaine	1.7	0.0	24.3	6.5	0.0	0.9	0.0	6.1	2.4	0.0	6.0	1.7	60.8	154.1	243.8	16.7	525.1
Neah Bay	3.7	0.0	11.2	0.0	0.0	0.8	0.0	7.2	0.0	0.0	0.0	0.1	22.1	21.2	4.9	142.6	213.7
Westport	1.3	5,904.0	11.7	3.1	1.0	0.0	0.0	16.8	2.9	1.7	2.2	0.0	57.8	16.1	30.8	18.6	6,067.9
Ilwaco	0.0	1,247.8	0.0	0.0	2.4	0.0	0.0	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1,252.5
Astoria	7.7	8,494.2	235.8	24.5	0.2	0.7	0.0	23.9	52.5	126.6	35.5	0.5	838.1	312.7	271.7	343.7	10,768.4
Garibaldi	0.2	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	13.9	0.6	18.0	36.7
Newport	5.4	20,706.5	213.7	18.2	0.7	0.8	3.5	6.7	45.2	61.8	20.7	4.6	378.7	67.7	70.4	65.5	21,670.2
Florence	0.3	0.0	0.4	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	4.2	2.3	0.0	24.2	31.5
Charleston	6.4	4,426.8	191.8	2.4	5.3	1.0	0.4	8.2	44.4	144.1	21.9	2.9	629.2	278.2	75.9	150.3	5,989.1
Brookings	0.0	2,165.3	65.2	0.1	0.0	0.0	0.0	0.1	16.2	46.9	3.1	0.0	182.0	14.7	3.0	20.9	2,517.5
Crescent City	0.4	0.0	26.5	0.0	0.0	0.0	0.0	0.0	3.4	28.6	2.1	0.0	79.3	5.8	4.6	35.3	186.1
Eureka Area	0.1	805.8	79.2	0.0	0.0	0.0	0.0	0.0	21.9	66.1	3.1	8.9	271.8	13.6	6.8	44.9	1,322.3
Fort Bragg	0.2	0.0	126.9	0.0	0.0	0.0	0.0	0.0	54.7	119.1	6.5	6.5	471.0	6.3	0.8	24.8	816.8
Bodega Bay	0.0	1,835.8	17.0	0.0	0.0	0.0	0.0	1.8	8.0	22.5	1.3	25.4	64.2	5.2	1.1	14.8	1,997.3
San Francisco	1.4	0.0	59.7	0.0	1.9	0.0	0.0	0.0	17.6	37.8	32.3	31.5	225.4	35.6	0.1	51.9	495.1
Princeton	0.2	0.0	2.8	0.0	0.0	0.0	0.5	0.0	0.1	0.1	0.0	0.7	13.8	24.6	0.0	157.7	200.5
Santa Cruz	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	1.3
Moss Landing	0.8	0.0	29.9	0.0	0.0	0.0	0.8	0.0	11.8	31.6	9.2	29.1	181.4	5.5	3.9	93.6	397.7
Monterey	0.5	0.0	30.0	0.0	0.0	0.0	0.8	0.0	16.2	44.8	4.4	14.6	120.3	2.2	0.0	59.1	293.0
Morro Bay	0.1	0.0	4.4	0.0	0.0	0.0	0.0	0.0	2.6	10.3	1.7	1.3	29.8	5.3	0.0	4.2	59.7
Avila	0.0	0.0	34.1	0.0	0.0	0.0	0.0	0.0	19.3	71.7	25.2	13.7	182.9	5.1	0.0	10.1	362.2
Species Total	30.4	45,586.5	1,165.9	54.7	11.5	4.3	6.0	73.2	319.3	813.8	175.4	141.7	3,815.4	990.0	718.4	1,298.0	55,204.4

TABLE 8-16b. Projected 2005 groundfish landings by species and port for the **limited entry trawl** fleet under the **No Action Alternative** (mt). (Page 1 of 1)

Port (PCID)	Lingcod	Whiting	Sablefish	POP	Widow	Canary	Chili-pepper	Yellow-tail	Short-spine	Long-spine	Slope Rockfish	Other Rockfish	Dover	Petrale	Arrow-tooth	Other Flatfish	Port Total
Blaine	1.5	0.0	26.3	1.1	0.0	0.5	0.0	5.9	3.6	0.3	7.8	2.0	60.4	92.4	119.7	54.7	376.2
Neah Bay	3.3	0.0	24.1	0.0	0.0	1.2	0.0	2.0	0.6	0.0	0.0	0.2	21.3	38.8	8.6	261.2	361.4
Westport	1.5	17,046.8	15.8	0.2	0.0	0.5	0.0	2.0	2.2	0.7	1.6	0.1	78.7	34.1	13.4	57.9	17,255.4
Ilwaco	0.0	2,515.8	2.5	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.7	0.0	1.4	0.0	0.2	0.0	2,520.8
Astoria	9.7	25,855.3	441.5	27.2	0.0	3.4	0.0	27.6	96.6	121.0	60.8	2.6	1,502.9	662.9	429.8	790.8	30,032.2
Garibaldi	1.0	0.0	3.1	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	11.4	29.3	1.1	67.0	113.4
Newport	1.5	69,916.8	424.1	16.0	0.0	0.5	0.7	4.7	88.3	65.0	56.3	4.5	702.6	337.6	256.3	220.9	72,095.9
Florence	0.6	0.0	0.8	0.0	0.0	0.3	0.0	0.0	0.1	0.1	0.0	0.0	6.7	3.9	0.1	57.5	70.1
Charleston	3.0	9,287.0	353.2	24.6	0.0	0.9	0.0	3.7	81.6	125.7	37.7	2.1	1,011.8	562.7	64.9	586.0	12,145.0
Brookings	0.3	7,682.7	114.2	4.8	0.0	0.1	0.0	0.0	25.8	36.8	4.9	0.1	264.8	44.6	1.9	58.5	8,239.7
Crescent City	0.1	0.0	74.9	4.3	0.0	0.1	0.0	0.1	14.1	35.2	2.9	0.2	182.9	29.1	3.7	172.5	520.0
Eureka Area	1.1	2,371.0	181.0	9.7	0.0	0.4	0.0	1.9	50.8	78.3	13.2	0.6	521.9	131.0	22.3	217.1	3,600.5
Fort Bragg	0.7	0.0	188.8	0.0	0.0	0.0	6.7	0.0	78.1	100.5	51.5	3.7	628.5	25.8	0.5	137.5	1,222.5
Bodega Bay	0.1	5,783.2	34.1	0.7	0.0	0.0	0.7	0.0	11.2	17.5	9.6	2.6	81.4	13.3	0.7	43.1	5,998.2
San Francisco	5.7	0.0	93.6	0.2	0.0	0.8	6.2	3.6	31.7	29.7	81.2	6.0	340.7	100.1	12.5	527.3	1,239.4
Princeton	4.8	0.0	8.5	0.0	0.0	0.3	2.8	0.0	1.2	1.2	1.1	0.9	32.3	45.3	0.0	388.4	486.8
Santa Cruz	0.2	0.0	20.2	1.1	0.0	0.0	0.3	0.5	2.3	2.0	0.6	0.1	34.3	12.4	1.6	64.6	140.2
Moss Landing	1.6	0.0	51.4	0.3	0.0	0.1	3.0	0.1	26.3	31.7	46.8	3.7	261.0	36.0	6.5	199.7	668.1
Monterey	1.2	482.4	39.0	0.3	0.0	0.1	2.6	0.0	19.8	31.9	34.6	1.9	139.4	8.9	1.2	119.2	882.5
Morro Bay	0.3	0.0	4.3	0.0	0.0	0.0	0.2	0.0	3.1	4.5	8.5	1.1	26.3	16.3	0.0	30.4	95.0
Avila	0.2	0.0	47.8	0.0	0.0	0.0	0.2	0.0	33.5	46.7	115.6	4.0	208.0	18.6	0.1	30.9	505.8
Species Total	38.7	140,941.0	2,149.3	90.8	0.0	9.6	23.4	52.3	571.2	728.6	535.7	36.4	6,118.7	2,243.2	945.0	4,085.1	158,569.0

TABLE 8-16c. Projected 2005 groundfish landings by species and port for the **limited entry trawl** fleet under **Action Alternative 1** (mt). (Page 1 of 1)

Port (PCID)	Lingcod	Whiting	Sablefish	POP	Widow	Canary	Chili-pepper	Yellow-tail	Short-spine	Long-spine	Slope Rockfish	Other Rockfish	Dover	Petrale	Arrow-tooth	Other Flatfish	Port Total
Blaine	1.8	0.0	27.4	0.3	0.0	0.6	0.0	1.6	3.4	0.3	7.9	0.4	46.8	44.8	147.1	49.2	331.6
Neah Bay	1.2	0.0	15.6	0.0	0.0	0.7	0.0	2.2	0.2	0.0	0.0	0.2	16.1	34.7	6.6	184.3	261.8
Westport	0.3	16,538.7	16.3	0.2	0.0	0.1	0.0	1.7	1.7	0.7	1.7	0.0	56.6	30.6	14.2	51.7	16,714.5
Ilwaco	0.0	2,440.8	2.5	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.7	0.0	1.2	0.0	0.2	0.0	2,445.5
Astoria	7.9	25,084.7	410.1	17.9	0.0	1.8	0.0	15.4	93.7	120.7	61.3	1.5	1,291.3	597.2	382.2	617.0	28,702.8
Garibaldi	0.2	0.0	0.7	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	5.2	23.2	0.6	49.8	79.8
Newport	5.1	67,833.2	404.1	9.3	0.0	1.2	0.7	1.4	86.3	64.9	55.9	3.3	629.2	323.8	243.3	181.5	69,843.3
Florence	0.1	0.0	0.6	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.0	0.0	3.7	2.9	0.1	44.9	52.5
Charleston	5.0	9,010.2	330.7	17.2	0.0	1.1	0.0	2.8	79.9	131.3	37.9	1.8	905.7	556.2	62.0	487.6	11,629.3
Brookings	1.4	7,453.8	107.6	2.6	0.0	0.3	0.0	0.0	25.2	36.8	5.0	0.0	238.3	45.1	1.9	52.0	7,970.0
Crescent City	1.4	0.0	71.2	1.9	0.0	0.3	0.0	0.1	13.8	35.2	3.0	0.2	162.8	30.6	3.8	160.0	484.2
Eureka Area	2.7	2,300.4	167.9	5.4	0.0	0.6	0.0	0.8	49.6	78.3	13.4	0.5	455.2	128.2	20.8	178.1	3,402.0
Fort Bragg	0.3	0.0	174.8	0.0	0.0	0.0	6.7	0.0	76.3	100.5	44.5	2.2	577.1	25.1	0.5	67.5	1,075.6
Bodega Bay	0.4	5,610.8	25.2	0.0	0.0	0.1	0.7	0.0	11.0	17.5	26.7	2.6	65.5	13.3	0.6	24.3	5,798.8
San Francisco	3.3	0.0	83.0	0.0	0.0	0.4	6.2	1.8	31.0	29.7	101.5	4.4	304.0	94.6	16.7	308.1	984.6
Princeton	3.9	0.0	7.9	0.0	0.0	0.3	2.8	0.0	1.1	1.2	1.1	0.9	31.9	48.2	0.0	271.9	371.3
Santa Cruz	0.3	0.0	19.5	0.7	0.0	0.1	0.3	0.2	2.3	2.0	0.6	0.1	31.7	12.4	1.6	50.8	122.4
Moss Landing	1.0	0.0	47.6	0.0	0.0	0.1	3.0	0.0	25.7	31.7	53.0	3.2	233.9	27.4	5.5	101.0	532.9
Monterey	0.9	468.1	36.0	0.0	0.0	0.1	2.6	0.0	19.4	31.9	43.7	1.3	126.1	4.7	0.9	77.0	812.7
Morro Bay	0.1	0.0	4.0	0.0	0.0	0.0	0.2	0.0	3.0	4.5	6.7	1.1	26.6	13.1	0.0	14.3	73.7
Avila	0.2	0.0	44.2	0.0	0.0	0.0	0.2	0.0	32.7	46.7	127.1	3.7	190.0	18.6	0.1	15.8	479.3
Species Total	37.6	136,740.7	1,996.7	55.8	0.0	7.8	23.4	28.0	556.5	733.9	591.7	27.4	5,399.0	2,074.6	908.9	2,986.6	152,168.7

TABLE 8-16d. Projected 2005 groundfish landings by species and port for the **limited entry trawl** fleet under **Action Alternative 2** (mt). (Page 1 of 1)

Port (PCID)	Lingcod	Whiting	Sablefish	POP	Widow	Canary	Chili-pepper	Yellow tail	Short-spine	Long-spine	Slope Rockfish	Other Rockfish	Dover	Petrale	Arrow-tooth	Other Flatfish	Port Total
Blaine	1.4	0.0	25.0	0.0	0.0	0.4	0.0	7.4	3.5	0.3	8.2	2.7	58.7	60.8	37.1	76.4	282.1
Neah Bay	2.3	0.0	29.9	0.0	0.0	0.9	0.0	3.3	0.8	0.0	0.0	1.2	22.2	49.2	19.2	289.2	418.2
Westport	0.9	16,538.7	21.5	0.2	0.0	0.2	0.0	3.2	2.3	0.7	1.6	0.1	71.2	36.4	20.2	62.3	16,759.3
Ilwaco	0.0	2,440.8	2.5	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.7	0.0	1.2	0.0	0.2	0.0	2,445.5
Astoria	11.2	25,084.7	437.6	18.0	0.0	2.3	0.0	38.1	93.8	116.3	61.3	4.0	1,419.0	670.5	336.3	894.7	29,187.9
Garibaldi	0.6	0.0	3.2	0.0	0.0	0.2	0.0	0.0	0.1	0.0	0.0	0.0	14.7	31.6	1.5	74.8	126.7
Newport	5.9	67,833.2	407.1	9.4	0.0	1.3	0.7	7.2	86.4	64.8	55.8	7.0	651.7	355.0	263.5	240.2	69,989.1
Florence	0.4	0.0	1.0	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.0	0.0	8.7	5.6	0.1	69.7	85.9
Charleston	6.0	9,010.2	329.4	17.7	0.0	1.2	0.0	4.2	78.8	117.1	37.9	3.1	937.2	574.8	66.0	649.4	11,833.0
Brookings	1.5	7,453.8	108.8	2.7	0.0	0.4	0.0	0.0	25.2	36.8	4.9	0.1	239.3	46.3	2.0	65.0	7,986.8
Crescent City	1.6	0.0	72.4	2.0	0.0	0.4	0.0	0.1	13.8	35.2	3.0	0.3	166.1	31.1	3.9	197.3	527.1
Eureka Area	3.3	2,300.4	172.3	5.5	0.0	0.8	0.0	3.2	49.6	78.4	13.3	2.2	475.7	136.4	23.9	246.9	3,512.0
Fort Bragg	0.5	0.0	175.3	0.0	0.0	0.0	6.7	0.0	76.3	100.5	44.6	3.7	580.8	25.8	0.5	83.8	1,098.7
Bodega Bay	0.5	5,610.8	33.4	0.1	0.0	0.1	0.7	0.0	11.0	17.5	26.7	2.6	65.5	13.4	0.7	29.2	5,812.0
San Francisco	4.2	0.0	88.7	0.0	0.0	0.5	6.2	6.7	31.0	29.7	101.4	6.8	312.8	107.7	19.8	403.5	1,119.2
Princeton	4.3	0.0	7.9	0.0	0.0	0.3	2.8	0.0	1.1	1.2	1.1	0.9	32.0	48.4	0.0	333.2	433.3
Santa Cruz	0.4	0.0	19.5	0.8	0.0	0.1	0.3	0.5	2.3	2.0	0.6	0.1	31.7	13.5	1.6	61.3	134.6
Moss Landing	1.2	0.0	48.4	0.0	0.0	0.1	3.0	0.1	25.7	31.7	52.9	3.7	234.9	36.0	6.5	124.7	568.9
Monterey	1.2	468.1	36.9	0.0	0.0	0.1	2.6	0.0	19.4	31.9	43.8	1.9	126.1	9.4	1.2	100.9	843.6
Morro Bay	0.2	0.0	4.0	0.0	0.0	0.0	0.2	0.0	3.0	4.5	6.7	1.1	26.6	16.3	0.0	19.1	81.8
Avila	0.2	0.0	44.2	0.0	0.0	0.0	0.2	0.0	32.7	46.7	127.1	4.0	190.1	18.6	0.1	19.0	483.0
Species Total	47.9	136,740.7	2,069.2	56.7	0.0	9.3	23.4	74.1	557.1	715.3	591.7	45.6	5,666.4	2,286.8	804.2	4,040.7	153,729.0

TABLE 8-16e. Projected 2005 groundfish landings by species and port for the **limited entry trawl** fleet under **Action Alternative 3** (mt). (Page 1 of 1)

Port (PCID)	Lingcod	Whiting	Sablefish	POP	Widow	Canary	Chili-pepper	Yellow-tail	Short-spine	Long-spine	Slope Rockfish	Other Rockfish	Dover	Petrale	Arrow-tooth	Other Flatfish	Port Total
Blaine	1.6	0.0	27.7	0.0	0.0	0.5	0.0	9.8	3.6	0.3	8.2	3.1	55.5	77.3	280.5	86.9	555.1
Neah Bay	2.7	0.0	37.6	0.0	0.0	0.9	0.0	5.0	1.3	0.0	0.0	1.4	26.3	52.9	27.1	332.2	487.4
Westport	0.9	16,538.7	26.1	0.2	0.0	0.2	0.0	4.5	3.6	0.7	1.6	0.1	63.9	40.4	55.7	62.8	16,799.3
Ilwaco	0.0	2,440.8	2.6	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.7	0.0	1.2	0.0	0.2	0.0	2,445.7
Astoria	11.1	25,084.7	452.7	18.0	0.0	2.5	0.0	42.3	95.5	109.0	61.3	4.4	1,388.7	687.7	339.8	931.7	29,229.4
Garibaldi	0.7	0.0	3.8	0.0	0.0	0.2	0.0	0.0	0.1	0.0	0.0	0.0	15.5	36.4	2.5	74.8	134.0
Newport	6.2	67,833.2	425.4	9.6	0.0	1.4	0.7	7.7	87.6	64.9	55.7	8.0	661.5	372.9	337.1	254.3	70,126.1
Florence	0.5	0.0	2.0	0.0	0.0	0.1	0.0	0.1	0.2	0.1	0.0	0.0	11.8	5.8	0.1	76.9	97.6
Charleston	6.0	9,010.2	336.0	17.7	0.0	1.3	0.0	4.5	78.2	106.9	37.8	3.6	950.1	591.9	145.2	656.0	11,945.4
Brookings	1.5	7,453.8	112.7	2.7	0.0	0.4	0.0	0.0	25.2	36.8	4.9	0.1	239.8	46.3	5.0	65.1	7,994.4
Crescent City	1.5	0.0	71.5	2.0	0.0	0.4	0.0	0.1	13.8	30.1	3.0	0.4	169.2	31.6	8.5	202.2	534.1
Eureka Area	3.4	2,300.4	179.4	5.6	0.0	0.8	0.0	4.3	49.8	78.4	13.3	2.6	481.8	137.9	33.2	254.5	3,545.3
Fort Bragg	0.6	0.0	182.1	0.0	0.0	0.0	6.7	0.0	76.3	100.5	44.6	3.7	580.8	25.8	1.3	83.8	1,106.3
Bodega Bay	0.5	5,610.8	33.7	0.1	0.0	0.1	0.7	0.0	11.0	17.5	26.7	2.7	65.5	13.4	1.8	29.5	5,813.9
San Francisco	4.3	0.0	93.0	0.0	0.0	0.6	6.2	7.6	31.5	29.7	101.4	6.9	312.0	115.5	22.0	413.1	1,143.8
Princeton	4.3	0.0	8.2	0.0	0.0	0.3	2.8	0.0	1.1	1.2	1.1	0.9	32.0	48.4	0.0	333.2	433.6
Santa Cruz	0.4	0.0	19.8	0.8	0.0	0.1	0.3	0.5	2.3	2.0	0.6	0.1	31.7	13.5	1.6	61.3	135.0
Moss Landing	1.2	0.0	49.9	0.0	0.0	0.1	3.0	0.1	25.7	31.7	53.0	4.0	234.9	36.2	10.5	124.8	575.1
Monterey	1.2	468.1	37.9	0.0	0.0	0.1	2.6	0.0	19.4	31.9	43.8	2.0	126.1	9.4	1.2	100.9	844.7
Morro Bay	0.2	0.0	4.1	0.0	0.0	0.0	0.2	0.0	3.0	4.5	6.7	1.1	26.6	16.3	0.0	19.1	81.9
Avila	0.2	0.0	46.0	0.0	0.0	0.0	0.2	0.0	32.7	46.7	127.2	4.0	190.1	18.6	0.1	19.0	484.8
Species Total	48.8	136,740.7	2,152.1	56.8	0.0	9.8	23.4	86.4	561.9	692.7	591.7	49.2	5,665.1	2,378.4	1,273.5	4,182.2	154,512.9

TABLE 8-16f. Projected 2005 groundfish landings by species and port for the **limited entry trawl** fleet under the **Council Preferred Alternative** (mt). (Page 1 of 1)

Port (PCID)	Lingcod	Whiting	Sablefish	POP	Widow	Canary	Chili-pepper	Yellow-tail	Short-spine	Long-spine	Slope Rockfish	Other Rockfish	Dover	Petrale	Arrow-tooth	Other Flatfish	Port Total
Blaine	2.1	0.0	27.0	0.1	0.0	0.4	0.0	9.8	3.6	0.3	7.4	3.1	64.8	98.8	165.3	80.0	462.6
Neah Bay	2.6	0.0	36.3	0.0	0.0	0.5	0.0	7.0	1.3	0.0	0.0	1.5	26.2	54.5	22.8	364.2	516.9
Westport	1.0	16,538.7	27.1	0.2	0.0	0.2	0.0	6.1	3.6	0.7	1.4	0.1	80.4	48.9	38.3	58.0	16,804.8
Ilwaco	0.0	2,440.8	2.4	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.7	0.0	1.1	0.0	0.2	0.0	2,445.5
Astoria	11.6	25,084.7	444.7	25.3	0.0	1.5	0.0	44.5	98.1	111.8	48.8	4.5	1,597.6	717.5	406.9	934.8	29,532.3
Garibaldi	0.7	0.0	3.5	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	15.2	47.4	1.9	68.6	137.5
Newport	6.1	67,833.2	410.8	15.3	0.0	0.4	0.7	8.7	90.1	67.1	46.2	8.6	731.1	387.9	267.8	260.1	70,134.0
Florence	0.5	0.0	1.9	0.0	0.0	0.1	0.0	0.1	0.2	0.1	0.0	0.1	11.5	6.2	0.1	77.1	97.8
Charleston	6.0	9,010.2	329.3	23.3	0.0	0.6	0.0	6.3	80.0	110.1	28.1	3.9	1,059.1	611.0	69.3	671.4	12,008.7
Brookings	1.4	7,453.8	109.0	4.7	0.0	0.1	0.0	0.0	25.7	37.6	3.6	0.2	255.9	47.0	2.1	65.8	8,006.7
Crescent City	1.4	0.0	70.1	3.9	0.0	0.1	0.0	0.1	14.0	30.5	2.1	0.5	178.3	32.6	4.0	196.1	533.7
Eureka Area	3.3	2,300.4	173.9	9.9	0.0	0.2	0.0	4.3	51.0	79.8	9.7	2.9	510.3	139.7	26.4	246.1	3,557.8
Fort Bragg	0.7	0.0	194.1	0.0	0.0	0.0	6.7	0.0	77.4	103.2	44.5	5.2	635.1	27.1	0.5	111.0	1,205.6
Bodega Bay	0.5	5,610.8	33.7	0.6	0.0	0.0	0.7	0.0	11.0	17.8	26.1	2.7	66.9	13.4	0.7	39.2	5,824.2
San Francisco	5.3	0.0	103.3	0.0	0.0	0.5	6.2	8.1	32.9	31.1	97.4	7.9	356.9	138.2	117.7	440.1	1,345.5
Princeton	4.0	0.0	9.4	0.0	0.0	0.2	2.8	0.0	1.1	1.2	1.0	1.0	34.8	51.2	0.0	308.5	415.3
Santa Cruz	0.4	0.0	19.3	1.3	0.0	0.0	0.3	0.9	2.3	2.1	0.1	0.1	35.2	13.5	1.6	70.8	148.1
Moss Landing	1.7	0.0	54.1	0.3	0.0	0.1	3.0	0.1	26.8	33.3	51.4	4.1	256.4	38.6	6.7	169.2	645.7
Monterey	1.2	468.1	39.3	0.3	0.0	0.0	2.6	0.0	19.9	32.7	41.1	2.1	135.7	9.7	1.2	106.5	860.3
Morro Bay	0.2	0.0	4.3	0.0	0.0	0.0	0.2	0.0	3.1	4.5	6.2	1.1	29.0	16.4	0.0	19.1	84.1
Avila	0.2	0.0	48.6	0.0	0.0	0.0	0.2	0.0	34.1	48.7	121.3	4.2	208.5	18.8	0.1	23.5	508.4
Species Total	50.8	136,740.7	2,142.2	85.4	0.0	5.1	23.4	96.1	576.4	712.5	537.1	53.6	6,290.1	2,518.5	1,133.6	4,310.1	155,275.6

TABLE 8-17a. Summary of changes in projected **limited entry trawl** vessel groundfish annual revenue under the **No Action Alternative.** (Page 1 of 1)

Fleet / Avg. 2003 revenue / Direction of change	**< 20% change in projected revenue**					**> 20% change in projected revenue**					**All vessels**				
	# of Vessels	Avg. 2003 GF ($)	Proj. 2005 GF ($)	Average change in GF revenue $	Average change in GF revenue %	# of Vessels	Avg. 2003 GF ($)	Proj. 2005 GF ($)	Average change in GF revenue $	Average change in GF revenue %	# of Vessels	Avg. 2003 GF ($)	Proj. 2005 GF ($)	Average change in GF revenue $	Average change in GF revenue %
Non-whiting vessels															
$21 - $100,000															
Lower 2005 revenue	2	53,932	51,197	-2,735	-5%	4	75,007	49,693	-25,313	-34%	6	67,982	50,195	-17,787	-26%
Higher 2005 revenue	2	81,952	96,838	14,886	18%	36	45,919	105,554	59,635	130%	38	47,815	105,096	57,280	120%
Total	4	67,942	74,017	6,075	9%	40	48,828	99,968	51,140	105%	44	50,565	97,609	47,044	93%
> $100,000															
Lower 2005 revenue	2	125,372	111,587	-13,785	-11%	3	296,524	203,366	-93,158	-31%	5	228,063	166,654	-61,409	-27%
Higher 2005 revenue	3	148,493	169,312	20,819	14%	38	162,722	256,659	93,938	58%	41	161,681	250,268	88,588	55%
Total	5	139,245	146,222	6,977	5%	41	172,512	252,760	80,248	47%	46	168,896	241,180	72,284	43%
All															
Lower 2005 revenue	4	89,652	81,392	-8,260	-9%	7	169,943	115,553	-54,390	-32%	11	140,746	103,131	-37,615	-27%
Higher 2005 revenue	5	121,877	140,322	18,446	15%	74	105,899	183,149	77,250	73%	79	106,910	180,438	73,528	69%
Total	9	107,555	114,131	6,576	6%	81	111,433	177,307	65,874	59%	90	111,046	170,990	59,944	54%
Whiting vessels															
$21 - $100,000															
Higher 2005 revenue	.	.	.	.	.	3	40,036	146,127	106,091	265%	3	40,036	146,127	106,091	265%
> $100,000															
Higher 2005 revenue	.	.	.	.	.	29	240,800	584,223	343,423	143%	29	240,800	584,223	343,423	143%
All															
Higher 2005 revenue	.	.	.	.	.	32	221,978	543,151	321,173	145%	32	221,978	543,151	321,173	145%
Aggregate															
$21 - $100,000															
Lower 2005 revenue	2	53,932	51,197	-2,735	-5%	4	75,007	49,693	-25,313	-34%	6	67,982	50,195	-17,787	-26%
Higher 2005 revenue	2	81,952	96,838	14,886	18%	39	45,466	108,675	63,209	139%	41	47,246	108,098	60,852	129%
Total	4	67,942	74,017	6,075	9%	43	48,214	103,189	54,974	114%	47	49,893	100,706	50,813	102%
> $100,000															
Lower 2005 revenue	2	125,372	111,587	-13,785	-11%	3	296,524	203,366	-93,158	-31%	5	228,063	166,654	-61,409	-27%
Higher 2005 revenue	3	148,493	169,312	20,819	14%	67	196,517	398,441	201,924	103%	70	194,459	388,621	194,162	100%
Total	5	139,245	146,222	6,977	5%	70	200,803	390,080	189,278	94%	75	196,699	373,823	177,124	90%
All															
Lower 2005 revenue	4	89,652	81,392	-8,260	-9%	7	169,943	115,553	-54,390	-32%	11	140,746	103,131	-37,615	-27%
Higher 2005 revenue	5	121,877	140,322	18,446	15%	106	140,942	291,829	150,887	107%	111	140,083	285,004	144,921	103%
Total	9	107,555	114,131	6,576	6%	113	142,738	280,909	138,171	97%	122	140,143	268,606	128,463	92%

TABLE 8-17b. Summary of changes in projected **limited entry trawl** vessel groundfish annual revenue from 2003 under **Alternative 1** (with 8 mt canary limit). (Page 1 of 1)

Fleet / **Avg. 2003 revenue** / Direction of change	**< 20% change in projected revenue** # of Vessels	Avg. 2003 GF ($)	Proj. 2005 GF ($)	Average change in GF revenue $	%	**> 20% change in projected revenue** # of Vessels	Avg. 2003 GF ($)	Proj. 2005 GF ($)	Average change in GF revenue $	%	**All vessels** # of Vessels	Avg. 2003 GF ($)	Proj. 2005 GF ($)	Average change in GF revenue $	%
Non-whiting vessels															
$21 - $100,000															
Lower 2005	3	36,645	34,255	-2,390	-7%	4	75,007	42,960	-32,047	-43%	7	58,566	39,229	-19,337	-33%
Higher 2005	3	69,905	79,354	9,448	14%	34	47,212	95,430	48,219	102%	37	49,052	94,127	45,075	92%
Total	6	53,275	56,804	3,529	7%	38	50,138	89,907	39,770	79%	44	50,565	85,393	34,828	69%
> $100,000															
Lower 2005	5	170,318	149,942	-20,376	-12%	4	258,869	139,115	-119,754	-46%	9	209,674	145,130	-64,544	-31%
Higher 2005	2	148,552	159,922	11,369	8%	35	159,573	247,818	88,245	55%	37	158,977	243,067	84,090	53%
Total	7	164,099	152,793	-11,306	-7%	39	169,757	236,669	66,912	39%	46	168,896	223,905	55,009	33%
All															
Lower 2005	8	120,191	106,559	-13,631	-11%	8	166,938	91,037	-75,900	-45%	16	143,564	98,798	-44,766	-31%
Higher 2005	5	101,364	111,581	10,217	10%	69	104,207	172,729	68,522	66%	74	104,014	168,597	64,583	62%
Total	13	112,950	108,491	-4,459	-4%	77	110,724	164,241	53,517	48%	90	111,046	156,188	45,143	41%
Whiting vessels															
$21 - $100,000															
Higher 2005						3	40,036	145,112	105,076	262%	3	40,036	145,112	105,076	262%
> $100,000															
Higher 2005						29	240,800	570,286	329,486	137%	29	240,800	570,286	329,486	137%
All															
Higher 2005						32	221,978	530,426	308,447	139%	32	221,978	530,426	308,447	139%
Aggregate															
$21 - $100,000															
Lower 2005	3	36,645	34,255	-2,390	-7%	4	75,007	42,960	-32,047	-437%	7	58,566	39,229	-19,337	-33%
Higher 2005	3	69,905	79,354	9,448	14%	37	46,630	99,459	52,829	113%	40	48,376	97,951	49,575	102%
Total	6	53,275	56,804	3,529	7%	41	49,398	93,947	44,548	90%	47	49,893	89,205	39,312	79%
> $100,000															
Lower 2005	5	170,318	149,942	-20,376	-12%	4	258,869	139,115	-119,754	-46%	9	209,674	145,130	-64,544	-31%
Higher 2005	2	148,552	159,922	11,369	8%	64	196,379	393,936	197,557	101%	66	194,930	386,845	191,915	98%
Total	7	164,099	152,793	-11,306	-7%	68	200,055	378,947	178,892	89%	75	196,699	357,839	161,140	82%
All															
Lower 2005	8	120,191	106,559	-13,631	-11%	8	166,938	91,037	-75,900	-45%	16	143,564	98,798	-44,766	-31%
Higher 2005	5	101,364	111,581	10,217	10%	101	141,520	286,058	144,538	102%	106	139,626	277,828	138,202	99%
Total	13	112,950	108,491	-4,459	-4%	109	143,386	271,745	128,359	90%	122	140,143	254,349	114,206	81%

TABLE 8-17c. Summary of changes in projected **limited entry trawl** vessel groundfish annual revenue from 2003 under **Alternative 2** (with selective flatfish trawl with a 100 fm in line for three summer periods). (Page 1 of 1)

	< 20% change in projected revenue					**> 20% change in projected revenue**					**All vessels**				
Fleet / Avg. 2003 revenue / Direction of	# of Vessels	Avg. 2003 GF ($)	Proj. 2005 GF ($)	Average change in GF revenue $	%	# of Vessels	Avg. 2003 GF ($)	Proj. 2005 GF ($)	Average change in GF revenue $	%	# of Vessels	Avg. 2003 GF ($)	Proj. 2005 GF ($)	Average change in GF revenue $	%
Non-whiting vessels															
$21 - $100,000															
Lower 2005	2	53,932	53,435	-497	-1%	2	63,871	48,431	-15,440	-24%	4	58,901	50,933	-7,968	-14%
Higher 2005	4	67,006	72,816	5,810	9%	36	47,812	106,980	59,167	124%	40	49,732	103,563	53,832	108%
Total	6	62,648	66,356	3,708	6%	38	48,658	103,898	55,241	114%	44	50,565	98,779	48,213	95%
> $100,000															
Lower 2005	1	216,301	183,213	-33,087	-15%	3	273,058	164,525	-108,53	-40%	4	258,869	169,197	-89,671	-35%
Higher 2005	5	173,701	193,602	19,900	11%	37	158,520	251,755	93,236	59%	42	160,327	244,832	84,505	53%
Total	6	180,801	191,870	11,069	6%	40	167,110	245,213	78,103	47%	46	168,896	238,255	69,359	41%
All															
Lower 2005	3	108,055	96,695	-11,360	-11%	5	189,383	118,087	-71,296	-38%	8	158,885	110,065	-48,820	-31%
Higher 2005	9	126,281	139,919	13,638	11%	73	103,924	180,359	76,435	74%	82	106,378	175,921	69,542	65%
Total	12	121,725	129,113	7,388	6%	78	109,403	176,367	66,965	61%	90	111,046	170,067	59,021	53%
Whiting vessels															
$21 - $100,000															
Higher 2005						3	40,036	147,642	107,606	269%	3	40,036	147,642	107,606	269%
> $100,000															
Higher 2005						29	240,800	574,478	333,678	139%	29	240,800	574,478	333,678	139%
All															
Higher 2005						32	221,978	534,462	312,484	141%	32	221,978	534,462	312,484	141%
Aggregate															
$21 - $100,000															
Lower 2005	2	53,932	53,435	-497	-1%	2	63,871	48,431	-15,440	-24%	4	58,901	50,933	-7,968	-14%
Higher 2005	4	67,006	72,816	5,810	9%	39	47,214	110,108	62,893	133%	43	49,055	106,639	57,583	117%
Total	6	62,648	66,356	3,708	6%	41	48,027	107,099	59,072	123%	47	49,893	101,898	52,004	104%
> $100,000															
Lower 2005	1	216,301	183,213	-33,087	-15%	3	273,058	164,525	-108,53	-40%	4	258,869	169,197	-89,671	-35%
Higher 2005	5	173,701	193,602	19,900	11%	66	194,673	393,558	198,885	102%	71	193,196	379,476	186,280	96%
Total	6	180,801	191,870	11,069	6%	69	198,081	383,600	185,519	94%	75	196,699	368,262	171,563	87%
All															
Lower 2005	3	108,055	96,695	-11,360	-11%	5	189,383	118,087	-71,296	-38%	8	158,885	110,065	-48,820	-31%
Higher 2005	9	126,281	139,919	13,638	11%	105	139,903	288,276	148,374	106%	114	138,827	276,564	137,737	99%
Total	12	121,725	129,113	7,388	6%	110	142,152	280,541	138,389	97%	122	140,143	265,646	125,503	90%

TABLE 8-17d. Summary of changes in projected **limited entry trawl** vessel groundfish annual revenue from 2003 under **Alternative 3** (with Selective Flatfish Trawl, 12 mt canary limit and with 100 fm in line for three summer periods). (Page 1 of 1)

Fleet / Avg. 2003 revenue / Direction of change	< 20% change in projected revenue: # of Vessels	Avg. 2003 GF ($)	Proj. 2005 GF ($)	Average change in GF revenue: $	%	> 20% change in projected revenue: # of Vessels	Avg. 2003 GF ($)	Proj. 2005 GF ($)	Average change in GF revenue: $	%	All vessels: # of Vessels	Avg. 2003 GF ($)	Proj. 2005 GF ($)	Average change in GF revenue: $	%
Non-whiting vessels															
$21 - $100,000															
Lower 2005 revenue	2	54,206	53,882	-324	-1%	2	63,871	48,577	-15,293	-24%	4	59,038	51,229	-7,809	-13%
Higher 2005 revenue	4	66,870	75,715	8,846	13%	36	47,812	109,995	62,182	130%	40	49,718	106,567	56,848	114%
Total	6	62,648	68,437	5,789	9%	38	48,658	106,762	58,104	119%	44	50,565	101,536	50,970	101%
> $100,000															
Lower 2005 revenue	.	.	.	.		3	273,058	176,849	-96,208	-35%	3	273,058	176,849	-96,208	-35%
Higher 2005 revenue	3	171,135	188,802	17,666	10%	40	160,916	254,556	93,640	58%	43	161,629	249,969	88,340	55%
Total	3	171,135	188,802	17,666	10%	43	168,740	249,135	80,395	48%	46	168,896	245,200	76,304	45%
All															
Lower 2005 revenue	2	54,206	53,882	-324	-1%	5	189,383	125,541	-63,842	-34%	7	150,761	105,067	-45,694	-30%
Higher 2005 revenue	7	111,555	124,181	12,626	11%	76	107,341	186,080	78,739	73%	83	107,696	180,859	73,163	68%
Total	9	98,811	108,559	9,748	10%	81	112,405	182,343	69,938	62%	90	111,046	174,964	63,919	58%
Whiting vessels															
$21 - $100,000															
Higher 2005 revenue	.	.	.	.		3	40,036	148,223	108,187	270%	3	40,036	148,223	108,187	270%
> $100,000															
Higher 2005 revenue	.	.	.	.		29	240,800	576,052	335,253	139%	29	240,800	576,052	335,253	139%
All															
Higher 2005 revenue	.	.	.	.		32	221,978	535,943	313,965	141%	32	221,978	535,943	313,965	141%
Aggregate															
$21 - $100,000															
Lower 2005 revenue	2	54,206	53,882	-324	-1%	2	63,871	48,577	-15,293	-24%	4	59,038	51,229	-7,809	-13%
Higher 2005 revenue	4	66,870	75,715	8,846	13%	39	47,214	112,935	65,721	139%	43	49,043	109,473	60,430	123%
Total	6	62,648	68,437	5,789	9%	41	48,027	109,796	61,769	129%	47	49,893	104,516	54,623	109%
> $100,000															
Lower 2005 revenue	.	.	.	.		3	273,058	176,849	-96,208	-35%	3	273,058	176,849	-96,208	-35%
Higher 2005 revenue	3	171,135	188,802	17,666	10%	69	194,490	389,678	195,188	100%	72	193,517	381,308	187,791	97%
Total	3	171,135	188,802	17,666	10%	72	197,764	380,810	183,046	93%	75	196,699	373,130	176,431	90%
All															
Lower 2005 revenue	2	54,206	53,882	-324	-1%	5	189,383	125,541	-63,842	-34%	7	150,761	105,067	-45,694	-30%
Higher 2005 revenue	7	111,555	124,181	12,626	11%	108	141,307	289,743	148,436	105%	115	139,496	279,665	140,169	100%
Total	9	98,811	108,559	9,748	10%	113	143,435	282,477	139,043	97%	122	140,143	269,647	129,505	92%

TABLE 8-17e. Summary of changes in projected **limited entry trawl** vessel groundfish annual revenue from 2003 under **the Council-preferred Alternative** (with Selective Flatfish Trawl, and with 100 fm in line for four summer periods). (Page 1 of 1)

Fleet / Avg. 2003 revenue / Direction of change	< 20% change in projected revenue: # of Vessels	Avg. 2003 GF ($)	Proj. 2005 GF ($)	Average change in GF revenue: $	%	> 20% change in projected revenue: # of Vessels	Avg. 2003 GF ($)	Proj. 2005 GF ($)	Average change in GF revenue: $	%	All vessels: # of Vessels	Avg. 2003 GF ($)	Proj. 2005 GF ($)	Average change in GF revenue: $	%
Non-whiting vessels															
$21 - $100,000															
Lower 2005 revenue	2	53,932	52,440	-1,492	-3%	2	63,871	47,435	-16,435	-26%	4	58,901	49,937	-8,964	-15%
Higher 2005 revenue	4	53,842	60,370	6,528	12%	36	49,275	113,439	64,164	130%	40	49,732	108,132	58,400	117%
Total	6	53,872	57,726	3,854	7%	38	50,043	109,965	59,922	120%	44	50,565	102,842	52,276	103%
> $100,000															
Lower 2005 revenue	1	145,904	118,767	-27,136	-19%	2	336,635	242,132	-94,503	-28%	3	273,058	201,010	-72,048	-26%
Higher 2005 revenue	2	169,749	195,784	26,035	15%	41	161,233	257,151	95,918	59%	43	161,629	254,296	92,667	57%
Total	3	161,800	170,111	8,311	5%	43	169,391	256,452	87,061	51%	46	168,896	250,821	81,925	49%
All															
Lower 2005 revenue	3	84,589	74,549	-10,040	-12%	4	200,253	144,783	-55,469	-28%	7	150,683	114,683	-36,000	-24%
Higher 2005 revenue	6	92,478	105,508	13,030	14%	77	108,889	189,961	81,072	74%	83	107,703	183,856	76,153	71%
Total	9	89,848	95,188	5,340	6%	81	113,401	187,730	74,329	66%	90	111,046	178,476	67,430	61%
Whiting vessels															
$21 - $100,000															
Higher 2005 revenue	.	.	.	.	.	3	40,036	147,418	107,382	268%	3	40,036	147,418	107,382	268%
> $100,000															
Higher 2005 revenue	.	.	.	.	.	29	240,800	576,225	335,426	139%	29	240,800	576,225	335,426	139%
All															
Higher 2005 revenue	.	.	.	.	.	32	221,978	536,025	314,046	141%	32	221,978	536,025	314,046	141%
Aggregate															
$21 - $100,000															
Lower 2005 revenue	2	53,932	52,440	-1,492	-3%	2	63,871	47,435	-16,435	-26%	4	58,901	49,937	-8,964	-15%
Higher 2005 revenue	4	53,842	60,370	6,528	12%	39	48,564	116,053	67,488	139%	43	49,055	110,873	61,817	126%
Total	6	53,872	57,726	3,854	7%	41	49,311	112,705	63,394	129%	47	49,893	105,687	55,794	112%
> $100,000															
Lower 2005 revenue	1	145,904	118,767	-27,136	-19%	2	336,635	242,132	-94,503	-28%	3	273,058	201,010	-72,048	-26%
Higher 2005 revenue	2	169,749	195,784	26,035	15%	70	194,196	389,339	195,142	100%	72	193,517	383,962	190,445	98%
Total	3	161,800	170,111	8,311	5%	72	198,153	385,250	187,097	94%	75	196,699	376,644	179,945	91%
All															
Lower 2005 revenue	3	84,589	74,549	-10,040	-12%	4	200,253	144,783	-55,469	-28%	7	150,683	114,683	-36,000	-24%
Higher 2005 revenue	6	92,478	105,508	13,030	14%	109	142,089	291,557	149,468	105%	115	139,501	281,850	142,349	102%
Total	9	89,848	95,188	5,340	6%	113	144,148	286,362	142,214	99%	122	140,143	272,259	132,116	94%

TABLE 8-17f. Revised summary of changes in projected **limited entry trawl** vessel groundfish annual revenue from 2003 under **the Council-preferred Alternative** (with Selective Flatfish Trawl, 100 fm shoreward RCA boundary for four summer periods, 200 fm seawrd RCA boundary north of 38° N. latitude, and reduced slope rockfish limits). (Page 1 of 1)

	< 20% change in projected revenue					> 20% change in projected revenue					All vessels				
Fleet		Avg.	Proj.	Average change			Avg.	Proj.	Average change			Avg.	Proj.	Average change	
Avg. 2003 revenue	# of	2003	2005	in GF revenue		# of	2003	2005	in GF revenue		# of	2003	2005	in GF revenue	
Direction of change	Vessels	GF ($)	GF ($)	$	%	Vessels	GF ($)	GF ($)	$	%	Vessels	GF ($)	GF ($)	$	%
Non-whiting vessels															
$21 - $100,000															
Lower 2005 revenue	3	60,560	58,130	(2,430)	-4%	2	63,871	46,570	(17,301)	-27%	5	61,884	53,506	(8,378)	-14%
Higher 2005 revenue	3	47,184	55,398	8,214	17%	36	49,275	111,177	61,901	126%	39	49,114	106,886	57,772	118%
Total	6	53,872	56,764	2,892	5%	38	50,043	107,776	57,733	115%	44	50,565	100,820	50,255	99%
> $100,000															
Lower 2005 revenue	1	145,904	118,767	(27,136)	-19%	2	336,635	231,539	(105,09	-31%	3	273,058	193,949	(79,109)	-29%6)
Higher 2005 revenue	2	169,749	194,690	24,942	15%	41	161,233	251,157	89,924	56%	43	161,629	248,530	86,901	54%
Total	3	161,800	169,383	7,582	5%	43	169,391	250,244	80,853	48%	46	168,896	244,971	76,074	45%
All															
Lower 2005 revenue	4	81,896	73,289	(8,607)	-11%	4	200,253	139,055	(61,198)	-31%	8	141,074	106,172	(34,902)	-25%
Higher 2005 revenue	5	96,210	111,115	14,905	15%	77	108,889	185,711	76,822	71%	82	108,116	181,163	73,047	68%
Total	9	89,848	94,303	4,455	5%	81	113,401	183,407	70,007	62%	90	111,046	174,497	63,451	57%
Whiting vessels															
$21 - $100,000															
Higher 2005 revenue	.	.	.	.	.	3	40,036	146,532	106,496	266%	3	40,036	146,532	106,496	266%
> $100,000															
Higher 2005 revenue	.	.	.	.	.	29	240,800	572,640	331,840	138%	29	240,800	572,640	331,840	138%
All															
Higher 2005 revenue	.	.	.	.	.	32	221,978	532,692	310,714	140%	32	221,978	532,692	310,714	140%
Aggregate															
$21 - $100,000															
Lower 2005 revenue	3	60,560	58,130	(2,430)	-4%	2	63,871	46,570	(17,301)	-27%	5	61,884	53,506	(8,378)	-14%
Higher 2005 revenue	3	47,184	55,398	8,214	17%	39	48,564	113,896	65,332	135%	42	48,466	109,718	61,252	126%
Total	6	53,872	56,764	2,892	5%	41	49,311	110,612	61,301	124%	47	49,893	103,738	53,844	108%
> $100,000															
Lower 2005 revenue	1	145,904	118,767	(27,136)	-19%	2	336,635	231,539	(105,09	-31%	3	273,058	193,949	(79,109)	-29%6)
Higher 2005 revenue	2	169,749	194,690	24,942	15%	70	194,196	384,343	190,146	98%	72	193,517	379,074	185,557	96%
Total	3	161,800	169,383	7,582	5%	72	198,153	380,098	181,945	92%	75	196,699	371,669	174,971	89%
All															
Lower 2005 revenue	4	81,896	73,289	(8,607)	-11%	4	200,253	139,055	(61,198)	-31%	8	141,074	106,172	(34,902)	-25%
Higher 2005 revenue	5	96,210	111,115	14,905	15%	109	142,089	287,577	145,488	102%	114	140,077	279,838	139,761	100%
Total	9	89,848	94,303	4,455	5%	113	144,148	282,320	138,172	96%	122	140,143	268,450	128,307	92%

TABLE 8-18. Revised projected annual impacts to the limited entry fixed gear sablefish fishery under the 2005-2006 management alternatives. (Page 1 of 1)

	2003 (Preseason Estimates)	**No Action:** 2004 OY, Seaward boundary of RCA at 100 fm North of 40o10' and at 150 fm South of 40°10'	**Alt 1A**: Med OY, Seaward boundary of RCA at 100 fm North of 40o10' and at 150 fm South of 40°10'	**Alt 1**: Med OY, Seaward boundary of RCA at 150 fm	**Alt 2**: Med OY, Seaward boundary of RCA at 125 fm	**Alt 3**: Med OY, Seaward boundary of RCA at 100 fm	**Council Preferred Alternative**	
Seaward RCA line:							**Year: 2005**	**Year: 2006**
North of C. Mendocino:	100 fm	100 fm	100 fm	150 fm	125 fm	100 fm	100 fm	100 fm
South of C. Mendocino:	150 fm	150 fm	150 fm	150 fm	125 fm	100 fm	150 fm	150 fm
Total catch allocated (mt)	2,194	2,545	2,536	2,536	2,536	2,536	2,536	2,482
Landed catch target (mt)	2,019	2,452	2,443	2,426	2,436	2,446	2,443	2,391
Amount allocated to:								
DTL (mt)	303	368	367	364	365	367	367	359
Primary fishery (mt)	1,716	2,084	2,077	2,062	2,070	2,079	2,077	2,032
% Longline	63.2%	63.1%	63.2%	65.0%	65.0%	65.0%	63.2%	63.2%
% Pot	36.9%	36.8%	36.9%	35.0%	35.0%	35.0%	36.9%	36.9%
Primary fishery tier limits (lb)								
Tier 1 (28 permits)	53,000	64,300	64,000	63,600	63,800	64,100	64,000	62,700
Tier 2 (42 permits)	24,000	29,200	29,100	28,900	29,000	29,100	29,100	28,500
Tier 3 (93 permits)	14,000	16,700	16,600	16,500	16,600	16,600	16,600	16,300
Total potential ex-vessel value of Landed Catch OY ($,000)[b/]	$8,073	$9,804	$9,770	$9,687	$9,726	$9,765	$9,770	$9,550
Difference from 2003 ($,000)	--	$1,731	$1,697	$1,614	$1,653	$1,692	$1,697	$1,477
% change from 2003	--	21.4%	21.0%	20.0%	20.5%	21.0%	21.0%	18.0%
Difference from No Action ($,000)	--	--	-$33	-$117	-$77	-$39	-$33	-$254
% change from No Action	--	--	-0.3%	-1.2%	-0.8%	-0.4%	-0.3%	-2.6%

a/ Assuming total landed catch target is caught and sold at 2003 average exvessel sablefish prices ($/lb): longline $1.76, pot $1.90.

TABLE 8-19. Revised relative size and configuration of RCAs under the 2005-2006 management alternatives. (Page 1 of 1)

		No Action		Alt 1		Alt 2		Alt 3		Council Preferred				Size of RCA compared with No Action a/				
										06-2004		09-2004					Council Preferred	
	Period	in line	out line	in line	out line	in line	out line	in line	out line	in line	out line	in line	out line	Alt 1	Alt 2	Alt 3	06-2004	09-2004
Non-Trawl RCA																		
N. of 40°10'																		
WA	All	0	100	0	150	0	125	0	100	0	100	0	100	+	+	0	0	0
OR	All	30	100	30	150	30	125	30	100	30	100	30	100	+	+	0	0	0
N. CA	All	30	100	30	150	30	125	30	100	30	100	30	100	+	+	0	0	0
S. of 40°10'	All	30	150	30	150	30	125	30	100	30	150	30	150	0	-	-	0	0
Trawl RCA																		
	1	75	150	75	150	75	150	75	150	75	150	75	200	0	0	0	0	+
	2	60	150	75	150	75	150	75	150	100	150	100	200	-	-	-	-	+
N. of 40°10'	3	60	150	60	150	100	150	100	150	100	150	100	200	0	-	-	-	+
	4	75	150	60	150	100	150	100	150	100	150	100	200	+	-	-	-	+
	5	75	150	60	150	100	150	100	150	100	150	100	200	+	-	-	-	+
	6	75	150	75	150	75	150	75	150	75	150	75	200	0	0	0	0	+
	1	75	150	75	150	75	150	75	150	75	150	75	200	0	0	0	0	+
	2	60	150	75	150	75	150	75	150	100	150	100	200	-	-	-	-	+
North Selective Footrope Limit	3	60	150	60	150	100	150	100	150	100	150	100	200	0	-	-	-	+
	4	75	150	60	150	100	150	100	150	100	150	100	200	+	-	-	-	+
	5	75	150	60	150	100	150	100	150	100	150	100	200	+	-	-	-	+
	6	75	150	75	150	75	150	75	150	75	150	75	200	0	0	0	0	+
	1	75	150	75	150	75	150	75	150	75	150	75	200	0	0	0	0	+
	2	60	150	75	150	75	150	75	150	100	150	100	200	-	-	-	-	+
40°10' to 38°	3	60	150	60	150	100	150	100	150	100	150	100	200	0	-	-	-	+
	4	75	150	60	150	100	150	100	150	100	150	100	200	+	-	-	-	+
	5	75	150	60	150	100	150	100	150	100	150	100	200	+	-	-	-	+
	6	75	150	75	150	75	150	75	150	75	150	75	200	0	0	0	0	+
	1	75	150	75	150	75	150	75	150	75	150	75	150	0	0	0	0	0
	2	75	150	75	150	75	150	75	150	100	150	100	150	0	0	0	-	-
S. of 38°	3	100	150	75	150	100	150	100	150	100	150	100	150	+	0	0	0	0
	4	100	150	75	150	100	150	100	150	100	150	100	150	+	0	0	0	0
	5	75	150	75	150	75	150	75	150	100	150	100	150	0	0	0	-	-
	6	75	150	75	150	75	150	75	150	75	150	75	150	0	0	0	0	0

a/ "+" larger RCA, "-" smaller RCA, "0" no change.

TABLE 8-20. Projected annual groundfish landings by tribal fleet under the 2005 and 2006 alternatives, displayed against 1998, 2002, 2003 and estimated 2004 landings (round-weight lb). (Page 1 of 1)

					2005 Projections				2006 Projections			
Species	1998	2002	2003	2004 est.	Alt 1	Alt 2	Alt 3	Council-Preferred	Alt 1	Alt 2	Alt 3	Council-Preferred
Arrowtooth Flounder	255	7,137	49,745									
Dover Sole	4,509	35,417	72,527									
English Sole	1,847	88,684	149,277									
Petrale Sole	3,249	45,479	185,732									
Rex Sole		6,632	10,886									
Rock Sole	2,396	5,833	5,160									
Unsp. Flatfish	38	8,406	6,380									
Unspecified Sanddab		19,655	1,725									
Sand Sole		2,748	62									
Starry Flounder		301										
Butter Sole		605	0									
Flatfish Total	12,294	220,897	481,494	601,868	601,868	601,868	601,868	601,868	601,868	601,868	601,868	601,868
Canary Rockfish	886	7,071	4,712	6,850	6,850	6,850	6,850	6,850	6,850	6,850	6,850	6,850
Darkblotched Rockfish	0	3,273	81	0	0	0	0	0	0	0	0	0
Pacific Ocean Perch	0	472	2,601	0	0	0	0	0	0	0	0	0
Redstripe Rockfish	1		2,333	2,916	2,916	2,916	2,916	2,916	2,916	2,916	2,916	2,916
Sharpchin Rockfish	1		2,332	2,915	2,915	2,915	2,915	2,915	2,915	2,915	2,915	2,915
Unspecified Rockfish	65,245											
Widow Rockfish	54	27,969	24,670	88,200	88,200	88,200	88,200	88,200	88,200	88,200	88,200	88,200
Yelloweye Rockfish		0	594	5,250	5,250	5,250	5,250	5,250	5,250	5,250	5,250	5,250
Yellowtail Rockfish	13,711	572,996	677,073	1,115,600	1,115,600	1,115,600	1,115,600	1,115,600	1,115,600	1,115,600	1,115,600	1,115,600
Unsp. Shelf Rockfish		23,629	2,354	2,942	2,943	2,942	2,942	2,942	2,942	2,942	2,942	2,942
Unsp. Near-shore Rockfish		116	45	56	56	56	56	56	56	56	56	56
Unsp. Slope Rockfish		32,941	41,458	51,822	51,822	51,822	51,822	51,822	51,822	51,822	51,822	51,822
Rockfish Total	79,903	668,467	758,341	1,276,561	1,276,552	1,276,552	1,276,552	1,276,552	1,276,552	1,276,552	1,276,552	1,276,552
Spiny Dogfish		2,607	10,760	13,450	13,450	13,450	13,450	13,450	13,450	13,450	13,450	13,450
Lingcod	5,247	24,264	49,276	55,200	55,200	110,200	220,200	220,200	55,200	110,200	220,200	220,200
Pacific Cod	4,873	128,530	471,655	589,569	589,569	589,569	589,569	589,569	589,569	589,569	589,569	589,569
Sablefish	980,719	959,982	1,328,253	1,618,176	1,605,804	1,605,804	1,605,804	1,605,804	1,579,419	1,579,419	1,579,419	1,579,419
Unspecified Skate	2,031	18,635	47,158	58,948	58,948	58,948	58,948	58,948	58,948	58,948	58,948	58,948
Shortspine Thornyhead	8,105	10,173	12,703	17,137	15,013	15,013	15,013	15,013	14,772	14,772	14,772	14,772
Other Groundfish Total	1,000,975	1,144,191	1,919,805	2,352,480	2,337,983	2,392,983	2,502,983	2,502,983	2,311,357	2,366,357	2,476,357	2,476,357
Pacific Whiting[a/]	53,984,582	45,867,384	51,673,540	55,066,079	77,161,000	77,161,000	77,161,000	77,161,000				
All Groundfish Species Total	55,077,754	48,372,507	54,833,180	59,296,988	81,377,403	81,432,403	81,542,403	81,542,403	4,189,777	4,244,777	4,354,777	4,354,777

a/ Assuming "medium" Pacific whiting OY under the alternatives for 2005.

TABLE 8-21. Projected annual groundfish revenue by tribal fleet under the 2005 and 2006 alternatives, displayed against 1998, 2002, 2003, and estimated 2004 revenue ($ exvessel). (Page 1 of 1)

					2005				2006			
Species	1998	2002	2003	2004 est.	Alt 1	Alt 2	Alt 3	Council Preferred	Alt 1	Alt 2	Alt 3	Council Preferred
Arrowtooth Flounder	26	715	5336									
Dover Sole	1,478	11,335	23219									
English Sole	613	29,289	49792									
Petrale Sole	3,249	46,509	191965									
Rex Sole		2,316	3764									
Rock Sole	791	2,033	1717									
Unsp. Flatfish	13	2,773	2103									
Unspecified Sanddab		5,110	455									
Sand Sole		2,084	47									
Starry Flounder		98										
Butter Sole		206										
Flatfish Total	6,170	102,468	278,398	347,998	347,998	347,998	347,998	347,998	347,998	347,998	347,998	347,998
Canary Rockfish	327	3,329	2,229									
Darkblotched Rockfish	0	1,477	33									
Pacific Ocean Perch	0	0	1,150									
Redstripe Rockfish	0		920									
Sharpchin Rockfish	0		912									
Widow Rockfish	19	13,452	11,705									
Yelloweye Rockfish		0	885									
Yellowtail Rockfish	4,684	174,509	323,272									
Unsp. Shelf Rockfish		9,794	1,072									
Unsp. Near-shore Rockfish		14,434	21									
Unsp. Slope Rockfish		55	18,325									
Rockfish Total	39,366	217,050	360,944	607,599	607,595	607,595	607,595	607,595	607,595	607,595	607,595	607,595
Spiny Dogfish		405	1,564									
Lingcod	3,007	18,176	34,597	38,756	38,756	77,372	154,604	154,604	38,756	77,372	154,604	154,604
Pacific Cod	1,924	63,961	235,241	294,051	294,051	294,051	294,051	294,051	294,051	294,051	294,051	294,051
Sablefish	1,280,233	1,512,595	2,187,823	2,665,368	2,644,989	2,644,989	2,644,989	2,644,989	2,601,530	2,601,530	2,601,530	2,601,530
Unspecified Skate	136	2,563	6,308									
Shortspine Thornyhead	7,760	8,232	10,605									
Other Groundfish Total	1,285,300	1,605,932	2,476,371	3,034,481	3,015,783	3,086,727	3,228,617	3,228,617	2,981,437	3,052,382	3,194,272	3,194,272
Pacific Whiting[a/]	2,699,229	2,065,122	2,773,686	2,955,788	4,141,779	4,141,779	4,141,779	4,141,779				
All Groundfish Species Total	4,030,065	4,323,521	5,889,399	6,945,865	8,113,154	8,184,099	8,325,989	8,325,989	3,937,029	4,007,974	4,149,864	4,149,864

a/ Assuming "medium" Pacific whiting OY under the alternatives for 2005.

TABLE 8-22. Historical and projected Washington coastal recreational angler trips. (Page 1 of 1)

	Total[a/]						Projected[b/]	
Trip Type	2000	2001	2002	2003	3-Yr Avg.	4-yr Avg.	2005	2006
Groundfish Directed[c/]	26,539	23,765	25,390	22,810	23,988	24,626	23,988	23,988
Groundfish Incidental	100,761	200,749	146,442	174,779	173,990	155,683	173,990	173,990
Total	127,300	224,514	171,832	197,589	197,978	180,309	197,978	197,978

a/ Albacore and sturgeon trips were excluded due to no groundfish impact.
b/ Effort projections for 2005-2006 are the three-year average of 2001-2003 due to the somewhat flat trend over that period.
c/ Groundfish directed includes groundfish and dive trips; groundfish Incidental includes salmon and halibut trips.

TABLE 8-23. Estimated annual recreational groundfish effort and total effort under the 2005-2006 management alternatives (thousand angler trips). (Page 1 of 1)

Area	Fishing Mode	2003		No Action		Alternative 1		Alternative 2		Alternative 3		Council Preferred	
		Groundfish Trips	Total Trips	Groundfish Trips	Total Trips	Groundfish Trips	Total Trips	Groundfish Trips	Total Trips	Groundfish Trips	Total Trips	Groundfish Trips	Total Trips
Washington													
	Charter	11	61	12	59	12	59	12	59	12	59	12	59
	Private	11	136	12	139	12	139	12	139	12	139	12	139
	Total	23	198	24	198	24	198	24	198	24	198	24	198
Oregon													
	Charter	32	75	32	75	32	75	32	75	32	75	32	75
	Private	25	315	25	315	25	315	25	315	25	315	25	315
	Total	57	390	57	390	57	390	57	390	57	390	57	390
North and Central California[a/]													
	Charter	92	148	109	175	109	175	109	175	109	175	109	175
	Private	579	1,485	468	1,199	468	1,199	468	1,199	468	1,199	468	1,199
	Total	671	1,633	576	1,374	576	1,374	576	1,374	576	1,374	576	1,374
Southern California													
	Charter	189	574	191	578	191	578	191	578	191	578	191	578
	Private	343	1,632	371	1,769	371	1,769	371	1,769	371	1,769	371	1,769
	Total	532	2,206	562	2,347	562	2,347	562	2,347	562	2,347	562	2,347
California Total													
	Charter	281	722	299	753	299	753	299	753	299	753	299	753
	Private	922	3,117	839	2,968	839	2,968	839	2,968	839	2,968	839	2,968
	Total	1,203	3,839	1,138	3,721	1,138	3,721	1,138	3,721	1,138	3,721	1,138	3,721
West Coast Total													
	Charter	325	858	343	887	343	887	343	887	343	887	343	887
	Private	958	3,569	876	3,422	876	3,422	876	3,422	876	3,422	876	3,422
	Total	1,283	4,427	1,219	4,309	1,219	4,309	1,219	4,309	1,219	4,309	1,219	4,309

a/ From Point Conception (34°27') to the Oregon border.

TABLE 8-24. Estimated annual income impacts from commercial fishing activities by port area under the 2005-2006 groundfish management alternatives ($ million). (Income impacts derived from harvesting and shoreside processing in Council-managed ocean area commercial fisheries.) (Page 1 of 2)

	WASHINGTON				OREGON				
Alternative/Fishery	Puget Sound	North Washington Coast	South and Central Washington Coast	WA Total	Astoria-Tillamook	Newport	Coos Bay	Brookings	OR Total
2003									
Total West Coast (All Ocean Fisheries, 0-200 miles)	18.98	16.86	128.34	164.17	71.86	37.98	26.88	29.71	166.44
Non-Tribal Groundfish	7.27	2.59	9.71	19.57	15.69	14.84	7.76	3.57	41.87
Limited Entry Trawl Groundfish	1.58	1.37	6.34	9.28	13.31	12.10	5.18	1.14	31.73
All Other Groundfish Gear	5.69	1.22	3.37	10.28	2.38	2.74	2.58	2.43	10.13
Tribal Groundfish	0.12	3.49	2.22	5.83	0.00	0.00	0.00	0.00	0.00
No Action (projected 2004)									
Total West Coast (All Ocean Fisheries, 0-200 miles)	18.85	17.11	135.96	171.91	83.42	75.04	31.43	29.82	219.71
Non-Tribal Groundfish	7.13	2.36	17.33	26.82	27.25	51.91	12.31	3.67	95.14
Limited Entry Trawl Groundfish	1.44	1.14	13.96	16.54	24.86	28.48	9.73	1.25	64.32
All Other Groundfish Gear	5.69	1.22	3.37	10.28	2.38	23.43	2.58	2.43	30.82
Tribal Groundfish	0.12	3.97	2.23	6.32	0.00	0.00	0.00	0.00	0.00
Alternative 1									
Total West Coast (All Ocean Fisheries, 0-200 miles)	18.55	16.96	135.48	170.99	82.11	76.96	30.99	29.82	219.88
Non-Tribal Groundfish	6.83	2.22	16.85	25.90	25.93	53.83	11.88	3.67	95.31
Limited Entry Trawl Groundfish	1.14	1.00	13.48	15.61	23.55	27.81	9.30	1.25	61.91
All Other Groundfish Gear	5.69	1.22	3.37	10.28	2.38	26.01	2.58	2.43	33.41
Tribal Groundfish	0.12	3.97	2.23	6.32	0.00	0.00	0.00	0.00	0.00
Alternative 2									
Total West Coast (All Ocean Fisheries, 0-200 miles)	18.69	17.30	135.62	171.62	82.99	77.56	31.50	29.86	221.92
Non-Tribal Groundfish	6.97	2.50	17.00	26.47	26.82	54.43	12.39	3.71	97.35
Limited Entry Trawl Groundfish	1.28	1.28	13.63	16.18	24.44	28.08	9.80	1.29	63.60
All Other Groundfish Gear	5.69	1.22	3.37	10.28	2.38	26.35	2.59	2.43	33.75
Tribal Groundfish	0.12	4.03	2.23	6.38	0.00	0.00	0.00	0.00	0.00
Alternative 3									
Total West Coast (All Ocean Fisheries, 0-200 miles)	18.77	17.58	135.63	171.98	83.31	77.65	31.60	29.87	222.44
Non-Tribal Groundfish	7.04	2.67	17.01	26.71	27.14	54.52	12.49	3.73	97.87
Limited Entry Trawl Groundfish	1.35	1.44	13.64	16.42	24.75	28.17	9.90	1.30	64.12
All Other Groundfish Gear	5.69	1.22	3.37	10.28	2.38	26.35	2.59	2.43	33.75
Tribal Groundfish	0.13	4.14	2.23	6.50	0.00	0.00	0.00	0.00	0.00
Council Preferred Alternative									
Total West Coast (All Ocean Fisheries, 0-200 miles)	19.00	17.66	135.70	172.36	83.81	76.39	31.87	29.88	221.95
Non-Tribal Groundfish	7.27	2.75	17.08	27.09	27.63	53.26	12.75	3.74	97.38
Limited Entry Trawl Groundfish	1.58	1.53	13.71	16.81	25.25	28.22	10.16	1.31	64.94
All Other Groundfish Gear	5.69	1.22	3.37	10.28	2.38	25.04	2.59	2.43	32.43
Tribal Groundfish	0.13	4.14	2.23	6.50	0.00	0.00	0.00	0.00	0.00

TABLE 8-24. Estimated annual income impacts from commercial fishing activities by port area under the 2005-2006 groundfish management alternatives ($ million). (Income impacts derived from harvesting and shoreside processing in Council-managed ocean area commercial fisheries.) (Page 2 of 2)

	CALIFORNIA										
Alternative/Fishery	Crescent City	Eureka	Fort Bragg	San Francisco	Monterey	Morro Bay	Santa Barbara	Los Angeles	San Diego	CA Total	WOC Total
2003											
Total West Coast (All Ocean Fisheries, 0-200 miles)	12.21	29.13	18.45	34.61	36.35	6.02	43.95	64.10	9.66	254.48	585.09
Non-Tribal Groundfish	2.84	5.79	4.18	3.39	4.04	3.36	0.57	1.28	0.59	26.03	87.47
Limited Entry Trawl Groundfish	1.38	3.76	2.54	2.51	2.18	1.65	0.00	0.00	0.00	14.03	55.05
All Other Groundfish Gear	1.46	2.03	1.64	0.88	1.86	1.70	0.57	1.28	0.59	12.00	32.42
Tribal Groundfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.83
No Action (projected 2004)											
Total West Coast (All Ocean Fisheries, 0-200 miles)	11.54	30.02	18.84	36.16	36.94	5.99	43.95	64.10	9.66	257.20	648.82
Non-Tribal Groundfish	2.18	6.67	4.57	4.94	4.63	3.33	0.57	1.28	0.59	28.76	150.72
Limited Entry Trawl Groundfish	0.72	4.65	2.93	4.06	2.77	1.62	0.00	0.00	0.00	16.75	97.61
All Other Groundfish Gear	1.46	2.03	1.64	0.88	1.86	1.70	0.57	1.28	0.59	12.00	53.11
Tribal Groundfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.32
Alternative 1											
Total West Coast (All Ocean Fisheries, 0-200 miles)	11.54	29.90	18.69	35.53	36.64	5.93	43.95	64.10	9.66	255.95	646.83
Non-Tribal Groundfish	2.18	6.56	4.42	4.32	4.32	3.27	0.57	1.28	0.59	27.51	148.72
Limited Entry Trawl Groundfish	0.72	4.53	2.79	3.44	2.46	1.57	0.00	0.00	0.00	15.51	93.03
All Other Groundfish Gear	1.46	2.03	1.64	0.88	1.86	1.70	0.57	1.28	0.59	12.00	55.69
Tribal Groundfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.32
Alternative 2											
Total West Coast (All Ocean Fisheries, 0-200 miles)	11.60	30.04	18.76	35.91	36.79	5.97	43.95	64.10	9.66	256.80	650.33
Non-Tribal Groundfish	2.24	6.70	4.49	4.70	4.48	3.32	0.57	1.28	0.59	28.36	152.17
Limited Entry Trawl Groundfish	0.77	4.67	2.86	3.82	2.62	1.61	0.00	0.00	0.00	16.35	96.13
All Other Groundfish Gear	1.46	2.03	1.64	0.88	1.86	1.70	0.57	1.28	0.59	12.00	56.04
Tribal Groundfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.38
Alternative 3											
Total West Coast (All Ocean Fisheries, 0-200 miles)	11.60	30.08	18.80	35.95	36.81	5.98	43.95	64.10	9.66	256.94	651.36
Non-Tribal Groundfish	2.24	6.74	4.52	4.73	4.50	3.32	0.57	1.28	0.59	28.50	153.08
Limited Entry Trawl Groundfish	0.78	4.71	2.89	3.85	2.64	1.62	0.00	0.00	0.00	16.50	97.04
All Other Groundfish Gear	1.46	2.03	1.64	0.88	1.86	1.70	0.57	1.28	0.59	12.00	56.04
Tribal Groundfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.50
Council Preferred Alternative											
Total West Coast (All Ocean Fisheries, 0-200 miles)	11.59	30.08	18.99	36.10	37.01	6.03	43.95	64.10	9.66	257.53	651.84
Non-Tribal Groundfish	2.23	6.74	4.72	4.88	4.70	3.37	0.57	1.28	0.59	29.09	153.56
Limited Entry Trawl Groundfish	0.77	4.72	3.09	4.00	2.84	1.67	0.00	0.00	0.00	17.09	98.84
All Other Groundfish Gear	1.46	2.03	1.64	0.88	1.86	1.70	0.57	1.28	0.59	12.00	54.72
Tribal Groundfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.50

TABLE 8-25. Estimated No Action, and change from No Action (for other Alternatives) in annual income from commercial fishing activities by port area under the 2005-2006 groundfish management alternatives ($ million). (Income impacts derived from harvesting and shoreside processing in Council-managed ocean area fisheries.) (Page 1 of 2)

	WASHINGTON				OREGON				
Alternative/Fishery	Puget Sound	North Washington Coast	South and Central Washington Coast	WA Total	Astoria-Tillamook	Newport	Coos Bay	Brookings	OR Total
No Action (projected 2004)									
Total West Coast (All Ocean Fisheries, 0-200 miles)	*18.85*	*17.11*	*135.96*	*171.91*	*83.42*	*75.04*	*31.43*	*29.82*	*219.71*
Non-Tribal Groundfish	*7.13*	*2.36*	*17.33*	*26.82*	*27.25*	*51.91*	*12.31*	*3.67*	*95.14*
Limited Entry Trawl Groundfish	*1.44*	*1.14*	*13.96*	*16.54*	*24.86*	*28.48*	*9.73*	*1.25*	*64.32*
All Other Groundfish Gear	*5.69*	*1.22*	*3.37*	*10.28*	*2.38*	*23.43*	*2.58*	*2.43*	*30.82*
Tribal Groundfish	*0.12*	*3.97*	*2.23*	*6.32*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
Alternative 1									
Total West Coast (All Ocean Fisheries, 0-200 miles)	-0.30	-0.14	-0.48	-0.92	-1.31	1.92	-0.43	0.00	0.18
Non-Tribal Groundfish	-0.30	-0.14	-0.48	-0.92	-1.31	1.92	-0.43	0.00	0.18
Limited Entry Trawl Groundfish	-0.30	-0.14	-0.48	-0.92	-1.31	-0.67	-0.43	0.00	-2.41
All Other Groundfish Gear	0.00	0.00	0.00	0.00	0.00	2.59	0.00	0.00	2.59
Tribal Groundfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Alternative 2									
Total West Coast (All Ocean Fisheries, 0-200 miles)	-0.16	0.19	-0.33	-0.30	-0.43	2.52	0.08	0.04	2.21
Non-Tribal Groundfish	-0.16	0.14	-0.33	-0.36	-0.43	2.52	0.08	0.04	2.21
Limited Entry Trawl Groundfish	-0.16	0.14	-0.33	-0.36	-0.43	-0.40	0.07	0.04	-0.72
All Other Groundfish Gear	0.00	0.00	0.00	0.00	0.00	2.93	0.00	0.00	2.93
Tribal Groundfish	0.00	0.06	0.00	0.06	0.00	0.00	0.00	0.00	0.00
Alternative 3									
Total West Coast (All Ocean Fisheries, 0-200 miles)	-0.08	0.47	-0.33	0.06	-0.11	2.61	0.18	0.06	2.74
Non-Tribal Groundfish	-0.09	0.31	-0.33	-0.11	-0.11	2.61	0.18	0.06	2.74
Limited Entry Trawl Groundfish	-0.09	0.31	-0.33	-0.11	-0.11	-0.31	0.18	0.06	-0.19
All Other Groundfish Gear	0.00	0.00	0.00	0.00	0.00	2.93	0.00	0.00	2.93
Tribal Groundfish	0.01	0.17	0.00	0.18	0.00	0.00	0.00	0.00	0.00
Council Preferred Alternative									
Total West Coast (All Ocean Fisheries, 0-200 miles)	0.15	0.56	-0.25	0.45	0.39	1.35	0.44	0.07	2.24
Non-Tribal Groundfish	0.13	0.39	-0.25	0.27	0.39	1.35	0.44	0.07	2.24
Limited Entry Trawl Groundfish	0.13	0.39	-0.25	0.27	0.39	-0.26	0.44	0.07	0.63
All Other Groundfish Gear	0.00	0.00	0.00	0.00	0.00	1.61	0.00	0.00	1.61
Tribal Groundfish	0.01	0.17	0.00	0.18	0.00	0.00	0.00	0.00	0.00

TABLE 8-25. Estimated No Action, and change from No Action (for other Alternatives) in annual income from commercial fishing activities by port area under the 2005-2006 groundfish management alternatives ($ million). (Income impacts derived from harvesting and shoreside processing in Council-managed ocean area fisheries.) (Page 2 of 2)

	CALIFORNIA										
Alternative/Fishery	Crescent City	Eureka	Fort Bragg	San Francisco	Monterey	Morro Bay	Santa Barbara	Los Angeles	San Diego	CA Total	WOC Total
No Action (projected 2004)											
Total West Coast (All Ocean Fisheries, 0-200 miles)	*11.54*	*30.02*	*18.84*	*36.16*	*36.94*	*5.99*	*43.95*	*64.10*	*9.66*	*257.20*	*648.82*
Non-Tribal Groundfish	*2.18*	*6.67*	*4.57*	*4.94*	*4.63*	*3.33*	*0.57*	*1.28*	*0.59*	*28.76*	*150.72*
Limited Entry Trawl Groundfish	*0.72*	*4.65*	*2.93*	*4.06*	*2.77*	*1.62*	*0.00*	*0.00*	*0.00*	*16.75*	*97.61*
All Other Groundfish Gear	*1.46*	*2.03*	*1.64*	*0.88*	*1.86*	*1.70*	*0.57*	*1.28*	*0.59*	*12.00*	*53.11*
Tribal Groundfish	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*6.32*
Alternative 1											
Total West Coast (All Ocean Fisheries, 0-200 miles)	0.00	-0.11	-0.14	-0.63	-0.31	-0.05	0.00	0.00	0.00	-1.25	-1.99
Non-Tribal Groundfish	0.00	-0.11	-0.14	-0.63	-0.31	-0.05	0.00	0.00	0.00	-1.25	-1.99
Limited Entry Trawl Groundfish	0.00	-0.11	-0.14	-0.63	-0.31	-0.05	0.00	0.00	0.00	-1.25	-4.58
All Other Groundfish Gear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.59
Tribal Groundfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Alternative 2											
Total West Coast (All Ocean Fisheries, 0-200 miles)	0.06	0.02	-0.07	-0.25	-0.15	-0.01	0.00	0.00	0.00	-0.40	1.51
Non-Tribal Groundfish	0.06	0.02	-0.07	-0.25	-0.15	-0.01	0.00	0.00	0.00	-0.40	1.45
Limited Entry Trawl Groundfish	0.06	0.02	-0.07	-0.25	-0.15	-0.01	0.00	0.00	0.00	-0.40	-1.48
All Other Groundfish Gear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.93
Tribal Groundfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06
Alternative 3											
Total West Coast (All Ocean Fisheries, 0-200 miles)	0.06	0.06	-0.04	-0.21	-0.13	0.00	0.00	0.00	0.00	-0.26	2.54
Non-Tribal Groundfish	0.06	0.06	-0.04	-0.21	-0.13	0.00	0.00	0.00	0.00	-0.26	2.36
Limited Entry Trawl Groundfish	0.06	0.06	-0.04	-0.21	-0.13	0.00	0.00	0.00	0.00	-0.26	-0.57
All Other Groundfish Gear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.93
Tribal Groundfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18
Council Preferred Alternative											
Total West Coast (All Ocean Fisheries, 0-200 miles)	0.05	0.07	0.16	-0.06	0.07	0.04	0.00	0.00	0.00	0.33	3.02
Non-Tribal Groundfish	0.05	0.07	0.16	-0.06	0.07	0.04	0.00	0.00	0.00	0.33	2.84
Limited Entry Trawl Groundfish	0.05	0.07	0.16	-0.06	0.07	0.04	0.00	0.00	0.00	0.33	1.23
All Other Groundfish Gear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.61
Tribal Groundfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18

TABLE 8-26. Projected annual personal income impacts related to trip expenditures in the 2005-2006 ocean recreational fishery. (Page 1 of 2)

Area	2005-06 Management Alternatives:	Angler Trips (thousands)[a/]			Personal Income Impacts Associated with the Ocean Recreational Fishery ($,000)[b/]				Change in Income ($,000)	Number of jobs	Change in Jobs
		Charter	Private	Total	Charter	Private	Total	Percent Change			
Washington Coast	2003	61	136	198	11,438	4,464	15,903			715	
	No Action	59	139	198	11,115	4,534	15,649			703	
	Alt 1	59	139	198	11,115	4,534	15,649	0%	0	703	0
	Alt 2	59	139	198	11,115	4,534	15,649	0%	0	703	0
	Alt 3	59	139	198	11,115	4,534	15,649	0%	0	703	0
	Council Pref.	59	139	198	11,115	4,534	15,649	0%	0	703	0
Oregon	2003	75	315	390	10,683	12,132	22,814			1,024	
	No Action	75	315	390	10,683	12,132	22,814			1,024	
	Alt 1	75	315	390	10,683	12,132	22,814	0%	0	1,024	0
	Alt 2	75	315	390	10,683	12,132	22,814	0%	0	1,024	0
	Alt 3	75	315	390	10,683	12,132	22,814	0%	0	1,024	0
	Council Pref.	75	315	390	10,683	12,132	22,814	0%	0	1,024	0
North/Central California	2003	148	1,485	1,633	19,523	58,292	77,815			3,089	
	No Action	175	1,199	1,374	23,085	47,065	70,150			2,785	
	Alt 1	175	1,199	1,374	23,085	47,065	70,150	0%	0	2,785	0
	Alt 2	175	1,199	1,374	23,085	47,065	70,150	0%	0	2,785	0
	Alt 3	175	1,199	1,374	23,085	47,065	70,150	0%	0	2,785	0
	Council Pref.	175	1,199	1,374	23,085	47,065	70,150	0%	0	2,785	0
Southern California	2003	574	1,632	2,206	62,150	59,298	121,447			4,213	
	No Action	578	1,769	2,347	62,583	64,276	126,858			4,400	
	Alt 1	578	1,769	2,347	62,583	64,276	126,858	0%	0	4,400	0
	Alt 2	578	1,769	2,347	62,583	64,276	126,858	0%	0	4,400	0
	Alt 3	578	1,769	2,347	62,583	64,276	126,858	0%	0	4,400	0
	Council Pref.	578	1,769	2,347	62,583	64,276	126,858	0%	0	4,400	0
California Total	2003	722	3,117	3,839	81,673	117,589	199,262			7,302	
	No Action	753	2,968	3,721	85,668	111,341	197,008			7,185	
	Alt 1	753	2,968	3,721	85,668	111,341	197,008	0%	0	7,185	0
	Alt 2	753	2,968	3,721	85,668	111,341	197,008	0%	0	7,185	0
	Alt 3	753	2,968	3,721	85,668	111,341	197,008	0%	0	7,185	0
	Council Pref.	753	2,968	3,721	85,668	111,341	197,008	0%	0	7,185	0

TABLE 8-26. Projected annual personal income impacts related to trip expenditures in the 2005-2006 ocean recreational fishery. (Page 2 of 2)

Area	2005-06 Management Alternatives:	Angler Trips (thousands)[a/] Charter	Private	Total	Personal Income Impacts Associated with the Ocean Recreational Fishery ($,000)[b/] Charter	Private	Total	Percent Change	Change in Income ($,000)	Number of jobs	Change in Jobs
W-O-C Total	2003	858	3,569	4,427	103,794	134,185	237,979			9,041	
	No Action	887	3,422	4,309	107,465	128,006	235,471			8,913	
	Alt 1	887	3,422	4,309	107,465	128,006	235,471	0%	0	8,913	0
	Alt 2	887	3,422	4,309	107,465	128,006	235,471	0%	0	8,913	0
	Alt 3	887	3,422	4,309	107,465	128,006	235,471	0%	0	8,913	0
	Council Pref.	887	3,422	4,309	107,465	128,006	235,471	0%	0	8,913	0

a/ Angler trip estimates are from Groundfish Management Team.

b/ Personal income impacts include wages and salaries paid to guides, charter oprators and suppliers, and the additional income generated when those wages and salaries are spent. Includes impacts of all recreational ocean fisheries based on PFMC Recreational FEAM (9/03).

TABLE 8-27. Estimated commercial fishery-related annual employment by port area under the 2005-2006 management alternatives. (Employment impacts derived from harvesting and shoreside processing in Council-managed ocean area commercial fisheries.) (Page 1 of 1)

			Alternative 1		Alternative 2		Alternative 3		Council Preferred	
Port Group Area	2003 Employ-ment	No Action (Projected 2004) Employment	Projected Employ-ment	Change from No Action	Projected Employ-ment	Change from No Action	Projected Employ-ment	Change from No Action	Projected Employ-ment	Change from No Action
Puget Sound	668	663	652	-1.6%	657	-0.8%	660	-0.4%	668	0.8%
North Washington Coast	705	715	710	-0.8%	724	1.1%	735	2.8%	739	3.3%
South and Central Washington Coast	5,768	6,110	6,088	-0.4%	6,095	-0.2%	6,095	-0.2%	6,099	-0.2%
Astoria-Tillamook	2,848	3,306	3,254	-1.6%	3,289	-0.5%	3,302	-0.1%	3,322	0.5%
Newport	1,597	3,156	3,237	2.6%	3,262	3.4%	3,266	3.5%	3,213	1.8%
Coos Bay	1,056	1,234	1,217	-1.4%	1,237	0.2%	1,241	0.6%	1,252	1.4%
Brookings	1,334	1,339	1,339	0.0%	1,341	0.1%	1,341	0.2%	1,342	0.2%
Crescent City	477	451	451	0.0%	453	0.5%	453	0.5%	453	0.5%
Eureka	1,135	1,170	1,165	-0.4%	1,171	0.1%	1,172	0.2%	1,172	0.2%
Fort Bragg	732	748	742	-0.8%	745	-0.4%	746	-0.2%	754	0.8%
San Francisco (incl. Bodega Bay)	1,032	1,078	1,059	-1.7%	1,070	-0.7%	1,072	-0.6%	1,076	-0.2%
Monterey	1,140	1,159	1,149	-0.8%	1,154	-0.4%	1,155	-0.4%	1,161	0.2%
Morro Bay	209	208	206	-0.9%	207	-0.2%	208	0.0%	209	0.7%
Santa Barbara	1,321	1,321	1,321	0.0%	1,321	0.0%	1,321	0.0%	1,321	0.0%
Los Angeles	1,608	1,608	1,608	0.0%	1,608	0.0%	1,608	0.0%	1,608	0.0%
San Diego	257	257	257	0.0%	257	0.0%	257	0.0%	257	0.0%
TOTAL	21,886	24,522	24,455	-0.3%	24,591	0.3%	24,632	0.4%	24,644	0.5%

* Includes total income and employment impacts: wages and salaries paid to primary producers, processors and suppliers, and the additional income and employment generated when these wages and salaries are spent (PFMC FEAM 9/03).

TABLE 8-28. Revised summary of net social benefit analysis for impacts under the 2005-2006 management alternatives. (Page 1 of 1)

Socioeconomic Effect **(Note: Higher number implies higher net benefits)**	Alternatives					
	No Action	*Alternative 1*	*Alternative 2*	*Alternative 3*	*Council Preferred Alternative 06-2004*	*Council Preferred Alternative 09-2004*
PRODUCER SURPLUS						
Seafood Harvesters						
Adjustment costs (rankings based on projected revenue in 2005: 1 = highest adjustment cost (lowest revenue), 6 = lowest adjustment cost (highest revenue))	2	1	3	4	6	5
Seafood Processors and Handlers						
Adjustment costs (rankings based on projected value of fish deliveries in 2005: 1 = highest adjustment cost (lowest revenue), 6 = lowest adjustment cost (highest revenue))	2	1	3	4	6	5
Recreational Charter Vessels						
Ability to supply higher quality experience (rankings based on California size and bag limits: 1 = lowest quality (lowest bag), 3 = highest qualility (largest bag))	2	1	3	3	3	3
CONSUMER SURPLUS						
Seafood Consumers						
Availability of fresh and frozen products, if applicable.	NA	NA	NA	NA	NA	
Recreational Fishers						
Availability of higher quality experience (rankings based on California size and bag limits: 1 = lowest quality (lowest bag), 3 = highest qualility (largest bag))	2	1	3	3	3	3
Nonconsumptive Users						
Value of wildlife viewing experience (rankings based on degree of protection for overfished species: 1 = lower value (smallest RCA), 6 =higher value (largest RCA))	4	5	3	2	1	6
Nonusers						
Option, existence and bequeathal values (rankings based on degree of protection for overfished species: 1 = lower value (smallest RCA), 6 =higher value (largest RCA))	4	5	3	2	1	6
PUBLIC EXPENDITURES (May affect either consumer or producer surpluses.)						
Enforcement costs (1 = relatively higher costs (larger RCA), 2 = relatively lower costs (smaller RCA))	2	1	2	2	2	1
Survey and monitoring costs (rankings based on additional costs for administering selective flatfish trawl: 1 = highest costs, 3 = lowest costs)	2	1	3	3	3	3

9.0 SUMMARY OF OTHER ENVIRONMENTAL MANAGEMENT ISSUES

Based on the environmental impacts disclosed in Chapters 3 through 8, this chapter summarizes a range of issues that an EIS must address. These issues are identified at 40 CFR 1502.16, describing the analysis of environmental consequences in an EIS. The last two sections in this chapter describe mitigation measures (as required by 40 CFR 1502.16(h)) and identify unavoidable adverse impacts (as required by 40 CFR 1502.16).

9.1 Short-Term Uses Versus Long-Term Productivity

Section 1.2.1 in Appendix A discusses short-term costs versus long-term risk in setting OYs. As noted there, this is possibly the most important tradeoff governing the management of renewable resources. Balancing short-term use and long-term productivity is the essence of the range of harvest specification (OY) alternatives. Short-term uses generally affect the present quality of life for the public, in contrast to long-term productivity, which affects the quality of life for future generations, based on environmental sustainability. The proposed action indirectly affects the sustainability of marine resources by constraining fishing mortality to levels that are sustainable. This represents a tradeoff between short-term benefits, reflected in revenue generated from fishing in 2005 and 2006, and long-term productivity of fish stocks, which determines the abundance of fish in the future, and thus future harvests. Managers must respond to changes in resource status, whether a result of harvests or other, environmental factors; this requires effective monitoring of total fishing mortality. A better understanding of the role of environmental and ecological factors play in affecting stock productivity would also enhance managers' ability to predict future stock response to current harvest levels.

Multi year management is based on the framework in the FMP, which dictates how harvest control rules should be set in order to produce sustainable harvests over the long term. While each species' harvest in any one year affects long-term productivity, these harvests are part of an ongoing activity, fishing over many years, which cumulatively affects productivity.

9.2 Irreversible Resource Commitments

An irreversible commitment represents some permanent loss of an environmental attribute or service. The use of non-renewable resources is irreversible; unsustainable renewable resource use may be irreversible if future production is permanently reduced or, at the extreme, is extinguished.

The use of non-renewable energy resources, such as fossil fuel, represents a pervasive irreversible commitment associated with the proposed action because fishing vessels are mechanically powered. The use of energy is discussed below in Section 9.4.

However the proposed action, implemented under the alternatives, does not by itself represent an irreversible commitment, because harvest levels under the Council-preferred OYs are specified for each year in the biennium, and management measures are projected to constrain total fishing mortality to these levels. Inseason monitoring combined with adjustments to the management measures will be used if catch projections indicate harvest levels may be exceeded during either of the two years in the biennial management period. Cumulatively, past, current, and future specifications could result in an irreversible commitment if a stock were to be extirpated or if population size is reduced to such a degree that even if harvesting stopped completely the stock would not recover. Theoretical work, for example, suggests that ecological factors can inhibit recovery of stocks that are reduced to very low biomass levels (MacCall 2002a; Walters and Kitchell 2001). Although several overfished stocks, such as cowcod, bocaccio, canary rockfish, and yelloweye rockfish, are at low biomasses relative to B_{MSY} (the biomass capable of supporting MSY), there can be considerable uncertainty about the likelihood of recovery. For example, the 2002 bocaccio stock assessment and rebuilding analysis (MacCall 2002b; MacCall and He 2002a), used as the basis for setting harvest specifications for 2003, concluded that the stock was unlikely to recover within the rebuilding framework time period (T_{MAX}) even if fishing mortality was reduced to zero. The 2003 stock assessment and rebuilding analysis (MacCall 2003b; MacCall and He 2002b) painted a quite different picture. Detection of a strong 1999 year class in more recent data sets, along with other factors, resulted in a substantial increase in the 2004 OY in comparison to 2003 (from under 20 mt in 2003 to 250 mt in 2004 under the Council OY Alternative) for the rebuilding target previously chosen by the Council and based on a rebuilding probability (P_{MAX}) of 70%. Given this variability in assessment results, there is not enough information to determine a definite threshold below which population decline is irreversible.

9.3 Irretrievable Resource Commitments

A resource is irretrievably committed if its use is lost for time, but is not actually or practically lost permanently. The analysis of direct, indirect and cumulative impacts in Chapters 3 through 8 generally describe irretrievable resource commitments, and in the case of renewable resources, these parallel the tradeoff between short-term use and long-term productivity. Alternatives that constrain fish harvests to a level related to the harvest specifications are predicted to allow future sustainable harvests. The fish that are harvested represent an irretrievable resource commitment, as do the inputs in terms of capital and labor (including energy and resources) needed to harvest and market these fish. In addition, the difference between the current sustainable yield for a stock and the long-term MSY (recognizing this may be only a theoretical optimum) would represent an irretrievable resource commitment.

9.4 Energy Requirements and Conservation Potential of the Alternatives

The proposed action indirectly affects energy use primarily in the form of fossil fuels used to power surveillance craft and fishing vessels. Energy used in at-sea and aerial monitoring and enforcement activities is a direct effect. Change in the level of this type of monitoring is hard to predict because it depends on the types of management measures that will be implemented biennially and inseason. Generally, the RCA, which was first implemented in late 2002, would require more surveillance to be effective. However, the VMS requirement implemented at the beginning of 2004 will compensate for the increased surveillance need because vessel positions can be remotely monitored. Finally, the availability of ships and aircraft to conduct surveillance, which is partly contingent on U.S. Coast Guard mission priorities, will also dictate the level and the number of patrols, affecting energy use. For these reasons, it is difficult to predict how energy use would change from baseline conditions. The proposed action affects fishing activity, and thus, the consumption of fuel by fishing vessels. Fuel consumption is likely to correlate with projected harvest levels, which are a consequence of the different types of management measures in the alternatives. For example, projected harvest levels under Alternative 1 are lower than under the other alternatives, which could reduce vessel fuel consumption if vessels spent less time fishing. However, there are a variety of other factors that could affect overall energy use and efficient utilization. Changes in fuel prices, for example, could affect the level of fishing vessel operations independent of the constraining effect of management measures under the alternatives.

9.5 Urban Quality, Historic Resources, and the Design of the Built Environment

The direct and indirect impacts on the urban quality, historic resources, and the built environment will be minimal. Cumulative impacts could be greater. Fishing income has already fallen in many coastal communities, both because of declines in groundfish landings and in other fisheries such as salmon.

Cumulative loss of income could lead to a fall in private investment that could curtail maintenance of buildings and other private infrastructure. Public investment, which includes shoreside amenities and marine-related infrastructure such as docks, boat basins, jetties, and navigable channels, is sensitive to changes in tax revenue. By itself, changes in fishing-related revenue may not have an overwhelming impact on local tax revenues, but external factors such as changes in the broader economy could act cumulatively. It is also possible that as private investment shrinks so that, for example, there are fewer fishing vessels using shoreside infrastructure, there will be less political motivation to devote public resources to these uses. In large urban centers, such as Seattle, San Francisco, and the Los Angeles area, the relative impact would be slight and probably not result in changes in urban quality substantially different from the baseline. For small communities, and especially those likely to be more hard hit by declining revenues, the effect on urban quality could be noticeable, especially over the long term (again, depending on external economic factors). These changes could also affect cultural and historic resources as fishing and fishing-dependent activities are supplanted or simply disappear, changing the character of a coastal community. Since the effects described above are speculative, it is not possible to compare the effects of the alternatives beyond projected changes in revenue. No direct impacts of the proposed action on cultural historic resources protected under the National Historical Preservation Act are expected. Because indirect or cumulative impacts are too speculative, these impacts cannot be predicted.

9.6 Possible Conflicts Between the Proposed Action and Other Plans and Policies For the Affected Area

Overfished groundfish species are caught incidentally in fisheries managed under other Council FMPs (salmon, CPS, and HMS). More restrictive measures, such as those that would be required to meet the harvest limits under Alternative 1, are likely to affect these fisheries and thus conflict with some of the objectives of these FMPs. (FMPs try to strike a balance between conservation and utilization, so they include objectives related to resource use.)

9.7 Significant and Unavoidable Adverse Impacts

The EIS must include a discussion of those adverse effects that cannot be avoided (40 CFR 1502.16). This discussion focuses on potentially significant adverse impacts of the proposed action, as implemented by the different alternatives. Council on Environmental Quality (CEQ) regulations at 40 CFR 1508.27 define “significantly” in terms of both context and intensity, and provide ten factors to consider when evaluating the intensity of an impact. National Oceanic and Atmospheric Administration (NOAA) provides agency guidance in determining significant impacts of fishery management actions in NOAA administrative order (NAO) 216-6 at §6.02, which expands on the CEQ definition. These criteria focus on the components of the human environment most likely to be affected by these types of actions. Based on the guidance in these two sources, the proposed action could result in the following *potentially* significant impacts.

The proposed action could *potentially* jeopardize the sustainability of any target or non-target species that may be affected by the action (NAO 216-6 §6.02a & b). The proposed action has two components: establishing harvest specifications (the Council-preferred OY Alternative) and implementing management measures to constrain total fishing mortality to this specification (the Council-preferred Alternative for management measures). The harvest specification alternatives represent different levels of precaution in relation to scientific uncertainty associated with scientific assessments of stock status. The harvest specification represents a total fishing mortality limit, which according to the best available science, maintains stocks at or rebuilds them to a biomass capable of supporting MSY. Although unlikely, scientific error could result in overfishing if the Council-preferred OY Alternative actually results in a fishing mortality rate above the MFMT. However, overfishing in these two years alone would not necessarily jeopardize the sustainability of a stock. Although overfishing would reduce stock size below B_{MSY}, or further delay recovery to that level, receipt of new scientific information and analysis, along with remedial management, could still allow stock rebuilding. Therefore, truly jeopardizing the sustainability of a stock is more likely to result from the cumulative effect (NAO 216-6 §6.02f, 40 CFR 1508.27(b)(7)) of overfishing over a longer period than the 2005-2006 management cycle. Past overfishing has resulted in the overfished status for eight groundfish stocks, jeopardizing sustainability. Recurrent overfishing would further jeopardize stocks.

The Council-preferred Alternative also establishes management measures intended to constrain total fishing mortality at or below the OYs established under the Council-preferred OY Alternative. Even if the OY alternative represents the correct specification, if the management measures do not effectively constrain fishing mortality within these limits, this would constitute overfishing. As already discussed, overfishing could cumulative jeopardize the continued sustainability of stocks.

The proposed action may potentially impact biodiversity and ecosystem function within the affected area (NAO 216-6 §6.02g). This would result from the cumulative effect of overfishing and fishing-related impacts to physical and biogenic habitat, including EFH. Past overfishing, resulting in stock sizes far below their unfished biomass level, makes prey less available for those organisms that feed on overfished species. Changes in relative abundance could affect overall ecosystem structure, although these effects are not well-understood. Fishing activity can damage or alter benthic habitat, which may be important to management unit species and other marine species. However, the proposed action is intended to allow stock rebuilding and keeps fishing well below historic levels. Harvest specifications for future management cycles are likely to continue this policy and have a cumulatively beneficial effect.

By itself, the proposed action does not have significant social or economic impacts interrelated with the potential significant natural or physical environmental effects discussed above (NAO 216-6 §6.02h), in that exvessel revenue and personal income are not projected to change substantially in 2005 and 2006 from levels estimated for the recent past and present (2003 and 2004). Cumulative socioeconomic impacts have been significant, however. Non-whiting groundfish landings averaged 63,345 mt over 1994 through 1997 while they averaged 36,397 mt from 1998 through 2002, a 43% drop (see Table 6-1a in Appendix A).

CEQ regulations also state that “the degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about future consideration” (40 CFR 1508.27(b)(6)) should be part of the significance evaluation. With implementation of Amendment 17, the proposed action is the first biennial (two-year) management cycle. This does not fundamentally change the way harvest specifications are set (their scientific basis, for example) or the types of management measures that will be used. However, there may be unforeseen effects of this procedural change. For example, adjustments to management measures will occur through inseason actions over two years rather than the thorough re-visiting that has occurred annually in the past.

9.8 Mitigation

An EIS must discuss “means to mitigate the adverse environmental impacts” stemming from the proposed action (40 CFR 1502.16(h)), even if the adverse impacts are not by themselves significant. Alternatives are mitigative to the degree that management measures constrain fishing mortality to levels below the harvest specifications. Further mitigation measures could address the adverse impacts that would still occur with implementation of any of the action alternatives. Potential mitigation measures are discussed with respect to the components of the human environment potentially affected by the proposed action.

<u>Habitat and ecosystem</u>: Although adverse impacts to overfished species’ habitats may be caused by a range of natural events and human activities, mitigation measures within the scope of NMFS authority would

address fishing-related impacts. The RCA currently used to reduce overfished species bycatch also reduces related adverse impacts to benthic habitat within its boundaries, because bottom trawling is prohibited in these areas. In a separate action, NMFS is preparing an EIS to identify and describe groundfish EFH, and identify habitat areas of particular concern within EFH. The alternatives in this EIS will include measures to minimize adverse effects on EFH caused by fishing.

Reduction in total fishing mortality below the OY: Management measures implemented through the biennial process could provide additional mitigation if total fishing mortality—especially for overfished species bycatch—is less than the OYs established by the Council-preferred OY Alternative. In some cases, this is simply a function of the constraints imposed by the overfished species with the lowest OY. Management measures needed to stay within this OY limit keeps harvests of all co-occurring stocks—including other overfished species—to levels below their OYs. This is not intended mitigation but does have a mitigative effect.

Bycatch reduction: Management measures intended to further reduce bycatch rates below current rates would be explicitly mitigative. Although not part of the proposed action, this EIS (Section 4.3.2.1) describes measures to reduce widow rockfish bycatch in the Pacific whiting fishery. First, closed areas—similar in intent to the current RCAs—could be established to prevent the whiting fleet from fishing in areas where widow rockfish bycatch rates are known to be high. Second, the "penalty box" concept, which has been used by the shoreside whiting fleet to reduce bycatch, could be applied more widely. Under this scheme a vessel has to stay out of the fishery for a predetermined number of days if a specified bycatch rate is exceeded. This acts as an incentive for the vessel operator to avoid fishing strategies which may result in high bycatch rates. Chapter 7 describes other measures, which although not part of the proposed action could be subsequently implemented to reduce bycatch rates. Section 7.4.1 in this EIS describes a variety of area management measures, or "hotspots," that could be implemented to reduce bycatch rates for overfished species. These include refinement of existing RCAs, recreational fishery closures to reduce canary and yelloweye rockfish bycatch, and the aforementioned closures in the Pacific whiting fishery. Section 7.3.1 in this EIS discusses the implementation of full retention and/or bycatch caps. Section 7.4.2.2 in this EIS describes a discard reduction strategy for the Oregon DTS fishery currently implemented under an EFP. This program could be converted into regulations as means to further reduce bycatch in this fishery. Section 7.4.2.3 describes an Arrowtooth Flounder–Rockfish Conservation Area trawl fishing program (also see Appendix B), which would allow trawling in the RCA while closing areas with high bycatch of overfished species while requiring 100% observer coverage and bycatch caps. In another separate action, NMFS prepared a PEIS evaluating bycatch reduction measures. The Council recommended their preferred alternative at their April 2004 meeting. The Council-preferred alternative for the bycatch EIS combines elements of the other alternatives in that DEIS, including future consideration of bycatch caps and individual fishing quotas.

Introducing more selective gear: Gear modifications can also reduce bycatch rates. The selective flatfish trawl gear (using a cutback headrope), which has been tested under an EFP, and will be required for fishing shoreward of the RCA north of 40º10' N latitude as part of the preferred alternative, is one such example. Section 7.4.2 in this EIS describes requiring this gear south of 40º10' N latitude shoreward of the RCA as future actions to reduce bycatch rates. This type of bycatch-reducing gear could be more widely tested through the EFP program authorized under the Groundfish FMP.

Socioeconomic sectors: Adverse socioeconomic impacts are attributable to reductions in commercial harvests and recreational fishing opportunities necessary to rebuild stocks. Evaluating these impacts is made difficult because of the tradeoff between short- and long-term costs and benefits. Imposing short-term costs in the form of harvest reductions should result in a long-term net benefit in the form of future MSY harvests. (Note that the MSY concept encompasses both maximum *and* sustainable harvests, so that once rebuilt, these stocks could support an ongoing stream of higher harvests.) One general form of mitigation is to compensate fishermen directly through subsidies or the provision services, such as job retraining programs for displaced workers. The forms of mitigation discussed above for impacts to groundfish stocks are also a form of socioeconomic mitigation if target species harvests can be sustained or increased while reducing overfished species bycatch.

9.9 Environmentally Preferred Alternative and Rationale for Preferred Alternative

NEPA regulations, at 40 CFR 1505.2(b), state that the ROD will identify an alternative or alternatives considered "environmentally preferable." In order to inform the public and facilitate preparation of the ROD, the rationale for identifying the Low OY Alternative and management measure Alternative 1 as the environmentally preferable alternatives is summarized here. Guidance, in the form of *Forty Most Asked Questions Concerning CEQ's NEPA Regulations*, states that the environmentally preferable alternative is "the alternative that will promote the national environmental policy as expressed in NEPA's Section 101. Ordinarily, this means the alternative that causes the least damage to the biological and physical environment; it also means the alternative which best protects, preserves, and enhances historic, cultural, and natural resources" (Question 6.A). Among the harvest level alternatives the Low OY Alternative is environmentally preferable. It would result in fewer groundfish species being harvested, which would also reduce associated impacts to EFH, the ecosystem, and protected species. Among the management measure alternatives, Action Alternative 1 is the environmentally preferred alternative. Total fishing mortality on all groundfish species is lowest under this alternative along with bycatch of overfished species, although the No Action Alternative is projected to result in lower fishing mortality for some species. Tables 2-5 through 2-9 show estimates of total fishing mortality for overfished groundfish species. As a percentage of their OYs, Alternative 1 is projected to have the lowest mortality for all overfished species except for darkblotched rockfish and POP. For these two species, fishing mortality is lowest under No Action. Total target species mortality projections are only available for the trawl sector (Tables 2-12 through 2-16). Except for thornyheads and slope rockfish, Alternative 1 has the lowest total mortality for target species; for thornyheads and slope rockfish, No Action values are slightly lower. Overall, however, Alternative 1 has the lowest catch of the main target species (see Table 3-2). It also would implement the largest RCA. (Table 3-1 shows the size of the trawl RCA under different alternatives.) To the degree that fishing prohibitions in the RCA reduce habitat impacts, Alternative 1 would be the most beneficial.

For the harvest level alternatives, the Council OY Alternative is consistent with adopted rebuilding plans and establishes OYs that are generally intermediate in the range of likely values suggested by uncertainties about stock status (and reflected in stock assessments for assessed stocks). Although the Low OY Alternative is environmentally preferable, it would likely require severely curtailing or closing many West Coast fisheries. Although within the range of harvest levels that would not cause overfishing, the High OY Alternative is insufficiently precautionary, given uncertainties about stock status.

For the management measure alternatives, the Council-preferred Alternative allows higher catches of target species than is projected to occur under the other alternatives while preventing overfishing. Total catch of overfished species, while higher than the other alternatives (except for canary and widow rockfish), is still below the respective OYs. Except for canary, widow, and yelloweye rockfish, projected fishing mortality is less than half of the overfished species OYs. Target species catch is projected to be 25% above the catch occurring under Alternative 1; most of this increase occurs shoreward of the RCA (see Table 3-2). This is partly a result of the modeling approach used to develop the alternatives. Management measures for Alternatives 1 through 3 were developed by applying bycatch rates observed in the selective flatfish trawl EFP fishery for the summer months (May through October) and rates observed in the WCGOP for the remainder of the year. For the preferred alternative, the rates from the selective flatfish trawl EFP were used during the summer months; but for the remainder of the year, selective fish trawl rates, seasonally adjusted using trend information from the WCGOP, were used. Because observed bycatch rates are lower when using selective flatfish trawl gear, more liberal cumulative trip limits and RCA boundaries could be applied for the Council-preferred Alternative, while still projecting catch mortalities below the OYs. If this modeling approach had been available when developing the preliminary range of alternatives (Alternatives 1 through 3), more liberal management measures could have been proposed, resulting in higher target species catch for any given level of overfished species bycatch.

Pacific whiting OYs for 2005 and 2006 will be decided in separate, connected actions in March 2005 and March 2006, based on new stock assessments conducted annually. In addition, bycatch information for the previous year's fishery will be available, allowing more accurate projections. Other factors being equal, projected bycatch is a function of the Pacific whiting harvest, as determined by the OY. For the purposes of this EIS, overfished species bycatch has been predicted for different whiting OY levels. For the preferred alternative "placeholder" values for the two constraining overfished species, canary and widow rockfish, have been inserted. In prosecuting the fishery in 2005 and 2006 these values will serve as sector-wide bycatch caps. Updated bycatch rates, based on information from the 2004 and 2005 whiting fisheries, will figure into the decision on whiting OYs by determining bycatch projections. This EIS also describes mechanisms that may be implemented to reduce bycatch rates in the whiting fishery (summarized above under mitigation) or to close the fishery if the de facto canary and widow rockfish caps are threatened to be exceeded.

The Council-preferred Alternative is intended to maximize fishing opportunities, exvessel revenue and personal income, while assuming a minimal or modest risk of overfishing.

10.0 CONSISTENCY WITH THE GROUNDFISH FMP AND MSA NATIONAL STANDARDS

10.1 FMP Goals and Objectives

The Groundfish FMP goals and objectives are listed below. The way in which the harvest specifications and management measures for 2005 and 2006 addresses each objective is briefly described in italics below the relevant statement.

Management Goals.

Goal 1 - Conservation. Prevent overfishing and rebuild overfished stocks by managing for appropriate harvest levels, and prevent, to the extent practicable, any net loss of the habitat of living marine resources.

Goal 2 - Economics. Maximize the value of the groundfish resource as a whole.

Goal 3 - Utilization. Achieve the maximum biological yield of the overall groundfish fishery, promote year-round availability of quality seafood to the consumer, and promote recreational fishing opportunities.

Objectives. To accomplish these management goals, a number of objectives will be considered and followed as closely as practicable:

Conservation.

Objective 1. Maintain an information flow on the status of the fishery and the fishery resource which allows for informed management decisions as the fishery occurs.

The Council-preferred Alternative employs the same data sources that have been used in past years to monitor groundfish fisheries. In addition, data from the first two years of the WCGOP (August 2001 to August 2003) was available to develop management measures for the 2005-2006 management cycle. It can be used to project bycatch resulting from different management measures and more accurately predict total fishing mortality. A VMS was implemented at the beginning of 2004, providing real-time location information for participating vessels. Additionally, staff from CDFG and the PSMFC designed a new program for sampling California's recreational fisheries, incorporating both the comprehensive coverage of the MRFSS program and the high quality sampling of the CDFG's Ocean Salmon Project. This new program, CRFS, started in 2004 and is designed to increase the timeliness and accuracy of recreational fisheries data so they can be more effectively used for inseason monitoring, estimating take for species of concern, developing harvest guidelines, and producing stock assessments. These information sources would also apply to all of the other alternatives evaluated in this EIS.

Objective 2. Adopt harvest specifications and management measures consistent with resource stewardship responsibilities for each groundfish species or species group.

The Council-preferred Alternative adopts harvest specifications that support rebuilding of overfished and precautionary stocks and sustainable harvest of healthy stocks. The other harvest specification action alternatives fall within the management framework, but represent different tradeoffs between overfishing *risk and potential socioeconomic impacts. Management measure alternatives are intended to constrain total fishing mortality at or below the OY for each stock as identified in the Council-preferred Alternative.*

> Objective 3. For species or species groups which are below the level necessary to produce MSY, consider rebuilding the stock to the MSY level and, if necessary, develop a plan to rebuild the stock.

All of the action alternatives, including the Council-preferred Alternative, set risk averse harvest levels for overfished species (in that the probability of rebuilding within the specified time frame is greater than 50%).

> Objective 4. Where conservation problems have been identified for nongroundfish species, and the best scientific information shows the groundfish fishery has a direct impact on the ability of that species to maintain its long-term reproductive health, the Council may consider establishing management measures to control the impacts of groundfish fishing on those species. Management measures may be imposed on the groundfish fishery to reduce fishing mortality of a nongroundfish species for documented conservation reasons. The action will be designed to minimize disruption of the groundfish fishery, in so far as consistent with the goal to minimize the bycatch of nongroundfish species, and will not preclude achievement of a quota, harvest guideline, or allocation of groundfish, if any, unless such action is required by other applicable law.

None of the alternatives include new measures intended to control the impacts of groundfish fishing on nongroundfish stocks.

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

The use of GCAs under all alternatives will reduce EFH impacts by eliminating most fishing-related impacts in those areas. However, redistribution of effort into open areas could intensify fishing effort in some areas; resulting habitat impacts cannot be predicted at this time. In addition to the GCAs, bottom trawlers are required to use small footropes shoreward of GCAs , lessening impacts to continental shelf and nearshore rocky habitat, a preferred habitat for some overfished groundfish species.

Economics.

> Objective 6. Attempt to achieve the greatest possible net economic benefit to the nation from the managed fisheries.

Calculating net costs and benefits in 2005 and 2006 (including the imputed value of non-market costs and benefits) and the present value of all future net benefits under each alternative would be the best way to compare net benefits. Although the analysis estimates changes in income associated with the alternatives, there is no directly comparable measure of the conservation benefits of the alternatives (such as net present value of future harvests), so it is not possible to determine which alternative achieves the greatest possible net economic benefit. Furthermore, the best economic use of resources in the future cannot be predicted. However, the action alternatives fall within the management framework intended to achieve maximum sustained yield over the long term. This gives greater latitude for future decision making to achieve maximum economic net benefit.

> Objective 7. Identify those sectors of the groundfish fishery for which it is beneficial to promote year-round marketing opportunities and establish management policies that extend those sectors' fishing and marketing opportunities as long as practicable during the fishing year.

All of the alternatives have management measures intended to allow commercial fisheries year-round, bearing in mind that individual fisheries, such as the directed fixed gear sablefish fishery, are seasonally constrained. Given low harvest specifications for some overfished species, however, actual harvests may result in early attainment of a particular specification, necessitating the closure of particular fisheries. Recreational fishery alternatives also attempt to provide year-round fisheries but, seasonal closures and/or depth restrictions are often used to maximize opportunity while minimizing impacts to overfished species.

> <u>Objective 8</u>. Gear restrictions to minimize the necessity for other management measures will be used whenever practicable.

All the action alternatives would require the use of selective flatfish trawl gear shoreward of the RCA north of 40º10' N latitude and small footrope trawl gear south of 40º10' N latitude. Selective flatfish trawl gear reduces the catch rate of certain overfished species. A portion of the OY for certain species is allocated to vessels fishing under EFPs. Some of these EFPs are being used as a means to test new gear configurations that reduce bycatch of overfished species. Additionally, gear restrictions, such as midwater trawl requirements in the Pacific whiting fisheries and hook size requirements in California recreational fisheries allow limited access to closed areas (RCAs).

Utilization.

> <u>Objective 9</u>. Develop management measures and policies that foster and encourage full utilization (harvesting and processing) of the Pacific Coast groundfish resources by domestic fisheries.

There has been no foreign fishing on the West Coast for more than a decade, so all of the alternatives meet this objective.

> <u>Objective 10</u>. Recognizing the multispecies nature of the fishery and establish a concept of managing by species and gear or by groups of interrelated species.

As in past years, management measures in all of the alternatives use species groups related to particular fisheries or gear to structure trip limits.

> <u>Objective 11</u>. Strive to reduce the economic incentives and regulatory measures that lead to wastage of fish. Also, develop management measures that minimize bycatch to the extent practicable and, to the extent that bycatch cannot be avoided, minimize the mortality of such bycatch. In addition, promote and support monitoring programs to improve estimates of total fishing-related mortality and bycatch, as well as those to improve other information necessary to determine the extent to which it is practicable to reduce bycatch and bycatch mortality.

GCAs are meant to reduce bycatch of overfished species by prohibiting fishing that generates significant bycatch in areas where these species are most abundant. (GCAs are included in all the alternatives.) In addition, trip limits under all the alternatives are set through model projections that include estimated bycatch, based on data derived from the WCGOP. This provides the best estimates of total fishing-related mortality and bycatch currently available.

> <u>Objective 12</u>. Provide for foreign participation in the fishery, consistent with the other goals to take that portion of the OY not utilized by domestic fisheries while minimizing conflict with domestic fisheries.

This objective is no longer relevant, since all stocks are fully utilized by domestic fishers.

Social Factors.

> <u>Objective 13</u>. When conservation actions are necessary to protect a stock or stock assemblage, attempt to develop management measures that will affect users equitably.

The Council process facilitates input from resource user groups, state and federal agencies, and the general public. This promotes the formulation of equitable management measures.

> <u>Objective 14.</u> Minimize gear conflicts among resource users.

Although redistribution of fishing effort because of GCA closures could increase crowding in nearshore areas, this has not emerged as an issue voiced during scoping for this EIS or through other public comment opportunities during Council meetings.

> <u>Objective 15</u>. When considering alternative management measures to resolve an issue, choose the measure that best accomplishes the change with the least disruption of current domestic fishing practices, marketing procedures, and the environment.

Management measures proposed for 2005 and 2006 do not differ substantially in kind from those used in 2004. GCAs have been in use since 2002, and this base of experience has allowed managers to propose configurations that vary less over the course of the year, simplifying their application. One new management aspect for 2005 and 2006 is the management of bycatch in the Pacific whiting fishery. In response to the elevated catches of canary rockfish in the 2004 fishery, the Council requested that NMFS develop an emergency rule that allows an individual sector of the primary whiting fishery to be closed if impacts to overfished species meet or exceed expectations. Therefore, NMFS intends to publish an emergency rule that establishes routine management measure authority, under the Groundfish FMP, to close the Pacific whiting primary season fisheries by sector before the sector's whiting allocation is reached, to minimize impacts on overfished species. The intended effect of the emergency action is to provide for a fast response time if there is concern that the incidental catch of an overfished species is likely to result in the OY for that species being exceeded.

> <u>Objective 16</u>. Avoid unnecessary adverse impacts on small entities.

Section 11.3.2 evaluates the impact of the proposed action on small entities, as required by the Regulatory Flexibility Act, based on information and analyses in the EIS. The proposed action, as implemented by the Council-preferred harvest level and management measure alternatives, is not predicted to result in adverse impacts to small entities. In comparison to 2004, a modest increase in exvessel revenue is predicted. The analysis predicts there will be no change in recreational fishing income impacts from 2004 levels.

> <u>Objective 17</u>. Consider the importance of groundfish resources to fishing communities, provide for the sustained participation of fishing communities, and minimize adverse economic impacts on fishing communities to the extent practicable.

The impacts of all the alternatives on communities are evaluated in Sections 8.3.6, 8.4.6, and 8.5.6. The Council-preferred OY Alternative allows continued fishing opportunity while meeting stock conservation requirements. In comparison to the other action alternatives, management measures under the Council-preferred Alternative are predicted to result in the largest increase in community income from 2004 levels.

Objective 18. Promote the safety of human life at sea.

GCAs could affect safety if more vessels elect to fish seaward of the closed areas and are more exposed to bad weather conditions. If smaller vessels traditionally fishing in the areas now part of GCAs, or shoreward elect to fish seaward of the GCAs weather-related safety issues could arise. Use of selective flatfish trawl gear north of 40°10' N latitude has not only provided increased trip limits for target species, but has also decreased the size of the trawl RCAs. This provides increased opportunity shoreward of the RCA and decreased incentive for smaller vessels to fish seaward of the RCA. Implementation of a vessel monitoring system capable of sending distress calls could mitigate this safety issue.

10.2 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, including the Council-preferred Alternative, all include OY values that reflect harvest rates below the overfishing threshold and include precautionary reductions to rebuild overfished stocks and other stocks that, while not overfished, are at a biomass below the level necessary to produce MSY. The No Action Alternative is not based on the best available science for all stocks and, in some cases, would specify harvest limits that are not sufficiently precautionary.

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

OY values in the harvest specification action alternatives, including the Council-preferred Alternative, are based on the most recent stock assessments, developed through the peer-review STAR process. This represents the best available science. The No Action Alternative OY values are based on stock assessments conducted prior to 2004, the year to which the No Action Alternative management measures apply. Given that more recent stock assessments are available, the No Action Alternative does not use the best available science.

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.

Some groundfish stocks are managed as individual units with specific trip limits. However, given the multi-species nature of many groundfish fisheries, other stocks are grouped in stock complexes and managed accordingly. This generally applies to non-target species for which no individual stock assessments have been performed. Until recently, landings of many species in groundfish fisheries were not recorded individually. Nongroundfish fisheries also may not report incidental groundfish catches at the species level. This limits the amount of time-series data available for individual species stock assessments. However, whenever possible individual stocks are assessed. For example, black rockfish, previously part of the rockfish complex, was first assessed in 2003. This allowed a species-specific OY to be established and used in management decision making for 2004. Stocks 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.

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.

Management measures are developed 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. Decisions about catch allocation between different sectors or gear groups are also part of this participatory process, and emphasis is placed on equitable division while ensuring conservation goals. None of the management measures in the alternatives would allocate specific shares or privileges to one individual or corporation.

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.

Management measures in the groundfish fishery are not designed specifically for the purpose of efficient utilization. However, lower OY levels and other restrictions are likely to result in further fleet capacity reduction as fishing becomes economically unviable for more vessels. There is broad consensus that capacity reduction in some sectors is needed to rationalize fisheries. In response, the Council and NMFS implemented a fixed gear permit stacking program through Amendment 14 to the FMP. NMFS has also completed a trawl vessel buyback program to reduce the size of the limited entry fleet. Additionally, the Council has begun to explore the potential for individual quotas, in part, as a means of providing regulatory flexibility and economically viable fishing communities.

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. Because of the low harvest specifications for overfished species, management measures are proposed for nongroundfish fisheries to minimize bycatch of these species. Each alternative was evaluated in terms of the probable bycatch of overfished species, based on the proposed management measures. (See Chapter 2 and Chapter 4.) This allows comparison between the proposed OY and a judgement of whether management measures will constrain fisheries sufficiently.

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

The alternatives do not explicitly address this standard. Generally, by coordinating management, monitoring, and enforcement activities between the three West Coast states duplication, and thus cost, is minimized. Necessary monitoring and enforcement programs, such as the use of fishery observers and implementation of VMS, increase management costs. But these efforts are necessary to effective management.

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 Sections 8.3.6, 8.4.6, and 8.5.6), and these effects were taken into account in choosing the preferred harvest specification and management measure alternatives. The preferred alternatives represent the Council's judgement of the best tradeoff between the need to conserve and rebuild fish stocks and the economic impacts of the necessary management measures. Generally, this tradeoff is resolved by structuring management measures to allow communities to access healthy, harvestable stocks while minimizing catch of overfished stocks.

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 all species and overfished species in particular, is an important component of the alternatives. GCAs are meant to keep fishing away from areas where overfished species are most abundant, and therefore reduce bycatch. Trip limits are structured to discourage directed and incidental catch of these species, but where bycatch is unavoidable, to allow some minimal retention. Integration of observer data into the management process allows more accurate estimates of bycatch rates, and thus total catch estimates. Selective flatfish trawl gear has demonstrated reduce bycatch rates for several overfished rockfish species and is required north of 40°10' N latitude shoreward of the RCA.

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. Use of selective flatfish trawl gear north of 40°10' N latitude has not only provided increased trip limits for target species, but has also decreased the size of the trawl RCAs thereby providing additional opportunity shoreward of the RCA and decreased incentive for smaller vessels to fish seaward of the RCA. 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.

10.3 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 NSGs (50 CFR 600.310).

Chapter 3 in this EIS constitutes an EFH assessment of the proposed action's impacts, as required by 50 CFR 600.920 (e)(3). NMFS is currently preparing an EIS evaluating programmatic measures designed to identify and describe West Coast groundfish EFH, and minimize potential fishing impacts on West Coast groundfish EFH. According to the current schedule, NMFS will publish a draft EIS for this action in February 2005. Publication of the final EIS for this action is scheduled for December 2005, with implementation of any measures pursuant to the EIS occurring in 2006.

11.0 CROSS-CUTTING MANDATES

11.1 Other Federal Laws

11.1.1 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. The *Council-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 2005-2006 are not expected to affect any state's coastal management program.

11.1.2 Endangered Species Act

NMFS issued BOs under the 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 groundfish fishery 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). During the 2000 Pacific whiting season, the whiting fisheries exceeded the chinook bycatch amount specified in the Pacific whiting fishery BO (December 15, 1999) incidental take statement estimate of 11,000 fish, by approximately 500 fish. In the 2001 whiting season, however, the whiting fishery's chinook bycatch was about 7,000 fish, which approximates the long-term average. After reviewing data from, and management of, the 2000 and 2001 whiting fisheries (including industry bycatch minimization measures), the status of the affected listed chinook, environmental baseline information, and the incidental take statement from the 1999 whiting BO, NMFS determined in a letter dated April 25, 2002 that a re-initiation of the 1999 whiting BO was not required. NMFS has concluded that implementation of the FMP for the Pacific Coast groundfish fishery is 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. The proposed action is within the scope of these consultations.

11.1.3 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 West Coast groundfish fisheries are considered a Category III fishery, indicating a remote likelihood of or no known serious injuries or mortalities to marine mammals, in the annual list of fisheries published in the *Federal Register*. Based on its Category III status, the incidental take of marine mammals in the West Coast groundfish fisheries does not significantly impact marine mammal stocks. 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.

11.1.4 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.

11.1.5 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.

11.1.6 Regulatory Flexibility Act

The purpose of the 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 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 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 RIR and NEPA analyses.

Section 11.3 (below) summarizes the analytical conclusions specific to the RFA and EO 12866.

11.2 Executive Orders

11.2.1 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 11.3 of this document.

11.2.2 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 §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 8.5 in Appendix A describes a methodology, using 2000 U.S. Census data, to identify potential "communities of concern" because their populations have a lower income or a higher proportion of minorities than comparable communities in their region. Based on this information, but focusing on more isolated, rural coastal communities, Section 8.5.7 of this document identifies 18 communities of concern in Washington, Oregon, and California and discusses the potential effects of the proposed action 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 accessability. 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.

11.2.3 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.

11.2.4 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. At Section 302(b)(5), the Magnuson-Stevens Act 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% 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 2005-2006 have been developed in consultation with the affected tribe(s) and, insofar as possible, with tribal consensus.

11.2.5 EO 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds)

EO 13186 supplements the MBTA (above) by requiring federal agencies to work with the 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.

Chapter 6 in this EIS evaluates impacts to seabirds and concludes that the proposed action will not significantly impact seabirds.

11.3 Regulatory Impact Review and Regulatory Flexibility Analysis

In order to comply with EO 12866 and the RFA, this document also serves as an RIR and an IRFA. A summary of these analyses is presented below.

11.3.1 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 regulatory principles in EO 12866 emphasize careful identification of the problem to be addressed. The agency is to identify and assess alternatives to direct regulation, including economic incentives such as user fees or marketable permits, to encourage the desired behavior. Each agency is to assess both the costs and the benefits of the intended regulation and, recognizing that some costs and benefits are difficult to quantify, propose or adopt a regulation only after reasoned determination the benefits of the intended regulation justify the costs. In reaching its decision agency must use the best reasonably obtainable information, including scientific, technical and economic data, about the need for and consequences of the intended regulation.

NMFS requires the preparation of an RIR for all regulatory actions of public interest; implementation of rebuilding plans includes the publication of strategic rebuilding parameters in federal regulations. The RIR provides a comprehensive review of the changes in net economic benefits to society associated with proposed regulatory actions. The analysis also provides a review of the problems and policy objectives prompting the regulatory proposals and an evaluation of the major alternatives that could be used to solve the problems. The purpose of the analysis is to ensure the regulatory agency systematically and comprehensively considers all available alternatives, so the public welfare can be enhanced in the most efficient and cost-effective way. The RIR addresses many of the items in the regulatory philosophy and principles of EO 12866.

The RIR analysis and an environmental analyses required by NEPA have many common elements and they have been combined in this document. The following table shows where the elements of an RIR, as required by EO 12866, are located.

Required RIR Elements	Corresponding Sections
Description of management objectives	Sections 1.2 & 1.3
Description of the fishery[a/]	Section 8.1 Appendix A, Chapters 6 & 7
Statement of the problem	Section 1.2.2
Description of each alternative considered in the analysis	Chapter 2
An analysis of the expected economic effects of each alternative	Chapter 8

a/ In addition to the information in this document, basic economic information is provided annually in the Council's Stock Assessment and Fishery Evaluation document.

The RIR is designed to determine whether the proposed actions could be considered "significant regulatory actions" according to EO 12866. The EO 12866 test requirements used to assess whether or not an action would be a "significant regulatory action" and the expected outcomes of the proposed management alternative are discussed below. A regulatory program is "economically significant" if it is likely to result in the following effects:

1.a. Have an annual effect on the economy of $100 million or more, or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or state, local, or tribal governments or communities.

1.b. Present a risk to long term productivity:

2. Create a serious inconsistency or otherwise interfere with action taken or planned by another agency.

3. Materially alter the budgetary impact of entitlement, grants, user fees, or loan programs or the rights and obligations of recipients thereof.

4. Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this EO.

The following table summarizes these effects under the 2005-2006 groundfish management alternatives.

Summary of EO 12866 Test Requirements
(Changes Indicated Are Relative to the No Action Alternative (Projected 2004))

EO 12866 Test of "Significant Regulatory Actions"	***No Action Alternative***	***Alternative 1***	***Alternative 2***	***Alternative 3***	***Council-preferred Alternative***
(1) Have a annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or state, local, or tribal governments or communities	(Projected 2004) Total Exvessel Rev $320.1 mil; Commercial Fishery-related Income Impacts $648.8 mil (excluding at-sea whiting); Rec Fishery Income Impacts $235.5 mil.	2005-2006 Potential Changes: Total Exvessel Rev -$0.3 mil; Commercial Fishery-related Income Impacts -$2 mil (excluding at-sea whiting); Rec Fishery Income Impacts +$0 mil.	2005-2006 Potential Changes: Total Exvessel Rev +$1.8 mil; Commercial Fishery-related Income Impacts +$1.5 mil (excluding at-sea whiting); Rec Fishery Income Impacts +$0 mil.	2005-2006 Potential Changes: Total Exvessel Rev +$2.5 mil; Commercial Fishery-related Income Impacts +$2.5 mil (excluding at-sea whiting); Rec Fishery Income Impacts +$0 mil.	2005-2006 Potential Changes: Total Exvessel Rev +$2.5 mil; Commercial Fishery-related Income Impacts +$3 mil (excluding at-sea whiting); Rec Fishery Income Impacts +$0 mil.
Overall Long Term Risk to Productivity	All long term risk levels are same as No Action and within Magnuson-Stevens Act guidelines				
(2) Create a serious inconsistency or otherwise interfere with action taken or planned by another agency	None Identified	None Identified	None Identified	None Identified	None Identified
(3) Materially alter the budgetary impact of entitlement, grants, user fees, or loan programs or the rights and obligations of recipients thereof	None Identified	None Identified	None Identified	None Identified	None Identified
(4) Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this EO	None Identified	None Identified	None Identified	None Identified	None Identified

11.3.2 Impacts on Small Entities (Regulatory Flexibility Act, RFA)

The RFA requires government agencies to assess the effects that regulatory alternatives would have on small entities, including small businesses, and to determine ways to minimize those effects. A fish-harvesting business is considered a "small" business by the Small Business Administration (SBA) if it has annual receipts not in excess of $3.5 million. For related fish-processing businesses, a small business is one that employs 500 or fewer persons. For wholesale businesses, a small business is one that employs not more than 100 people. For marinas and charter/party boats, a small business is one with annual receipts not in excess of $5 million.

The data available for this analysis are based on data sets that have vessel and buyer/processor identifiers. The commercial data are from the PacFIN data system, and the recreational data were provided by the states. The vessel and processor counts are based on unique vessel and buyer/processor identifiers. However, it is known that in many cases a single firm may own more than one vessel, or a buyer/processing facility may include more than one profit center. Therefore, the counts should be considered upper bound estimates. Additionally, businesses owning vessels and/or buyers and processors may have revenue from fisheries in other geographic areas, such as Alaska, or from nonfishing activities. Therefore, it is likely that when all operations of a firm are aggregated, some of the small entities identified here are actually larger than indicated.

A slight increase in harvest under the Council-preferred Alternative is expected to increase exvessel revenue by 0.8% as compared to No Action (revenue includes tribal, nontribal, and all whiting deliveries, at-sea and shoreside). This is approximately the same result as under Alternative 3. From the buyer/processor perspective this represents an increase in raw product available. Under the Alternative 1, a slight decrease in exvessel revenue would be expected, and under Alternative 2, a 0.6% increase is shown compared to status quo. Individual groups may experience greater or lesser reductions or increases (Sections 8.3 through 8.6). Following is a more specific description of the possible impacts on small entities.

Seafood Harvesters - Most of the vessels, processors, and related businesses engaged in the West Coast groundfish fishery would be classified as small businesses under these definitions. Table 8-4 in Appendix A shows that of a total 4,588 commercial vessels fishing from West Coast ports, 1,709 vessels had some involvement in West coast groundfish fisheries. Of these, 421 held groundfish limited entry permits, and an additional 771 participated in open access groundfish fisheries and derived more than 5% of total revenue from groundfish. Ninety one limited entry trawl vessels, representing 35% of the limited entry trawl fleet, were permanently retired under a recent buyback program. The share of annual groundfish exvessel revenue retired under the buyback was somewhat greater, 36% including whiting or 46% of non-whiting exvessel revenue. There has been some concern that effective capacity in the fishery will not actually be reduced this much due to reactivation of “latent” permits. There were 24 permits not fished at all during 2001 through 2003, and 40 permits not fished at all in 2002 and 2003. Events have shown that of the 20 limited entry trawl permits that have changed hands since the buyback was completed, 14 of these permits had no recorded landings in 2002. Six buyback participants have reentered the limited entry trawl fishery, purchasing a total of 11 permits.

The action alternatives all require use of selective flatfish trawl gear for groundfish trawlers fishing shoreward of the RCA. This may result in increased equipment costs for these vessels to acquire and deploy the legal gear. Estimated cost of selective flatfish trawl gear ranges up to $8,000. Under Alternative 1, 100% observer coverage is also required for vessels in this fishery. The increased access to commercial stocks afforded by the less restrictive RCA lines allowed under the action alternatives will help offset these increased costs. Selective flatfish trawl gear is not required under No Action.

The Council-preferred Alternative attempts to optimize harvests allowed under the adopted OYs, while assuring the long term health of the resources involved. Section 8.3.1 identifies relative impacts on different categories of vessels. In general, there does not appear to be a substantial disproportionate affect on any particular group.

Buyers/Processors - Table 7-1 in Appendix A shows that out of a total 1,780 fish buyers on the West Coast, 732 bought at least some groundfish from commercial fishermen. All but 19 of these purchased less than $2 million worth of total harvest during the year 2000. A few buyers/processors may not qualify as small businesses under the SBA criterion. Fewer than nine buyers/processors who process groundfish were listed as employing more than 500 people (Warren 2004). However the employee counts for these buyers/processors include operations in Alaska and processing for species other than groundfish. Many of the listed employees are therefore likely in Alaska due to the much higher volumes of fish processing done there. Finally, since most processing employment is seasonal, many of these buyers/processors would not be expected to employ more than 500 employees year round.

Recreational Fishery Substantially less information is available on the recreational fishing industry than on the commercial fishery. In 2001 it is estimated that there were 753 recreational charter vessels on the West Coast, 106 in Washington, 232 in Oregon and 415 in California. Limited information on the vessels in the fishery and lack of detailed information on effort prevents segregation of the fleet into smaller units for analysis. The best available index of the economic effect of the alternatives on the recreational fishing industry is the change in projected income impacts associated with the fishery. Since there is no difference in proposed recreational fishery management measures for the Washington and Oregon, and very little difference between the alternatives for California, there is no difference in the projected number of recreational angler trips, and no difference in the projected income impacts between the alternatives. Projected impacts under the action alternatives are the same as the projected number of angler trips and income impacts associated with No Action.

Section 603 (b) of the RFA identifies the elements that should be included in the IRFA. These are bulleted below, followed by information that addresses each element.

- A description of the reasons why action by the agency is being considered.

The purpose and need for the proposed action are discussed in Section 1.2.

- A succinct statement of the objectives of, and legal basis for, the proposed rule.

The description of purpose and need in Section 1.2 also outlines the objectives of the proposed action. The introductory paragraph in Chapter 1 and Section 1.3, background to the purpose and need, provide information on the legal basis for the proposed action (proposed rule).

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

The economic impact will be shared among groundfish buyers, commercial harvesters, and recreational operators. It is estimated there are about 730 groundfish buyers, 1,700 commercial vessels and 750 recreational charter operators that may be affected by these actions. Although there is some double counting, most of these entities would probably qualify as small businesses under SBA criteria.

- A description of the projected reporting, record-keeping, and other compliance requirements of the proposed rule, including an estimate of the classes of small entities that will be subject to the requirements of the report or record.

There are no new reporting or record-keeping requirements that are proposed as part of this action.

- An identification, to the extent practicable, of all relevant federal rules, which may duplicate, overlap, or conflict with the proposed rule.

No federal rules have been identified that duplicate, overlap, or conflict with the alternatives. Public comment is hereby solicited, identifying such rules.

- A description of any significant alternatives to the proposed rule that accomplish the stated objectives that would minimize any significant economic impact of the proposed rule on small entities.

This EIS includes a range of alternatives, which were considered by the Council. The Council-preferred alternative results in the greatest socioeconomic benefits in comparison to the other alternatives considered.

12.0 LIST OF PREPARERS

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Name	Position	Participation
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Mr. John DeVore	Groundfish Staff Officer	Principal author, Chapters 2, 4-5; contributing author, Chapter 7, Appendix A
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Groundfish Management Team

The Groundfish Management Team worked with the Council to develop the details of the alternatives and provided catch and bycatch projections. State and tribal representatives put forward proposals for allocations and management measures. Additional contributions are noted below, as appropriate.

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13.0 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

14.0 ACRONYMS AND GLOSSARY

ABC	acceptable biological catch. The ABC is a scientific calculation of the sustainable harvest level of a fishery, and is used to set the upper limit of the annual total allowable catch. It is calculated by applying the estimated (or proxy) harvest rate that produces maximum sustainable yield to the estimated exploitable stock biomass (the portion of the fish population that can be harvested).
B_{MSY}	The biomass that allows maximum sustainable yield to be taken.
BO	Biological Opinion
B_o	Unfished biomass; the estimated size of a fish stock in the absence of fishing.
CCA	Cowcod Conservation Area
CDFG	California Department of Fish and Game
CEQ	Council on Environmental Quality
CFCG	California Fish and Game Commission
CFR	Code of Federal Regulations. A codification of the regulations published in the *Federal Register* by the executive departments and agencies of the federal government. The CFR is divided into 50 titles that represent broad areas subject to federal regulation Title 50 contains wildlife and fisheries regulations.
CINMS	Channel Islands National Marine Sanctuary
Council	Pacific Fishery Management Council
CPFV	commercial passenger fishing vessel
CPS	coastal pelagic species. Coastal pelagic species are schooling fish, not associated with the ocean bottom, that migrate in coastal waters. They usually eat plankton and are the main food source for higher level predators such as tuna, salmon, most groundfish, and humans. Examples are herring, squid, anchovy, sardine, and mackerel.
CPUE	catch per unit effort
CRFS	California Recreational Fisheries Survey
CV	coefficients of variation
CZMA	Coastal Zone Management Act
DEIS	draft environmental impact statement
DPEIS	draft programmatic environmental impact statement
DTS	Dover sole, thornyhead(s), and trawl-caught sablefish complex

EA	environmental assessment. As part of the National Environmental Policy Act (NEPA) process, an EA is a concise public document that provides evidence and analysis for determining whether to prepare an Environmental Impact Statement (EIS) or a Finding of No Significant Impact.
EEZ	Exclusive Economic Zone. A zone under national jurisdiction (up to 200 nautical miles wide) declared in line with the provisions of the 1982 United Nations Convention of the Law of the Sea, within which the coastal state has the right to explore and exploit, and the responsibility to conserve and manage, the living and non-living resources.
EFH	essential fish habitat. Those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.
EFP	exempted fishing permit
EIS	environmental impact statement. As part of the National Environmental Policy Act (NEPA) process, an EIS is an analysis of the expected impacts resulting from the implementation of a fisheries management or development plan (or some other proposed action) on the environment. EISs are required for all fishery management plans as well as significant amendments to existing plans.
EO	Executive Order
EPA	Environmental Protection Agency
ESA	Endangered Species Act. An act of federal law that provides for the conservation of endangered and threatened species of fish, wildlife, and plants. When preparing fishery management plans, councils are required to consult with the National Marine Fisheries Service and the U.S. Fish and Wildlife Service to determine whether the fishing under a fishery management plan is likely to jeopardize the continued existence of an ESA-listed species, or to result in harm to its critical habitat.
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."
FEAM	Fisheries Economic Assessment Model
fecundity	The potential to produce offspring.
FEIS	final environmental impact statement
fm	fathom
FMP	Fishery management plan. A plan, and its amendments, that contains measures for conserving and managing specific fisheries and fish stocks.

FONSI	Finding of No Significant Impact. As part of the National Environmental Policy Act (NEPA) process, a finding of no significant impact (FONSI) is a document that explains why an action that is not otherwise excluded from the NEPA process, and for which an environmental impact statement (EIS) will not be prepared, will not have a significant effect on the human environment.
FPEIS	final programmatic environmental impact statement
FRFA	Final Regulatory Flexibility Analysis. the FRFA includes all the information from the initial regulatory flexibility analysis. Additionally, it provides a summary of significant issues raised by the public, a statement of any changes made in the proposed rule as a result of such comments, and a description of steps taken to minimize the significant adverse economic impact on small entities consistent with stated objectives.
GAP	Groundfish Advisory Subpanel. The Council established the GAP to obtain the input of the people most affected by, or interested in, the management of the groundfish fishery. This advisory body is made up of representatives with recreational, trawl, fixed gear, open access, tribal, environmental, and processor interests. Their advice is solicited when preparing fishery management plans, reviewing plans before sending them to the Secretary, reviewing the effectiveness of plans once they are in operation, and developing annual and inseason management.
GCA	Groundfish Conservation Area
GIPC	Ad Hoc Groundfish Information Policy Committee
GMT	Groundfish Management Team. Groundfish management plans and annual and inseason management recommendations are prepared by the Council's GMT, which consists of scientists and managers with specific technical knowledge of the groundfish fishery.
GPS	Global Positioning System
HMS	highly migratory species
INPFC	International North Pacific Fishery Commission
IPHC	International Pacific Halibut Commission. A commission responsible for studying Pacific halibut stocks and the halibut fishery. The IPHC makes proposals to the U.S. and Canada concerning the regulation of the halibut fishery.

IRFA	Initial Regulatory Flexibility Analysis. Anytime an agency publishes a notice of proposed rule making and the rule may have a significant impact on a substantial number of small entities, an IRFA is required. It describes the impact of the proposed rule on small entities and includes a description of the action, why it is necessary, the objectives and legal basis for the action, the small entities that will be impacted by the action, and the projected reporting, record-keeping, and other compliance requirements of the proposed rule. Rules that duplicate, overlap, or conflict with the proposed rule are also identified.
ITQ	individual transferrable quota
kg	kilogram
LOA	Letter of Acknowledgment
m	meter
Magnuson-Stevens Act	Magnuson-Stevens Fishery Conservation and Management Act. The MSA, sometimes known as the "Magnuson-Stevens Act," established the 200-mile fishery conservation zone, the regional fishery management council system, and other provisions of U.S. marine fishery law.
MBTA	Migratory Bird Treaty Act
mean generation time	A measure of the time required for a female to produce a reproductively-active female offspring.
MFMT	maximum fishing mortality threshold. A limit identified in the National Standard Guidelines. A fishing mortality rate above this threshold constitutes overfishing.
MHHW	mean high high water
mixed stock exception	In "mixed-stock complexes," many species of fish swim together and are caught together. This becomes a problem when some of these stocks are healthy and some are overfished, because even a sustainable harvest of the healthy stocks can harm the depleted stock. In order to avoid having to shut down all fisheries to protect one particular overfished stock, the national standard guidelines allow a "mixed-stock" exception to the "overfished" definition. This would allow higher catches of some overfished species than ordinarily allowed in order to avoid severe hardship to fishing communities.
MMPA	Marine Mammal Protection Act. The MMPA prohibits the harvest or harassment of marine mammals, although permits for incidental take of marine mammals while commercial fishing may be issued subject to regulation. (See "incidental take" for a definition of "take".)
MPA	marine protected area
MRFSS	Marine Recreational Fisheries Statistical Survey
MRPZ	Marine Resources Protection Zone

MSA	Magnuson-Stevens Fishery Conservation and Management Act (see Magnuson-Stevens Act, above).
MSST	minimum stock size threshold. A threshold biomass used to determine if a stock is overfished. The Council proxy for MSST is $B_{25\%}$.
MSY	maximum sustainable yield. An estimate of the largest average annual catch or yield that can be continuously taken over a long period from a stock under prevailing ecological and environmental conditions. Since MSY is a long-term average, it need not be specified annually, but may be reassessed periodically based on the best scientific information available.
mt	metric ton. 1,000 kilos or 2,204.62 pounds.
NAO	NOAA Administrative Order
NEPA	National Environmental Protection Act
NMFS	National Marine Fisheries Service. A division of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA). NMFS is responsible for conservation and management of offshore fisheries (and inland salmon). The NMFS Regional Director is a voting member of the Council.
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPOA	National Plan of Action
NRDC	Natural Resources Defense Council
NSG	National Standard Guidelines
NWR	Northwest Region
OAL	Office of Administrative Law
OAR	Oregon Administrative Rules
ODFW	Oregon Department of Fish and Wildlife
OFWC	Oregon Fish and Wildlife Commission
ORBS	Ocean Recreational Boat Survey (Oregon Department of Fish and Wildlife)
OSP	Ocean Sampling Program (Washington)
overfished	Any stock or stock complex whose size is sufficiently small that a change in management practices is required to achieve an appropriate level and rate of rebuilding. The term generally describes any stock or stock complex determined to be below its overfished/rebuilding threshold. The default proxy is generally 25% of its estimated unfished biomass; however, other scientifically valid values are also authorized.

overfishing	Fishing at a rate or level that jeopardizes the capacity of a stock or stock complex to produce MSY on a continuing basis. More specifically, overfishing is defined as exceeding a maximum allowable fishing mortality rate. For any groundfish stock or stock complex, the maximum allowable mortality rate will be set at a level not to exceed the corresponding MSY rate (B_{MSY}) or its proxy.
OY	optimum yield. The amount of fish that will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems. The OY is developed on the basis of the MSY from the fishery, taking into account relevant economic, social, and ecological factors. In the case of overfished fisheries, the OY provides for rebuilding to a level that is consistent with producing the MSY for the fishery.
PacFIN	Pacific Coast Fisheries Information Network
PDO	Pacific Decadal Oscillation
PEIS	programmatic environmental impact statement
P_{MAX}	The estimated probability of reaching T_{MAX}. May not be less than 50%.
POP	Pacific ocean perch
PSMFC	Pacific States Marine Fisheries Commission
QSM	quota species monitoring
RCA	Rockfish Conservation Area
RCW	Revised Code of Washington
Rebuilding	Implementing management measures that increase a fish stock to its target size.
RecFIN	Recreational Fishery Information Network
RFA	Regulatory Flexibility Act (see IRFA and FRFA above). The Regulatory Flexibility Act (5 U.S.C. 601-612) requires federal agencies to consider the effects of their regulatory actions on small businesses and other small entities and to minimize any undue disproportionate burden.
RIR	Regulatory Impact Review. RIRs are prepared to determine whether a proposed regulatory action is “major.” The RIR examines alternative management measures and their economic impacts.
RLMA	Rockfish/Lingcod Management Area
ROD	Record of Decision

SAFE	Stock Assessment and Fishery Evaluation. A SAFE document is a document prepared by the Council that provides a summary of the most recent biological condition of species in the fishery management unit, and the social and economic condition of the recreational and commercial fishing industries, including the fish processing sector. It summarizes, on a periodic basis, the best available information concerning the past, present, and possible future condition of the stocks and fisheries managed in the FMP.
Secretary	U.S. Secretary of Commerce
SEIS	supplemental environmental impact statement
SFA	Sustainable Fisheries Act (see Magnuson-Stevens Act, above).
SFFT	selective flatfish trawl
SSC	Scientific and Statistical Committee. An advisory committee of the Council made up of scientists and economists. The Magnuson-Stevens Act requires that each council maintain an SSC to assist in gathering and analyzing statistical, biological, ecological, economic, social, and other scientific information that is relevant to the management of Council fisheries.
STAR	Stock Assessment Review Panel. A panel set up to review stock assessments for particular fisheries. In the past there have been STAR panels for sablefish, rockfish, squid, and other species.
STAT	Stock Assessment Team. Stock assessment authors from the National Marine Fisheries Service fisheries science centers.
SWOP	Shoreside Whiting Observation Program
TAC	total allowable catch
T_{MAX}	The maximum time period to rebuild an overfished stock, according to National Standard Guidelines. Depends on biological, environmental, and legal/policy factors.
T_{TARGET}	The target year, set by policy, for a fish stock to be completely rebuilt.
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).
U and A	usual and accustomed
USEPA	United States Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VMS	Vessel Monitoring System
VMSC	Ad Hoc Vessel Monitoring System Committee
WAC	Washington Administrative Code

WCGOP	West Coast Groundfish Observer Program
WDFW	Washington Department of Fish and Wildlife
WFWC	Washington Fish and Wildlife Commission
WOC	Washington/Oregon/California
YRCA	Yelloweye Rockfish Conservation Area

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APPENDIX E
TO THE
PROPOSED ACCEPTABLE BIOLOGICAL CATCH AND OPTIMUM YIELD SPECIFICATIONS AND MANAGEMENT MEASURES
FOR THE
2005-2006 PACIFIC COAST GROUNDFISH FISHERY

RESPONSE TO COMMENTS ON THE DEIS

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→SFD

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

October 8, 2004

Reply To
Attn Of: ETPA-088

Ref: 04-047-NOA

NOAA-NMFS
RECEIVED
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NORTHWEST REGIONAL

D. Robert Lohn, Regional Administrator
NMFS/NOAA - Northwest Region
7600 Sand Point Way N.E., Bldg 1
Seattle, WA 98115-0070

Dear Mr. Lohn:

The U.S. Environmental Protection Agency (EPA) has reviewed the draft Environmental Impact Statement (EIS) for **Proposed Acceptable Biological Catch and Optimum Yield Specifications and Management Measures for the 2005 - 2006 Pacific Coast Groundfish Fishery** (CEQ No. 040404) in accordance with our responsibilities under the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act. Section 309, independent of NEPA, specifically directs EPA to review and comment in writing on the environmental impacts associated with all major federal actions and the document's adequacy in meeting NEPA requirements.

The draft EIS proposes to establish harvest levels (optimum yields) based on acceptable biological catch for stocks and stock complexes managed under the Pacific Coast Groundfish Fishery Management Plan for 2005 and 2006. The proposed action also establishes harvest guidelines for groundfish species, species groups, and geographic subunits, which are caught in a variety of fisheries occurring off the coasts of Washington, Oregon and California. Management measures include cumulative landing limits for species, gear restrictions and recreational bag and size limits.

The EIS identifies four harvest level and four management measure action alternatives. The four harvest level action alternatives include a low, medium and high Optimum Yield (OY) alternative and a Pacific Fishery Management Council Preferred alternative. The Low OY alternative represents the most precautionary approach to the management of harvest levels reflecting the most conservative interpretation of stock assessment results. The EIS identifies the Low OY alternative as the environmentally preferable alternative. The High OY alternative is the least precautionary alternative that assumes most long-term risk for the greatest short-term benefit. The Medium OY alternative and the Pacific Fishery Management Council's Preferred Alternative propose harvest levels with intermediate levels of precaution. The Pacific Fishery Management Council Preferred Alternative is more precautionary than the Medium OY alternative as it proposes lower harvest levels for overfished species.

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The EIS proposes four management action alternatives with various impacts on west coast marine ecosystems and essential fish habitat, overfished and target species, ESA listed species, marine mammals and the public. The Pacific Fishery Management Council preferred management alternative allows higher catches of target species than are projected to occur under the other action alternatives while preventing overfishing. The EIS identifies management Alternative 1 as the environmentally preferable alternative.

Based on our review and evaluation, we have assigned the following ratings to the alternatives evaluated in the draft EIS.

Harvest Alternative	Rating
Low Optimum Yield	LO (Lack of Objections)
Medium Optimum Yield	EC-2 (Environmental Concerns-Insufficient Information)
High Optimum Yield	EC-2 (Environmental Concerns-Insufficient Information)
Pacific Fishery Management Council	LO (Lack of Objections)
Management Alternative	**Rating**
Alternative 1	LO (Lack of Objections)
Alternative 2	EC-2 (Environmental Concerns-Insufficient Information)
Alternative 3	EC-2 (Environmental Concerns-Insufficient Information)
Pacific Fishery Management Council	EC-2 (Environmental Concerns-Insufficient Information)

An overall rating of EC-2 (Environmental Concerns - Insufficient Information) along with a summary of our comments will be published in the *Federal Register*. A copy of the rating system used in conducting our review is enclosed for your reference.

Our concerns with the EIS focus on projected exceedances of optimum yields for canary and widow rockfish, observer coverage and impacts on essential fish habitat. Detailed comments discussing our concerns are provided below.

Thank you for the opportunity to review this draft EIS. If you would like to discuss these issues, please contact Mike Letourneau at (206) 553-6382.

Sincerely,

Christine Reichgott

Christine Reichgott, Manager
NEPA Review Unit

Enclosures

EPA's Detailed Comments
Proposed Acceptable Biological Catch and Optimum Yield Specifications and Management Measures for the 2005 - 2006 Pacific Coast Groundfish Fishery Draft Environmental Impact Statement

Optimum Yield Projections for Canary and Widow Rockfish

The EIS states that management Alternatives 2 and 3 will result in exceeding the Optimum Yield (OY) for canary and widow rockfish. The EIS estimates that Alternative 3 would result in overages of more than twice the OY for widow rockfish and concludes that the OY exceedances for canary and widow rockfish projected from Alternatives 2 and 3 would result in significant adverse impacts. Even with the most conservative of rebuilding plans that include minimum OYs for these overfished species, maximum sustainable yields would not be met for decades.

While the EIS discusses the benefits of these alternatives, these benefits are short-term and the impacts from these alternatives would be extensive and long-term. Mitigation measures such as those included in the Pacific Fishery Management Council Preferred Alternative (i.e., additional bycatch reduction measures in the Pacific whiting fishery and de facto sector-wide bycatch caps for canary and widow rockfish) could prevent OY from being exceeded under management Alternative 2. However, the projected overages in Alternative 3 are of such a great magnitude that it is unlikely that mitigation measures would effectively reduce total bycatch mortality for these species to levels below their OYs.

The EIS should include mitigation measures to reduce the projected take of canary and widow rockfish in all management alternatives. In addition, the EIS should assure that these mitigation measures would meet OYs for canary and widow rockfish. These measures may include the closing of fisheries when it is projected that the OYs for canary and widow rockfish would be met.

Observer Coverage

Significant uncertainties in the data utilized for determining optimum yields include data on bycatch across all fisheries. The National Marine Fisheries Service (NMFS) implemented an observer program for groundfish fisheries in 2001 and data from that program was first available in early 2003. This observer data results in much more accurate bycatch estimates. Effective bycatch accounting and control mechanisms are critical for staying within target catch optimum yields and the first element in limiting bycatch is accurately measuring bycatch rates by time, area, depth, gear type and fishing strategy. The best available means of obtaining bycatch rate information is through the observer program.

Camera monitors onboard ships are a good mechanism for monitoring the retention of bycatch. However, cameras do not provide a means of accurately accounting for species composition and weight of bycatch that is discarded. At present, electronic monitoring technology is not accurate enough to identify species and estimate the weight of discarded fish more than 63% of the time. Therefore, we support 100% observer coverage as proposed in management Alternatives 1 until such time that video and electronic monitoring of bycatch equals or exceeds that of the observer program. While we recognize that there are risks associated with 100% observer coverage (i.e., low participation in a fishery because of the cost of the observer equipment and bycatch caps), these risks can be offset with incentives such as switching to deep water complex target species thus avoiding overfished species. In addition, we support quota incentives to those fishers and vessels that accommodate observers, until such time that 100% observer coverage can be provided.

Impacts on Habitat

The Magnuson-Stevens Act obligates the Fisheries Councils and NMFS to identify and characterize essential fish habitat that is necessary to allow for groundfish production to support long-term sustainable fisheries for groundfish and for groundfish contributions to a healthy ecosystem. Trawling gear is known to modify seafloor habitats by altering benthic habitat complexity and by removing or damaging infauna and sessile organisms. Other fisheries related changes in the physical environment include changes in water quality associated with vessel traffic and fish processing discards.

The EIS describes adverse impacts of fishing on Essential Fish Habitat (EFH) including ecosystem effects, in very general terms. While the management alternatives presented in the EIS are evaluated for their impacts on ecosystems and EFH, these comparisons are based on differences in fishing effort between the alternatives not on specific impacts various habitats may sustain. The EIS provides very specific spatial and temporal management measures for fishing effort (i.e., the use of selective flatfish trawl gear in the Rockfish Conservation Area north of 40°10' latitude, at depths between 75 fathoms and 150 fathoms in January and February); however, it only discusses impacts to EFH in nonspecific terms regardless of location, time and fishing gear utilized. For example, the management action alternatives propose expanding and decreasing the size of the current Rockfish Conservation Area (RCA). The EIS concludes that the alternatives with the greatest decrease in the RCA would result in the greatest amount of impacts on EFH due to the proposed increase in available fishing area and thus increased fishing effort. The EIS does not discuss the types of habitat that are currently present in the RCA, the amount and type of habitat that will be made more or less vulnerable to fishing impacts due to increasing or decreasing the size of the RCA, and what effects these habitat impacts will have on target and non-target fish species.

While sufficient information may not currently exist to perform a precise quantitative analysis of the impacts the groundfish fishery would have on the various fish habitats under each of the proposed management alternatives, the EIS should discuss in more detail what is known about the habitats in the proposed fishing areas and how the alternatives vary in the magnitude of their impacts. In particular, the EIS should discuss how the spatial and temporal distribution of fishing efforts with various gear (e.g., selective flatfish trawl gear, large footrope gear) will impact the various habitats (e.g., rocky and non-rocky shelf habitats), for each of the proposed management alternatives.

U.S. Environmental Protection Agency Rating System for Draft Environmental Impact Statements Definitions and Follow-Up Action*

Environmental Impact of the Action

LO – Lack of Objections

The U.S. Environmental Protection Agency (EPA) review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC – Environmental Concerns

EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce these impacts.

EO – Environmental Objections

EPA review has identified significant environmental impacts that should be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no-action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU – Environmentally Unsatisfactory

EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the Council on Environmental Quality (CEQ).

Adequacy of the Impact Statement

Category 1 – Adequate

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis of data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2 – Insufficient Information

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses or discussion should be included in the final EIS.

Category 3 – Inadequate

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the National Environmental Policy Act and or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

* From EPA <u>Manual 1640 Policy and Procedures for the Review of Federal Actions Impacting the Environment</u>. February, 1987.

2.0 NRDC Comment Letter

→ SFD

NRDC
THE EARTH'S BEST DEFENSE

NATURAL RESOURCES DEFENSE COUNCIL

October 12, 2004

NOAA-NMFS
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OCT 21 2004
NORTHWEST REGIONAL OFFICE

BY FAX (206-526-6736) AND MAIL

D. Robert Lohn
Regional Administrator
National Marine Fisheries Service
7600 Sand Point Way, N.E., Bldg. 1
Seattle, WA 98115-0070

Dear Mr. Lohn:

On behalf of the over 1 million members and activists of NRDC (Natural Resources Defense Council), we are writing to comment on the draft environmental impact statement ("DEIS") on the 2005-2006 specifications and management measures ("specifications") for the Pacific groundfish fishery. For the following reasons, the DEIS fails to comply with the requirements of the National Environmental Policy Act ("NEPA") and the Magnuson-Stevens Act ("MSA"). First, crucial information is inaccurate or omitted entirely. Second, the National Marine Fisheries Service ("NMFS") fails to consider adequate alternative harvest levels and alternative bycatch reduction measures for overfished species. Third, the analysis fails to discuss adequately the specifications' effects on overfished species, bycatch reduction, rockfish conservation areas ("RCAs"), and essential fish habitat ("EFH"). Finally, the DEIS fails to address sufficiently the cumulative impacts of repeated overfishing as well as its effects on EFH and the marine ecosystem.

I. THE DEIS LACKS DATA THAT IS CRUCIAL TO THE INFORMED DECISIONMAKING PROCESS REQUIRED OF NEPA AND THE MSA.

The DEIS fails to include data that is essential to understanding and evaluating the environmental effects of the proposed specifications. For example, the document omits relevant information regarding total catch and bycatch mortality for recent years. This data is excluded without any explanation despite its central importance for judging the effect of past fishing harvests and the effectiveness of NMFS's management of fishing mortality. It does not suffice to include only draft estimated total mortality of selected species when more accurate actual catch and bycatch data exists and is being (or should be) used to calculate future harvest levels.

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This information is essential to a reasoned decisionmaking process for establishing future harvests and for evaluating the comparative merits of the alternatives considered. Information pertaining to the actual catch and bycatch mortality over the past five years is crucial for reviewing the relative direct, indirect, and cumulative impacts of the various alternative harvest levels being considered.

Failure to include this information also violates the MSA and NMFS's regulations implementing the MSA. See 16 U.S.C. § 1852(a)(5) (requiring that fishery management plans ("FMPs") include "catch by species in numbers of fish or weight thereof"); see also 50 C.F.R. § 600.315(b)(1) (explaining that "successful fishery management depends, in part, on the timely availability, quality, and quantity of scientific information, as well as on the thorough analysis of this information, and the extent to which the information is applied"). The DEIS acknowledges that "the availability of data is critical to the effective management of fishery resources," DEIS at 7.3.1.2, yet fails to include important data, such as comprehensive actual catch and bycatch mortality totals by species. NMFS must clearly disclose the relevant information – including recent catch data – and explain how that information affects its decisions on future harvests. It is insufficient to merely cite to the stock and rebuilding assessments on which the agency purportedly relies.

Unfortunately, not only is crucial data omitted from the draft EIS, but some of the data that is included – such as estimates for total mortality – conflicts with similar data included in the scientific reports on which the document relies. For example, the DEIS' estimated total catch for bocaccio in 2002 is listed at 140.3 mt (40.3% above optimum yield ("OY")), yet the total catch contained in the 2003 MacCall Stock Assessment on which NMFS relies lists 2002 catch at 201 mt (101% above OY). Alec D. MacCall, Southwest Fisheries Science Center, National Marine Fisheries Service, Status of Bocaccio of California in 2003 ii (June 2003). The mortality estimates for the eight overfished groundfish species contained in the DEIS' mortality scorecards is also at odds with the estimates provided in NMFS' proposed rule implementing the 2005-2006 specifications. Compare DEIS at Tables 2-13a and 2-13b, and 69 Fed. Reg. 56550, 566631-56647. For example, the estimated recreational take for lingcod in 2005 in the DEIS scorecard is 8 mt greater than that contained within the proposed rule. Id. A discrepancy of several mt also exists in the two documents regarding the lingcod commercial take. Id. NMFS cannot argue that it considered the best scientific information available in making a reasoned decision when its own numbers do not even add up. Additionally, the public cannot effectively review and respond to NMFS' environmental analysis when the data on which it relies is unclear, confusing, and inconsistent.

As the DEIS correctly notes, risk and uncertainty are inherent in fishery management due to imperfect sources of data, inaccurate or inadequate monitoring, and unknown future environmental conditions. DEIS at 7.1.3. However, these limitations are only compounded by NMFS's unclear, inconsistent, and, at times, absent depiction of the data that it does have available to it.

The DEIS also fails to discuss adequately the underlying stock assessments and rebuilding assessments on which the alternatives are based, including uncertainties inherent to the assessments. Such discussion must be part of the analysis regarding alternative harvest levels.

Finally, the DEIS fails to consider the estimated total mortality of overfished species by fishery for 2006 for any of the action alternatives except for the Council-preferred Alternative. Charts 2-5, 2-10, 2-11, 2-12. In choosing to establish specifications for both 2005 and 2006, NMFS must provide complete analysis of predicted mortality for both years.

II. THE DEIS FAILS TO CONSIDER A REASONABLE RANGE OF ALTERNATIVES

A central component of NEPA is the requirement that agencies "study, develop and describe alternatives to recommended courses of action in any proposal which involves conflicts concerning alternative uses of available resources". 42 U.S.C. § 4332(2)(E). In interpreting this requirement, the Ninth Circuit has held that "informed and meaningful consideration of alternatives ... is an integral part of [NEPA's] statutory scheme. Bob Marshall Alliance v. Hodel, 852 F.2d 1223, 1228 (9th Cir. 1988). Courts have struck down environmental impact statements where agencies have failed to consider a reasonable range of alternatives or omitted from consideration viable alternatives. Muckleshoot Indian Tribe v. U.S. Forest Service, 177 F.3d 800, 813-814 (9th Cir. 1999). The DEIS fails to consider adequate alternative harvest levels and alternative bycatch reduction measures for overfished species. The following examples are intended to be illustrative rather than comprehensive.

A. The DEIS Fails to Consider Alternative Harvest Levels Adequately for Several Overfished Species.

Darkblotched Rockfish

The DEIS fails to consider any alternative harvest levels for darkblotched rockfish other than the status quo and Council-preferred Alternatives. See DEIS Tables 2-1(a) and 2-1(b). Furthermore, the discussion entitled "Alternative Harvest Levels" does not actually discuss any alternatives for darkblotched rockfish. The brief section is instead devoted to an illogical attempt to explain NMFS's disturbing decision to set OY at ABC (discussed in section III.A above). NMFS is required to consider and discuss fully alternative harvest levels for darkblotched rockfish other than the one proposed. At least one of those alternatives must consider setting OY below ABC.

Since 2000, actual total mortality for the species has exceeded harvest specifications at least three times, and is projected to do so again in 2004. See Draft Summary Minutes of the Ad Hoc Allocation Committee of the Pacific Fishery Management Council 3 (Aug. 27, 2001) (mortality exceeded OY by 24% in 2000); see also Jean Beyer Rogers, Pacific Fishery Management Council, Darkblotched Rockfish (*Sebastes crameri*) 2003 Stock Status and Rebuilding Update, Vol. 1: Status of the Pacific Coast Groundfish Fishery Through 2003 and Recommended Acceptable Biological Catches for 2004 (Stock Assessment and Fishery Evaluation) 5 (2003) (mortality exceeded OY by 31.5% in 2001); DEIS Tables 4.1-4.2

(estimated mortality exceeded OY by 20% in 2002); Pacific Fishery Management Council, GMT Report on Initial Consideration of Status of Fisheries and Inseason Adjustments Addendum C.2.b (Sept. 2004) (projecting 2004 mortality for darkblotched to be more than 15% over the OY/ABC). Based on recent past experience, setting the OY at ABC is exceedingly likely to result in overfishing and is thus a highly risky strategy. The DEIS must consider alternative harvest levels for darkblotched rockfish that account for these continuing overharvests.

Canary Rockfish

The DEIS considers only two alternative harvest levels to the status quo for canary rockfish: 43 mt and 48 mt for 2005 and 45 mt and 51 mt for 2006. DEIS Tables 2-1(a) and 2-1(b). Interestingly, NMFS's short discussion of alternative harvest levels refers to three alternatives – Low, Medium, and High OY. See DEIS at 2.1.2.3. Perhaps most significantly, neither the Tables nor the discussion explains what the proposed harvest level is under the Council-preferred Alternative. NMFS must consider a wider range of alternatives for canary rockfish.

Bocaccio

The DEIS fails to explain why bocaccio are assessed separately south of 40° 10' N latitude from those to the north. DEIS at 2.1.2.1. It is unclear whether a stock assessment has ever been performed on the northern population. NMFS must explain on what basis it believes that only the southern population is overfished. NMFS must also present alternative harvest levels for the northern population.

Lingcod

None of the alternative harvest levels for lingcod is lower than OY for 2004. DEIS Tables 2-1(a) and 2-1(b). None of the alternative harvest levels discussed account for past overfishing despite the fact that OY for lingcod has been exceeded at least three of the past five years. DEIS at 2.1.1.2; see Draft Summary Minutes of the Ad Hoc Allocation Committee of the Pacific Fishery Management Council 3 (Aug. 27, 2001) (reporting total catch for 2000 of 483 mt, or 28% over OY); see also DEIS Tables 4.1-4.2 (estimating total mortality in 2002 at 980 mt, or 70% over OY; and in 2003 at 1366.6 mt, or 110% over OY). Indeed, total catch for 2003 even exceeded ABC. See DEIS Tables 4.2 (estimating total mortality in 2003 at 1366.6 mt, or 62% over ABC). NMFS is required to consider alternative harvest levels for 2005-2006 that account for its repeated inability to constrain mortality below the harvest levels.

B. The DEIS Fails to Consider Alternative Bycatch Reductions Measures Adequately.

NMFS is required to implement conservation and management measures that minimize bycatch and bycatch mortality to the extent practicable. 16. U.S.C. § 1851(a)(9). Bycatch reduction is essential to NMFS' overall obligation to prevent overfishing, 16 U.S.C. §§ 1802(28), 1851(a)(1), and to rebuild overfished species as quickly as possible, 16 U.S.C. § 1854(e). In order to comply with these statutory requirements, NMFS must analyze all potentially practicable bycatch minimization measures and adopt all those that are practicable. The DEIS fails to do either.

Bycatch Caps

NRDC agrees with the proposed rule authorizing NMFS to close the whiting fishery if canary or widow rockfish bycatch limits are reached but believes that the closures should be mandatory not permissive. NMFS is required by law to reduce bycatch. 16 U.S.C. §§ 1851(a)(9), 1853(a)(11). Consistent with its duty to prevent overfishing, 16 U.S.C. §§ 1802(28), 1851(a)(1), and to rebuild overfished species as quickly as possible, 16 U.S.C. § 1854(e), NMFS should implement a system of bycatch caps that requires the closure of the fishery when bycatch limits are exceeded. NMFS must consider this alternative in the EIS.

Alternative Management Measures to Reduce Bycatch

In a departure from past analyses, NMFS creates a "separate decisional step" between the choice of ABC/OY for each species and the development of management measures to accomplish the selected harvest levels. See DEIS at 1.3.2. As a result, the DEIS only considers alternative management measures for the Council-preferred Alternative. The practical effect of this new approach is a failure to consider the ways in which alternative management measures could further reduce bycatch of overfished species while maximizing the catch of more healthy stocks. Absent such consideration, neither NMFS nor the public can fully appreciate and weigh the potential tradeoffs between long-term sustainability and short-term maximization of the resource. These trade-offs are an inherent and essential part of NMFS' decisionmaking that must be discussed fully.

NEPA requires that the EIS systematically explain what management measures would be used under each alternative and how each differing regime would variably affect bycatch rates. It is not enough merely to list expected bycatch mortality by species on the mortality scorecards found in Tables 2-5, 2-10, 2-11, 2-12, and 2-13. The analysis must explain how the choice of alternative management measures will affect those rates.

Several bycatch reduction measures that have been proven extremely effective are mentioned in the DEIS but quickly discarded without sufficient explanation. For example, the analysis of alternatives for the whiting trawl fisheries describes several measures, such as more widespread use of closed areas, the use of a "penalty box" strategy, and the strategic closing off of hot-spots known to contain high co-occurring overfished species. See DEI 4.3.2.1. Despite an ODFW staff report finding that such measures "can drastically reduce widow bycatch," the Council-preferred Alternative does not act on any of them. DEIS at 4.3.2.1. The only explanation provided for failing to do so is that "NMFS did not wish to recommend these management measures until it had a chance to review additional analyses and hear industry comment." Id. NMFS must consider each of these management tools as an alternative in the EIS.

III. THE DEIS FAILS TO DISCLOSE AND ANALYZE ADEQUATELY THE ENVIRONMENTAL EFFECTS OF THE PROPOSED SPECIFICATIONS.

NEPA requires that an EIS include a "detailed statement" on the environmental impacts and effects of each alternative. 42 U.S.C. § 4332; 40 C.F.R. § 1502.16. The Supreme Court has stressed the importance of this requirement in ensuring that the agency has before it "*detailed information* concerning significant environmental impacts" before making a decision. Roberston v. Methow Valley Citizens Council, 490 U.S. 332, 349 (1989) (emphasis added). The DEIS provides inadequate analysis of the environmental effects of the proposed specifications on overfished species, bycatch reduction, rockfish conservation areas, and essential fish habitat.

A. The DEIS' Analysis of Impacts on Overfished Species is Inadequate.

NEPA requires that an environmental impact statement "rigorously explore and objectively evaluate all reasonable alternatives," 40 C.F.R. § 1502.14, and, *in a separate section*, discuss the environmental consequences of each alternative, 40 C.F.R. § 1502.16. Importantly, the evaluation of alternatives and the discussion on the environmental effects of those alternates must be distinct and non-duplicative. Id. The DEIS blatantly disregards this requirement by cutting and pasting the discussion of alternatives contained in Chapter 2 with the discussion of their impacts contained in Chapter 4. Compare DEIS at 2.1 with 4.3.

Additionally, the species-by-species analysis pertaining to alternative harvest levels and their impacts that is provided lacks genuine analysis, is based on extremely tentative scientific conclusions, and is riddled with inconsistencies. The following examples illustrate many, but not all, of these shortcomings.

Darkblotched Rockfish

NMFS has chosen to set optimum yield ("OY") for the overfished darkblotched rockfish at the allowable biological catch ("ABC") for 2005 and 2006. This decision conflicts with the mandate to rebuild overfished species as quickly as possible, the need for caution in light of uncertain scientific stock assessments, and NMFS' policy calling for harvest levels to be set below ABC for overfished species. The decisionmaking process for darkblotched epitomizes NMFS' general modus operendi whereby "[m]anagement immediately tries to capitalize on any apparent stock increase or marginal fishing opportunity, but only slowly responds to apparent decreases in stock." Andrew A. Rosenberg, Managing to the Margins: The Overexploitation of Fisheries, 1 Frontiers in Ecology and the Environment 102 (2003).

NMFS fails to address these pertinent issues and justify its decision accordingly. The Agency bases its decision to set harvest levels at the ABC threshold on "recent strong recruitment" in the 2000 and 2001 classes. NMFS projects that these juveniles will enter the fishery at some point in the future but are "too small to have fully recruited to the fishery in 2004-2006." DEIS at 2.1.2.5 and 4.3.1.7. NMFS seems to be gambling that projected strong recruitment numbers will eventually recruit to the fishery at some point beyond 2006, but that such predictions are too uncertain to have any present affect on the species' ABC. Such a gamble lacks both common sense and support in the scientific analysis on which NMFS claims to be relying. NMFS must discuss the environmental consequences of setting such high harvest levels in the case that the projected strong recruitment class never matures into the fishery.

Amazingly, NMFS admits that the optimistic recruitment numbers on which the high harvest levels are based have "not been completely validated in the data used to assess the stock." Id. NMFS also acknowledges that the "risk of error progressively increased from including those recruitment estimates because they were based on increasingly limited data." Id. NMFS' decision to set harvest levels at ABC appears based entirely on this unvalidated and uncorroborated data. Such irrational reasoning is indefensible. NMFS must discuss fully the environmental consequences of the severe overfishing that will occur if the data upon which it relies turns out to be an inaccurate overestimation of the 2000 and 2001 recruitment classes.

NMFS' decision to set such high harvest levels is inconsistent with the scientific studies on which it purports to rely. The 2003 Stock Assessment cautions against over reliance on the 2000 and 2001 numbers: "Information on 2000 and 2001 recruitments should be carefully monitored. High estimates for both the 1995 and 1998 recruits were later reduced when more information was received." Jean Beyer Rogers, Pacific Fishery Management Council, Darkblotched Rockfish (*Sebastes crameri*) 2003 Stock Status and Rebuilding Update, Vol. 1: Status of the Pacific Coast Groundfish Fishery Through 2003 and Recommended Acceptable Biological Catches for 2004 (Stock Assessment and Fishery Evaluation) 5 (2003). The DEIS conveniently omits any mention of these findings despite referencing the 2003 Rogers Assessment as the basis for its decision. NEPA requires that NMFS fully analyze and discuss the quality of the information on which it is relying and how it accounted for that quality in its choice to set harvest levels so high for the darkblotched rockfish.

NMFS' decision to front-load predicted strong recruitment numbers as justification for setting the darkblotched OY at ABC is contradicted by a growing recognition among scientists that high year classes may be less likely to recruit to a depleted fishery. See DEIS at App. A 2.3.2. The DEIS explains how this works:

> Researchers are beginning to identify cultivation/depensation effects that run counter to traditional ideas of density-dependent population response (Pauly *et al.* 2002). Adults of a given species may control the abundance of species preying on their juveniles. If the number of adults is reduced below some level, this predation is unchecked, leading to serial recruitment failure. This process is hypothesized for large-sized rockfish species; declines in several of these species are correlated with increases in the abundance of smaller-sized rockfish species. The latter may be preying on the former's juveniles (Piner 2001).

Id. NMFS must consider this scientific phenomenon in its analysis of the recent strong recruitment classes for darkblotched rockfish and determine whether such an optimistic reliance on recruitment data is warranted at this time.

NMFS explains the relationship between OY and ABC for overfished species as follows: "the OY is typically the management target and is usually less than the ABC, based on the need to rebuild stocks to B_{msy}." DEIS at 4.1. The decision to set the OY at the ABC for darkblotched, a severely overfished species that is well below B_{msy}, is entirely inconsistent with NMFS' own policy. The DEIS fails to explain this apparent contradiction.

The DEIS also fails to consider recent overharvests of darkblotched rockfish. See supra Part II.A. Undeterred by these recent failings of the regulatory management regime to prevent overfishing, NMFS decided to set the 2004 harvest level for the darkblotched at the ABC. The Groundfish Management Team ("GMT") recently reported to NMFS that it projects 2004 mortality for darkblotched to be more than 15% over the OY/ABC. Pacific Fisheries Management Council, GMT Report on Initial Consideration of Status of Fisheries and Inseason Adjustments Addendum C.2.b (Sept. 2004). Recurrent overfishing of the most depleted species indicates a systemic failure of NMFS' management policy that must be addressed in this DEIS and, more broadly, in an entire overhaul of that policy.

Canary Rockfish

NMFS has chosen to include a buffer between projected mortality and harvest levels for overfished species that it claims results in an added layer of protection to prevent overfishing. The DEIS explains that such a buffer is especially important for "constraining species" such as canary rockfish due to the high cost and difficulty of monitoring and inseason management actions needed to avoid exceeding the OYs for such species. DEIS at 7.3.1.1. Illogically, the buffer for canary rockfish – the very species used to justify the need for a buffer – is smaller in the Council-preferred alternative than for any of the other overfished species other than the widow rockfish, which is afforded no buffer at all. See DEIS Tables 2.13a and 2.13b (5.4% buffer in 2005 and 3.8% in 2006). NEPA requires that NMFS explain fully its rationale for including buffers for overfished species and what size buffers are necessary to avoid overfishing. NMFS must also explain the variance in the size of buffers selected for the different overfished species and the environmental consequences of any of the buffers being exceeded.

Widow Rockfish

The DEIS fails to address fully the uncertainties in the data underlying the alternative harvest levels presented for the widow rockfish and how those uncertainties could alter the calculus in successfully rebuilding the species. See DEIS at 2.1.2.9 and 4.3.1.11. The limited discussion states that "the range of harvest specifications attempts to analyze varying rebuilding probabilities and model uncertainties in the assessment and rebuilding analysis," but does not begin to explain the analysis or its potential ramifications on the successful rebuilding of the species. Id. The scientific stock assessment and rebuilding analysis on which the range of 2005-2006 harvest specifications is based cautions that "the primary source of information on trends in abundance of widow rockfish . . . is a questionable source of information for widow rockfish." Xi He, et al., National Marine Fisheries Service, Status of the Widow Rockfish Resource in 2003 3 (May 2003). The DEIS must explain and analyze the consequences of its actions to ensure informed decisionmaking and public participation. It is unclear whether any consideration is given to the questionable source of information on which NMFS relies in setting widow harvest specifications. If NMFS has done so, it must explain how this basic uncertainty plays into its decision to choose the highest harvest level for widow rockfish among all the alternatives considered.

As mentioned above, the proposed specifications provide no buffer for widow rockfish, one of the most depleted species. It is unreasonable to choose an alternative with no buffer given the major uncertainties in the reliability of the stock assessment mentioned above. The DEIS fails to explain the rationale for choosing this approach.

Bocaccio

The DEIS lacks any meaningful discussion of how alternative bocaccio harvest levels would affect the species's prospects of rebuilding successfully. See DEIS at 2.1.2.1 and 4.3.1.3. Total mortality for bocaccio has exceeded OY every year since 2000, in at least one case by more than 100%. The DEIS does not even mention this astounding track record. NMFS must consider what impacts such continuous overfishing have on the viability of the rebuilding plan and the assumptions contained therein. Failure to do so violates NEPA.

The DEIS also fails to explain NMFS' reasoning behind the 23% increase in OY for bocaccio from 2004 to 2005. Consistent with the conclusory rationale used to justify high harvest levels for most of the overfished species, the DEIS blindly relies on the assumptions and conclusions contained within stock assessments and rebuilding plans without any explanation for the reader. NMFS must do more than merely cite to a stock assessment or rebuilding analysis to fulfill NEPA's requirement that it discuss the environmental consequences of its actions.

In the section entitled "Irreversible Resource Commitments," the DEIS mentions that "there is not enough information to determine a definite threshold below which population decline is irreversible" due to the "variability in assessment results." DEIS at 9.2. Such a conclusion cries out for a more precautionary approach to setting harvest levels for overfished species. In addition, this is precisely the type of information – great uncertainty regarding irreversible population decline for an overfished species – that must be addressed more thoroughly in the DEIS' explanation for choosing the preferred harvest level over more precautionary alternatives.

The DEIS also fails to investigate the potential impacts of the trip-limit allocation of bocaccio to large footrope trawl in the preferred alternative for limited entry trawl gear south of 40 degrees 10 minutes. Since large footropes can only be used seaward of the RCA, the bocaccio caught under this trip limit are likely to be the large old fish that dwell at depth. Several new studies show that big old fish are particularly productive, and that their young grow and survive more successfully than those of more junior members of the population.[1] The DEIS should explain how the strategy of encouraging commercial trawl catch of big old fish helps

[1] Bobko, Stephen J. and Steven A. Berkeley, 2004. Maturity, ovarian cycle, fecundity and age-specific parturition of black rockfish, Fish. Bull. 102: 418-429. Berkeley, Steven A. and Mark Hixon, Ralph Larson, and Milton Love, 2004. Fisheries sustainability via protection of age structure and spatial distribution of fish populations. Fisheries (in press). Berkeley, Steven A., Colin Chapman and Susan Sogard, 2004. Maternal age as a determinant of larval growth and survival in a marine fish, *Sebastes melanops*. Ecology 85(5), pp. 1258-1264.

rebuild the bocaccio population as soon as possible, and how that strategy meshes with these new findings.

B. The DEIS' Analysis of Bycatch Reduction is Inadequate.

The DEIS employs a different analytical approach to estimate bycatch impacts on the non-whiting trawl fishery for Action Alternatives 1 through 3 than it does under the Council-preferred Alternative. See DEIS at 4.3.2.1. The Council-preferred Alternative employs a bycatch model that applies the bycatch rate from the selective flatfish trawl (SFFT) experimental fishing permit ("EFP") in lieu of the bycatch model used in Action Alternative 1-3 that bases its models on bycatch rates from the WCGOP observer program. Id. This approach leads to "predicted savings in rockfish [that] are even more substantial" than the approach that calculates bycatch based on observer data alone. Id. Expansion of the SFFT gear to the entire fishery is a prudent approach to reducing bycatch. However, as NMFS acknowledges, the SFFT gear has never been tested during the winter months so it is inappropriate and risky to assume lower bycatch rates for the fishery year-round until that data have been fully validated. The DEIS explores four options for extrapolating winter SFFT bycatch rates from the limited data available and ultimately chooses the least cautious approach. Id. NMFS must analyze the environmental consequences of significantly increased bycatch in the winter months if these estimates prove inaccurate.

C. The DEIS' Analysis of Rockfish Conservation Areas is Inadequate.

NMFS is proposing to reduce the size of the non-whiting trawl RCA by 40%. DEIS at Table 3-1. This is the smallest amongst the RCA alternatives. Id. NMFS does not discuss how this choice will affect the successful rebuilding of overfished species. The discussion of environmental effects is limited to a vague prediction that "this alternative will have the greatest impact on EFH and the ecosystem because projected target species catch, acting as a proxy for fishing effort, is highest under this alternative." DEIS at 3.5. The unjustified and unanalyzed decision to dramatically reduce the size of the RCA conflicts with the DEIS' broad proclamation that "these Rockfish Conservation Areas (RCAs) were a key feature of 2003 management, and continue to be so today." DEIS at 1.3.2. The DEIS must discuss fully the potential environmental consequences of shrinking the RCA and must compare these consequences with the environmental and conservation advantages of keeping the RCA to its current boundaries.

The DEIS fails to analyze the impacts of the various RCA alternatives on overfished groundfish species and, more generally, the marine ecosystem. NMFS explains that "the extent of the RCAs . . . are smaller under the Council-preferred Alternative . . . because it reduces the size of the closed areas in need of enforcement." DEIS at 7.5.5. However, in the very next sentence, NMFS contradicts its own justification for a smaller RCA by stating that "regulatory complexity and costs to the management regime due to the size of commercial closed areas . . . are not anticipated to differ substantially between the alternatives." Id. Later in its analysis, the DEIS explains that vessel costs and safety are reduced along with the size of the RCA. See DEIS at 8.3.1.5. If lower costs are the chosen rationale for shrinking the size of the RCA, then NMFS must be clear about this and explain who will benefit from the savings – the regulatory regime, the fishing community, or both. Regardless of whether the justification is reduced cost or something else, the DEIS must also analyze the expected environmental impacts of reducing the RCA. It makes little sense, of course, to reduce the size of the RCAs in order to save on enforcement costs if the consequence of that decision is to increase mortality of overfished species.

Another problem with the analysis pertaining to RCAs is that the DEIS applies inconsistent reasoning between the decisions to reduce the size of the trawl RCA but to maintain the status quo for the non-trawl RCA. The DEIS correctly resists calls to shrink the non-trawl RCA because "[t]he estimated mortality of overfished shelf species (bocaccio, cowcod, canary, lingcod, widow, and yelloweye) would be progressively higher [if the RCA was reduced in size] since more fishing is progressively allowed in depths where these species are found." DEIS at 4.3.2.2. However, it is completely arbitrary and capricious for NMFS to base its decision to maintain the size of the non-trawl RCA on sound science and the need to rebuild overfished species yet ignore these realities in its decision to reduce the size of the trawl RCA. The DEIS must apply the same scientific standards and decisionmaking criteria to both analyses.

D. The DEIS' Analysis of Impacts on Essential Fish Habitat and the Ecosystem is Inadequate.

The MSA requires NMFS to describe, identify and minimize impacts to essential fish habitat ("EFH"). 16 U.S.C. §§ 1853(a)(7), 1855(b). NMFS claims to recognize its obligation to analyze how the proposed specifications and management measures will impact EFH and the ecosystem in general. See DEIS 3.1 ("[m]anagement measure alternatives that affect fishing activities having potential adverse effects on EFH must be evaluated"). However, rather than actually evaluate these impacts in relation to the proposed specifications, NMFS merely provides a general overview of the scientific literature on the general effects to EFH of a variety of fishing and non-fishing related activities. See generally DEIS App. A. NMFS has decided not to predict the effects of other actions, such as setting harvest specifications," until after it completes its programmatic EFH EIS sometime in February 2006. DEIS App. A at 4.5. NMFS must evaluate impacts of the proposed specifications to EFH within this NEPA review. As Appendix A demonstrates, NMFS possesses considerable information on EFH.

IV. THE DEIS FAILS TO ANALYZE CUMULATIVE IMPACTS ADEQUATELY.

NMFS's discussion of cumulative impacts is vague and incomplete. NEPA requires NMFS to address the cumulative effects which result from the incremental impact of the proposed fishing specifications "when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions." 40 C.F.R. § 1508.7. The DEIS fails to analyze adequately the cumulative effects of past overfishing and the cumulative impacts on EFH and the marine ecosystem.

A. The DEIS Fails to Consider the Cumulative Effects of Past Overharvests.

NMFS must discuss the cumulative effects of past overharvests and how these past overharvests were accounted for in developing the 2005-2006 harvest levels. See Lands Council v. Powell, 379 F.3d 738, 744-746 (9th Cir. 2004) (requiring timber harvest EIS to discuss impacts from past harvests in consideration of alternatives and to provide adequate data of the time, type, place, and scale of past timber harvests). The DEIS lacks any discussion of the ramifications of past overharvests on the 2005-2006 specifications, especially regarding the most overfished species.

NMFS acknowledges that past overfishing is a cumulative effect that could jeopardize the sustainability of overfished species, but completely ignores consideration of the cumulative effects of repetitive overfishing. The DEIS explicitly states that "[p]ast overfishing has resulted in the overfished status for eight groundfish stocks, jeopardizing sustainability" and that "[r]ecurrent overfishing would further jeopardize stocks." DEIS at 9.7. However, NMFS also explains that "[t]ruly jeopardizing the sustainability of a stock is more likely to result from the cumulative effect of overfishing over a longer period than the 2005-2006 management cycle." Id. In essence, NMFS is saying that overfishing can jeopardize sustainability, but that is unlikely to occur within the next few years, even if overfishing continues. Unfortunately, NMFS seems to be relying more on faith than sound science or rational analysis. NMFS must explain its belief and support its decisions on this issue. The DEIS does neither.

In lieu of any true cumulative impacts analysis, NMFS merely directs the reader to the tables listing the estimated mortality on the eight overfished species from various sources under the different alternatives. See DEIS at 4.4. The brief section lacks any discussion at all regarding how bycatch of overfished species would be affected under the different Action Alternatives. The section merely identifies canary rockfish as the most at risk of exceeding its harvest level because bycatch comprises nearly all of its OY. The only proposal NMFS can muster is that "tracking canary rockfish mortalities closely inseason will be critical to avoid overfishing that stock." Id.

The DEIS also declares that management measures in 2005-2006 are intended to respond to past overharvests, but does not explain sufficiently what measures it plans to employ and specifically how they will respond to past overfishing. DEIS at 4.2.

B. The DEIS Fails to Consider the Cumulative Impacts on Essential Fish Habitat and Ecosystems.

The analysis of cumulative impacts on EFH and the marine ecosystem is similarly undeveloped and vague. Although the DEIS mentions that past fishing activity "likely resulted in substantial impacts to EFH and . . . ecosystem structure," the document lacks any discussion or explanation as to what those impacts were or how they may effect the long term viability of a sustainable groundfish fishery. DEIS at 3.4. In addition, no mention is made regarding the cumulative impacts on the ecosystem and EFH of chronic overharvesting of overfished species.

The DEIS fails to address how the cumulative impacts on the ecosystem and EFH would vary depending on which alternatives are chosen. This lack of cumulative impacts analysis is said to be the result of insufficient information on whether "the magnitude of cumulative effects under the alternatives will differ from the relative magnitude of direct and indirect effects." DEIS at 3.5. Rather than derive an answer to this question, NMFS instead chooses to summarily conclude that "those alternatives producing greater direct and indirect impacts would be expected to result in greater cumulative impacts," and not discuss what those impacts would be. Id. NMFS has failed to perform the analysis required by NEPA.

V. CONCLUSION

The DEIS on the proposed 2005-2006 specifications fails to meet the requirements of NEPA. Accordingly, we urge the Council and NMFS to provide more detailed information on the decisionmaking process; consider adequate alternative harvest levels and alternative bycatch reduction measures for overfished species; assess fully the specifications' effects on overfished species, bycatch reduction, RCAs, and EFH; and consider adequately the cumulative effects of repeated overfishing on overfished species and EFH. NMFS must take all other steps necessary to bring this DEIS into compliance with the requirements of NEPA.

Sincerely,

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3.0 Responses to Comments Received on the Draft EIS

The 45-day public comment period on the Groundfish Harvest Specifications DEIS closed on October 12, 2004 (69 FR 52668). NMFS received a comment letter from EPA in accordance with the requirements of NEPA and Section 309 of the Clean Air Act. In their comment letter, EPA rated the alternatives. Additionally, NMFS received a comment letter from the Natural Resources Defense Council (NRDC), an environmental advocacy organization. The EPA letter and comments and the NRDC letter are reproduced in Section 1.0 and 2.0 of this appendix. The next two sections provide responses to the comments in these two letters.

3.1 Response to Comments from EPA

The EPA had three comments attached to their letter. Responses to their comments are given below the headings used in their letter.

Optimum Yield Projections for Canary and Widow Rockfish

EPA notes that harvests under Alternatives 2 and 3 are projected to exceed OYs for canary and widow rockfish established by the Council. As noted, the Council-preferred alternative includes sufficient mitigation, partly in the form of bycatch caps for the whiting fishery, so that projected harvest does not exceed OYs. If the Council had decided to choose a package of management measures modeled after those in Alternatives 2 or 3, mitigation measures sufficient to constrain harvests to OYs would have been developed and included in the alternative. In other words, the Council and NMFS, as a matter of policy, do not establish management measures that are projected to allow harvests exceeding the OYs also established as part of the proposed action.

Observer Coverage

NMFS has not proposed electronic monitoring as a substitute for human observers. Electronic monitoring equipment is primarily useful in identifying where a vessel is located or what fishing activities are taking place on board that vessel. For example, NMFS has been testing the use of camera monitors in the full-retention shorebased whiting fishery. In this fishery, participating vessels retain all of their catch and do not sort it until the vessel is at the dock. Camera monitors were tested in the summer of 2004 to determine whether they would be useful tools for verifying whether the participating vessels had retained all of their catch or dumped some catch at sea. Because the vessels do not sort their catch at sea, species-specific identification of catch is not necessary.

Depending on the goal of an observer program, 100% observer coverage may not be necessary. WCGOP is a total catch sampling program, meaning that a portion of the groundfish catch is sampled and bycatch estimates are extrapolated for the fleet from those samples. Vessels participating in the at-sea whiting fisheries are being monitored for real-time accounting of catch and bycatch, thus they carry observers around the clock. For sectors where a full retention program is possible, camera monitoring in company with current VMS requirements may be a sufficient monitoring program. For sectors where real-time data is needed to monitor individual quota (IQ) catch of particular species, 100% observer coverage may be appropriate.

EPA also supports quota incentives for fishers and vessels that accommodate observers. This is a feature in the preferred alternative in the FEIS for the bycatch mitigation program, distributed by NMFS in September 2004. The Council is also evaluating various monitoring requirements in connection with the Trawl IQ EIS, currently under Council development. At their November meeting, the Council will discuss both future steps for implementing their preferred alternative in the Bycatch FEIS and for developing a range of alternatives for the Trawl IQ EIS.

Impacts on Habitat

EPA states that the EIS should discuss the spatial and temporal distribution of fishing effort by various gear types and resulting impacts on various habitats. These types of data are not currently available, so the EIS provides a general estimate of the distribution of effort based on the distribution of projected catches seaward and shoreward of the RCA. NMFS and the Council agree that more information needs to be gathered on the effects of fishing on EFH. NMFS is currently developing an EIS, both to improve the information base and propose mitigation measures for fishing-related impacts. This DEIS is scheduled to be completed in February 2005.

3.2 Response to Comments from NRDC

Responses to comments provided by NRDC are given below under headings used in their letter.

I. The DEIS Lacks Data That is Crucial to the Informed Decisionmaking Process Required of NEPA and the MSA

The NRDC claims the DEIS has not provided crucial data for informed groundfish management decision-making and cites the following points to bolster these claims:

1. Failure to provide actual catch and bycatch mortalities for the past five years.
2. Failure to provide adequate discussion of the underlying stock assessments and rebuilding analyses on which alternatives are based.
3. Failure to consider estimated mortalities of overfished species by fishery for 2006 for alternatives other than the Council-preferred Alternative.

The best estimates of total mortality in 2002 and 2003 West Coast fisheries, including landings and discard mortalities (or bycatch), are provided in DEIS Tables 4-1 and 4-2. Species-specific data is not available for all groundfish species because not all groundfish species are noted individually on landings receipts. Commercially unimportant species or species landed in small amounts tend to be landed as part of a species aggregation, such as “minor slope rockfish.”

Total landings for all West Coast fisheries that have taken groundfish from 1981-2003 are provided in Table 8-1a. Additional groundfish landings and discard estimates for the 1999-2003 whiting trawl fisheries are provided in Table 4-11, groundfish mortalities in the 2000-2003 tribal fisheries in Tables 4-15 and 4-16, groundfish mortalities in 1996-2003 Washington recreational fisheries in Table 4-18, groundfish landings in the 2000-2003 Oregon recreational fisheries in Table 4-21, and groundfish mortalities in the 2003 California recreational fishery in Table 4-25. The GMT and scientists from the NMFS Northwest Fisheries Science Center deliberated on how far back to hindcast groundfish discard mortalities using WCGOP data to produce the analogous historical catch information provided in Tables 4-1 and 4-2. Their professional judgement was that WCGOP data collected since the fall of 2001 should only be used to estimate discards during the period since WCGOP implementation. Using these data to estimate discards prior to the 2002 fishing year was not recommended since harvest specifications, trip limits, and other aspects of the management regime were dramatically different prior to 2002, which has a direct effect on discard rates. Therefore, only assumed rates of discard were available for those years. Furthermore, the GMT believed these older, less informed estimates of total mortality were not particularly useful for projecting impacts of alternative 2005 and 2006 groundfish management measures, given the different suite of fishery constraints and the new depth-based management regime.

Total catch estimates from 2004 are not included in the FEIS because the 2004 fishing year will not have ended by the time the FEIS is required to be completed. Data from the 2004 fishing year, including observer data, will become available in 2005. At this time, these 2004 fishing year data are preliminary and incomplete. The Council and NMFS plan to adjust management measures inseason as necessary, including potential changes in the configuration of RCAs, in response to fishery status or new information. Section 7.3.1.1. describes this process and details a schedule developed by the Groundfish Information Policy Committee where new WCGOP information on bycatch in limited entry trawl, limited entry fixed gear, and open access sectors will be introduced to the 2005 and 2006 fisheries on an inseason basis.

Regarding claim number two, the DEIS cites all the relevant stock assessments and rebuilding analyses used for 2005-2006 groundfish management decision-making. Key conclusions and summaries from these publications are provided in DEIS chapters 2 and 4, with all the underlying science otherwise incorporated by reference. All the relevant stock assessments, stock assessment review panel reports, and rebuilding analyses can also be found in published Stock Assessment and Fishery Evaluation (SAFE) documents on the Council's website at http://www.pcouncil.org/groundfish/gfstocks.html.

As explained in section 2.2.4 of the DEIS, there is only a total catch accounting of 2005 management measures in the "bycatch scorecards" provided for the non-preferred action alternatives since "there is only a minor variation in some 2005 and 2006 OYs (Tables 2-1a and 2-1b) that cannot be discerned in the aggregated mortality estimates for those sectors where there are annual differences." Such minor differences in expected 2005 and 2006 fishery impacts are explored throughout the DEIS.

Finally, the commenter stated that mortality estimates in the DEIS scorecards (Tables 2-13a and 2-13b) differed from the mortality estimates of overfished species provided in the proposed rule to implement the 2005-2006 specifications and management measures. The only species for which the total catch OYs for both years differs between the DEIS and the proposed rule is lingcod, where the 2005 and 2006 OYs are listed in Tables 2-13a and 2-13b as 2,414 mt and in the proposed rule as 2,413 mt, a difference attributable to rounding. There is also a typographic error in the proposed rule's 2006 ABC/OY table under the entry for cowcod, which incorrectly shows both the Monterey and Conception area OYs as 2.4 mt, when they should be shown as 2.1 mt each. NMFS will make this correction in its final rule. The mortality estimates in Tables 2-13a and 2-13b are those adopted by the Council. NMFS will review any additional typographic errors pointed out by the commenter and correct them, if necessary, in the final rule for this action.

II. The DEIS Fails to Consider a Reasonable Range of Alternatives

The commenters state that the EIS fails to consider a reasonable range of alternatives for harvest levels and bycatch reduction measures. The range of harvest levels that can be considered is constrained by policies for setting ABC, based on available scientific information, outlined in Section 4.3 of the Groundfish FMP. For overfished species, rebuilding plans place constraints on the OYs that can be considered. For assessed stocks, the most recent stock assessment places boundaries on the range of OYs that can be considered, usually reflecting scientific uncertainty in the assessment models. The EIS considers a reasonable range of OYs falling within the constraints imposed by these policies and a science-based approach. Bycatch reduction, especially for overfished species, is an important part of the management strategy. The range of reduction measures that could be implemented given currently available data is fully explored in the EIS. These issues are discussed in more detail below.

A. The DEIS Fails to Consider Alternative Harvest Levels Adequately For Several Overfished Species

Darkblotched Rockfish

The NRDC takes issue with the range of alternative harvest levels considered for darkblotched rockfish and found the decision to set the OY equal to the ABC to be "disturbing." The range of considered harvest levels for darkblotched rockfish was consistent with the darkblotched rockfish rebuilding plan adopted by Groundfish FMP Amendment 16-2. The new darkblotched rockfish stock assessment and rebuilding analysis (Rogers 2003a) provided alternative yield projections that were the basis for the range of alternative harvest levels explored in the DEIS. The Council-preferred Alternative does not modify the target rebuilding year decided under the adopted rebuilding plan, nor the harvest control rule modified from the rebuilding plan during the 2004 Groundfish Specifications process. The 2005 and 2006 darkblotched rockfish harvest specifications under the Council-preferred alternatives are therefore based on projections from the stock assessment/rebuilding analysis consistent with these past decisions.

The decision to set the OY equal to the ABC was predicated on the ABC being the legal limit for a harvest specification under the MSA and NSGs. The darkblotched rockfish ABC is based on a proxy harvest rate applied to the current estimate of exploitable biomass. As explained in the DEIS, the Rogers (2003a) stock assessment/rebuilding analysis projected rebuilding OYs that were higher than the ABC derived using the proxy harvest rate. Therefore, limiting the OY to the lower ABC specification is considered a risk-averse decision that will result in faster rebuilding than required by the rebuilding plan.

Finally, the Council revisited some groundfish management measures at their September 2004 meeting, subsequent to preparation and publication of the DEIS, in response to new information about expected darkblotched rockfish impacts. The FEIS documents a Council recommendation to revise 2005 and 2006 trawl management measures to extend the seaward boundary of the trawl RCA from 150 fm to 200 fm north of 38° N latitude and to halve the slope rockfish trawl trip limit to reduce expected darkblotched rockfish impacts. These revisions were considered necessary after observing darkblotched rockfish impacts in the summer 2004 trawl fishery that were higher than expected. These revisions were designed to ensure the 2005 and 2006 harvests remain below the adopted OYs.

Canary Rockfish

The range of considered harvest levels for canary rockfish is consistent with the canary rockfish rebuilding plan adopted by Groundfish FMP Amendment 16-2. As explained in the DEIS, differential size selectivity of commercial and recreational fishing gears leads to differential total mortality impacts of canary rockfish as the ratio of projected commercial and recreational take varies. Therefore, the alternative canary rockfish harvest levels analyzed simply reflect differential commercial and recreational impacts; all of which are impact-neutral in terms of the adopted rebuilding plan. No modification of the specified canary rockfish target rebuilding year or harvest control rule were contemplated in the 2005 and 2006 groundfish management decision, since there was not a new stock assessment or rebuilding analysis conducted on which to base a broader range of harvest level alternatives. The commenter is correct, however, in noting that Tables 2-1a and 2-1b neglected to include the final Council OY alternative for canary rockfish. Those tables have been corrected in this FEIS.

Bocaccio

NMFS agrees that the DEIS should have explained why bocaccio were assessed separately south of 40°10' N latitude. The FEIS discusses the research indicating the lack of genetic mixing between the stock located south of 40°10' N latitude and the stock located in waters off northern Washington. It is the stock south of 40°10' N latitude that has been assessed as overfished. NMFS trawl survey information also indicates a break in bocaccio distribution north and south with very few bocaccio ever observed in waters off northen California and Oregon. The stock was never formally assessed north of 40°10' N latitude due to a lack of available information.

Bocaccio are managed in the north as part of the Remaining Rockfish North complex. While a separate ABC and OY were determined in the Rogers et al. (1996) assessment of Sebastes based on historical landings in the north, the management unit is the Remaining Rockfish North complex due to the paucity of information for a quantitative stock-specific assessment. Therefore, the judgement of the GMT and other DEIS authors was that there was not enough information available to develop and analyze a range of harvest level alternatives for the Remaining Rockfish North complex, nor was this particularly necessary due to the lack of expected impacts given the depth-based area closures and gear restrictions that were part of the considered 2005-2006 management actions in the north. For 2005-2006, the Remaining Rockfish North complex will be managed under the Council's precautionary policy of setting the complex's total catch OY at 56.25% of historic landing levels (historical catch * 0.75 = ABC, ABC * 0.75 = total catch OY).

Lingcod

The NRDC takes issue with the range of considered harvest levels for lingcod and the fact that none of the alternatives analyzed are lower than the 2004 OY. The new lingcod stock assessment and rebuilding analysis (Jagielo et al. 2004) indicate a much higher lingcod spawning stock biomass than when the stock was last assessed. The Council's SSC further analyzed lingcod status at the March 2004 Council meeting, which considered the higher than expected 2003 catches. Catch exceedances from prior years were incorporated into the lingcod stock assessment. The SSC analysis of the lingcod assessment, which is summarized in DEIS Table 2-3, shows the stock has recovered to within 99.3% of the spawning biomass target and has, in fact, exceeded rebuilding plan goals north of 40°10' N latitude and is exceeding expected rebuilding plan progress on a coastwide basis. Lingcod's rapid and vigorous response to rebuilding measures has resulted in increased lingcod abundance and availability to commercial and recreational fisheries. The new assessment/rebuilding analysis also allows consideration of modifying strategic rebuilding parameters, such as the target rebuilding year and the harvest control rule. The Low OY harvest level alternative applied the previously-specified harvest control rule from the lingcod rebuilding plan adopted by Groundfish FMP Amendment 16-2 to the new estimate of exploitable biomass, while the other harvest level alternatives consider changes to the harvest control rule. While the Low OY harvest level alternative is still larger than the No Action (2004) OY, it is due to the new estimate of a much larger stock biomass. The Council-preferred Alternative also specifies conservative measures to manage lingcod to ensure timely stock recovery. Such management measures include conservative recreational and commercial harvest guidelines that, in combination, project total mortality impacts that are less than 40% of the recommended lingcod OY in 2005 and 2006 (Tables 2-13a and 2-13b, respectively). These measures are considered responsive to past overharvest of lingcod and risk-averse for rebuilding the stock.

B. The DEIS Fails to Consider Alternative Bycatch Reduction Measures Adequately

The alternatives encompass several bycatch reduction mechanisms that can be implemented under the current management regime, including RCA restrictions for the non-whiting trawl, fixed gear and open access commercial sectors; depth and season restrictions in recreational fisheries; new trawl requirements to require proven bycatch-reducing gear modifications; and differential trip limits as an incentive to fish in areas deeper than those inhabited by overfished species. Additionally, the Council-preferred alternative includes bycatch caps in fisheries where monitoring exists to substantiate total catch, namely the Pacific whiting fisheries.

Relative to Pacific whiting, setting specific harvest specifications for the 2005 and 2006 Pacific whiting fisheries are not part of the suite of actions considered in this EIS. However, the Council did specify set-asides for stocks that could potentially constrain opportunities in the Pacific whiting and other West Coast fishing sectors. Adoption of harvest specifications for the 2005 Pacific whiting fishery will occur through Council and NMFS action in March 2005. A new stock assessment for Pacific whiting is underway and is anticipated for review in February 2005. NMFS and the Council do not currently have the information necessary to establish or evaluate the value of area closures in the whiting fishery. However, NMFS and the Council plan to evaluate these possible tools for use in the fishery, and, if appropriate, could implement them through a separate rulemaking process. The "penalty box" proposal was raised late in the process, and is difficult to implement in the federal regulations because of the due process issues raised. Voluntary avoidance of areas of high bycatch of overfished species as a means of harvesting Pacific whiting quotas while staying below bycatch caps may be sufficient to limit impacts to overfished species in the Pacific whiting trawl fishery. Additionally, the Council-preferred Alternative includes bycatch caps on canary rockfish and widow rockfish for the Pacific whiting trawl fleet.

III. The DEIS Fails to Disclose and Analyze Adequately the Environmental Effects of the Proposed Specifications

The commenters state that the EIS does not provide detailed information on the environmental impacts of the proposed action, especially in relation to overfished species, bycatch reduction, RCAs and essential fish habitat. However, the EIS does provide extensive and detailed discussion of the impacts of the alternatives across a range of environmental components in Chapters 3 through 8 of the document. Comments on these specific issues are addressed below.

A. The DEIS' Analysis of Impacts on Overfished Species is Inadequate

Darkblotched Rockfish

As explained in the response to NRDC comments in section II.A, setting the OY equal to the ABC is not risk-prone since the rebuilding analysis concludes higher OYs than the ABC would rebuild the stock within the timeframe recommended in the National Standard 1 Guidelines with a high probability. The Rogers (2003a) assessment and rebuilding analysis concludes an OY of 333 mt in 2005 (and 362 mt in 2006) would rebuild to the biomass goal of 40% of unfished biomass with an 80% probability within the maximum allowable time. This OY specification relies on preliminary evidence of relatively strong 2000 and 2001 year classes. However, the Council's recommendation to set the OY at a lower level and equal to the ABC (269 mt in 2005 and 294 mt in 2006), does not rely on this recent recruitment assumption as the NRDC claims in their response. The Council-preferred OY for darkblotched rockfish simply applies the proxy harvest rate of F45% to current estimates of exploitable biomass and does not include the potential effect of the 2000 and 2001 year classes on the 2005 and 2006 fisheries. The Rogers (2003a) assessment/rebuilding analysis does factor in the actual harvests in historical fisheries, whether they were estimated above prescribed limits or not. Therefore, the underlying science does account for past fishing mortalities.

Canary Rockfish

This comment refers to discussions in Chapter 7 of the EIS pertaining to impacts to the management regime. The concept of harvest specification buffers is explained in the FEIS in section 7.3.1.1. The Council and NMFS plan to minimize impacts to overfished species and to manage groundfish fisheries in 2005 and 2006 to attain but not exceed rebuilding OYs. Management measure alternatives that do not fully utilize OYs can provide inseason management flexibility and reduce the impacts to the management regime and the risk of exceeding the OYs. However, providing these "buffers" can be a difficult challenge for constraining species such as canary rockfish and it may not always be possible to prevent significant inseason adjustments in response to new information or fishery status. The Council and NMFS weighed the benefits to the management regime against the socioeconomic costs from adopting management measures projected to harvest less than the rebuilding OY when considering the alternatives. As stated in Section 7.3.1.1, improved fishery monitoring of commercial and recreational fisheries, including continuation of the WCGOP and implementation of the CRFS will help the Council and NMFS achieve the goal of managing 2005 and 2006 groundfish fisheries within rebuilding OYs.

Widow Rockfish

The widow rockfish stock assessment (He et al. 2003b) and rebuilding analysis (He et al. 2003a) are relatively data-poor, as noted in the DEIS. The alternative widow rockfish harvest levels analyzed in the DEIS represent the range of plausible model outputs recommended by the Council's SSC and are consistent with the widow rockfish rebuilding plan adopted by Groundfish Amendment 16-3. The alternative harvest levels considered in the Amendment 16-3 EIS allow a thorough exploration of the uncertainty of data sources underlying this range of alternative harvest levels. These uncertainties were summarized in this DEIS, with more specific discussion incorporated by reference to the Amendment 16-3 EIS.

The NRDC confuses the apparent lack of a "buffer" in the overfished species' bycatch accounting tables or "bycatch scorecards" (Tables 2-13a and 2-13b for the 2005 and 2006 Council-preferred alternative, respectively) with an intent to manage for the highest widow rockfish harvest level. As stated clearly in section 2.2.4.1, the Council is focusing its widow rockfish bycatch reduction measures on the whiting fishery, where the vast majority of impacts to this stock occur. While a suite of potential bycatch reduction management measures for future whiting trawl fisheries are analyzed in the DEIS, 2005 whiting trawl management measures will not be decided by the Council until March 2005. Tables 2-13a and 2-13b, the 2005 and 2006 bycatch scorecards for the Council-preferred Alternative, note the residual yield of widow rockfish that might be available to the whiting trawl fishery after accounting for impacts in all other fishery sectors, which may be considered bycatch caps for these fisheries. These caps will not be exceeded and actual total mortality could fall below these caps.

Bocaccio

The alternative bocaccio harvest levels analyzed in the DEIS represent the range of plausible model outputs recommended by the Council's SSC and are consistent with the adopted bocaccio rebuilding plan adopted by Groundfish Amendment 16-3. The alternative harvest levels considered in the Amendment 16-3 EIS thoroughly explored the uncertainty of data sources underlying this range of alternative harvest levels and provides a decision table from the MacCall (2003a) rebuilding analysis exploring likely rebuilding consequences of choosing an assessment model that does not represent the true state of nature. These uncertainties were summarized in this DEIS, with more specific discussion incorporated by reference to the Amendment 16-3 EIS.

The DEIS did not adequately explain the difference in the No Action (2004) bocaccio harvest level and considered 2005 and 2006 harvest levels. The basis for the 2004 specification was added to section 4.3.1.3 in the FEIS. The basis for the 2005-2006 specifications may be found in section 4.3.1 of the EIS.

The commenters cite discussion in DEIS section 9.2 of the risk of irreversible decline if an overfished species' population size were to fall below some minimum threshold. They argue that this discussion "cries out for a more precautionary approach" with respect to bocaccio. The section summarizes potential irreversible resource commitments, one type of impact out of a range of impacts that must be discussed as part of an environmental impact analysis (40 CFR 1502.16). These are commitments which cause some permanent loss of an environmental attribute or service. The passage partially quoted by the commenters is in reference to theoretical work, and that is why "there is not enough information to determine a definite threshold below which population decline is irreversible." This discussion is meant to be speculative and is presaged by the statement "Cumulative, past, current, and future specifications could result in an irreversible commitment if a stock were extirpated or if population size is reduced to such a degree that even if harvesting stopped completely the stock would not recover." If an overfished species, including bocaccio, were to reach a population size small enough to present even a moderate risk of extinction, NMFS would be obligated to list that species under the ESA and manage the stock accordingly. Section 4.5.3.7 in the Groundfish FMP states that measures under an ESA-mandated recovery plan or biological opinion would supercede rebuilding plan measures if the ESA-related measures are more stringent. On January 30, 2001, the NRDC, Center for Biological Diversity, and The Ocean Conservancy petitioned NMFS to list bocaccio as threatened under the ESA. NMFS found that such a listing was not warranted (67 FR 69704, November 19, 2002). This finding used the 2002 bocaccio stock assessment (MacCall 2002), which estimated the age 2+ population at slightly less than 3,000 mt. The 2003 bocaccio OY was chosen based on an associated sustainability analysis, which showed a high probability of no further decline during the next 100 years with a 2003 harvest level of 20 mt or less. The next bocaccio assessment (MacCall 2003b), using new recruitment data, estimated the age 1+ population at just over 7,000 mt and indicated higher population productivity. Given this information, it is unlikely that the bocaccio population risks the kind of "extinction spiral" discussed in general terms in Section 9.2. Management measures implemented pursuant to the rebuilding strategy for bocaccio are precautionary, are estimated to result in a 70% probability of stock rebuilding, and are unlikely to result in the severe population declines cited by the commenters and discussed in Section 9.2.

The rationale for specifying a bocaccio trip limit for large footrope trawls south of 40°10' N latitude was added to section 4.3.2.1 in the FEIS. While there is no change to the seaward boundary of the southern trawl RCA from No Action, the specified trip limit under the Council-preferred Alternative is designed to allow better shoreside monitoring of incidental mortalities of bocaccio caught as bycatch while targeting deep-water target species such as Dover sole, thornyheads, and sablefish. The GMT believes such a small trip limit (300 pounds/two months) will not encourage targeting of bocaccio, a species that is not considered desired or a valuable commercial target species. This trip limit represents a slight increase from the large footrope trip limit under the No Action Alternative of 100 pounds/month.

B. The DEIS' Analysis of Bycatch Reduction is Inadequate

The NRDC correctly notes the analytical approach to modeling impacts using selective flatfish trawls in the north varies between Action Alternatives 1-3 and the Council-preferred Alternative. While the explanation for the different analytical approaches is provided in DEIS section 4.3.2.1, the NRDC incorrectly surmises the method used to analyze the Council-preferred Alternative is the most risk-prone of the four methods considered. The approach used to model the Council-preferred Alternative was recommended by the GMT because the selective flatfish trawl's effectiveness at avoiding depleted rockfish is based on the behavior of rockfish when encountering the gear, not on variable distribution of rockfish or other seasonal effects. Nevertheless, the Council decided to buffer the uncertainty in expected impacts in non-whiting trawl fisheries by assuming a higher potential impact of the most constraining species (canary rockfish) than the new bycatch model predicts. The difference is a bycatch model point estimate of 5.2 mt of incidentally-caught canary rockfish versus a "buffered" impact projection of 8.0 mt under the Council-preferred Alternative. The Council's September 2004 refinement of trawl management measures in response to higher than expected darkblotched rockfish impacts, specifically the reduction in the slope rockfish trip limit and the seaward extension of the trawl RCA to 200 fm, further reduced the estimated impact of canary rockfish from 5.2 mt to 4.7 mt, thereby increasing the trawl impact buffer. The rationale for these linked decisions is thoroughly explored in DEIS section 4.3.2.1.

C. The DEIS' Analysis of Rockfish Conservation Areas is Inadequate

RCAs are analyzed first and foremost for impacts to overfished species with the intent of reducing bycatch. Section 4.3.2.1 presents alternate levels of projected target species' landings and impacts to rebuilding species under various RCA configurations and includes the underlying science-based bycatch rates from the WCGOP and studies on selective trawl gear. Various RCA configurations, coupled with trip limit alternatives, are intended to provide opportunities to harvest target species while constraining mortality on overfished species to rebuilding OYs, thereby achieving rebuilding goals. Often, the tradeoff for larger or smaller RCAs is larger or smaller trip limits, all designed to stay at or below rebuilding OYs. While issues such as vessel safety, socioeconomic costs and benefits, fishing impacts to EFH, and increased enforcement and management burdens are all presented in the DEIS for Council and NMFS consideration, the principle rationale for RCAs and their configurations is the reduction of bycatch by restricting fishing in areas of relatively high abundance of overfished species.

Additionally, the Council and NMFS plan to adjust management measures inseason as necessary, including potential changes in the configuration of RCAs, in response to fishery status or new information. Section 7.3.1.1. describes this process and details a schedule developed by the Groundfish Information Policy Committee where new WCGOP information on bycatch in limited entry trawl, limited entry fixed gear, and open access sectors will be introduced to the 2005 and 2006 fisheries on an inseason basis.

The letter refers to seemingly contradictory language in Section 7.5.5 of the EIS. The intent of this section of the EIS is to summarize impacts to the management regime that result from the alternatives, in this case the Council-preferred Alternative. This language has been revised to clarify that the impact to the enforcement burden due to the size of the RCA has been reduced considerably with the implementation of the Vessel Monitoring System. The intent of this language is not to imply that the trawl RCA configuration under the Council-preferred alternative was based solely on enforcement concerns or impacts to the fishery management regime. Again, the principle rationale for RCAs and their configurations is the reduction of bycatch by restricting fisheries in areas of relatively high abundance of the adult life stage of overfished species.

Relative to the size and configuration of RCAs, the commenters suggest there is a science-based approach to decisions on non-trawl RCAs and a lack of such considerations on decisions affecting trawl RCAs. In fact, the trawl RCA configuration is based on a greater amount of scientific evidence than the nontrawl RCA. As stated above and detailed in Section 4.3.2, the trawl RCA was analyzed using recently observed bycatch rates from the WCGOP as well as trawl gear research conducted by ODFW. It is also noted in Section 4.3.2.2 that less information is currently available on bycatch in the limited entry fixed gear fishery when compared to the trawl sector and that data is being collected in the WCGOP to improve our understanding of non-trawl commercial bycatch. When fully quoted, Section 4.3.2.2 states that "there is clearly an effect of varying the size of the nontrawl RCA on the estimated mortality of overfished species that can *only be addressed qualitatively*. The estimated mortality of overfished shelf species (bocaccio, cowcod, canary, lingcod, widow, and yelloweye) would be progressively higher under Action Alternatives 3, 2, and 1 since more fishing is progressively allowed in depths where these species are found." (Emphasis added.) Furthermore, this section makes it clear that new information is being collected on non-trawl bycatch in the WCGOP with anticipated improvements in impact assessment to be considered for use in inseason management of 2005 and 2006 fisheries (also see Section 7.3.1.1 for the schedule of anticipated new information in 2005 and 2006).

D. The DEIS' Analysis of Impacts on Essential Fish Habitat and Ecosystem is Inadequate

The commenters state that the evaluation of impacts to EFH and the ecosystem is inadequate because it "merely provides a general overview of the scientific literature on the general effects of EFH" and NMFS has decided not to predict the effect of setting harvest specifications "until after it completes its programmatic EFH EIS." The "general overview" found in Appendix A and Section 3.1 of the document describes the affected environment, or baseline conditions. CEQ regulations at 40 CFR 1502.15 state

> The environmental impact statement shall succinctly describe the environment of the area(s) to be affected by the alternatives under consideration. The descriptions shall be no longer than is necessary to understand the effects of the alternatives.... Agencies shall avoid useless bulk in statements and shall concentrate effort and attention on important issues.

The affected environment description is at a level of detail sufficient to give the reader an understanding of current conditions and adequately summarizes current scientific understanding of the status of West Coast

EFH and ecosystems. The second statement, that "NMFS has decided not to predict effects" misconstrues what is stated in Section 3.2. The section, discussing the criteria used to evaluate impacts, points out that current data on the distribution and intensity of fishing effort is limited, making it difficult to predict effects with geographic specificity. Furthermore, the relationship between a given quantum of fishing effort, or impact, and the effect on habitat function is unknown. The development of a "comprehensive risk assessment" model as part of the EFH EIS process is mentioned in relation to how incomplete or unavailable information is addressed, in adherence to 40 CFR 1502.22. It simply notes that once the EFH EIS is completed, it may be possible to predict effects with more specificity. While acknowledging the difficulty in predicting impacts because of unavailable information, the EIS does compare the alternatives in terms of their relative effects on EFH and ecosystems.

IV. The DEIS Fails to Analyze Cumulative Impacts Adequately

The commenters state that the cumulative impacts analysis is vague and incomplete. However, the EIS evaluates cumulative impacts across the full range of environmental components addressed by the analysis. The commenters cite two parts of the cumulative impact analysis to support their allegation. These are addressed below.

A. The DEIS Fails to Consider the Cumulative Effects of Past Overfishing

The commenters note the EIS discloses that past overfishing could jeopardize sustainability of stocks. This is part of the discussion in Section 9.7 of unavoidable adverse impacts, as required by CEQ regulations at 40 CFR 1502.16. This discussion emphasizes that this is a potential adverse effect, which would depend on a continuing mis-specification of harvest levels or an inability to constrain total mortality to correctly specified OYs. NMFS addresses the effects of past over-harvest first by accounting for historical harvests in the stock assessments used to set OYs. These analyses, which are discussed in Section 4.3, form the basis for the range of OYs considered in the EIS. In addition, for fisheries which have shown a risk of overharvest in the past, the Council has set more precautionary management measures in order to mitigate these cumulative effects. For example, high catch rates in the California recreational groundfish fishery during 2003, which contributed to overfishing of lingcod stocks, were given greater weight in the catch projection model for 2005-2006 used to develop management measures for that fishery, resulting in more restrictive management measures. The EIS discusses the bycatch of overfished species under the different alternatives at section 4.3.2.

B. The DEIS Fails to Consider the Cumulative Impacts on Essential Fish Habitat and Ecosystems

As noted above, the EIS acknowledges that currently the information necessary to fully evaluate the impacts of fishing on EFH and ecosystems is unavailable. In Section 3.4, the EIS describes past, present, and reasonably foreseeable future actions affecting EFH, aside from the proposed action. However, given the inability to quantitatively predict direct and indirect effects to EFH of this or other actions, the most reasonable supposition is that past, present, and future actions outside of this action would have an equal effect across all the alternatives, so the differential impact of the alternatives to this action would be the primary contributor to cumulative effects.

APPENDIX A
TO THE
PROPOSED ACCEPTABLE BIOLOGICAL CATCH AND OPTIMUM YIELD SPECIFICATIONS AND MANAGEMENT MEASURES
FOR THE
2005-2006 PACIFIC COAST GROUNDFISH FISHERY

AFFECTED ENVIRONMENT

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1.1 The Management Process

1.1.1 Scientific Research and Stock Assessments

1.1.1.1 The Stock Assessment Process

Stock assessments for Pacific Coast groundfish are generally conducted by staff scientists of California Department of Fish and Game, Oregon Department of Fish and Wildlife, Washington Department of Fish and Wildlife, Oregon State University, University of Washington, and the NMFS Southwest, Northwest, and Alaska Fisheries Science Centers. These assessments describe the condition or status of a particular stock and report on its health. This allows biologically sustainable harvest levels to be forecast; scientists can then make management recommendations to maintain or restore the stock. If a stock is determined to be overfished (less than 25% of its unfished biomass), a rebuilding analysis and a rebuilding plan are developed.

For more than 20 years, groundfish assessments have primarily been concentrated on important commercial and recreational species. Table 1-1 summarizes which species have been assessed over the past 10 years. These species account for most of the historical catch and have been the targets of fishery monitoring and resource survey programs that provide basic information for quantitative stock assessments. However, not all groundfish assessments use the same level of information and precision.

Quantitative and nonquantitative assessments are used for groundfish stocks. For stocks that are assessed quantitatively, scientists use life history data to build a biologically realistic model of the fish stock for these stock assessments; they then calibrate the model so that it reproduces the observed fishery and survey data as closely as possible. Recently similar, but more powerful, models using state-of- the-art software tools have been developed. Assessment models and results are independently reviewed by the Council's Stock Assessment Review (STAR) Panels. It is the responsibility of the STAR Panels to review draft stock assessment documents and relevant information to determine if they use the available scientific data effectively to provide an accurate assessment of the condition of the stock. In addition, the STAR Panels review the assessment documents to ensure that they are sufficiently complete and the research needed to improve assessments in the future is identified. The STAR process is a key element in an overall process designed 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 the assessment results are as accurate and error-free as possible.

Following review of assessment models by the STAR Panels, and subsequently the Groundfish Management Team (GMT) and Scientific and Statistical Committee (SSC), the GMT uses the reviewed assessments to recommend preliminary allowable biological catch (ABC) and optimum yield (OY) values to the Council.[1/] The SSC comments on the STAR review results and the GMT recommendations. Biomass estimates from an assessment may be for a single year or an the average of the current and several future years. In general, an ABC will be calculated by applying the appropriate harvest policy (MSY proxy) to the best estimate of

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1/ The ABC is calculated by multiplying the default fishing mortality rate to achieve maximum sustainable yield (MSY) biomass (denoted F_{MSY}) by the current biomass. This represents a harvest limit that can be supported without decline in stock size. OY is the harvest guideline, accounting for total fishing mortality (which also includes bycatch), as modified by biological and socioeconomic factors. It must be equal to or less than the ABC and typically represents a precautionary reduction from the ABC for stocks known to be below their MSY biomass or those for which there is limited stock status information.

current biomass. ABCs based on quantitative assessments remain in effect until revised by either a full or partial assessment.

Full assessments provide information on the abundance of the stock relative to historical and target levels, and provide information on current potential yield. Scientists conduct partial assessments when they do not have enough data for a full assessment. Even full assessments can vary widely in reliability because of the amount of data available for modeling. Council-affiliated scientists conduct several assessments each year. Individual stocks may be periodically reassessed as often as every year—currently only the case for Pacific whiting—to every two to four years. However, because of limits on scientific staff and data availability, some species have been assessed only once.

Stocks with ABCs set by non-quantitative assessments typically do not have a recent quantitative assessment, but there may be a previous assessment or some indicators of the status of the stock. Detailed biological information is not routinely available for these stocks, and ABC levels have typically been established on the basis of average historical landings. Typically, the spawning biomass, level of recruitment, or the current fishing mortality rates are unknown.

Many species have never been assessed and lack the data necessary to conduct even a qualitative assessment, such as a general indication in biomass trend. ABC values have been established for only about 26 stocks. The remaining species are incidentally landed and usually are not listed separately on fish landing receipts. Information from fishery-independent surveys is often lacking for these stocks, because of their low abundance or invulnerability to survey sampling gear. Precautionary measures continue to be taken when setting harvest levels (the OYs) for species that have no or only rudimentary assessments. Since implementation of the 2000 specifications, ABCs have been reduced by 25% to set OYs for species with less rigorous stock assessments, and by 50% to set OYs for those species with no stock assessment. At-sea observer data will be available for use in the near future to upgrade the assessment capability or evaluate overfishing potential of these stocks.

1.1.1.2 Rebuilding Overfished Species

In the case of overfished species, stock assessment results form the basis of a rebuilding analysis, which in turn is used to develop rebuilding policies and choose the rebuilding target identified in each rebuilding plan. The elements of rebuilding analyses are described in the SSC Terms of Reference for Rebuilding Analyses (SSC 2001). This guidance has been incorporated into a computer program for conducting rebuilding analyses (Punt 2002b). In the analysis the probability the overfished stock will reach the target biomass defining a rebuilt stock (B_{MSY} or $B_{40\%}$) is determined in the absence of fishing (T_{MIN}) and the maximum permissible rebuilding time under National Standard Guidelines (T_{MAX}). The target rebuilding year (T_{TARGET}) is determined based on these limits and the probability of achieving the target biomass by T_{MAX} (denoted P_{MAX}). Probability statements are an estimate that something may happen (in this case, that stocks will reach a given size in a specified time period) and thus also the level of risk associated with a given action. When interpreting rebuilding analyses it is important to understand how probability statements are derived, distinguish the basic policy choice from those parameters determined by national policy, identify different sources of uncertainty, and appreciate that even "fixed" values can change as the system (or fish stock)—and our understanding of it—change over time.

The rebuilding analysis program uses "Monte Carlo simulation" to derive a probability estimate for a given rebuilding strategy. This method projects population growth many times in separate simulations. It accounts for one source of uncertainty about future stock status by randomly choosing the value of a key variable—in this case total recruitment or recruits per spawner—from a range of values. These values can be specified empirically, by listing some set of historical values, or by a relationship based on a model. The SSC recommends the rebuilding analyses use historical values. Because of this variability in a key input value, each individual simulation, or "case," will show a different pattern of population growth. As a result, a modeled population may reach the target biomass in a different year in each of the cases in the Monte Carlo simulation. Figure 1-1 shows the results of five such cases from a hypothetical rebuilding analysis. (The values do not represent any of the actually overfished species.) The horizontal line at 0.4 represents target biomass. It can be seen that population increases steadily in each case, but at a different rate because of differences in the number of recruits in each future year for each case. Case #1 reaches the target biomass soonest, in 2025, while case #5 takes the longest, reaching the target in 2048.

The number of cases that reach the target biomass in any year can be computed and these values cumulated, or successively added together, starting with the first year set for the simulation and running out to some maximum number of years (which could be the case in which the population took the longest time to reach the target biomass or a predetermined maximum value). This cumulative probability shows the number of cases that have reached the target biomass in all the years up to and including the specified year, which is also an estimate of the probability the stock will rebuild by that year.

Figure 1-2 illustrates this concept of cumulative probability. The percent of simulations reaching the target biomass in each year, for some specified fishing mortality rate, is represented by the vertical bars. The five cases shown in the previous figure are plotted along with the other 995 cases that are part of this Monte Carlo simulation. The years in which the five cases in the previous figure reached the target biomass are highlighted in this figure. Case #3, for example, along with 26 other cases (that weren't plotted in the first figure), make up the bar tallying the number of cases rebuilt in 2032. The ascending solid line sums simulations that have reached the target biomass in any of the preceding years, even if biomass declines below the target in subsequent years. This ascending line represents the rebuilding probability. (It is important to note the calculated cumulative probability includes cases reaching the target biomass in any previous year. Species with highly variable recruitment may achieve the target biomass and subsequently fall below it, even in the absence of fishing. If these cases were excluded, the probability of recovery in any given year would likely be lower, depending on species being modeled.)

This technique can be used first to calculate T_{MIN} in probabilistic terms, which is defined as the time needed to reach the target biomass in the absence of fishing with a 50% probability. (It may be said that the 50% value represents "even odds"; it is equally likely the stock has rebuilt or not rebuilt in this year. In all other years it is either more or less likely the stock has rebuilt.) Thus, in a Monte Carlo simulation with 1,000 cases where the fishing mortality rate (F) is set to 0, the number of cases reaching the target biomass in a given year can be cumulated. In Figure 1-3 T_{MIN} is determined by finding the year in which this cumulative value equals 500 (or 50%). In other words, in half the simulations the target biomass was reached in some year up to and including the computed T_{MIN}. Given T_{MIN}, and assuming that it is greater than or equal to ten years (as is the case with most of the overfished groundfish stocks), T_{MAX} is computed by adding the value of one mean generation time. Figure 1-3 shows a T_{MIN} of 15 years (or 2014 if the stock were declared overfished in 1999). A mean generation time of 17 years is added to compute T_{MAX}.

After determining T_{MAX}, multiple Monte Carlo simulations are conducted, varying the fishing mortality rate. This determines the relationship between F and the probability of the stock being rebuilt by T_{MAX}, which is P_{MAX}. Figure 1-4 displays the results of three hypothetical simulations for fishing mortality rates resulting in P_{MAX} values of 90%, 70% and 50% (the minimum permissible rebuilding probability). Since a higher P_{MAX} probability must be achieved by lowering the fishing mortality rate (other things being equal) there is a tradeoff between fishery harvests and rebuilding speed in probabilistic terms. As we reduce fishing, the likelihood the stock will recover in this maximum time period increases.

Once probability distributions have been computed, like those plotted in Figure 1-4, a corresponding T_{TARGET} can be determined for distributions representing different harvest rates (F) and corresponding P_{MAX} values.

T_{TARGET} is defined as the median year in each probability distribution, which is simply the year by which half of all cases have already rebuilt, and is unique for a given F and P_{MAX}. Figure 1-4 shows how this is computed for the three plotted fishing mortality rates and corresponding P_{MAX} probabilities. As expected, if we apply the lowest of the three plotted fishing mortality rates (in other words, limit fishing the most), the stock will rebuild the fastest (or more accurately, has the highest probability of rebuilding by T_{MAX}). The target year for the lowest fishing mortality is 25 years. (To determine the actual target year, we add this value to the year in which the stock was declared overfished. Continuing with the example above, if the stock was declared overfished in 1999, then the target year is 2024.) Not surprisingly, this strategy also results in the highest P_{MAX}, equal to 90%. The fishing mortality rate associated with the 70% P_{MAX} value gives a later target year: 2028. Finally, T_{TARGET} equals T_{MAX} for the highest allowable fishing since the P_{MAX} value—50%—is the same probability used to determine T_{TARGET}.

From a policymaking standpoint, the essential tradeoff is between a given level of fishing mortality and the probability the stock will be rebuilt within the maximum permissible time period (P_{MAX}), and the related target year. Although computationally there is a prescribed relationship, with P_{MAX} as an input value, policymakers may wish to base their decisions on F, as expressed in the harvest control rule or simply choose a given target year and determine from it the associated P_{MAX} and F. Figure 1-5, taken from the canary rockfish rebuilding analysis, illustrates this tradeoff. It shows the relationship between any OY level in the current year, P_{MAX} and T_{TARGET}.

As the preceding discussion suggests, probability statements about T_{MAX} tell us the likelihood of an outcome based on our understanding of a fish stock and our ability to model how that stock will grow over time. Since our understanding of these population characteristics is imperfect, some sources of uncertainty are not captured in the aforementioned probability statements. First, inputs to the rebuilding analysis are to a greater or lesser degree best estimates of true values. This applies to basic biological parameters, such as fecundity, that are used to model population growth. Population projections also depend on an estimate of the size and age structure of the modeled stock at the outset of the projected time period, derived from the most recent stock assessment. Similarly, the biomass target ($B_{40\%}$) requires an estimate of the equilibrium population size that would be reached in the absence of fishing (see below). In all these cases the best estimate may not coincide with the true value. The Monte Carlo simulation used in the rebuilding analyses only considers uncertainty about future recruitment, so inaccuracy in the estimation of both species and stock-specific variables will not be captured in resulting probability statements. Finally, there is some uncertainty (or variability) inherent to the Monte Carlo simulation because any one simulation will not include all possible outcomes (or cases). This variability can be assessed by performing several simulations and measuring the variation in the output value (fishing mortality for a given T_{MAX} probability) among these simulations (Punt 2002a). This type of assessment can be used to establish a range around a point estimate (the mean value) expressing the likelihood the true value falls within that range.[2/]

New information may result in new estimates of biological and stock parameters, and assessed uncertainty in the Monte Carlo simulation tells us something about the range of possible outcomes. But rebuilding trajectories will also change over time with new stock assessments and as historical data (such as total catch

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2/ These assessments demonstrates three important points. First, different modeled species will produce different degrees of variability when comparing Monte Carlo simulations because of the underlying variability in the input recruitment data. Second, for a given species and P_{MAX} increasing the number of cases in a simulations decreases uncertainty (or relative variability). But this decrease is not constant; increasing the number of cases in a simulation beyond a certain number produces diminishing returns in terms of reducing uncertainty. Finally, for a given species and number of cases in the Monte Carol simulation, choosing a lower P_{MAX} increases certainty (by decreasing the range of possibly "correct" values for fishing mortality, or OY).

estimates for past years) replace projected values. The time limits and target—T_{MIN}, T_{MAX}, and T_{TARGET}—fall along a time scale that begins when the stock is declared overfished (y_{DECL}).[3/] Because the rebuilding analysis is usually conducted from one to several years after y_{DECL}, a more recent stock assessment may allow population growth to be projected from the most recent year for which stock structure data (such as mortality, weight, and number of animals for each age class in the population) are available. In subsequent analyses (conducted as new stock assessment data become available), the pool of historical recruitment values will likely differ (with addition of the most recent years' data) and the there will be fewer years for which population growth is projected. (This assumes that T_{MAX} is not re-computed because, for example, changes in stock structure produce a different value for mean generation time.) It is highly likely the new analysis will suggest a different level of fishing mortality to achieve the same P_{MAX} and by extension T_{TARGET}. Conversely, if the policymaker wishes to continue with the same harvest policy—a given fishing mortality rate for example—P_{MAX} and T_{TARGET} would likely be different in the new analysis.

Estimation of Unfished Biomass

Target biomass is directly related to B_0, or unfished biomass. (It is expressed as a percentage of this value.) Target biomass in turn affects the rebuilding trajectory described by T_{MIN}, T_{MAX}, and T_{TARGET}. B_0 is rarely known absolutely; instead, it is calculated based on the relationship between the number of spawning fish and resulting recruits to the fishable population. Modelers choose a time period for which data are available and fishing effort has been at a stable and relatively moderate level. However, biologists are not sure of how important environmental conditions are to survival and growth, versus spawning population size. (A hypothesis favoring spawning population size as the determinant of recruitment is called a "density dependent" spawner to recruitment relationship. For groundfish this relationship is believed to be positive: a larger spawning population results in greater total recruitment.) These considerations complicate the choice of the time period used as basis for unfished biomass computations. For Pacific Coast groundfish these two factors have historically had potentially confounding effects. A large-scale regime shift began in 1977; many scientists believe that generally warmer water produced less favorable conditions for groundfish (Hare and Mantua 2000). The period after 1977 also saw a decline in groundfish populations due to increased fishing effort. If an environmental explanation is favored, one would choose a long time series that encompassed recruitment both before and after 1977 in order to account for the impact of the environmental change. However, this will result in a relatively lower value for B_0 than only using recruitment values before 1977 when biomass and recruitment were closer to an unfished state. The SSC also discussed a third approach in its Terms of Reference (SSC 2001), using spawner-recruit models instead of relying solely on empirical data. These models are problematic because they mathematically presuppose a certain spawner-recruit relationship. An overfished species being modeled may not exhibit this relationship because of its particular biology and ecology. The SSC recommended determining B_0 based on the density-dependent hypothesis and, therefore, using earlier data (resulting in relatively large values for B_0). Although, as discussed above, the determination of B_0 is not a policy choice, its value does influence policy choices since other parameters, such as target biomass, are defined in relation to B_0.

1.1.1.3 Research Fisheries

Research fisheries, or resource surveys, are an essential part of the management process. They provide fishery-independent data which—because it is gathered in a uniform, consistent manner—provide "benchmarks" used to track natural and anthropogenic changes in fish abundance. In some cases, a single

3/ National Standard guidelines identify the initial rebuilding year, for the purpose of calculating targets, as the year in which rebuilding measures were first implemented. For overfished Pacific groundfish this would be the year in which interim rebuilding plan measures were implemented as part of the annual management process. In most cases this was either y_{DECL} or the following year.

survey or a short time series can be directly calibrated to absolute abundance. An annual survey will most closely track natural biological fluctuations and smooth out apparent fluctuations caused by environmental effects on catchability. However most current surveys involve catching fish, adding to total fishing mortality. For overfished stocks with low OY values, the research take can represent a significant proportion of the harvest specification.[4/] At the same time, the reduction in fishery catches means less data are available from this source, making it even more difficult to determine abundance, measure stock recovery, and estimate potential yields.

Long-term groundfish survey efforts include:

- Acoustic and midwater trawl survey: A coastwide survey that has been conducted triennially (1977-2003) for Pacific whiting. Recent surveys have been coordinated with the Canadian acoustic survey to assure adequate coverage in northern areas.

- Shelf survey: A bottom trawl survey conducted triennially in midsummer, with sufficient coastwide coverage for most target species. Areas south of Point Conception were not surveyed until recently, however. The survey covers bottom depths of 30 fm to 275 fm using two large (125 foot) chartered vessels.

- Slope survey: A bottom trawl survey conducted nearly annually in mid-autumn, covering bottom depths of 100 fm to 700 fm. This survey began in 1998 and 1999.

- Nearshore survey: Scuba and hook-and-line surveys for various nearshore rockfish off California conducted by California Department of Fish and Game (CDFG).

- Mark-recapture survey: A Washington Department of Fish and Wildlife (WDFW) survey targeting black rockfish and lingcod.

- Shelf rockfish recruitment survey: A midwater trawl survey off Central California by Southwest Fisheries Science Center (SWFSC) for age zero rockfish.

- California Cooperative Oceanographic Fisheries Investigation (CalCOFI): A multi-species, multi-disciplinary oceanographic and egg and larvae survey off Southern California, which is currently conducted quarterly.

- International Pacific Halibut Commission annual survey: This survey using longline vessels is important for management of Pacific halibut. However, it catches groundfish incidentally.

1.1.2 The Management Cycle and Council Decision-making

1.1.2.1 Periodic Management

Groundfish management is mainly implemented through a framework in the groundfish fishery management plan (FMP), which allows the Council to recommend new fishing regulations, as long as these measures fall within the range of the principles and policies described in the FMP. Through 2004 this type of “seasonal”

4/ Submersible surveys, where fish are counted and measured photographically, need to be developed. These may be especially appropriate for depleted rockfish species that occur in discrete habitats such as reefs and rock piles.

management was implemented through regulations promulgated annually, covering a fishing year, which corresponds to the calendar year. This annual process presented a number of problems, not the least of which was the inability to complete the necessary regulatory processes before the start of the new year. A 2001 lawsuit (*Natural Resources Defense Council* v. *Evans*, 2001 168 F. Supp. 2d 1149 [N.D. Cal. 2001]) requires NMFS to complete notice and comment rulemaking before implementing management measures. Because the agency is unable to complete these regulatory procedures after Council decision-making is finished and the new fishing season (calendar year) begins, it had to implement management measures for the first two months of the year in 2003 and 2004 through an emergency rule. This allowed the fishing season to commence while comment continued on the final rule, which covered the remaining 10 months of the year (March-December). Promulgating both rules resulted in a procedurally complex and administratively burdensome process. The difficulty of an annual process is compounded by the fishing industry's strong desire for the fishing season to stay open through the full calendar year in order to assure consistent supply to processors and markets. As management becomes more complex, there is not enough time in a one-year cycle to complete all of the required components, starting with completed stock assessments and ending with annual regulations. In recent years management measures (primarily bag limits and seasons) have also been applied to recreational fisheries, adding to this complexity. In addition to these procedural problems, the complexity of the annual cycle left little time for fishery managers to work on other initiatives to improve the management regime.

For these reasons, a biennial management cycle was implemented pursuant to Amendment 17 to the groundfish FMP, approved by the Council November 2002. Starting in 2005 and 2006, harvest specifications (ABCs and OYs) and management measures are established for two years. (Separate ABCs and OYs are identified for each year in the two-year cycle, however. That is, two one-year OYs are specified for each managed stock or stock complex.) This new cycle extends Council decision-making over three meetings. At its November meeting 14 months before the start of the biennium the Council identifies preliminary ABCs and OYs. At the following April and/or March meeting, the Council finalizes these harvest specifications and identifies a preliminary range of management measures. The Council makes its final decisions on these management measures at the June meeting preceding the next a biennium. This schedule allows enough time for NMFS to publish a proposed rule in the *Federal Register* and take public comment before its final decision on whether to approve the Council recommendations. More time is also available to meet the procedural and documentary requirements of the National Environmental Policy Act (NEPA). Finally, this cycle accommodates an "off-year" during which the Council and NMFS would be less occupied with ongoing management of the groundfish fishery and could spend more time on long-term initiatives such as developing better assessment models and surveys.

To ensure the Council could respond to significant changes in a fishery, the Council also included in Amendment 17 a process for reviewing fishing levels during the two-year management period. Harvest levels could be changed in response to new science or assessment information in order to prevent overfishing and rebuild overfished species. The Council has asked the GMT (in consultation with the SSC and Groundfish Advisory Subpanel, or GAP) to develop thresholds for determining whether mid-process changes are necessary.

1.1.2.2 Measures Currently Used to Manage Groundfish Fisheries

The alternatives in the 2003 and 2004 groundfish harvest specifications and management measures EISs (PFMC 2003b; PFMC 2004) describe the types of measures currently used to manage groundfish fisheries. Based on the most recent stock assessments, and for overfished species, rebuilding analyses and plans, the Council chooses harvest levels for stocks and stock complexes. Management measures are intended to keep total fishing mortality (landed catch plus bycatch) within these harvest levels, or OYs. Allocating harvest opportunity among different fishery sectors is an integral part of the management process. Some stocks, such as sablefish and Pacific whiting, have fixed or “hard” allocations: management measures must be structured so that particular sectors have the opportunity to catch a fixed percentage of the OY. Allocations for the majority of groundfish species are determined as part of the process of developing management measures, however. In these cases, rather than a hard allocation, the Council develops management measures, evaluates the likely allocations resulting from those measures, and then—if necessary—modifies the proposed measures until a *de facto* allocation acceptable to all sectors have been achieved. This is particularly true in deciding harvest allocations between commercial and recreational sectors. As described in Section 1.1.3.2, three Indian tribes in Washington state are allocated a share of the OYs for groundfish species taken in their fisheries. Based on their allocations, the tribes then oversee the prosecution of their fisheries separate from the management of other groundfish fishery sectors.

The main management measures used over the past two years for commercial and recreational fisheries are summarized below. Measures subject to periodic change within the framework established by the FMP are described. More permanent features of the management regime, such as licence limitation, are not discussed here.

Commercial Fishery Management Measures

Seasons: Most fisheries are managed to achieve a year round season; in fact, this is one of the key objectives expressed in the groundfish FMP because buyers and processors regard a continuous and consistent supply of fish as essential to maintaining markets. In the last two years managing fisheries to prevent OYs from being exceeded before the end of the year has become increasingly difficult because of the low harvest limits for some overfished species, and some fisheries have been closed early. A few groundfish fisheries are managed according to shorter seasons. The Pacific whiting fishery is probably the most significant example in terms of the volume of landings. It usually begins on April 1 and runs until the OY has been caught, usually by late October. The limited entry fixed gear sablefish fishery is also limited to a “primary season” from April 1 to October 31. (Sablefish may be caught by other sectors and fisheries at other times of the year, but the allocation and catch limits are smaller.)

Cumulative trip limits: Trip limits have been a feature of groundfish management since the inception of the FMP; over time the regime has become more complex, covering a wider range of species and fishery sectors. The basic concept is to set a limit on the how much of a given species (or multi-species complex[5/]) an individual vessel may land in a fixed time period. Originally, these limits were on a per trip basis; today the limits are for a two-month cumulative limit period, in order to reduce the likelihood of regulatory discards. Cumulative trip limits are separately established for the limited entry trawl, limited entry fixed gear, and open access sectors. (For a description of these sectors, see Section 6.) For each of these sectors separate limits are established for U.S. waters north and south of 40°10' N latitude (approximately Cape Mendocino, California). The Pacific whiting fishery is a significant exception to trip limit management. As noted above, it occurs during a season whose length is determined by how quickly the OY is taken. (The OY is allocated according to fixed percentages between shore-based, at sea mothership, at-sea catcher/processor, and tribal fleets.) Within a given whiting fleet, participants coordinate fishing behavior to determine how long the season will last.

5/ Many less commercially important or less frequently caught species are combined in stock complexes for the purposes of management. These species may not be differentiated in reported landings and most have not been assessed; these factors make it impossible to manage these species individually. Multi-species complexes currently in use include the minor rockfish (additionally separated into several sub-categories), other flatfish, and other fish categories.

Management Areas: For the purposes of fisheries management the West Coast exclusive economic zone (EEZ) is divided into several, sometime overlapping, areas, shown in Figure 1-6. The five named areas (Vancouver, Columbia, Eureka, Monterey, and Conception) were originally devised by the International North Pacific Fishery Commission (INPFC) as statistical areas for cataloguing fish catch. Although still occasionally referred to as "INPFC areas," this organization is defunct and "management area" is the preferred term. Landings continue to be reported by these areas in the groundfish SAFE document and these boundaries are some times used to demarcate the application of different management measures. The 40°10' N latitude line (near the Eureka-Monterey boundary) is more significant in this respect; as noted above, for example, trip limits differ north and south of this boundary. Other boundaries in use for management include latitude lines at significant coastal landmarks, such as Point Reyes and Point Conception. The latter represents an important marine biogeographic boundary and is used to distinguish some sub-specific stocks (such as sablefish) as well as management measures.

Groundfish Conservation Areas: Three different closed areas have been implemented to limit bycatch of overfished species. A relatively small Yelloweye Rockfish Conservation Area (YRCA) closes a "hotspot" off the Washington coast. Recreational fishing is prohibited within the YRCA and the area is a designated as a voluntary closure for the limited entry fixed gear sablefish fleet and salmon trollers. The YRCA was first implemented in 2003. The are two areas off the southern California coast designated Cowcod Conservation Areas (CCAs), intended to protect cowcod. Recreational and commercial fishing are prohibited within the CCAs, except that rockfish and lingcod fishing is permitted shoreward of 20 fathoms. The CCAs were first implemented in 2001. Rockfish Conservation Areas (RCAs) are by far the most extensive and complex closed areas. First implemented in late 2002 as part of an inseason management action, they extend from the Canadian to the Mexican border of U.S. waters. The RCAs were implemented to reduce bycatch of overfished species. These species are more frequently caught within certain depth ranges and, based on analysis of logbook data, the boundaries of the RCAs have been set to prohibit fishing within a range of depths. (In order to make enforcement possible, in most cases the actual isobaths—lines of equal depth—have been approximated by straight lines between published waypoints.) The depths covered by 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.) Figure 1-7, taken from the 2004 harvest specifications and management measures environmental impact statement (EIS), shows the extent of RCAs under the different alternatives in schematic form. In this case the No Action Alternative represents the configurations used in 2003.

Gear Restrictions: Although various gear restrictions were a key feature of groundfish management even before the FMP was implemented, perhaps the most important current measures distinguish between large and small footrope gear. This refers to the size of the roller gear affixed to the bottom leading edge of a bottom trawl net. Large footrope gear allows the net to be fished over rougher ground. In nearshore and inner continental shelf areas rocky habitat is important to a range of organisms, including several overfished rockfish species. The Council has developed measures to discourage fishing on these rock piles. Beginning in 2003, vessels using small footrope trawl gear at any time in a cumulative limit period are subject to lower trip limits for Dover sole, thornyheads, and sablefish (DTS species) for the entirety of that period. Small footropes are more commonly used in areas inshore of RCAs; but if this gear is used, the lower trip limits act as a penalty by limiting the amount of fish that can be caught in deeper water with either small or large footrope trawl gear. (Large footrope gear is preferred when trawling on the soft bottom areas offshore where DTS species are found.) This is meant to encourage vessels to fish exclusively seaward of the RCA, using large footrope gear, thereby avoiding bycatch of overfished groundfish species (particularly canary rockfish) found on the continental shelf. In some nongroundfish fisheries, such the pink shrimp fishery, bycatch reduction devices (BRDs) are required. These devices are added to the trawl net and divert finfish out of the codend of the net, where the catch is accumulated.

Recreational Fishery Management Measures

Recreational fisheries typically occur closer inshore than most commercial fisheries and are actively managed by the states. Thus management measures, although developed through the Council process, tend to differ state-to-state. The main recreational management measures are season limitations and bag limits, which restrict the number of groundfish an angler may land, and size restrictions. Since some overfished species are frequently caught in recreational fisheries, species-specific sublimits may be applied within the overall bag limit. Closed seasons have also been imposed in response to overfishing. The most recent response to recreational catches of overfished species has been to established areal restrictions. Although similar in intent to the RCAs, these measures restrict fishing to depths less than a specified value and boundaries defined by waypoints are not developed.

1.1.2.3 FMP Amendments

Annual management allows adaptation to short-term changes in the status of stocks and the fisheries exploiting them (tied to long-term targets in the case of stocks below the target biomass). Broader changes to the management regime require FMP amendments. (Regulations also may be amended to effect such a change. Generally speaking, the FMP governs the management regime while regulations specify public conduct—in this case, what fishermen may or may not do.) Council Operating Procedure 11 describes the process for amending the FMP (PFMC 2000a). An issue identified by advisory bodies or the public is taken up at the first meeting where the need for action is considered, along with possible alternatives. A draft amendment package is then prepared for Council review at a second meeting. During this meeting the Council selects a preferred alternative, if possible, and adopts the draft amendment for public review. Staff then prepare a final draft amendment, which is made available for public comment. Public hearings are held during a third Council meeting and the Council adopts the final amendment for implementation by the Secretary of Commerce (Secretary).[6/] After the third meeting, Council staff make any needed non-substantive additions and changes and transmit the document to NMFS for review. The Secretary may then disapprove, approve or partially approve the amendment. If disapproved or partially approved, the Council may revise the proposal, addressing concerns raised by the Secretary, and resubmit the amendment. Given this process, aside from any staff time needed to prepare the analyses and supporting documentation, Council decision-making can take six to eight months. This is the minimum time within which three meetings could occur given the Council meeting schedule. For example, about six month would elapse if initial consideration occurred at the April meeting, then the June and September meetings were used to complete the process. Of course, the Council may not be able to consider an action during three successive meetings because of the total time available for the meeting agenda or because requisite document drafts are incomplete. This would lengthen the schedule still further. Additional time is also needed after the Council's final decision to prepare the NEPA document submitted to NMFS to start the agency review process, which results in implementation if the amendment is approved.

1.1.3 Federal, State, and Tribal Roles and Responsibilities in Management

1.1.3.1 State/Federal Jurisdiction under the Magnuson-Stevens Act

Under the Magnuson-Stevens Act, NMFS manages the groundfish fishery in the Exclusive Economic Zone, which starts at the seaward boundary of the state waters (3 nm from shore) and extends 200 miles offshore. The states retain jurisdiction to manage fisheries in state waters (within 3 nm of shore). A state can also

6/ The MSA identifies the Secretary of Commerce as the decision maker. In practice, the authority is delegated to the appropriate NMFS Regional Administrator.

regulate vessels registered under the laws of that state in federal waters if the state's laws and regulations are consistent with the FMP and applicable federal law.

In practice, the states and federal government manage the groundfish fishery consistently and cooperatively. For the groundfish fishery, the states, the responsible federal agencies, and the Pacific Fishery Management Council coordinate closely. Each state has a representative of its fishery agency as a voting member on the Council. NMFS has a voting member on the Council, and the U.S. Coast Guard, U.S. Fish and Wildlife Service, and the Pacific States Marine Fisheries Commission have non-voting members on the Council. The states and NMFS also have representatives on the Council management and scientific committees that help develop the management measures. In short, there is very close coordination between the states and NMFS.

Management measures—including catch limits, bag limits, and size limits—apply to vessels operating in the EEZ (50 CFR 660.301). However, these limits, which apply to vessels that fish in the EEZ, also include fish caught between 0 and 3 miles from shore (50 CFR 660.323(a)). Therefore, if a vessel fishes in both state and federal waters, any fish caught count toward the limits in the federal groundfish regulations, no matter whether the fish were caught in state or federal waters. In addition, because the regulations have been developed cooperatively through the Council process, the States of Washington, Oregon, and California adopt regulations under their own authority that are the same as the federal regulations. For area closures, the federal regulations implement closed areas in federal waters, and state regulations implement closed areas in state waters.

1.1.3.2 Treaty Indian Fishing Rights

Treaties between the United States and numerous Pacific Northwest Indian tribes reserve to these tribes the right of taking fish at usual and accustomed grounds and stations ("u & a grounds") in common with all citizens of the United States. See U.S. v. Washington, 384 F. Supp. 312, 349-350 (W.D. Wash. 1974).

NMFS recognizes four tribes as having u & a grounds in the marine areas managed by the Pacific Coast groundfish FMP: the Makah, Hoh, and Quileute tribes, and the Quinault Indian Nation. The Makah Tribe is a party to the Treaty of Neah Bay, Jan. 31, 1855, 12 Stat. 939. See 384 F. Supp. at 349, 363. The Hoh and Quileute tribes and the Quinault Indian Nation are successors in interest to tribes that signed the Treaty with the Quinault, *et al.* (Treaty of Olympia), July 1, 1855, 12 Stat. 971. See 384 F. Supp. at 349, 359 (Hoh), 371 (Quileute), 374 (Quinault). The tribes' u&a grounds do not vary by species of fish. U.S. v. Washington, 157 F. 3d 630, 645 (9th Cir. 1998).

NMFS recognizes the areas set forth in the regulations cited below as marine u&a grounds of the four Washington coastal tribes. The Makah u&a grounds were adjudicated in U.S. v. Washington, 626 F.Supp. 1405, 1466 (W.D. Wash. 1985), aff'd 730 F.2d 1314 (9th Cir. 1984); see also Makah Indian Tribe v. Verity, 910 F.2d 555, 556 (9th Cir. 1990); Midwater Trawlers Co-op. v. Department of Commerce, 282 F.3d 710, 718 (9th Cir. 2002). The u&a grounds of the Quileute, Hoh, and Quinault tribes have been recognized administratively by NMFS. See, e.g., 67 Fed. Reg. 30616, 30624 (May 7, 2002) (u&a grounds for salmon); 50 CFR 660.324(c) (u&a grounds for groundfish); 50 CFR 300.64(I) (u&a grounds for halibut). The u&a grounds recognized by NMFS may be revised as ordered by a federal court.

The treaty fishing right is generally described as the opportunity to take a fair share of the fish, which is interpreted as up to 50% of the harvestable surplus of fish that pass through the tribes' u&a grounds. Washington v. Washington State Commercial Passenger Fishing Vessel Association, 443 U.S. 658, 685-687 (1979) (salmon); U.S. v. Washington, 459 F. Supp. 1020, 1065 (1978) (herring); Makah v. Brown, No. C85-160R, and U.S. v. Washington, Civil No. 9213 - Phase I, Subproceeding No. 92-1 (W.D. Wash., Order on Five Motions Relating to Treaty Halibut Fishing, at 6, Dec. 29, 1993) (halibut); U.S. v. Washington, 873 F.

Supp. 1422, 1445 and n. 30 (W.D. Wash. 1994), aff'd in part and rev'd in part, 157 F. 3d 630, 651-652 (9th Cir. 1998), cert. denied, 119 S.Ct. 1376 (1999) (shellfish); U.S. v. Washington, Subproceeding 96-2 (Order Granting Makah's Motion for Summary Judgment, etc. at 4, November 5, 1996) (Pacific whiting). The court applied the conservation necessity principle to federal determinations of harvestable surplus in Makah v. Brown, No. C85-160R/ United States v. Washington, Civil No. 9213 - Phase I, Subproceeding No. 92-1, Order on Five Motions Relating to Treaty Halibut Fishing, at 6-7, (W.D. Wash. Dec. 29, 1993); Midwater Trawlers Co-op. v. Department of Commerce, 282 F.3d 710, 718-719 (9th Cir. 2002).

The treaty right was originally adjudicated with respect to salmon and steelhead. However, it is now recognized as applying to all species of fish and shellfish within the tribes' u&a grounds.[7/] U.S. v. Washington, 873 F.Supp. 1422, 1430, aff'd 157 F. 3d 630, 644-645 (9th Cir. 1998), cert. denied, 119 S.Ct. 1376; Midwater Trawlers Co-op. v. Department of Commerce, 282 F.3d 710, 717 (9th Cir. 2002).

In 1994, the U.S. government formally recognized that the four Washington Coastal Tribes (Makah, Quileute, Hoh, and Quinault) have treaty rights to fish for groundfish, and concluded that, in general terms, the quantification of those rights is 50% of the harvestable surplus of groundfish available in the tribes' u&a grounds. In 1996, NMFS promulgated a "framework rule" on treaty Indian fishing rights to groundfish. This rule is codified at 50 CFR 660.324. The rule establishes procedures for implementing treaty rights, and provides that rights will be implemented either through an allocation of fish that will be managed by the tribes, or through federal regulations that apply specifically to tribal fisheries. Under 50 CFR 660.332(a), tribal allocations are subtracted from the species OY before limited entry and open access allocations are derived.

The tribal allocation of Pacific whiting has been based on a methodology originally proposed by the Makah Tribe in 1998. The methodology is an abundance-based sliding scale that determines the tribal allocation based on the level of the overall U.S. OY, up to a maximum 17.5% tribal harvest ceiling at OY levels below 145,000 mt.

The sliding scale methodology used to determine the treaty Indian share of Pacific whiting is the subject of ongoing litigation. In United States v. Washington, Subproceeding 96-2, the Court held that the methodology is consistent with the Magnuson-Stevens Act, and is the best available scientific method to determine the appropriate allocation of whiting to the tribes. United States v. Washington, 143 F.Supp.2d 1218 (W.D. Wash. 2001). This ruling was reaffirmed in July 2002. Midwater Trawlers Cooperative v. Daley, C96-1808R (W.D. Wash.) (Order Granting Defendants' Motion to Supplement Record, July 17, 2002). Additional briefing will occur in this case. However, at this time NMFS remains under a court order in Subproceeding 96-2 to continue use of the methodology unless the Secretary finds just cause for its alteration or abandonment, the parties agree to a permissible alternative, or further order issues from the court. Therefore, NMFS is obliged to continue to use the methodology unless one of the events identified by the court occurs. Since NMFS finds no reason to change the methodology, it has been used to determine the 2003 tribal whiting allocation.

For some species on which the tribes have a modest harvest, no specific allocation has been determined. Rather than try to reserve specific allocations for the tribes, NMFS establishes trip limits recommended by the tribes and the Council to accommodate modest tribal fisheries.

7/ "The term "fish" as used in the Stevens Treaties encompassed all species of fish, without exclusion and without requiring specific proof (citations omitted)".

1.1.4 Public Involvement

The Council process offers a range of forums for public participation. Council members are meant to represent a range of stakeholders (although some argue that representation is insufficiently diverse). Council advisory bodies involved in groundfish management include the GMT, with representation from state, federal, and tribal fishery scientists; and the GAP, whose members are drawn from the commercial and recreational fishery, processing, and conservation sectors. The Ad Hoc Allocation Committee, a subpanel of the Council, provides advice on allocating harvest opportunity among the various fishery sectors. The GAP reflects the perceptions and opinions of representatives of industry, recreationalists and other constituents on the committee; consensus statements from this body can directly influence Council members' decisions. (Technical bodies, such as the GMT and SSC, similarly promote consensus on scientific issues.) Meetings of these bodies are open to the public, allowing limited participation by nonmembers and, at a minimum, public scrutiny of discussion and decisions. Comments from the public at large, through letters to the Council in advance of meetings and during comment periods at meetings can be collectively influential. The public also has the chance to lobby members of advisory bodies and the Council during meetings, but outside established, formal public comment periods. Once the Council passes on its decisions to NMFS, as recommendations, there are opportunities for the submission of written comments during the rulemaking process. The most visible, and formalized, venues for public participation through commenting are associated with decision-making (either by the Council or NMFS). More complex decision processes (for example, involving multiple stages of review and revision by advisory bodies and the Council) generally afford more opportunity for public comment.

1.1.5 Monitoring and Enforcement

Traditional fishery monitoring techniques include air and surface craft surveillance, declaration requirements, landing inspections, and analysis of catch records and logbooks.

The U.S. Coast Guard and state enforcement entities use ships, helicopters, and fixed wing aircraft to patrol offshore areas, including one large 210-foot Coast Guard cutter, and smaller Coast Guard and state enforcement vessels. Only the aircraft and large cutter are suitable for patrolling the more distant seaward boundaries of the Rockfish Conservation Area. The availability of Coast Guard assets depends on their use in other missions, such as homeland security and search and rescue. State enforcement ability may be affected by budget cutbacks.

State-enforced declaration requirements have been used to increase the efficiency of at-sea patrols and improve enforcement, particularly in areas closed to certain gear types or fishing strategies. Under declaration programs a vessel operator planning to enter a closed area must report his intention to state enforcement authorities beforehand. This requirement is generally reserved for vessels that would otherwise appear to be fishing illegally when seen by an at-sea patrol craft.

The size, irregular configuration and offshore extent of the RCA makes enforcement by air and surface craft more difficult. Therefore, NMFS is requiring all vessels registered to a groundfish limited entry permit to be equipped with a vessel monitoring system (VMS) transmitter, beginning in 2004 (68 FR 62374). VMS, in contrast, allows continuous monitoring of vessels' positions. A unit on the vessel periodically transmits location information via satellite to a processing center on shore. Enforcement officers are then be able to determine if vessels are operating in the RCA and take appropriate action to confirm a potential infraction. VMS must be coupled with declaration systems to distinguish vessels allowed to fish in the RCA and those transiting through it from vessels fishing illegally. In some instances air and/or sea surveillance may be necessary to confirm a vessel's disposition. For these reasons, VMS dramatically enhances, rather than replaces, traditional techniques. However, there are several issues related to the implementation of VMS in a fishery, including the variety of equipment types and associated costs, vessels' ability to carry VMS, VMS operating requirements, VMS vessel coverage, and integration of VMS with traditional enforcement techniques. As part of the process of developing the regulations to implement the West Coast groundfish VMS, NMFS prepared an environmental assessment (EA), which discusses these issues in greater detail (NMFS 2003b).[8/] This document also describes the range of fishery monitoring alternatives considered, and their associated costs and environmental impacts. Who will bear the cost of purchasing, installing and operating VMS transmitters was a significant issue in developing the program. Although the federal government has subsidized some of the costs of other VMS programs (such as for fisheries in Alaska), no such subsidy is currently part of the West Coast groundfish VMS program. In addition to purchase and installation costs, regular transmission charges apply for satellite use. Purchase costs are also a function of the types of VMS units NMFS approves for use. New type-approvals could allow the use of lower cost units. The current list of approved VMS equipment was published in the *Federal Register* on November 17, 2003, and additional equipment may be approved at a later date.

Shoreside recreational and commercial vessel inspections complement declaration programs and at-sea monitoring and enforcement activities by ensuring compliance with landing limits, gear restrictions, and seasonal fishery closures. State agencies are increasingly using dockside sampling to assess groundfish catch in recreational fisheries, which when combined with state and federal enforcement patrols at boat launches and marinas, ensures compliance with bag limits and fishery closures. Commercial landings are routinely checked when landed or delivered to buying stations or processing plants; they also can be tracked through fishticket and logbook records.

1.2 Key Management Issues

1.2.1 Considering Short-term Costs versus Long-term Risk in Setting OYs

Short-term uses generally affect the present quality of life for the public, in contrast to long-term productivity, which affects the quality of life for future generations, based on environmental sustainability. This tradeoff is perhaps the most important consideration governing the management of renewable resources, such as fish. At any given time, the current set of management measures indirectly affects the sustainability of marine resources by constraining fishing mortality to levels that are thought to be sustainable. This represents a tradeoff between short-term benefits, reflected in revenue generated from fishing in the present, and long-term productivity of fish stocks, which determines the abundance of fish in the future, and thus future harvests. Within the management framework, the limits of this tradeoff are established by the concept of overfishing. In simple terms, overfishing describes a situation where current harvest levels, if continued, will result in a decline in the size of the stock from the biomass thought to produced MSY, and thus the size of future yields. However, managers must also respond to changes in resource status resulting from environmental factors, which may be unpredictable. Shifts in the North Pacific ocean regime, which affect biological productivity, have been discovered relatively recently (Hare and Mantua 2000). Setting harvest levels based on stock performance in the past, without an appreciation of the effect of these conditions, may have contributed to past overfishing of groundfish. A better understanding of the role of environmental and ecological factors

8/ This document, the final rule, and a list of approved equipment, can be found at the website of NMFS Northwest Region Sustainable Fisheries Division (www.nwr.noaa.gov/1sustfsh/groundfish/VMS/index.html). Additional information at the site, specifically for vessel owners, includes a guide for complying with the VMS program, instructions for installation and activation of transmitting units, and worksheets to help users navigate an automated phone declaration system.

play in affecting stock productivity would enhance managers' ability to predict future stock response to current harvest levels.

If fishery managers had perfect information about the size and status of a fish stock, setting current harvest levels to ensure MSY on a continuing basis would be comparatively easy.[9/] However, marine fish are widely dispersed in an inaccessible environment, making it difficult to sample and monitor their populations. Furthermore, accurately monitoring total fishing mortality (that is, both the landed component of the catch and fish caught be the gear but not landed—primarily at-sea discards) is expensive and procedurally complex. The diversity of both the fisheries and species involved makes catch monitoring in West Coast groundfish fisheries especially difficult. For these reasons, the long-term environmental consequences current management measures is often subject uncertainty. Walters (1986) classifies uncertainty in three broad categories; Mace and Sissenwine (2002) identify an additional two management-related sources of uncertainty. These five sources of uncertainty are:

- Natural variation in the environment, including that caused by other, non-fishing human activities. Natural variability in recruitment is probably the most germane factor for estimating sustainable yields.

- Observation errors, including measurement error—an inaccurate temperature reading for example—and sampling error, or the difference between the distribution of values in a set of measurements and the actual frequency and range of values in the population or phenomenon being measured.

- Model mis-specification, or the accuracy of abstract representations of reality (models) in terms of causal relationships and system dynamics.

- Translation of scientific advice into management measures. Scientists may express uncertainty by bracketing a value with a range or confidence interval. Managers may be tempted to choose a value at the high end of the range if there is no more specific information about the risk (versus short-term benefit) of such an action.

- Imperfect implementation of management measures. The most common implementation error stems from inaccurate monitoring of the fishery. If fishing mortality is not accurately measured on a reasonably "real time" basis total catch may exceed the harvest specification.

Groundfish management (like many other management regimes) is subject to these sources of uncertainty:

- Regime shifts, or meso-scale climate variability influences stock productivity.

- Fishing and non-fishing impacts to habitat may be demonstrably damaging, but currently it is not possible to quantify the effect on stock productivity or precisely specify the relationship between habitat impacts and productivity. The effect of changes in trophic structure is also uncertain.

9/ Traditionally, MSY has been viewed as an OY or target harvest level; but the precautionary approach and National Standards Guidelines treat MSY as a limit rather than a target. Therefore, harvest levels for populations below MSY must be adjusted downward to allow rebuilding to the MSY biomass. Further, although fishery managers view MSY dynamically by specifying fishing mortality rates (versus constant catch), population productivity (recruitment) can vary due to environmental factors such as regime shifts. Over the long term these environmental factors need to be accounted for or the population size can move away from the MSY level. Finally, even if the biological system were perfectly specified, society may value resources in complex ways, by attaching non-consumptive value to some proportion of the resource, for example.

- Observation error comes into play in all cases where fishery-dependent and independent data are gathered. Measurement error is common to much fishery-dependent data; bycatch estimates represent one crucial source of error of this type. Although measurement error is more easily reduced in survey work, sampling error is almost always present. For example, random stratified assignment of fishery observers allows partial coverage to be representative of what occurs in a fishery as a whole, but some, albeit quantifiable, level of uncertainty exists.

- Model error is unavoidable and not always transparent. Careful review of stock assessments by a range of experts and interested parties may reduce risk (even if sources of uncertainty are not formally addressed) through a shared understanding about the state of nature being modeled and described.

- Mistranslation and misapplication in the management process are ongoing issues. Mistranslation—the choice of "over-optimistic" harvest levels, for example—are reduced somewhat through the procedures such as the rebuilding analyses now used to determine harvest specifications for overfished species. In contrast to a point estimate bounded by a confidence interval, a rebuilding analysis can specify the risk for any value within a range (see Section 1.1.2, above). Misapplication is still a major problem, one that overlaps with observation error. Timely and accurate estimates of recreational catches are currently a major challenge to effective inseason management. Since bocaccio were declared overfished, for example, actual catches have sometimes exceeded harvest specifications, largely for this reason.

Bayesian statistics are another way to deal with scientific uncertainty; the methods have been gaining popularity in natural resource management arena recently. A recent Pacific ocean perch stock assessment (Hamel *et al.* 2003) and an analytical framework being developed in support of the Pacific Coast Groundfish essential fish habitat (EFH) EIS (MRAG Americas Inc. and TerraLogic GIS Inc. 2003) use Bayesian methods.

Greater uncertainty about the outcome of a particular action or event generally increases the level of risk, depending on how many possible outcomes would be undesirable. Risk analysis evaluates the likelihood that a given action will produce an undesirable outcome, often using statistical methods to specify the probability of certain outcomes. The rebuilding analyses that underlie the range of harvest specifications for overfished species use these methods to compute the probability of a population rebuilding to B_{MSY} within the specified time period if a given level of harvest is allowed. This is a form of risk analysis; the residual probability value expresses the risk of the population not reaching B_{MSY}. But the rebuilding analyses only evaluate recruitment variability, one component of the many sources of uncertainty about future stock performance. These analyses do, however, present managers with a more explicit measure of risk on which to base their decisions.

Uncertainty and risk are also translatable into socioeconomic impacts, an issue not explored by Mace and Sissenwine. Very broadly, mis-specification of harvest levels involves the assumption of either short-term or long-term risk. Short-term risk accords with under-harvest, if harvests are set below a level that is both sustainable in the long term and below some social optimum (representing a mix of consumptive market and non-consumptive, non-market values). Long-term risk is usually expressed as the potential of over-harvest compromising future returns from the fishery; it involves the tradeoff of short-term benefit (harvests now) against long-term gain (potentially higher harvests in the future). This returns us to the central issue introduced here. To a large degree the management process implicitly plays off these two types of risk. However, current analytical capability precludes effective quantification of the tradeoff.

1.2.2 Rebuilding Overfished Species as a Constraint on Harvests of Other Stocks

Although different West Coast groundfish fisheries may be distinguished by the species they nominally target, a wider range of species is likely caught in any one haul, set, or trip. Although some of these species may be desirable (in terms of marketability), multi-species catches are equally a function of the selectivity of the gear—or lack thereof—and the diversity of the fish stocks occurring in the habitat being fished. For these reasons some incidental catch is unavoidable, and for either economic or regulatory reasons some of the catch is discarded, becoming what the Magnuson-Stevens Fishery Conservation and Management Act (MSA) defines as bycatch. Managing multi-species or "mixed-stock" fisheries can be difficult in the best of circumstances because it is essentially impossible to optimize harvests—achieve MSY—for all stocks caught in these fisheries. MSY harvest of one stock may result in under-harvest or over-harvest of another stock. Under-harvest is less of a concern from a biological management standpoint; if the fish are marketable it represents and economic impact in terms of forgone revenues. Over-harvest of a co-occurring species is of much greater concern. This problem has become acute with the declaration of nine West Coast groundfish fishery management unit (FMU) species as overfished.[10/] Harvest levels for overfished species must be reduced substantially in order to allow them to recover to a target biomass capable of supporting MSY. Fisheries must then be managed based on the constraint imposed by low harvest levels. Thus, even if one of these species is not the target in a particular fishery, they may be caught incidentally. Since groundfish fisheries are generally not managed directly, by means of species-specific quotas for example, limits have to be imposed on the harvest of healthy stocks. The number of overfished species and their occurrence in different areas and habitats means that virtually all groundfish fisheries have to be managed in ways that constrain the harvest of other healthy stocks. For this reason, overfished species are sometimes referred to as "constraining stocks." A forthcoming paper (Hilborn *et al.* in press), in which the authors modeled different approaches to managing West Coast groundfish fisheries, found that managing fisheries to prevent overfishing on any stock (termed "weak stock management") is likely to require forgoing substantial potential harvests—perhaps by as much as 90%—to prevent overfishing of any of the 12 stocks they evaluated. The authors restricted the evaluation to 12 species based on the availability of stock assessments; "had assessments been available for all 83 species included in the Groundfish Fishery Management Plan, at least one would be classified overfished each year, either due to natural variation or stock assessment error." Technological solutions, if available, could improve the terms of this tradeoff between preventing overfishing and maximizing socioeconomic benefits. For example, more selective gear or fishing practices—by avoiding overfished species while catching healthy stocks—would allow higher harvests. The Groundfish Conservation Areas (primarily the RCA, see Section 1.1.2.2) are a management response along these lines. They allow higher cumulative trip limits while preventing fishing in depth ranges were incidental catch of overfished species is most likely to occur. They thus force a change in fishing behavior intended to change the "selectivity"—or more accurately, the catch rates—of overfished species.

National Standard Guidelines, pursuant to the MSA, applicable to rebuilding overfished stocks (50 CFR 600.310), identify a "mixed stock exception" to the requirement to rebuild an overfished stock to its target

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10/ Pursuant to the MSA, the Secretary of Commerce declares a species overfished when stock biomass has fallen below a minimum stock size threshold defined in the management framework. The nine overfished groundfish species are bocaccio (*Sebastes paucispinis*), canary rockfish (*S. pinniger*), cowcod (*S. levis*), darkblotched rockfish (*S. crameri*), Pacific ocean perch (*S. alutus*), widow rockfish (*S. entomelas*), yelloweye rockfish (*S. rebuerimus*), lingcod (*Ophiodon elongatus*), and Pacific whiting (*Merluccius productus*). However, the most recent Pacific whiting stock assessment reveals that this species is not currently overfished and may never have been overfished. Its overfished status was due to error in a previous assessment.

biomass (50 CFR 600.310(d)(6)). This exception allows overfishing of one stock in a mixed-stock complex to continue is there is a demonstrable long-term net benefit to the nation in doing so. The Council considered applying this exception when evaluating rebuilding plan alternatives for canary rockfish, but chose not to invoke it (PFMC 2003a).

1.2.3 Minimizing Bycatch

As noted above, bycatch refers to species, which, although caught, are not landed and/or marketed. More specifically, the MSA defines bycatch as "fish which are harvested in a fishery, but which are not sold or kept for personal use, and includes economic and regulatory discards" but excludes fish released alive in a recreational catch and release program. As implied by the definition, fish may be discarded for economic reasons—the costs of landing the fish exceed revenue earned by their sale—or regulatory constraints—such as prohibitions on retaining or landing a particular species, or landing more than a specified amount of a species. National Standard 9 in the MSA establishes requirements to minimize bycatch and bycatch mortality, and to accurately monitor fishing mortality resulting from bycatch.

In West Coast groundfish fisheries bycatch management is closely related to the overfished species issue. All of the currently overfished species are marketable; bycatch mainly results from regulatory discards. For the past few years cumulative trip limits for these species have been set very low, or retention may be entirely prohibited for all or part of the year. Fishing vessels may exceed the cumulative limit for one of these species before they have reached the limit for species they are targeting. They may continue to fish, but discard catch of species for which they have exceeded the cumulative limit, since the trip limits are based on landings, not actual catch.

Once bycatch becomes a large fraction of total fishing mortality for a given species, accurate monitoring of these discards becomes essential for effective management. In the absence of a full accounting of discards, managers have attempted to estimate bycatch. Assumed or estimated bycatch rates are an essential component in predicting total fishing mortality and have been a source of contention in the management process. Historically, NMFS and the Council applied an estimated discard rate to a given species' optimum yield (OY, equivalent to the total allowable catch) to derive a landed catch OY. Starting with the development of harvest specifications and management measures for the 2002 fishing year, NMFS and the Council have been using a more sophisticated modeling approach to estimate bycatch. This tool produces estimates of total fishing mortality based on the landed catch likely to result from a given set of trip limits (Hastie 2001; Hastie 2003; Hastie [2003]). Initially, the bycatch rates used in the model were derived from previous studies and monitoring projects. As part of the 2002 harvest specifications process, the Council considered different bycatch rates that could be reasonably presumed from the available data and chose a mix of rates for different stocks and fishing strategies (PFMC 2001). To date this model has only been used to estimate bycatch in the limited entry trawl sector. (Section 6 describes the different groundfish fishery sectors.)

NMFS has also implemented the West Coast Groundfish Observer Program, beginning in August 2001, specifically to more accurately estimate bycatch (NMFS 2003e). This program covers a fraction of groundfish vessels at any given time, but is designed to produce a statistically representative sample of fleet behavior and bycatch activity. As with the bycatch estimation model, the observer program initially covered only the limited entry trawl sector, because these vessels account for the bulk of groundfish landings. After a full year of data from the observer program had been collected and processed it was made available for management, in early 2003. The Council directed NMFS to incorporate bycatch rates derived from observer data into the trawl model, beginning inseason in 2003 and thereafter. Observer-derived bycatch rates were deemed more accurate and current than the rates then in use. The observer program was subsequently expanded to other sectors and data on the fixed gear sector was released in early 2004. Using these data, the bycatch model will be updated and expanded so that estimates of total fishing mortality can be made for both trawl and fixed gear fisheries.

1.2.4 License Limitation, Capacity Reduction, and Fleet Rationalization

Marine fish are "common pool" resources with access and use stemming from the public trust doctrine. It is difficult to exclude people from using a common pool resource, because of the physical characteristics of these resources (Ostrom 1990). Fish are a relatively mobile, "fugitive" resource, making it impossible for any one individual to precisely know their location or control their distribution. A fish stock is also "subtractable," meaning that exploitation by any one person diminishes the total amount available to others. Under the common law public trust doctrine, resources in ocean areas under U.S. jurisdiction are believed to be held in trust by government to satisfy a broadly-defined public interest (Committee to Review Individual Fishing Quotas 1999). This doctrine also makes a legally defensible exclusive property right to fishery resources difficult or impossible (at least before fish are harvested).

These resource characteristics underlie another key management issue, variously described as "the race for fish" or "the tragedy of the commons"—this second phrase derived from the title of a seminal work on the subject (Hardin 1968). In a resource regime where no individuals or groups have a defensible right to exclude others from access to the resource, the incremental benefit to any one user outweighs the collective decline in benefits from the resource. Hardin used the village commons as an analogy. As farmers graze more livestock, the amount of grass available per head declines, as does the rate of growth of each cow. Each farmer will continue pasturing more livestock on the commons, however, as long as the weight gain in his cattle outweighs what he could realize from pasturing elsewhere even if better growth rates could be obtained with fewer cattle overall on the commons. The race for fish expresses this same concept in a different resource context. Put simply, no fisherman will voluntarily limit harvest knowing that some other fisherman will step in and take any forgone harvest. More abstractly, in such resource regimes there is a tendency for the number of users to increase until an equilibrium is reached. At this "open access" equilibrium, none of the participants are making an economic profit–defined as the total revenue net of opportunity cost. Put another way, economic rent, resulting from an exclusive right to some economic good, is dissipated. Although this equilibrium may coincide with any point on the surplus yield curve for a renewable resource, depending on the variable costs incurred by the user and the characteristics of the resource, typically it occurs at some yield on the low biomass limb of the yield curve.

Resources regimes where there is no mechanism for excluding users are usually termed open access. Public resources do not necessarily fall into this category because the government can establish measures to limit the number of people allowed to exploit the resource. License limitation programs serve this function. Groundfish FMP Amendment 6, adopted in 1992, established a "limited entry" program for certain sectors of the fishery. The amendment responded to concerns about declining harvests, excess harvest capacity, the potential for still more vessels to harvest groundfish if target stocks in other fisheries declined, and increasing complexity of regulations if no limited entry program were implemented. Events in the subsequent 14 years suggest that it failed in its overall goal of improving the stability and economic viability of all groundfish fisheries and was modestly effective in limiting capacity, if not reducing it. The efficacy of limited entry programs is usually compromised—as in the groundfish case—because they are implemented when there is already overcapacity in the subject fisheries and excluding any active participant when the program is implemented is politically too difficult. As a result, over capacity may be institutionalized; even if some vessels stop fishing because of declining yields, they may persist as "latent capacity" poised to re-enter the fishery when conditions improve. Groundfish limited entry has been further confounded because of continued declines in certain key stocks and the declaration of overfished stocks.

Furthermore, the limited entry program applies only to certain gear types when used to catch groundfish (trawl, longline, and fishpot), although these sectors represented the vast majority of groundfish landings at the time of implementation. This was necessary because there are a wide range of fisheries that catch groundfish incidentally while targeting other stocks, which need to be exempted from the license limitation requirement. (In fact, many of these so-called “open access” vessels possess limited entry permits for the target fisheries they participate in, such as Oregon shrimp trawl and salmon troll vessels.) In addition, a small fleet of vessels targeting groundfish remained outside the program at its inception. These were fixed gear vessels that had made relatively modest groundfish landings. More recently, new participants in the open access sector have been targeting groundfish with unconventional gear types. The so-called live fish fishery in the California coastal zone is notable in this regard. (Section 6.1.3 describes this fishery.) This open access sector is managed separately under its own set of management measures and based on the *de facto* allocation of harvest opportunity between sectors (for species without fixed allocations). Although the open access sector continues to represent a relatively small fraction of total groundfish landings, it represents a capacity pool competing for what has been, until very recently at least, a shrinking pie because of constraints imposed by overfished species and declining yields of other target stocks.

Amendment 9 to the FMP, implemented in 1997, added a further refinement to the limited entry program, establishing additional limits on the economically valuable fixed gear sablefish fishery. It requires vessels with a fixed gear limited entry permit to possess an additional endorsement to participate in the primary fixed gear sablefish fishery (April 1 to October 31). Amendment 14, implemented in 2001, establishes a fairly complicated system to reduce capacity in this fishery by establishing a “permit stacking” system. This allows a vessel owner with a sablefish-endorsed fixed gear permit to acquire up to two additional permits and use them in combination on one vessel. Based on the catch history of the vessels originally fishing under the permits, the vessel with the stacked permits is assigned to one of three tiers, each tier having a different landing limit. Once assigned to a tier, the vessel is eligible for the landing limit associated with that tier for each permit assigned to the vessel. Thus, a vessel with three permits would be eligible to land up to three times as much fish as another vessel in the same tier possessing only one permit. As of 2002, 83 of the approximately 164 sablefish-endorsed permits were registered to vessels holding more than one permit. Of the vessels with multiple sablefish-endorsed permits, 25 had two permits and 11 had three permits (PFMC 2003b). In terms of capacity reduction, the main effect is to remove fishing opportunity in other limited entry fixed gear fisheries that these permits confer (since once stacked, they only confer eligibility in the primary sablefish season). Vessels surrendering permits may shift to other non-permit-limited fisheries, if a viable opportunity exists. In addition to possible capacity reductions, the endorsement and permit stacking regime has also eliminated the characteristics of a “derby fishery” that plagued this fishery. Derby fisheries result when excess capacity combines with catch or landing limits so that fishing is concentrated in a very short fishing season, established to indirectly limit harvests. By 1995 the primary sablefish season was only a week long. (This was followed by a landing-limit-managed “mop up” period to allow harvests to reach the established limit or allocation.) Permit stacking essentially gives each vessel a fixed quota, which can be caught at any time during the six-month primary season. Although not a freely tradable quota, the stacking mechanism does allow harvest opportunity to be more efficiently allocated among permit holders through permit purchases. The seller also captures some economic rent in the sales price of the permit.

Similar capacity reduction and efficiency gains have not been realized in the trawl sector. A strategic planning effort by the Council recognized excess capacity as an ongoing problem (Ad-Hoc Pacific Groundfish Fishery Strategic Plan Development Committee 2000), sparking an initiative to purchase and retire trawl vessels and associated limited entry permits. This effort came to fruition in 2003 when Congress appropriated $10 million dollars to help underwrite purchases and authorized the federal government to provide an additional $36 million 30-year loan, to be repaid by remaining fishery participants. Repayment will occur through fees levied on landings. Because of this structure, the program required approval through a referendum by permit holders. With its passage, 92 trawl vessels and 240 associated permits (including those for other, state-managed fisheries for Dungeness crab and pink shrimp fisheries) were retired late in

2003 (68 FR 62435). The program stipulates that retired vessels cannot be used for fishing anywhere (not just in West Coast groundfish fisheries) to prevent shifting of this capacity into other fisheries.

Limiting participation in fisheries, even if accompanied by some form of capacity reduction, only goes part way towards achieving greater economic efficiency in the use of common pool resources.[11/] As outlined above in the description of the permit stacking regime in the fixed gear sablefish fishery, assigning a fixed harvest opportunity, or quota, to a vessel can increase efficiency because this guarantee allows individual fishermen to harvest fish in the most economical way, rather than in response to controls—essentially induced inefficiencies—established in the regulatory regime. The next step is to make individually held quota tradable. Once scientists have determined the total allowable catch (or optimum yield) for the fishing season, fractions of this potential catch are allocated among fishery participants through market-like mechanisms. This further promotes efficiency because it allows more technically efficient, or lower cost, producers to accumulate additional quota. As noted above, the seller also realizes some economic rent, reflecting the economic profit associated with the right to a fixed and scarce resource. An individual tradable quota regime also allows producers to align inputs (harvest potential) with costs and market conditions. (The term individual fishing quota, or IFQ, seems to have greater currency in descriptions of these regimes.) The sablefish permit stacking regime has a tradable element through the opportunity to purchase permits, which then confer a set amount of harvest opportunity. However, the input units are fairly "lumpy"; there is no provision to finely divide both the amount and timing of quota purchases. An IFQ regime, in contrast, puts fewer restrictions on the specifics of quota transfer. (For a comprehensive treatment of IFQs, see Committee to Review Individual Fishing Quotas (1999)). IFQs have been controversial, however, largely because of equity concerns. More efficient producers (which are often larger firms) may buy up available quota, raising concerns that small-scale fishermen will be "squeezed out," although they should be fully compensated through the sale of quota.[12/] Fish processors have also raised concerns about market power and wealth shifting to producers, who would have greater control over inputs—fish—purchased by processors. And economists have found some empirical evidence supporting these claims (Matulich 1996; Matulich and Clark 2003). In response to these concerns, Congress enacted a prohibition on implementing IFQ programs. This ban expired in 2002, which has renewed interest in this approach on the West Coast.

Now that a substantial amount of capacity has been wrung out of the limited entry trawl sector, there is increasing interest in implementing an IFQ program for this sector. In September 2003, the Council established a Groundfish Trawl Individual Quota Committee to explore how such a program could be structured and implemented. The Committee held its first meeting in October 2003. With the availability of additional funding, the Council expects to move forward on the FMP and regulatory amendment processes necessary to implement an IFQ program. Because of its complexity and the contentious issues surrounding IFQs, this is likely to be a long process; if a such a management regime is implemented, it would be in several years.

1.2.5 The Effect of Management on Vessel Safety

National Standard 10 in the Magnuson-Stevens Act calls for conservation and management measures to promote the safety of human life at sea to the extent practicable. Nevertheless, commercial fishing

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11/ Capacity reduction can also include limiting the fishing power or technical efficiency of fishing vessels. Even if the number of permits is limited, fishermen may respond by increasing the fishing capacity of the permitted vessel (by using a larger vessel, for example) so that there is no actual net reduction in fishing capacity. The limited entry program addresses this issue with vessel length permit endorsements. However, other technical improvements that increase harvesting efficiency or capacity are not restricted.

12/ In theory at least, the sales price should be a function of the market's assessment of the net present value of the stream of future profits resulting from fishing the quota share.

consistently ranks as one of the most hazardous occupations in the United States. Commercial fishing is inherently dangerous; however, repeated efforts to increase marine safety regulation and compliance have failed. While recreational fishing vessels also encounter safety risks, their risks are considerably different than those encountered by commercial vessels. Recreational vessel safety is discussed at the end of this section.

1.2.5.1 Commercial Vessel Safety

The 1999 report of the U.S. Coast Guard's Fishing Vessel Casualty Task Force (FVCTF), *Living to Fish, Dying to Fish* (FVCTF 1999) describes attempts to legislate safety in the commercial fishing industry. It describes casualty characteristics and presents recommendations for improving safety in the fishing industry. The report notes that much opposition to more stringent safety requirements has come from the fishing industry itself, both for cultural and economic reasons.

The Commercial Fishing Industry Vessel Safety Act of 1988 was one of the first successful attempts to legislate safety in the commercial fishing industry. The Act led to a set of regulations and a voluntary inspection program for commercial fishing vessels. While safety has improved since the Act went into effect, the Coast Guard report notes that "the level of fishing safety standards is analogous to *requiring* parachutes for an airplane crew, but only *marketing* voluntary measures to *encourage* a mechanically sound aircraft and a competent pilot and crew" (page 1). At present, certain safety gear such as EPIRBs (emergency position indicating radio beacons), radios, survival suits, fire protection equipment, life preservers, and life rafts are required on board commercial fishing vessels (requirements vary by the size and range of the vessel). Past efforts to implement safety regulations have attempted to address stability and seaworthiness, construction, licensing of skippers and crew, safety training, flooding detection, dewatering systems, prohibition of alcohol and drug use when engaged in commercial fishing operations, and related matters. These requirements have yet to be enacted. Currently, dockside safety inspections are strictly voluntary. (Different rules apply to recreational and charter boats. Regulations for charter boats vary depending on the size of the boat and where the boat is used.)

The Coast Guard reports that unsafe conditions on commercial fishing vessels are not exclusively created by mariners themselves. Systemic failures, such as regulations, pressure applied by owners, managers, and insurance companies, and larger market forces all contribute to the safety problems in the industry.

The Coast Guard report lists four solutions to the safety problem. These are *seaworthy boats, adequate survival gear, competent crews*, and *safety-conscious resource and industry management regimes*. This section provides a brief overview of the current state of these four areas and discusses other factors that affect safety.

Seaworthy Boats: Poor vessel or equipment condition is a primary cause of fishing casualties. Equipment may be used beyond its intended service life, used in ways that were not originally intended, poorly designed, or improperly installed. Even in the best of times, many boat owners put off needed replacements, maintenance, and repairs. This neglect arises from personal beliefs and values, economic reasons, lack of regulation, a culture that de-emphasizes safety concerns, and other factors. The Coast Guard report notes that "many fishers have strongly opposed standards that might save their own lives" (FVCTF 1999, page 1). This tendency to put off maintenance has been exacerbated during the past several years, as fishing regulations have grown increasingly stringent, and revenues have declined. Many commercial fishers have put off maintenance, hoping for better times.

Adequate Survival Gear: As noted above, the Coast Guard requires commercial fishing vessels to have certain survival equipment, such as EPIRBs, life rafts, and survival suits. This equipment is expensive and requires regular upkeep and inspection in order to function properly. For example, EPIRBs must be tested and registered, registration must be kept current, and batteries must be replaced. Life rafts must be inspected and repacked every year (after the first two years) at a cost of approximately $600 to $750 (Markle 2000). Immersion suits cost nearly $500.[16/] They must also be inspected and tested regularly; batteries for the attached lights must be renewed periodically. Alarm systems must be tested and maintained. Many accidents have been caused by people neglecting these inspections or using equipment improperly. Finally, crew must know how to properly use and maintain these different types of safety equipment.

Competent Crews: As revenues in the fishing industry decline, vessel owners and captains report it has become more difficult to find, hire, and keep qualified crew. While there are many skilled and capable crew members working on West Coast commercial fishing boats, many who once would have been attracted to the industry are discouraged by increasing regulations and by the apparent lack of a promising future. Conversely, the industry attracts people who are unable to find work elsewhere, and who lack the requisite skills and training. Some are itinerant, and do not stay long enough to be fully trained or invested in vessel operations—including safety (Gilden and Conway 2000). The Coast Guard report (FVCTF 1999) notes that inadequate training to respond to emergencies or use survival gear, lack of awareness of stability issues, and ignoring stability issues contributed to several recent marine accidents. Unskilled or untrained skippers and crew can also cause accidents by loading vessels improperly or modifying vessels, creating unsafe conditions.

At present, there are no specific licensing requirements for captains or crew of commercial fishing vessels under 200 gross tons—the vast majority of domestic fishing vessels. “John Doe” crew licenses also make it impossible to track or contact crew members, which increases the difficulty of conducting outreach and education campaigns.

Even the most skilled crew can be affected by fatigue and lack of sleep. Fisheries management measures that require captains to drive long distances or compete in “derby” fisheries can lead to levels of fatigue that compromise safety. An analysis of marine vessel casualties by the National Transportation Safety Board cites fatigue as a cause in 16% of accidents (NTSB 1999).

Lastly, because many safety measures are currently voluntary, “competence” must include a willingness to be educated and comply with these measures.

Safety-conscious Resource and Industry Management Regimes: Management decisions can have a strong impact on safety. For example, measures that increase competition or restrict people to limited seasons and catch quotas can force people to venture out in extreme weather or take other undue risks. Intense harvesting effort concentrated in limited areas can cause safety problems by increasing the chance of collisions. Management measures such as inshore closures can force boats into areas where they are unsafe or far from assistance.

Other Factors Affecting Safety: On the West Coast as elsewhere, weather and ocean conditions pose a significant safety risk to fishing operations—both commercial and recreational. Groundfish vessels mainly operate from coastal ports that have potentially hazardous bar crossings, and fishing grounds are in ocean waters primarily three miles to 50 miles offshore. Wind and sea state conditions can be dangerous and bar conditions extremely hazardous. Numerous marine advisories are issued by the National Weather Service each year. While icing, hurricanes, and other extreme weather conditions are rarely factors off the West Coast, water temperatures are low enough to quickly cause hypothermia when people who are not wearing survival suits fall overboard or have a boat sink under them.

16/ Stearns Immersion Suit with Harness, $490.99 at MARSARS Water Rescue Systems, Inc.

The Coast Guard's "Rescue 21" system is expected to improve the safety of marine vessels. This system, which has yet to go into effect on the West Coast, will serve as a "911" system for coastal waters. By increasing detection and localization of distress calls and eliminating known VHF radio coverage gaps, it will minimize the time search and rescue teams spend looking for people in distress. This system will be implemented first in the Northeast, then nationwide. Among other things, it increases channel capacity and uses Global Positioning System (GPS) technology to help locate distressed vessels.

1.2.5.2 Recreational Vessel Safety

The rate of recreational boating fatalities has been decreasing during the past ten years. Nevertheless, 519 recreational boaters drowned in the United States in 2000, and the Coast Guard estimates that half would have survived had they been wearing life jackets. The Coast Guard also reports that nearly one-third of these fatalities involved alcohol. Because of its long coastline, large population, warmer weather, and popular recreational fisheries, California had a higher number of recreational vessel accidents in 2000 than Oregon or Washington. That year, boaters off California experienced 900 accidents and 49 fatalities. Of the accidents, 338 were caused by collisions with other vessels. Off Oregon, the statistics were 97 accidents and 14 fatalities, and in Washington, 131 accidents and 22 fatalities (FVCTF 2001).

Recreational and charter vessels face some of the same safety risks as commercial vessels. However, recreational vessels do not face the same risks associated with the use of heavy equipment, and they tend to operate in better weather and stay closer to shore. At the same time, the operators of private recreational boats have widely varying levels of ability and are often less familiar with currents, tides, hidden obstacles, and other safety risks than professional charter captains or commercial captains. Operating close to shore creates a new set of safety risks associated with groundings and obstacles.

Fewer safety regulations pertain to small recreational boats than to commercial or charter vessels. Some states apply additional regulations to recreational boats operating within the three-mile limit. Regulations for charter vessels tend to be more stringent than for either recreational or commercial vessels; generally, the more passengers a vessel can carry and the farther it goes out to sea, the more stringent the regulations become. Unlike the other vessel categories, charter operators must be tested and licensed.

TABLE 1-1. Stock assessments over the last 10 years, year based on publication in SAFE. (Page 1 of 1)

	First Assessed (before 1994)	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Arrowtooth Flounder	1993											
Bank Rockfish		X*						X				
Black Rockfish	1993						X				X	
Blackgill Rockfish						X*						
Bocaccio	1990			X			X			X	X	
Cabezon												X*
Canary Rockfish	1984	X		X			X			X		
Chilipepper Rockfish	1992					X						
Cowcod							X*					
Darkblotched Rockfish				X*				X		X	X**	
Dover Sole	1984	X	X		X			X				
Lingcod	1986	X			X		X	X				X
Pacific Ocean Perch	1972		X					X		X	X	
Pacific Whiting	1982	X	X	X	X			X**		X		X
Petrale Sole	1984						X					
Remaining Rockfish-Sebastes				X*								
Sablefish	1984	X			X	X			X	X**		
Splitnose Rockfish		X*										
Thornyheads (2 spp.)		X			X							
Thornyhead-Shortspine	1990					X			X			
Widow Rockfish	1989	X**			X			X			X	
Yelloweye Rockfish									X*		X	
Yellowtail Rockfish	1980			X	X			X			X	

* First assessment (1994-2004)

** Assessment update

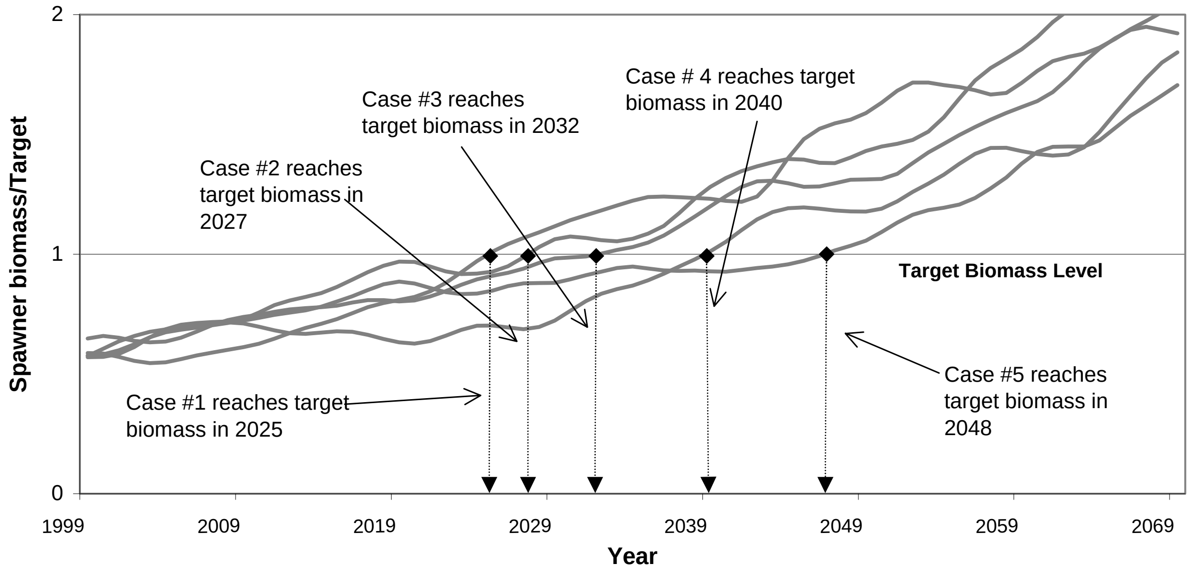

FIGURE 1-1. Example of five cases from a Monte Carlo simulation.

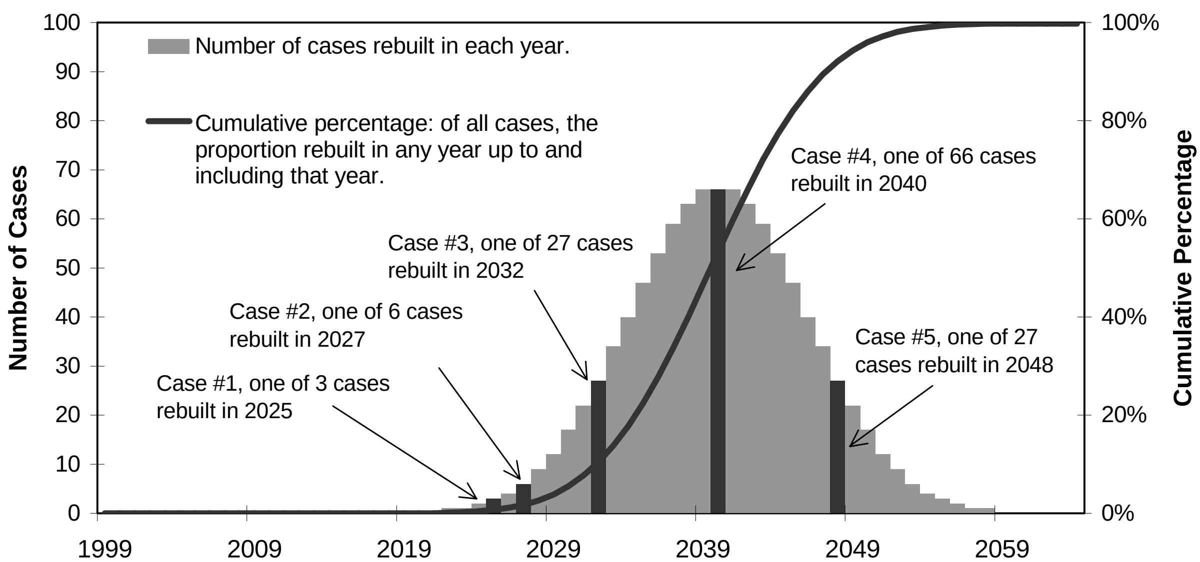

FIGURE 1-2. How cumulative probability is calculated in a Monte Carlo simulation.

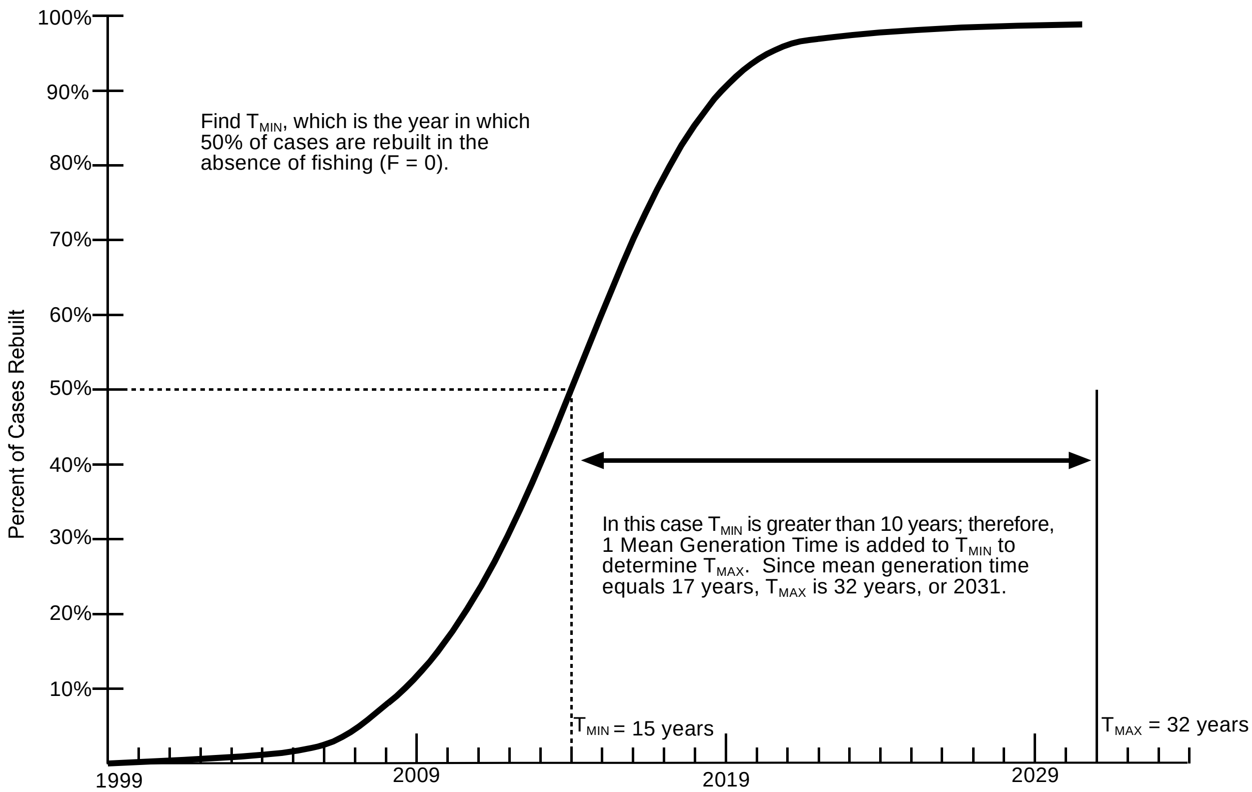

FIGURE 1-3. Calculation of the minimum rebuilding time, T_{MIN}.

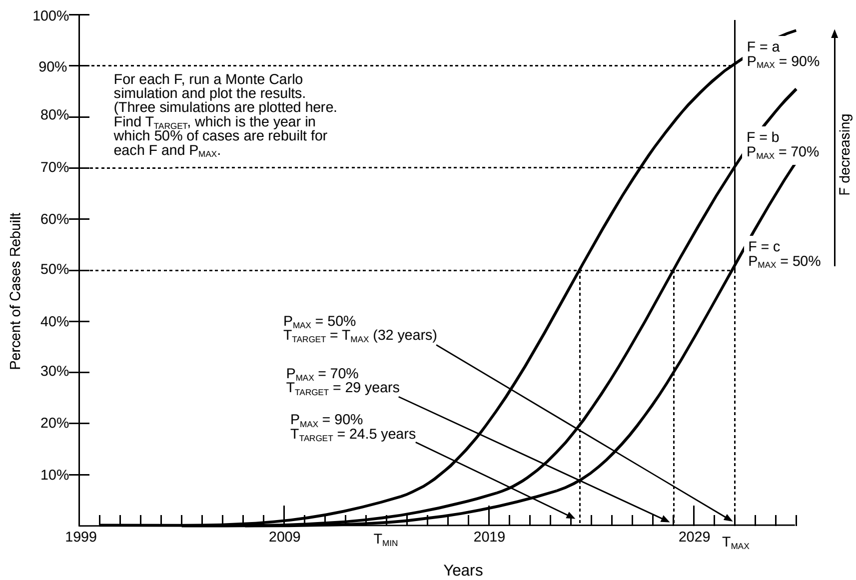

FIGURE 1-4. Computation of the rebuilding probability (P_{MAX}) and the median rebuilding year (T_{TARGET}).

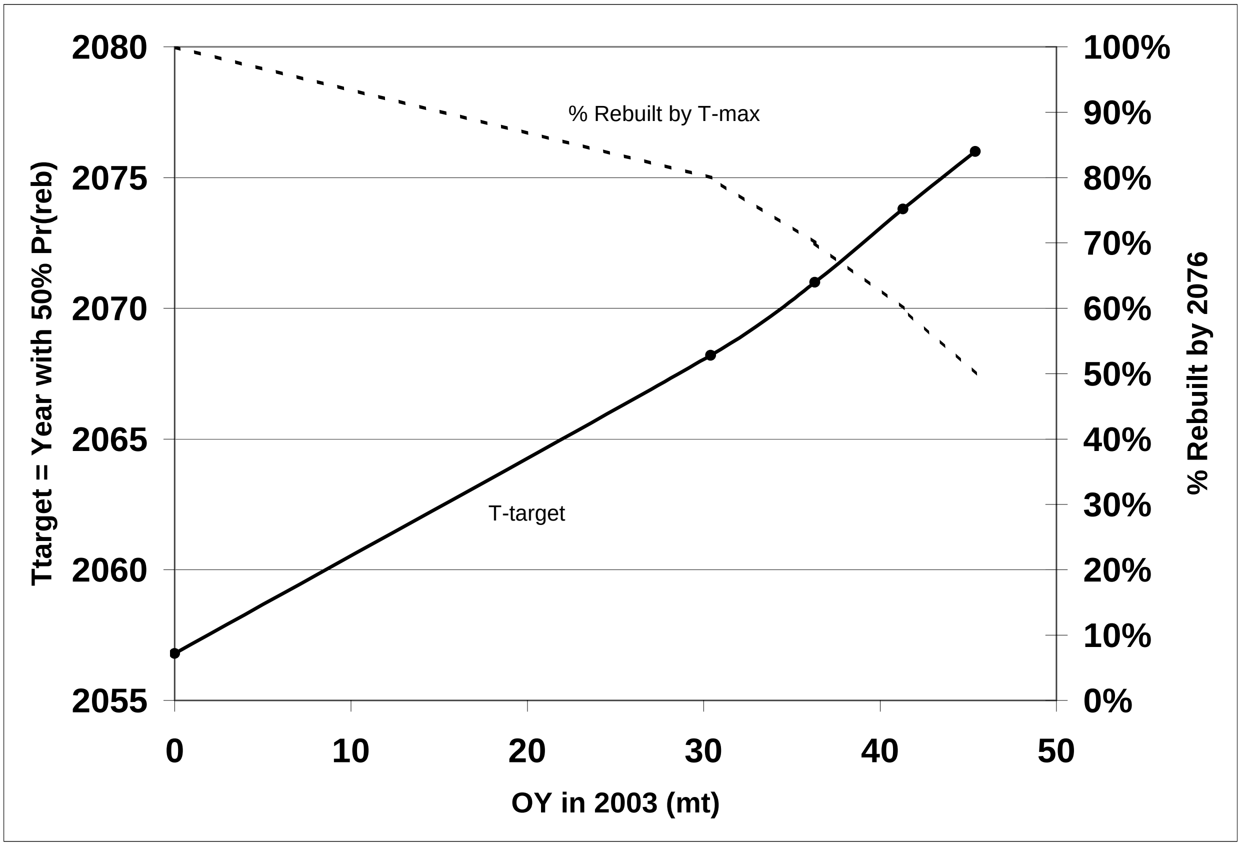

FIGURE 1-5. Tradeoff between OY in 2003, T_{TARGET}, and T_{MAX} from the canary rockfish rebuilding analysis (Methot and Piner 2002).

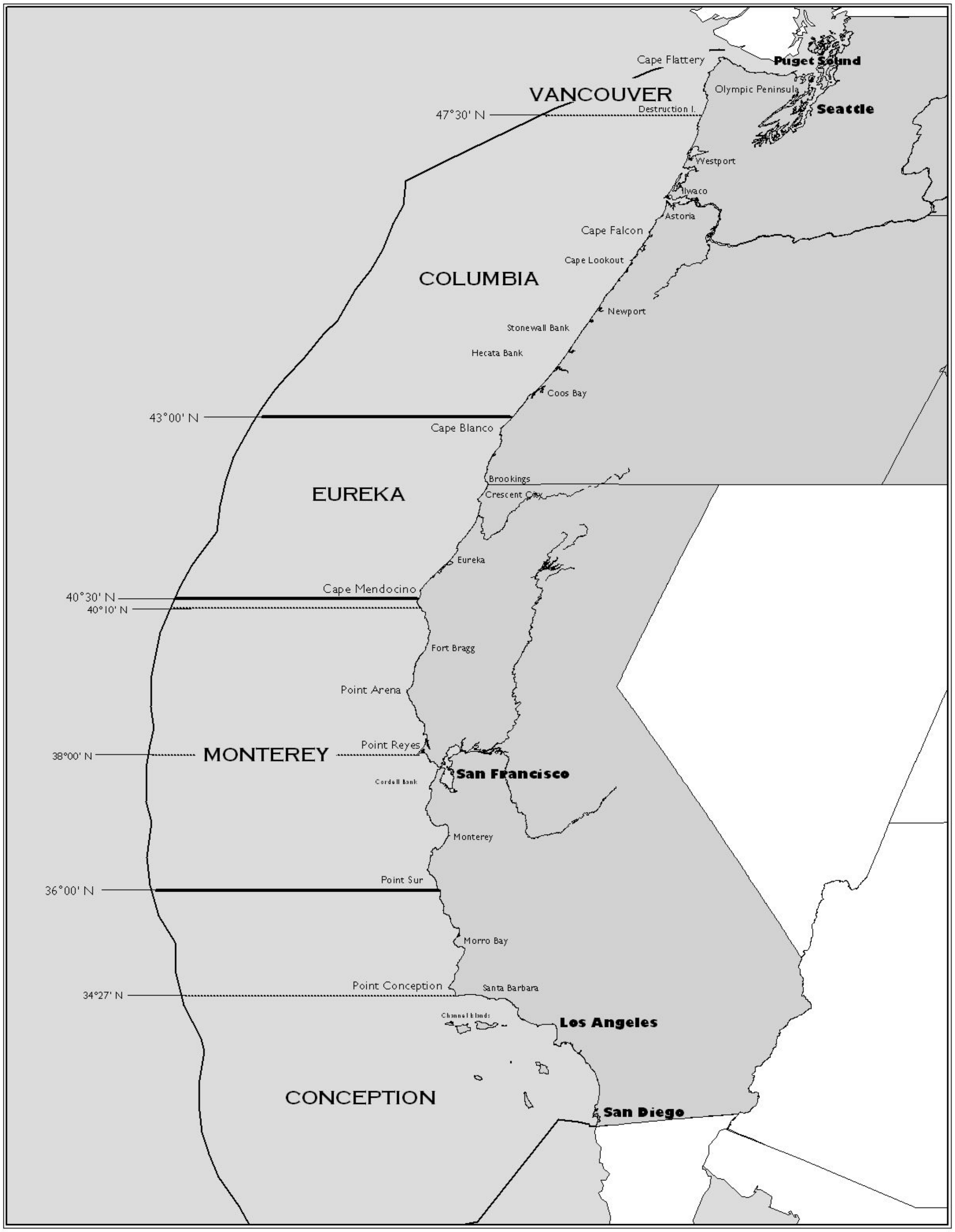

FIGURE 1-6. Management lines and zones and West Coast ports.

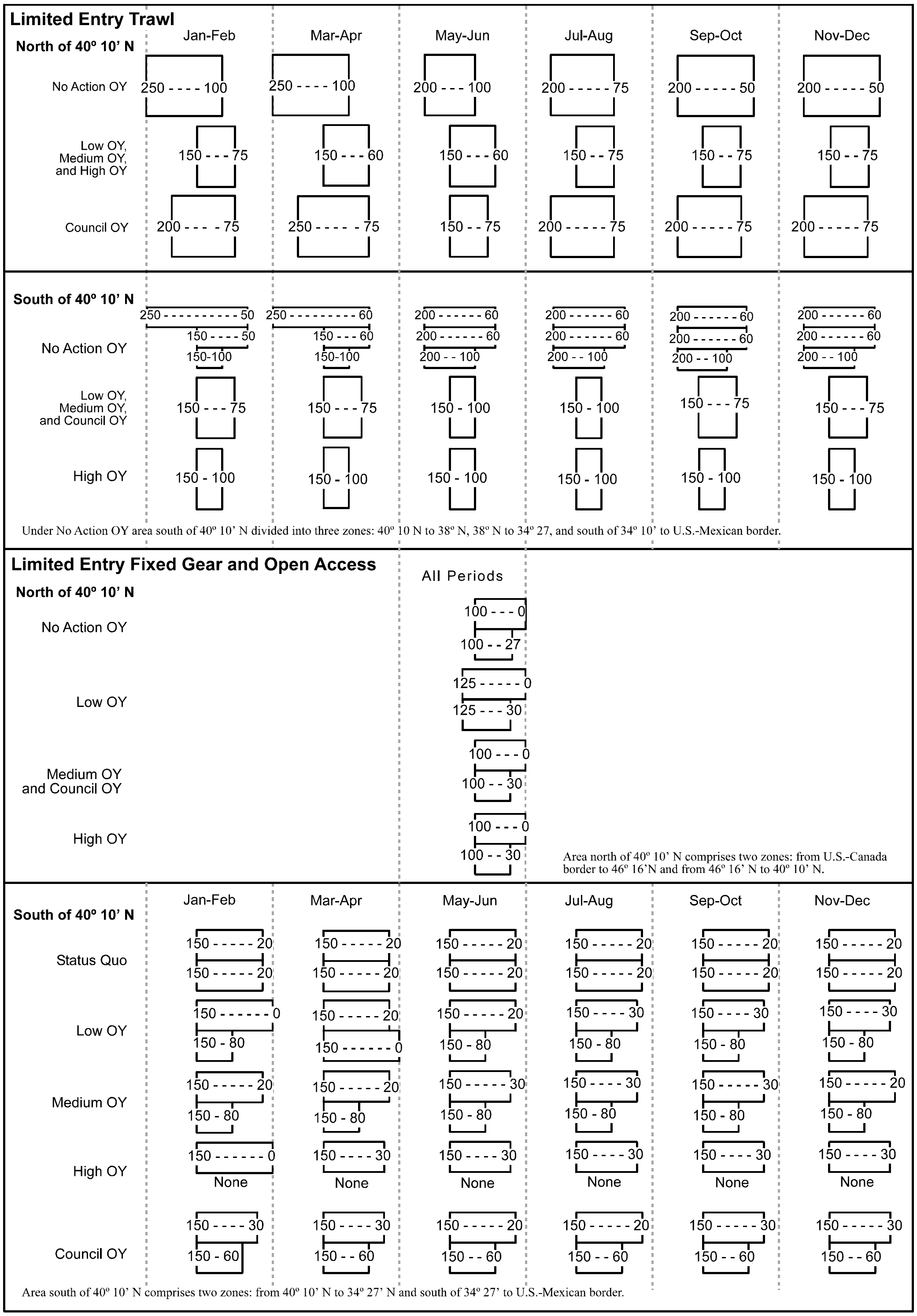

FIGURE 1-7. Schematic showing closed area boundaries under the different alternatives.

2.0 The Fishery Management Unit

2.1 Areas and Stocks Involved

Groundfish fisheries regulated under the FMP occur on the continental shelf and upper slope off Washington, Oregon, and California. The continental shelf is rather narrow, varying in width from less than a mile off the Monterey Peninsula in California to as much as 37 miles over Heceta Bank off southern Oregon. The total shelf area (0 to 100 fathoms) is about 30,000 square miles. By comparison, the area of the central and eastern Bering Sea shelf is an order of magnitude larger, extending approximately 200 miles from shore. The relatively limited continental shelf and upper slope habitat off the West Coast results in recent average groundfish yields of 268,085 mt within the U.S. EEZ in comparison to recent average groundfish yields in the Eastern Bering Sea and Aleutian Islands of 1,775,600 mt within the U.S. EEZ (NMFS 1999, p. 6). Nonetheless, productivity in West Coast waters is high, and groundfish resources in the region sustain fisheries of major importance to the U.S.

The fishery is prosecuted over a wide range of depths, from 20 fathoms for English sole and sanddabs to as deep as 700 fathoms for Dover sole and sablefish. Similarly, fishing may occur on smooth mud/sand substrates, rocky reefs, pinnacles and canyons.

A wide variety of groundfishes are harvested in the Washington-Oregon-California fishery. Table 2-1 lists fishes managed under the groundfish FMP, showing their distribution. West Coast groundfish range from semi-pelagic types like Pacific whiting, shortbelly rockfish, and widow rockfish to demersal types like Dover sole, lingcod, and thornyheads. Most species primarily inhabit the continental shelf, but Dover sole, thornyheads, rex sole, petrale sole, and some others occur in greatest abundance on the continental slope. The basic character of the fishery and the composition of landings are distinctive in each management area (see Figure 1-7). The close spatial relationship of certain species in any given area often results in large catches of non-target species, creating a multi-species fishery. This is particularly true in the case of bottom trawl catches. For example, vessels targeting on Dover sole in the Columbia area also may catch thornyheads, sablefish, and darkblotched rockfish. Several species of rockfish may be caught in a single trawl tow or gillnet set, the species composition of which may change from north to south. Historically, widow, yellowtail, and canary rockfish were particularly important in rockfish catches in the Vancouver and Columbia areas, while bocaccio and chilipepper rockfishes have been significant components in the Monterey and Conception areas. Fishermen can exercise some control over the proportions of various species in catches by bathymetric and area shifts in effort as well as modifying the manner in which gear is fished. However, it is often impossible to avoid the catch of some non-target species totally. The fishery's multispecies nature is further complicated by seasonal changes in fish availability, by weather, and by market conditions (prices and poundage limits)—factors which may cause a trawler to fish on several species assemblages in a single fishing trip. Many gear types are used in the fishery, including trawl nets, gillnets, traps, and longlines. However, trawl nets (both bottom and midwater types) account for a major portion of the groundfish catch.

2.2 History of Exploitation

Trawling began on the Pacific coast in 1876 (Scofield 1948), when the paranzella net, or two-boat trawl, was introduced in San Francisco Bay and towed by lateen-rigged sailing vessels. The method successfully produced catches which were larger than those by other fishing gear of the era, and trawling within the Bay became prevalent.

During the 1880s, steam-powered vessels began replacing sailing vessels. By 1888, paranzella gear was fished exclusively by paired steam trawlers. In 1906, San Francisco Bay was closed to trawling because of declining fish stock abundances. By this time paranzella fishing had expanded to open ocean areas outside the Bay. In 1884 a small schooner began fishing with a beam trawl (Harry and Morgan 1963). This was the first type of trawl gear used off the Oregon-Washington coasts. The beam trawl was an effective fishing gear which could be towed by a single vessel. The otter trawl was introduced as early as 1908 but was not used on a regular basis until 1926, when two vessels began fishing the protected waters of Puget Sound. Diesel engines became available during the 1920s as did other technological advances stimulated rapid growth and expansion of the trawl fishery. World War II created a high demand for food fish and for shark livers used in the production of vitamin A. The trawl fishery expanded to many productive offshore grounds off California, Oregon, and Washington, and by 1944 Washington trawlers were fishing as far north as Queen Charlotte Sound, Canada. In 1978 large productive trawl grounds in British Columbia, Canada were closed to U.S. fishermen. This action forced Washington fishermen to fish exclusively in U.S. waters, primarily off Washington. Foreign fishing fleets have also operated in the Washington, Oregon, and California area. The Soviet Union operated a large trawl fleet as early as the mid-1960s for rockfish and Pacific whiting. Poland, the German Democratic Republic, the Federal Republic of Germany, and the Republic of Korea also sent vessels, primarily trawlers/processors, to fish in this area prior to the implementation of the Magnuson Fishery Conservation Magnuson Act (MFCMA, and subsequently renamed the Magnuson-Stevens Fishery Conservation Magnuson Act, or MSA). Foreign trawl fleets were one of the principal causes for the depletion of the Pacific ocean perch stock.

In the late 1970s and early 1980s the creation of the 200 mile EEZ as part of the MFCMA, the availability of federal low-interest vessel construction funds, significant improvements in electronic navigation and fish-finding equipment, gear advancements, and the growth of a directed widow rockfish fishery helped fuel a broad expansion of the trawl fleet. For example, California's trawl fleet grew from 126 groundfish vessels in 1977 to 195 trawlers in 1983 (Korson 1984; Korson 1988). Similar expansions occurred in the Oregon and Washington trawl fleets. Investment in fishing vessels was aided by the federal Capital Construction Fund, which provided concessionary loans for the purchase of vessels and equipment. The, perhaps foreseeable, result of the “open access” management regime in place during this period was overcapitalization: “too many boats chasing too few fish.” (Section 1.2.4 discusses this issue.) By 1984, fleet over-capitalization had precipitated a substantial (25%) decline in fleet size, yet the remaining vessels still possessed tremendous fishing power. In response, the Council implemented a license limited entry program for trawl and fixed gear groundfish vessels in order to stem the increase in fishing capacity. FMP Amendment 6 accomplished this in 1992 (PFMC 1992).

At the same time that harvesting capacity was increasing, many groundfish stocks were steadily declining. Widow rockfish is a good example for tracking developments in the trawl sector, demonstrating both the increase in fishing capacity, and harvests, and subsequent decline in the stock. Caught with mid-water trawl nets, the advent of joint-venture fishing, in which catcher vessels use mid-water trawl gear, spurred the discovery that large catches could be made with relative ease. Rockfish schools had heretofore gone undetected because, unlike other rockfish, they aggregate at night but disperse during daylight hours. Given a large standing stock, landings rapidly escalated—from 1,107 mt in 1978 to a peak of 26,938 mt in 1981 (He *et al.* 2003a). With implementation of the groundfish FMP and imposition of harvest limits, landings fell to around ten thousand metric tons annually for most of the remainder of the decade. After an initial stock assessment in 1989, a harvest guideline of 12,100 mt was implemented. Subsequent assessments resulted in further reductions in harvest limits during the first part of the 1990s. Landings fluctuated somewhat above 6,000 mt annually during this period. Passage of the Sustainable Fisheries Act amendment to the MSA in 1996 required Councils to establish frameworks for preventing overfishing and rebuilding overfished stocks. In response, the Council adopted groundfish Amendment 11, which among other things established a minimum stock size threshold of 25% of unfished biomass to identify overfished stocks. A 2000 stock assessment (Williams *et al.* 2000) found that the stock had fallen just below this threshold, triggering declaration that the stock was overfished and requiring the Council to adopt a rebuilding plan. Landings in 2002 were a mere 263 mt while the 2004 harvest limit (optimum yield, or OY) adopted by the Council is 284 mt. Stock declines and resulting overfished species declarations in the late 1990s and 2000 exacerbated the problem of overcapacity in the groundfish trawl sector, which the limited entry program only partly addressed. An October 2000 strategic plan developed by the Council notes "...the number of vessels in most [groundfish] fishery sectors will have to be reduced by at least 50%.... Fishing fleet overcapitalization has been a major factor in fish stock depletion, and the industry and coastal communities are facing an economic and social crisis" (Ad-Hoc Pacific Groundfish Fishery Strategic Plan Development Committee 2000, p. 1). In 2003 Congress authorized grant and loan monies to established a groundfish limited entry trawl vessel and permit buyback program, which was implemented near the end of that year. Some 92 vessels and 240 associated permits (including those for other fisheries) were permanently retired. Section 1.2.4 describes this program in more detail.

Two other gear types, longline and trap (or pot), historically have participated in the groundfish fishery, primarily harvesting sablefish. Other hook-and-line gear are a minor constituent of the fishery not discussed here. Longline gear has been utilized for sablefish since the late 19th century. Longline fleet size has varied considerably over the years, but unfortunately accurate records of these vessels in the Washington, Oregon, and California area were unavailable until 1987. In 1987, 137 sablefish longline vessels landed in the Washington, Oregon, and California area. Anecdotal information suggests that longline fleet size increased during the late 1980s as a result of robust foreign sablefish demand, the use of very efficient circle hooks, and reduced halibut and sablefish fishing opportunities in Alaskan waters. In 1995, the second year of the groundfish limited entry program, 195 vessels holding limited entry permits made landings with hook and line gear. In 2001, 178 vessels with fixed gear permits (which would also include pot gear, discussed below) made landings. Of these, 158 landed sablefish.

Sablefish traps were developed for commercial use by fishermen and NMFS scientists in the early 1970s and quickly found widespread use by 1974. They proved to be effective and species-specific—they are used almost exclusively to target sablefish—and produce a high quality product. The pot sablefish fleet quickly grew from 60 to 207 vessels in 1979, primarily in response to strong market demand for sablefish in Japan as well as high availability of sablefish along the West Coast. In 1980, sablefish prices in foreign markets dropped sharply and many trap vessels left the fishery as a consequence. The fleet declined in size continually to a low of 26 vessels in 1987 (Korson 1984; Korson 1988). Vessel counts from the first half of the 1990s, however, show between 169 and 216 pot gear vessels making landings in the years 1990 to 1995 (Silverthorne 1996, p. EC 10). But the limited entry fleet that came into being in 1994 is a fraction of that number: less than 50 limited entry vessels using pot gear made landings in the first two years of license limitation.

Vessels targeting sablefish with longline and pot gear also suffered from over capacity and by the early 1990s the fishery was a "derby" managed by very short seasons of two weeks or less. Limited entry did not solve the problem completely and short seasons continued. Amendment 9, requiring an permit endorsement to participate in the primary sablefish fishery, and Amendment 14, introducing permit stacking, have helped to alleviate the symptoms of over capacity in the fixed gear sablefish fishery, effectively eliminating the short, derby season. Section 1.2.4 describes these changes in more detail.

Another significant development during the 1980s was the transition of the Pacific whiting fishery from a predominantly foreign to domestic fishery. Pacific whiting are caught and processed on an industrial scale; prior to passage of the MFCMA, large foreign catcher-processors harvested this resource. Passage of the Act in 1976 encouraged development of domestic fisheries. Joint-venture fisheries served as an intermediate step. In a joint-venture, U.S. trawl vessels catch the fish but deliver them to a foreign vessel, either a catcher-processor or mothership, which acts solely as an at-sea processor. After 1979 foreign catches began declining, from 114, 910 mt in that year to no foreign catches in 1983. However, foreign catches occurred from 1984 to 1998 under a renewed directed fishery by Polish vessels. The joint-venture fishery grew steadily during this period, from a mere 856 mt in 1978 to a peak of 203,578 mt in 1989. During the 1980s between 70% and 90% of whiting catches were attributable to joint-ventures and domestic landings. In 1989 and 1990, with no foreign trawl fishery for whiting, the groundfish fishery off Washington, Oregon, and California was 100% domestic, as intended by the authors of the Magnuson-Stevens Act. (Joint-venture catches are counted toward domestic landings.) In 1991, foreign processing of whiting at sea by joint ventures was replaced by the expanding domestic processing industry, predominantly the at-sea processing fleet that had been built primarily to harvest pollock in Alaska. (Technological advances allowing whiting to be turned into surimi underwrote this transformation.) The fishery has been prosecuted by domestic vessels since that time. Fishing opportunity is allocated among three sectors: catcher-processors, motherships, and shoreside processors. Like the foreign vessels they supplanted, catcher-processors are able to both harvest and process the catch at sea. Motherships take deliveries from trawl vessels, which also provide fish to shoreside processing plants.

2.3 The Fishery Ecosystem and Marine Biodiversity in Relation to Groundfish Management

2.3.1 The Fishery Ecosystem

Ecosystem and habitat, discussed below, are closely related concepts. Ecosystems embody both the relationships between species, represented by the flow of material and energy through a network of relationships, and the sum total of the species comprising the system within a given physical setting. This overlaps with habitat as the physical and biological attributes to the space occupied by a particular species. The ecosystem concept is reflected in groundfish management through the use of biogeographic zones and species complexes to distinguish the application of management measures. These ecological divisions have both a north south component, with Cape Mendocino representing an important break in the distribution of many groundfish species (particularly rockfish), hence the use of the 40°10' N. line of latitude (or alternatively, 40°30' N latitude). Point Conception represents another important biogeographic boundary considered when crafting management measures. A second, and perhaps more influential, ecological demarcation depends on distance from shore, or depth. Groundfish are managed based on distinction between nearshore, continental shelf, and continental slope species. Distinct species assemblages characterize these zones; in addition, there are differences between the zones based on possible vertical distribution of species. Finally, particular species may exhibit seasonal migrations, producing some annual variation in the characteristics of these different ecological zones. The nearshore, shelf, and slope ecosystems can be characterized by combinations of the habitat composites described below, the species assemblages particular to these ecosystems, and the trophic relationships between these species. More specific information on trophic relationships may be found in the managed species descriptions in Section 2.4.

Bathymetry and physical topography helps determine habitat, by influencing its physical structure, and also the co-occurrence of species. The U.S. West Coast is characterized by a relatively narrow continental shelf. The 200 m depth contour shows a shelf break closest to the shoreline off Cape Mendocino, Point Sur, and in the Southern California Bight; and widest from Central Oregon north to the Canadian border, as well as off Monterey Bay. Deep submarine canyons pocket the EEZ, with depths greater than 4,000 m south of Cape Mendocino (Figure 2-1).

As on land, climate is another important ecological determinant. However, in the ocean's fluid medium, currents are the predominant expression of this broad environmental influence. Not only do currents influence water temperature, vertical mixing and movement can bring nutrient-rich, deep-bottom water into the photic zone, strongly influencing biological productivity. In the North Pacific Ocean, the large, clockwise-moving North Pacific Gyre circulates cold, subarctic surface water eastward across the North Pacific, splitting at the North American continent into the northward-moving Alaska Current and the southward-moving California Current (Figure 2-2). Along the U.S. West Coast, the surface California

Current flows southward through the U.S. West Coast EEZ. The California Current is known as an eastern boundary current, meaning it draws ocean water along the eastern edge of an oceanic current gyre. The northward-moving California Undercurrent flows along the continental margin and beneath the California Current. Influenced by the California Current system and coastal winds, waters off the U.S. West Coast are subject to major nutrient upwelling, particularly off Cape Mendocino (Bakun 1996). Shoreline topographic features such as Cape Blanco and Point Conception, and bathymetric features such as banks, canyons, and other submerged features, often create large-scale current patterns such as eddies, jets, and squirts. For example, a current jet off Cape Blanco drives surface water offshore, which is replaced by upwelling sub-surface water (Barth *et al.* 2000). One of the better known current eddies off the West Coast occurs in the Southern California Bight between Point Conception and Baja, California (Longhurst 1998), wherein the current circles back on itself by moving in a northward and counterclockwise motion just within the Bight.

While the seasonal environmental effects of the California Current and related lesser current patterns are easily observable (Lynn and Simpson 1987), the influence of longer period cycles has only been appreciated recently. The effect of El Niño-Southern Oscillation (ENSO) events on climate and ocean productivity in the northeast Pacific is relatively well-known. In the past decade a still longer period cycle, termed the Pacific Decadal Oscillation or PDO, has been identified. Although similar in effect, instead of the one-year to two-year periodicity of ENSO, PDO events affect ocean conditions for 15 years to 25 years (Mantua in press). The PDO shifts between warm and cool phases. The warm phase is characterized by warmer temperatures in the northeast Pacific (including the West Coast) and cooler-than-average sea surface temperatures and lower-than-average sea level air pressure in the central North Pacific; opposite conditions prevail during cool phases. Because the effects are similar, “in-phase” ENSO events (e.g., an El Niño during a PDO warm phase) can be intensified. (However, aside from these phase effects, PDO conditions, although of much longer duration than ENSO events, are milder. It is also important to note that—while the fundamental causes of PDO are not fully understood—they are known to be different from those driving ENSO events. And while ENSO has its primary effect on the tropical Pacific, with secondary effects in colder regions, the opposite is true of PDO; its primary effects occur in the northeast Pacific.) The ecosystem effects of PDO conditions are pervasive. Climate conditions directly affect primary production (phytoplankton abundance), but ecosystem linkages ensure these changes influence the abundance of higher trophic level organisms, including fish populations targeted by fishers (Francis *et al.* 1998). Scientists have identified four regime shifts during the twentieth century, with the most recent occurring in 1976/1977, when a warm phase began. This has produced less productive ocean conditions off the West Coast and more favorable conditions around Alaska. For example, Hare *et al.* (1999) document the inverse relationship between salmon production in Alaska and the Pacific Northwest and relate this to PDO-influenced ocean conditions. Researchers have identified similar relationships between meso-scale climate regimes and the productivity of other fish populations, including groundfish (see Francis *et al.* 1998 for a review). Researchers have recently identified a second regime shift, occurring in 1989 (Hare and Mantua 2000), which apparently resulted in a further decline in the productivity of some fish populations in the northeast Pacific, including some groundfish species (McFarlane *et al.* 2000). (Pacific whiting and sardine populations, in contrast, showed increases.) Hare and Mantua (2000) hypothesize that a still longer, 50 year to 70 year oscillation may combine with the 15 year to 25 year PDO to produce shifts that vary in their characteristics, as do the 1977 and 1989 phenomena. However, a shift to a more favorable PDO cold phase may have occurred in the late 1990s, as evidenced in recent measurements of sea surface temperature (Bernton 2000).

The influence of ocean conditions, and in particular meso-scale climate regimes that can rapidly shift phases, is an important issue for annual management. As Hare and Mantua (2000) point out, current assessment models do not account for these changes in environmental conditions, which may lead to under- or over-estimation of population productivity. In turn, the range of OY values in the harvest level alternatives are derived from these assessments. Unfortunately, the inability to predict regime shifts and determine the precise correlation between environmental conditions and population productivity, preclude the incorporation of such measurements into assessment models. In contrast, fishers' direct empirical evidence (albeit unquantified) of recent increases in productivity (visible in 2002, for example, in the abundance of juvenile bocaccio due to a strong year class) causes some to distrust scientific assessments that lead to further reductions in harvest specifications. (These issues are closely related to the nature of scientific uncertainty in the management process, discussed in Section 1.2.1)

2.3.2 Biodiversity of Managed Fish Stocks

Biodiversity, shorthand for biological diversity, is a measure of the number of coexisting species and variability or genetic diversity within a population. The biodiversity concept may also be used to evaluate other aspects of variation and complexity, such as ecosystem diversity or species provenance—distinguishing between native and invasive species, for example. Biodiversity is, therefore, another way of thinking about ecosystem structure, which can be an important factor in population productivity. This link is reflected in the similarity between guidance by the Council on Environmental Quality (CEQ) for biodiversity (CEQ 1993) and those found in a recent panel report on ecosystem-based fishery management (EPAP 1999). Fishery harvests primarily affect local or regional species abundance rather than being directly implicated in species extinctions, although nationally a few marine fish species have been listed under the ESA (including numerous salmon runs on the West Coast, see Section 5.0). Overfished species are the most salient biodiversity concern in the context of groundfish management, because substantially reduced stock sizes could correlate with changes in the range or distribution of a species (implying local or temporary "extinctions").

Biological characteristics of species, combined with physiographic features, are important determinants of changes in distribution. More mobile and schooling species—such as Pacific whiting—may vary in location *en masse* as they move in response to environmental conditions and prey availability. Current regimes may also control the distribution of larvae, helping to determine the location of adult populations. The duration of larval and juvenile phases, and the degree to which they are pelagic and subject to current dispersal, also influences recruitment to a particular area or region. In fact, processes of dispersion and isolation contribute to speciation. For example, two rougheye rockfish forms, which may be cryptic species, are found in the Gulf of Alaska and the Aleutian Islands. A current gyre in the Gulf of Alaska may control larval dispersal, isolating the two populations from one another (Love *et al.* 2002, p. 14). The effect of local depletion on long-term abundance is thus influenced by a variety of often not well-understood processes: recruits may be transported from elsewhere to repopulate the area, and the concept of local depletion may have little meaning when considering a highly mobile species. Conversely, sedentary species—like cowcod—may be quite vulnerable to local extinction, especially if juvenile recruitment is wholly local. Ecological factors can also "tip the balance" for depleted populations. Researchers are beginning to identify cultivation/depensation effects that run counter to traditional ideas of density-dependent population response (Pauly *et al.* 2002). Adults of a given species may control the abundance of species preying on their juveniles. If the number of adults is reduced below some level, this predation is unchecked, leading to serial recruitment failure. This process is hypothesized for large-sized rockfish species; declines in several of these species are correlated with increases in the abundance of smaller-sized rockfish species. The latter may be preying on the former's juveniles (Piner 2001).

2.3.3 Current Research on the Fishery Ecosystem

In 2002 the NMFS Northwest Fisheries Science Center established a new ecosystem-based management research group–Science for Ecosystem-based Management Initiative (SEMI). This group will perform research on the ecological interactions and processes necessary to sustain ecosystem composition, structure and function in the environments in which fish and fisheries exist. SEMI will investigate interactions of a target fish stock with predators, competitors, and prey, effects of weather and climate on target species and their ecological communities, effects of fishing on marine ecosystems and fish habitat, interactions between fishes and their habitat, and Marine Protected Areas as a fisheries conservation and management tool. NMFS Northwest Region is also current preparing a comprehensive EIS evaluating impacts to essential fish habitat (see Section 4.5.) There are also numerous academic research projects underway focusing on fishery ecosystem dynamics in the northeast Pacific.

2.4 Life History Characteristics, Distribution, Status of FMU Stocks, and Harvest Policy

There are over 80 species of groundfish managed under the groundfish FMP. These species include over 60 species of rockfish in the family *Scorpaenidae,* 7 roundfish species, 12 flatfish species, assorted shark, skate, and a few miscellaneous bottom-dwelling marine fish species. Management of these groundfish species is based on principles outlined in the MSA, groundfish FMP, and national standard guidelines, which provide guidance on the 10 national standards in the MSA. Stock assessments are based on resource surveys, catch trends in West Coast fisheries, and other data sources. Section 1.1.1 describes, in general terms, how stock assessments are conducted and reviewed before they are applied in West Coast groundfish management. Table 2-1 depicts the latitudinal and depth distributions of groundfish species managed under the groundfish FMP.

The passage of the Sustainable Fisheries Act in 1996 incorporated current conservation and rebuilding mandates into the Magnuson-Stevens Act. These mandates—including abundance-based standards for declaring a stock overfished, in a "precautionary" status, or at levels that can support MSY (healthy or "rebuilt")—were subsequently incorporated in the groundfish FMP with adoption of Amendments 11 and 12. The abundance-based reference points for managing West Coast groundfish species are relative to an estimate of "virgin" or unexploited biomass of the stock, which is denoted as B_0 and is defined as the average equilibrium abundance of a stock's spawning biomass before it is affected by fishing-related mortality. The Magnuson-Stevens Act and national standard guidelines employ the MSY concept to frame management objectives. MSY represents a theoretical maximum surplus production from a population of constant size; national standard guidelines define it as "the largest long-term average catch or yield that can be taken from a stock or stock complex under prevailing ecological and environmental conditions." Thus, for a given population, and set of ecological conditions, there is a biomass that produces MSY (denoted as B_{MSY}), which is less than the equilibrium size in the absence of fishing (B_0). (Generally, population sizes above B_{MSY} are less productive, because of competition for resources.) The harvest rate used to specify harvest levels designed to achieve or sustain B_{MSY} is referred to as the Maximum Fishing Mortality Threshold (MFMT, denoted as F_{MSY}). There are two harvest specification reference points defined in the groundfish FMP, a total catch OY and an ABC. The OY is typically the management target and is usually less than the ABC, based on the need to rebuild stocks to B_{MSY} (see the following discussion). The ABC, which is the maximum allowable harvest, is calculated by applying an estimated or proxy F_{MSY} harvest rate to the estimated abundance of the exploitable stock.

The Council-specified proxy MSY abundance for most West Coast groundfish species is 40% of B_0 (denoted as $B_{40\%}$). The Council-specified threshold for declaring a stock overfished is when the stock's spawning biomass declines to less than 25% of B_0 (denoted as $B_{25\%}$). The Magnuson-Stevens Act and national standard guidelines refer to this threshold as the Minimum Stock Size Threshold or MSST. A rebuilding plan that specifies how total fishing-related mortality is constrained to achieve an MSY abundance level within the legally allowed time is required by the MSA and groundfish FMP when a stock is declared overfished.

Stocks estimated to be above the overfishing threshold, yet below an abundance level that supports MSY, are considered to be in the "precautionary zone." The Council has specified precautionary reductions in harvest rate for such stocks to increase abundance to $B_{40\%}$. The methodology for determining this precautionary reduction is described in the groundfish FMP and is referred to as the 40-10 adjustment. As the stock declines below $B_{40\%}$, the total catch OY is reduced from the ABC until, at 10% of B_0, the OY is set to zero. However, in practice the 40-10 adjustment only applies to stocks above $B_{25\%}$ (the MSST) because once a stock falls below this level, an adopted rebuilding plan supplants it. Most stocks with an estimated abundance greater than $B_{40\%}$ are managed by setting harvest to the ABC. Figure 2-3 presents this framework graphically.

Sections 2.4.1 through 2.4.3 describe groundfish stocks according to the categories just described: overfished, precautionary zone, and healthy. However, it is important to realize that of the more than 80 species in the management unit only a portion are individually managed. Thus, Section 2.4.3, covering stocks at or above target stock size, describes five species managed under separate harvest specifications. The remaining species are managed and accounted for in groupings or stock complexes because individually they comprise a small part of the landed catch and insufficient information exists to develop the stock assessments necessary to set an OY based on yield estimates. (The groundfish FMP identifies the OY for these species as an average of historical catch, based on the assumption that this is below MSY.)

2.4.1 Overfished Species

2.4.1.1 Bocaccio

Distribution and Life History

Bocaccio (*Sebastes paucispinis*) is a rockfish species that ranges from Krozoff and Kodiak Islands in the Gulf of Alaska to central Baja California, Mexico (Hart 1988; Miller and Lea 1972b). Love, *et al.* (Love *et al.* 2002) and Thomas and MacCall (Thomas and MacCall. 2001) describe bocaccio distribution and life history. Bocaccio are historically most abundant in waters off central and southern California. Juveniles settle in nearshore waters after a pelagic stage that last several months. Adults are most commonly found at 100-150 m over the outer continental shelf (Allen and Smith 1988). The southern bocaccio stock is most prevalent at the 54-82 fm depth zone (Casillas *et al.* 1998).

Bocaccio are found in a wide variety of habitats, often on or near bottom features, but sometimes over muddy bottoms. They are found both nearshore and offshore (Sakuma and Ralston 1995). Larvae and small juveniles are pelagic (Garrison and Miller 1982) and are commonly found in the upper 100 m of the water column, often far from shore (MBC 1987). Large juveniles and adults are semi-demersal and are most often found in shallow coastal waters over rocky bottoms associated with algae (Sakuma and Ralston 1995). Adults are commonly found in eelgrass beds, or congregated around floating kelp beds (Love *et al.* 1990; Sakuma and Ralston 1995). Young and adult bocaccio also occur around artificial structures, such as piers and oil platforms (MBC 1987). Although juveniles and adults are usually found around vertical relief, adult aggregations also occur over firm sand-mud bottoms (MBC 1987). Bocaccio move into shallow waters during their first year of life (Hart 1988), then move into deeper water with increased size and age (Garrison and Miller 1982).

Bocaccio are ovoviviparous (live young are produced from eggs that hatch within the female's body) (Garrison and Miller 1982; Hart 1988). Love *et al.* (1990) reported the spawning season to last nearly an entire year (>10 months). Parturition occurs during January to April off Washington, November to March off Northern and Central California, and October to March off Southern California (MBC 1987). Fecundity ranges from 20,000 to 2,300,000 eggs. In California, two or more broods may be born per year (Love *et al.* 1990). The spawning season is not well known in northern waters. Males mature at three to seven years, with about half maturing in four to five years. Females mature at three to eight years, with about half maturing in four to six years (MBC 1987).

Maximum age of bocaccio was radiometrically determined to be at least 40 and perhaps more than 50 years. Bocaccio are difficult to age, and stock assessments used length measurements as a proxy for age. MacCall *et al.* (MacCall *et al.* 1999) estimated that the instantaneous rate of natural mortality of 0.20 (82% adult annual survival when there is no fishing mortality).

Larval bocaccio eat diatoms, dinoflagellates, tintinnids, and cladocerans (Sumida and Moser 1984). Copepods and euphausiids of all life stages (adults, nauplii and egg masses) are common prey for juveniles (Sumida and Moser 1984). Adults eat small fishes associated with kelp beds, including other species of rockfishes, and occasionally small amounts of shellfish (Sumida and Moser 1984). Bocaccio are eaten by sharks, salmon, other rockfishes, lingcod, albacore, sea lions, porpoises, and whales (MBC 1987). Adult bocaccio are often caught with chilipepper rockfish and have been observed schooling with speckled, vermilion, widow, and yellowtail rockfish (Love *et al.* 2002). They compete with chilipepper and widow rockfish, yellowtail, and shortbelly rockfishes for both food and habitat resources (Reilly *et al.* 1992).

Stock Status and Management History

There are two separate West Coast bocaccio populations. The southern stock exists south of Cape Mendocino and the northern stock north of 48° N latitude in northern Washington (off Cape Flattery). It is unclear whether this stock separation implies stock structure. The distribution of the two populations and evidence of lack of genetic intermixing suggests stock structure, although MacCall (2002) sees some recent evidence for limited genetic mixing of the two populations. Nonetheless, assessment scientists and managers have treated the two populations as independent stocks north and south of Cape Mendocino.

Bocaccio have long been an important component of California rockfish fisheries. Catches increased to high levels in the 1970s and early 1980s as relatively strong year-classes recruited to the stock. The Council began to recommend increasingly restrictive regulations after an assessment of the southern stock in 1990 (Bence and Hightower 1990) indicated that fishing rates were too high. The southern stock has been assessed six times (Bence and Hightower 1990; Bence and Rogers 1992; MacCall 2002; MacCall 2003b; MacCall *et al.* 1999; Ralston *et al.* 1996b) and has suffered poor recruitment during the warm water conditions that have prevailed off Southern California since the late 1980s. The 1996 assessment (Ralston *et al.* 1996b) indicated the stock was in severe decline. NMFS formally declared the stock overfished in March 1999 after the groundfish FMP was amended to incorporate the tenets of the Sustainable Fisheries Act. MacCall *et al.* (1999) confirmed the overfished status of bocaccio and estimated spawning output of the southern stock to be 2.1% of its unfished biomass and 5.1% of the MSY level. The northern stock of bocaccio has not been assessed.

While previous assessments only used data from central and northern California, an assessment in 2002 (MacCall and He 2002) also included data for southern California. While relative abundance increased slightly from the last assessment (4.8% of unfished biomass), potential productivity appears lower than previously thought, making for a more pessimistic outlook. The Council assumed a medium recruitment scenario for the 1999 year class, which was not assessed (MacCall *et al.* 1999). The 2002 assessment revealed the 1999 year class experienced relatively lower recruitment. Therefore, although the 1999 year class contributed a substantial quantity of fish to the population, it did not contribute as much to rebuilding as was previously thought.

The 2003 bocaccio assessment differs greatly from the 2002 assessment. It is driven by the strength of the incoming 1999 year class that had not recruited into the indices used for the 2002 assessment and by a revised lower estimate of natural mortality (MacCall 2003b). In addition to the 2001 Triennial Survey data, the 2003 assessment used larval abundance data from recent CalCOFI surveys as well as length and catch-per-unit-effort (CPUE) data from recreational fisheries. In calculating the recreational CPUE information, a new method was used that identifies relevant fishing trips by species composition and adjusts the catch history for regulatory changes that effect the level of discard and avoidance. The results of these calculations suggest that recreational CPUE has increased dramatically in recent years and is at a record high level in central California north of Pt. Conception. The STAR Panel recommended the use of two assessment models as a means of bracketing uncertainty from the very different signals between the Triennial Survey and the recreational CPUE data. Following the STAR Panel meeting, MacCall presented a third "hybrid" model that incorporated the data from all of the indices. The SSC recommended and the Council approved the use of this third modeling approach. This resulted in modest improvement in estimated stock size, but significantly affected the estimated productivity of the stock. These results had substantial effects on the rebuilding outlook for bocaccio which, under the 2002 assessment, was not expected to rebuild within T_{MAX} even with no fishing related mortality. Total mortality in 2003 fisheries was restricted to less than 20 metric tons as a means of conserving the stock while minimizing adverse socioeconomic impacts to communities. The current rebuilding analysis (MacCall 2003a), using the "hybrid" model, suggests the stock could rebuild to B_{MSY} within 25 years while sustaining an OY of approximately 300 metric tons in 2004 (see Table 2-2).

2.4.1.2 Canary Rockfish

Distribution and Life History

Canary rockfish (*Sebastes pinniger*) range from northern Baja California, Mexico, to southeastern Alaska (Boehlert 1980; Boehlert and Kappenman 1980; Hart 1988; Love 1991; Miller and Lea 1972b; Richardson and Laroche 1979). There is a major population concentration of canary rockfish off Oregon (Richardson and Laroche 1979). Canary rockfish primarily inhabit waters 91 m to 183 m (50 fm to 100 fm) deep (Boehlert and Kappenman 1980). In general, they inhabit shallow water when they are young, and deep water as adults (Mason 1995). Adult canary rockfish are associated with pinnacles and sharp drop-offs (Love 1991) and are most abundant above hard bottoms (Boehlert and Kappenman 1980). In the southern part of their range, canary rockfish appear to be associated with reefs (Boehlert 1980). In Central California, newly settled canary rockfish are first observed at the seaward sand-rock interface and farther seaward in deeper water (18 m to 24 m).

Canary rockfish off the West Coast exhibit a protracted spawning period from September through March, probably peaking in December and January off Washington and Oregon (Hart 1988; Johnson *et al.* 1982). Female canary rockfish reach sexual maturity at roughly eight years of age. Like many members of *Sebastes*, canary rockfish are ovoviviparous, whereby eggs are internally fertilized within females, and hatched eggs are released as live young (Bond 1979; Golden and Demory 1984; Kendall and Lenarz 1986). Canary rockfish are a relatively fecund species, with egg production being correlated with size (e.g., a 49-cm female can produce roughly 0.8 million eggs, and a female that has realized maximum length (approximately 60 cm) produces approximately 1.5 million eggs (Gunderson 1971)).

Very little is known about the early life history strategies of canary rockfish. The limited research that has been conducted indicates that larvae are strictly pelagic (near the ocean surface) for a short period of time and begin to migrate to demersal waters during the summer of their first year of life. Larvae develop into juveniles around nearshore rocky reefs, where they may congregate for up to three years (Boehlert 1980; Sampson 1996). Evaluations of length distributions by depth developed from NMFS shelf trawl survey data generally supported other research that suggests this species is characterized by an increasing trend in mean size of fish with depth (Archibald *et al.* 1981; Boehlert 1980). Female canary rockfish generally grow faster and reach slightly larger sizes than males, but do not appear to live longer than males.

Love *et al.* (Love *et al.* 2002) and Williams and Adams (Williams and Adams 2001) described canary rockfish life history. The maximum age of canary rockfish is believed to be 84 years. Maximum size is 76 cm (30 in) and 7.9 kg (17 lb). A 1999 assessment estimated that the instantaneous rate of natural mortality was 0.06 (94% adult annual survival when there is no fishing mortality). Mature females may have higher natural mortality rates, and tend to be larger than males of the same age. Female canary rockfish reach 90% of their expected maximum size at 15 years.

Little is known about ecological relationships between canary rockfish and other organisms. Adult canary rockfish are often caught with bocaccio, sharpchin, yelloweye, and yellowtail rockfishes, and lingcod. Researchers have also observed canary rockfish associated with silvergray and widow rockfish. Young of the year feed on copepods, amphipods, and young stages of euphausiids. Adult canary rockfish feed primarily on small fishes, as well as planktonic creatures, such as krill and euphausiids (Love 1991; Phillips 1964). Small canary rockfish are consumed by seabirds, chinook salmon, and marine mammals.

Stock Status and Management History

Canary rockfish have long been an important component of rockfish fisheries. The Council began to recommend increasingly restrictive regulations after an assessment in 1994 (Sampson and Stewart 1994) indicated that fishing rates were too high.

From 1983 through 1994, canary rockfish were managed as part of the *Sebastes* complex, with various trip limits imposed over this period. In 1995, a cumulative monthly landing limit of 6,000 pounds was imposed specifically on canary rockfish, and commercial vessels were expected to sort the canary rockfish from the mixed species categories such as the *Sebastes* complex. For 1998, catches of canary rockfish were regulated using a two-month cumulative landing limit of 40,000 pounds for the Sebastes complex, of which no more than 15,000 pounds (38%) could be composed of canary rockfish. From 1998 to present, commercial groundfish fishing for canary rockfish has been drastically reduced, and the only significant take is that from incidental bycatch. Canary rockfish has become a limiting factor for other nongroundfish fisheries on the West Coast continental shelf.

A 1999 stock assessment showed the stock had declined below the overfished level ($B_{25\%}$) in the northern area (Columbia and U.S. Vancouver management areas, Crone *et al.* 1999) and in the southern area (Conception, Monterey, and Eureka areas, Williams *et al.* 1999). The stock was declared overfished in January 2000. The first rebuilding analysis (Methot 2000a) used results from the northern area assessment to project rates of potential stock recovery. The stock was found to have extremely low productivity, defined as production of recruits in excess of the level necessary to maintain the stock at its current, low level. Rates of recovery were highly dependent upon the level of recent recruitment, which could not be estimated with high certainty. The initial rebuilding OY for 2001 and 2002 was set at 93 mt based upon a 50% probability of rebuilding by the year 2057, a medium level for these recent recruitments, and maintaining a constant annual catch of 93 mt through 2002.

In 2002, a coastwide assessment of canary rockfish was conducted, treating the stock as a single unit from the Monterey management area north through the U.S. Vancouver area. This was a departure from the methodologies of past assessments (Methot and Piner 2002c). Although there is some evidence of genetic separation of the northern and southern stocks (Boehlert and Kappenman 1980; Wishard *et al.* 1980), the observed variability in growth rate by sex and area was not significantly different at small versus large spatial scales. The assessment by Williams *et al.* (Williams *et al.* 1999) suggested that at least some recruitment to the southern area may come from fish to the north. The areas of highest canary rockfish density were shown to be off headlands that separate management areas, which would tend to bias results if the assessment were stratified by area. No research has been done on the relationship between canary rockfish off Washington and British Columbia.

Another critical uncertainty in canary rockfish assessments is the lack of older, mature females in surveys and other assessment indices. The are two competing explanations for this observation. Older females could have a higher natural mortality rate, resulting in their disproportionate disappearance from the population. Alternatively, survey and fishing gears may be less effective at catching them, perhaps because older females hide in places inaccessible to the gear. If this is the case, then these fish (which, because of their higher spawning output may make an important contribution to future recruitment) are part of the population, but remain un-sampled. Methot and Piner (2002a) combined these two hypotheses in a single age-structured version of the SSC-endorsed stock synthesis assessment model (Methot 2000b) by allowing female natural mortality to increase with the maturity function, but also allowing selectivity to be domed-shaped (the model determines the selectivity of survey and fishery gear as opposed to assuming a fixed selectivity). They estimated the current abundance of canary rockfish coastwide is about 8% of B_0 (see Table 2-2). A canary rockfish rebuilding plan was adopted by the Council and submitted for incorporation in the groundfish FMP under Amendment 16-2.

2.4.1.3 Cowcod

Distribution and Life History

Relatively little is known about cowcod (*Sebastes levis*), a species of large rockfish that ranges from Ranger Bank and Guadalupe Island in central Baja California to Usal, Mendocino County, California (Miller and Lea 1972b), and may infrequently occur as far north as Newport, Oregon. Cowcod have been assessed only once (Butler *et al.* 1999).

Love *et al.* (2002) and Barnes (2001) described cowcod distribution and life history. Cowcod are most abundant in waters off central and southern California. They range from 22-491 m in depth and are considered to be parademersal (transitional between a midwater pelagic and benthic species). Adults are commonly found at depths of 180 m to 235 m and juveniles are most often found in 30 m to 149 m of water (Love *et al.* 1990).

MacGregor (1986) found that larval cowcod are almost exclusively found in Southern California and may occur many miles offshore. Juveniles occur over sandy bottom areas, and solitary ones have been observed resting within a few centimeters of soft-bottom areas where gravel or other low relief was found (Allen 1982). Young of the year have been observed on fine sand and clay sediment as well as oil platform shell mounds and other complex bottom features at depths ranging from 22-122 fm (40-224 m). Adult cowcod are primarily found over high relief rocky areas (Allen 1982). They are generally solitary, but occasionally aggregate (Love *et al.* 1990). Solitary subadult cowcod have been found in association with large white sea anemones on outfall pipes in Santa Monica Bay (Allen 1982). Although cowcod are generally not migratory, they may move, to some extent, to follow food (Love 1991).

Cowcod can live to be at least 55 years old. Maximum size is 94 cm (37 in) and 13 kg (28.5 lb). The instantaneous rate of natural mortality is believed to be 0.08 (92% adult annual survival when there is no fishing mortality) (Butler *et al.* 1999). Average size at age of mature females is similar to males. Females reach 90% of their maximum expected size by 40 years (Butler *et al.* 1999).

Cowcod are ovoviviparous, and large females may produce up to three broods per season (Love *et al.* 1990). Spawning peaks in January in the Southern California Bight (MacGregor 1986). Fecundity is dependent on size and ranges from 181,000 to 1,925,000 eggs. Larvae emerge at about 5.0 mm (MacGregor 1986).

Little is known about ecological relationships between cowcod and other organisms. Small cowcod feed on planktonic organisms such as copepods. Juveniles eat shrimp and crabs, and adults eat fish, octopus, and squid (Allen 1982).

Stock Status and Management History

While cowcod are not a major component of the groundfish fishery, they are highly desired by both recreational and commercial fishers because of their bright color and large size. The cowcod stock south of Cape Mendocino has experienced a long-term decline. The cowcod stock in the Conception area was assessed in 1998 (Butler *et al.* 1999). Abundance indices decreased approximately tenfold between the 1960s and the 1990s, based on commercial passenger fishing vessel (CPFV) logs (Butler *et al.* 1999). Recreational and commercial catch also declined substantially from peaks in the 1970s and 1980s, respectively.

B_0 was estimated to be 3,370 mt, and 1998 spawning biomass was estimated at 7% of B_0, well below the 25% overfishing threshold. As a result, NMFS declared cowcod in the Conception and Monterey management areas overfished in January 2000. Large areas off southern California (the Cowcod Conservation Areas) have been closed to fishing for cowcod. The stock's low productivity and declined spawning biomass also necessitates an extended rebuilding period, estimated at 62 years with no fishing-related mortality (T_{MIN}), to achieve a 1,350 mt B_{MSY} for the Conception management area.

There is relatively little information about the cowcod stock and there are major uncertainties in the one assessment that has been conducted. The assessment authors needed to make estimates of early landings based on more recent data and reported total landings of rockfish. Age and size composition of catches are poorly sampled, population structure is unknown, and the assessment was restricted to southern California waters.

A cowcod rebuilding review was completed in 2003 which validated the assumption that non-retention regulations and area closures have been effective in constraining cowcod fishing mortality {Butler, 2003 #668}. These encouraging results are based on cowcod fishery-related landings in recreational and commercial fisheries. Discard information from the WCGOP was unavailable at the time of the review and CPFV observations showed negligible discards. Angler reported discards were not included in the analysis. Non-retention regulations and limited observation data have increased the need for fishery independent population indices. A full stock assessment is scheduled to be conducted in 2005.

2.4.1.4 Darkblotched Rockfish

Distribution and Life History

Darkblotched rockfish (*Sebastes crameri*) are found from Santa Catalina Island off Southern California to the Bering Sea (Miller and Lea 1972a; Richardson and Laroche 1979). They are most abundant from Oregon to British Columbia.

Off Oregon, Washington, and British Columbia, darkblotched rockfish occur primarily on the outer shelf and upper slope (Richardson and Laroche 1979). Distinct population groups have been found off the Oregon coast between 44°30' N latitude and 45°20' N latitude (Richardson and Laroche 1979).

Young-of-the-year recruit to bottom at depths ranging from 55-200 m after spending up to five months as pelagic larvae and juveniles in offshore waters (Love *et al.* 2002). Off central California, young darkblotched rockfish recruit to soft substrate and low (<1 m) relief reefs (Love *et al.* 1991). Darkblotched rockfish make limited migrations after they become adults (Gunderson 1977).

Adults occur in depths of 25 m to 600 m, and 95% are found between 50 m and 400 m (Allen and Smith 1988). Adults are often found on mud near cobble or boulders. Fish tend to move to deeper waters as they age.

Maximum age of darkblotched rockfish is 64 years, and maximum size is 58 cm (23 in) and 2.3 kg (5.1 lb). Rogers, *et al.* (2000) estimated that the instantaneous rate of natural mortality was about 0.05 (95% adult annual survival when there is no fishing mortality). Females tend to be larger than males of the same age, and reach 90% of their maximum expected size by 13 years (Rogers *et al.* 2000).

Darkblotched rockfish are ovoviviparous (live bearers) (Nichol and Pikitch 1994). Insemination of female darkblotched rockfish occurs from August to December, and fertilization and parturition occur from December to March off Oregon and California, and primarily in February off Oregon and Washington (Hart 1988; Nichol and Pikitch 1994; Richardson and Laroche 1979). Fecundity is dependent on size and ranges from 20,000 to 610,000 eggs.

Little is known about ecological relationships between darkblotched rockfish and other organisms. Pelagic juveniles feed on planktonic organisms such as copepods. Adults are often caught with other fish such as Pacific Ocean perch and splitnose rockfish. Midwater animals such as euphausiids and amphipods dominate the diet of adult fish. Albacore and chinook salmon consume pelagic juveniles (Hart 1988); little is known about predation of adults.

Stock Status and Management History

Darkblotched rockfish were managed as part of the coastwide *Sebastes* complex, which was later segregated into north and south management units divided at 40°30' N latitude. The first assessment of darkblotched rockfish estimated the proxy MSY harvest rate and overfishing rate for the stock (Lenarz 1993). Lenarz (1993) estimated a range of likely natural mortalities (M = 0.025-0.05) for darkblotched rockfish based on a range of maximum ages (60 years to 105 years). He also estimated fishery selectivity from length compositions from the California fishery, which he converted to an age-based selectivity function. He then plotted the relative fecundity per recruit as a function of fishing-related and natural mortality to estimate an F_{MSY} of $F_{35\%}$ (the target MSY proxy harvest rate at that time) and $F_{20\%}$ (the overfishing harvest rate) relative to fecundity per recruit. Lenarz estimated the range of likely harvest rates (F) at the MSY target ($F_{35\%}$) was 0.04 to 0.06, and the overfishing harvest rate ($F_{20\%}$) ranged between 0.07 and 0.11. While he did not calculate an ABC for darkblotched rockfish, he did note the estimated harvest rates at MSY and overfishing were lower than expected. He also noted a trend of decreasing size of darkblotched rockfish from the length composition data he evaluated.

The next informative assessment for darkblotched rockfish addressed all West Coast *Sebastes* without individual ABCs (Rogers *et al.* 1996). Two methodologies were used to estimate an ABC for darkblotched rockfish. In the first method, fishing-related mortality was assumed to equal natural mortality (F=M) to estimate an $F_{35\%}$ harvest rate; in the second case, a simple stock synthesis model was used to estimate $F_{35\%}$. In the F=M approach, a catchability adjustment (Q) to triennial survey data was calculated to estimate relative biomass of generic *Sebastes*. It was determined that adjusting Q by 0.5 and then by M approximated $F_{35\%}$ estimates from stock synthesis models for most rockfish. A Q of 0.8 (instead of 0.5) was assumed for darkblotched rockfish, since the survey swept most of the depth range of darkblotched rockfish and caught smaller fish than the fishery. The other factors that influenced the magnitude of Q was a noted decreasing trend in estimated survey biomass over time, and the estimated size at 50% maturity was greater than estimated size at 50% selectivity (i.e., the survey caught darkblotched rockfish at sizes less than those estimated for most maturing and mature fish). The F=M method was compared to a stock synthesis modeling approach that incorporated triennial survey data and a Pacific ocean perch bycatch effort index.

Rogers *et al.* (2000) assessed darkblotched stock status in 2000 and determined the stock was at 14-31% of its unfished level, depending on assumptions regarding the historic catch of darkblotched rockfish in the foreign fishery from 1965-1978. They incorporated five relative abundance indices in a length based stock synthesis model (Methot 1990) to derive current estimates of abundance and productivity. The five indices included three NMFS surveys with different latitudinal and depth coverages, the Pacific ocean perch effort index developed in the generic *Sebastes* assessment (Rogers *et al.* 1996), and a logbook index derived from California trawl logbook and species composition data stratified by major California port (Ralston 1999). Major uncertainties in the assessment model included the uncertain foreign catch composition, which had a significant effect on estimated unfished biomass (B_0), and assumptions regarding maturity, discard rates, and unchanging selectivity over time. Of these, the foreign catch of darkblotched influences our understanding of stock status the most; larger assumed historical catches increase estimates of B_0. Four accepted model runs varied the assumed foreign catch proportion from 0%-20%, which resulted in significant differences in B_0 and the spawning index. Only one of those model runs (assuming 0% foreign catch of darkblotched) estimated the stock was not overfished. In all cases, the spawning biomass increased over the three-year time period with the reduced catch and the estimated very large 1994 year class reaching maturity. The STAR Panel (PFMC 2000b) and the GMT were unable to resolve the uncertainty in foreign catch composition. While the GMT thought it implausible that no darkblotched were caught in the foreign fishery, they could not offer a definitive recommendation. Therefore, the Stock Assessment Team's (STAT) assumption that 10% of foreign catch was comprised of darkblotched (Rogers *et al.* 2000) was accepted, leading to the conclusion that the spawning stock biomass was 22% of its unfished level (see Table 2-3).

Methot and Rogers (2001) prepared a rebuilding analysis for darkblotched that was recommended by the SSC and adopted by the Council in 2001. On the earlier recommendation of the SSC (June 2001 Council meeting), they incorporated results of the 2000 triennial slope trawl survey conducted by the Alaska Fishery Science Center and modeled a more recent time series of recruitments. Incorporating these data resulted in a downward revision in the estimated recruitment and abundance throughout the time series in the Rogers *et al.* (2000) assessment. The mean recruitment in the 1983-1996 period was estimated to be about 67% of earlier estimates. This led to a revised estimate of spawning stock biomass at the beginning of 2002 of 14% of its unfished level. The minimum time to rebuild (T_{MIN}) in the absence of fishing was estimated to be 14 years with a median rebuilding year of 2014. The maximum time to rebuild (T_{MAX}) in accordance with the National Standard Guidelines was 47 years (2047).

An assessment update for darkblotched rockfish, completed in 2003, suggested that the stock has not changed significantly from the last assessment, but there is evidence of strong recent recruitment (Rogers 2003). These strong recruitments have not been validated by indices used in the assessment, resulting in the determination that the stock is at 11% of it unfished level ($B_{11\%}$) (Table 2-3). New information included in this update includes revised estimates of the darkblotched rockfish catch in foreign fisheries, new fishery length and age composition information, a new Triennial Survey data point, and new slope survey data. Unresolved data discrepancies between data sources in length and age composition limited the amount of new data used in this assessment update. Although the indices suggested improving stock status for darkblotched rockfish, the greatest uncertainty was associated with evidence of recent recruitment strength. The SSC STAR Lite Panel requested progressive inclusion of 1997-1999, 2000, and 2001 recruitment estimates (Ralston *et al.* 2003). Risk of error progressively increased from including those recruitment estimates because they were based on increasingly limited data. Rebuilding results were sensitive to the high 2000 and 2001 recruitment estimates and including them allowed much greater 2004 OYs because those recruits enter the fishery and help rebuild the stock before the maximum allowable year.

A darkblotched rockfish rebuilding plan was adopted by the Council and submitted for incorporation in the groundfish FMP under Amendment 16-2. The rebuilding plan established a target rebuilding year of 2030 and the harvest control rule of F = 0.027 (with a P_{MAX} of 80%).

2.4.1.5 Lingcod

Distribution and Life History

Lingcod (*Ophiodon elongatus*), a top order predator of the family Hexagrammidae, ranges from Baja California, Mexico, to Kodiak Island in the Gulf of Alaska. Lingcod are demersal at all life stages (Allen and Smith 1988; NOAA 1990; Shaw and Hassler 1989). Adult lingcod prefer two main habitat types: slopes of submerged banks 10 m to 70 m below the surface with seaweed, kelp, and eelgrass beds and channels with swift currents that flow around rocky reefs (Emmett *et al.* 1991; Giorgi and Congleton 1984; NOAA 1990; Shaw and Hassler 1989). Juveniles prefer sandy substrates in estuaries and shallow subtidal zones (Emmett *et al.* 1991; Forrester and Thomson 1969; Hart 1988; NOAA 1990). As the juveniles grow they move to deeper waters. Adult lingcod are considered a relatively sedentary species, but there are reports of migrations of greater than 100 km by sexually immature fish (Jagielo 1990; Mathews and LaRiviere 1987; Matthews 1992; Smith *et al.* 1990).

Mature females live in deeper water than males and move from deep water to shallow water in the winter to spawn (Forrester 1969; Hart 1988; Jagielo 1990; LaRiviere *et al.* 1980; Mathews and LaRiviere 1987; Matthews 1992; Smith *et al.* 1990). Mature males may live their whole lives associated with a single rock reef, possibly out of fidelity to a prime spawning or feeding area (Allen and Smith 1988; Shaw and Hassler 1989). Spawning generally occurs over rocky reefs in areas of swift current (Adams 1986; Adams and Hardwick 1992; Giorgi and Congleton 1984; LaRiviere *et al.* 1980). After the females leave the spawning grounds, the males remain in nearshore areas to guard the nests until the eggs hatch. Hatching occurs in April off Washington, but as early as January and as late as June at the geographic extremes of the lingcod range. Males begin maturing at about two years (50 cm), whereas females mature at three plus years (76 cm). In the northern extent of their range, fish mature at an older age and larger size (Emmett *et al.* 1991; Hart 1988; Mathews and LaRiviere 1987; Miller and Geibel 1973; Shaw and Hassler 1989). The maximum age for lingcod is about 20 years (Adams and Hardwick 1992).

Lingcod are a visual predator, feeding primarily by day. Larvae are zooplanktivores (NOAA 1990). Small demersal juveniles prey upon copepods, shrimps, and other small crustaceans. Larger juveniles shift to clupeids and other small fishes (Emmett *et al.* 1991; NOAA 1990). Adults feed primarily on demersal fishes (including smaller lingcod), squids, octopi, and crabs (Hart 1988; Miller and Geibel 1973; Shaw and Hassler 1989). Lingcod eggs are eaten by gastropods, crabs, echinoderms, spiny dogfish, and cabezon. Juveniles and adults are eaten by marine mammals, sharks, and larger lingcod (Miller and Geibel 1973; NOAA 1990).

Stock Status and Management History

In 1997, U.S. scientists assessed the size and condition of the portion of the stock in the Columbia and Vancouver areas (including the Canadian portion of the Vancouver management area), and concluded the stock had fallen to below 10% of its unfished size (Jagielo *et al.* 1997). The Council responded by imposing substantial harvest reductions coastwide, reducing the harvest targets for the Eureka, Monterey, and Conception areas by the same percentage as in the north. In 1999, scientists assessed the southern portion of the stock and concluded the condition of the southern stock was similar to the northern stock, thus confirming the Council had taken appropriate action to reduce harvest coastwide (Adams *et al.* 1999).

Jagielo (2000) conducted a coastwide lingcod assessment and determined the total biomass increased from 6,500 mt in the mid-1990s to about 8,900 mt in 2000. In the south, the population had also increased slightly from 5,600 mt in 1998 to 6,200 mt in 2000. In addition, the assessment concluded previous aging methods portrayed an older population; whereas new aging efforts showed the stock to be younger and more productive. Therefore, the ABC and OY were increased in 2001 on the basis of the new assessment. A revised rebuilding analysis of coastwide lingcod (Jagielo and Hastie 2001) was adopted by the Council in September 2001. It confirmed the major conclusions of the 2000 assessment and rebuilding analysis, but slightly modified recruitment projections to stay on the rebuilding trajectory that reaches target biomass in 2009. This modification resulted in a slight decrease in the 2002 ABC and OY.

A new, full coastwide assessment for lingcod was completed in 2003 and approved by the Council in March 2004 for a use in setting harvest specifications for the 2005-2006 biennium.

A lingcod rebuilding plan was adopted by the Council and incorporated into the groundfish FMP under Amendment 16-2. Rebuilding parameters based on the 2000 rebuilding analysis are presented in Table 2-2.

2.4.1.6 Pacific Ocean Perch

Distribution and Life History

Pacific ocean perch (POP, *Sebastes alutus*) are found from La Jolla (Southern California) to the western boundary of the Aleutian Archipelago (Eschmeyer *et al.* 1983; Gunderson 1971; Ito *et al.* 1986; Miller and Lea 1972b), but are common from Oregon northward (Eschmeyer *et al.* 1983). They primarily inhabit waters of the upper continental slope (Dark and Wilkins 1994) and are found along the edge of the continental shelf (Archibald *et al.* 1983). Pacific ocean perch occur as deep as 825 m, but usually are at 100 m to 450 m and along submarine canyons and depressions (NOAA 1990). Larvae and juveniles are pelagic; subadults and adults are benthopelagic. Adults form large schools 30 m wide, to 80 m deep, and as much as 1,300 m long (NOAA 1990). They also form spawning schools (Gunderson 1971). Juvenile POP form ball-shaped schools near the surface or hide in rocks (NOAA 1990). Throughout their range, POP are generally associated with gravel, rocky, or boulder type substrate found in and along gullies, canyons, and submarine depressions of the upper continental slope (Ito 1986).

Pacific ocean perch winter and spawn in deeper water (>275 m). In the summer (June through August) they move to feeding grounds in shallower water (180 m to 220 m) (June through August) to allow gonads to ripen (Archibald *et al.* 1983; Gunderson 1971; NOAA 1990). They are slow-growing and long-lived. The maximum age has been estimated at about 98 years (Heifetz *et al.* 2000). Largest size is about 54 cm and 2 kg (Archibald *et al.* 1983; Beamish 1979; Eschmeyer *et al.* 1983; Ito *et al.* 1986; Mulligan and Leaman 1992; NOAA 1990). POP are carnivorous. Larvae eat small zooplankton. Small juveniles eat copepods, and larger juveniles feed on euphausiids. Adults eat euphausiids, shrimps, squids, and small fishes. Immature fish feed throughout the year, but adults feed only seasonally, mostly April through August (NOAA 1990). POP predators include sablefish and Pacific halibut.

Stock Status and Management History

POP were harvested exclusively by U.S. and Canadian vessels in the Columbia and Vancouver INPFC areas prior to 1965. Large Soviet and Japanese factory trawlers began fishing for POP in 1965 in the Vancouver area and in the Columbia area a year later. Intense fishing pressure by these foreign fleets occurred during the 1966 through 1975 period. The foreign fishery ended in 1977 after passage of the Magnuson-Stevens Act and the transition to a domestic fishery.

The POP resource off the West Coast was overfished before implementation of the groundfish FMP. Large removals of POP in the foreign trawl fishery, followed by significant declines in catch and abundance led the Council to limit harvest beginning in 1979. A 20-year rebuilding plan for POP was adopted in 1981. Rebuilding under the original plan was largely influenced by a cohort analysis of 1966 through 1976 catch and age composition data (Gunderson 1979), updated with 1977 through 1980 data (Gunderson 1981), and an evaluation of trip limits as a management tool (Tagart *et al.* 1980). This was the first time trip limits were used by the Council to discourage targeting and overharvest of an overfished stock. This is a management strategy still in use today in the West Coast groundfish fishery. The OY for POP was also lowered significantly. After twenty years of rebuilding under the original plan, the stock stabilized at a lower equilibrium than estimated in the pre-fishing condition. While continuing stock decline was abated, rebuilding was not achieved as the stock failed to increase in abundance to B_{MSY}.

Ianelli (1998) estimated POP female spawning biomass in 1997 was 13% of its unfished level, thereby confirming the stock was overfished. NMFS formally declared POP overfished in March 1999 after the groundfish FMP was amended to incorporate the tenets of the Sustainable Fisheries Act. The Council adopted and NMFS enacted more conservative management measures in 1999 as part of a redoubled rebuilding effort.

A 2000 POP assessment suggests the stock is more productive than originally thought (Ianelli *et al.* 2000). A revised POP rebuilding analysis was completed and adopted by the Council in 2001 (Punt and Ianelli 2001). This analysis estimated a T_{MIN} of 12 years and a T_{MAX} of 42 years. It was noted in the rebuilding analysis that the ongoing retrospective analysis of historic foreign fleet catches (Rogers In prep) is likely to change projections of POP rebuilding.

A new assessment for POP was done in 2003 (Punt *et al.* 2003) incorporating updated survey and fishery data including the retrospective of foreign fleet catches (Rogers In prep). The assessment region covers areas from southern Oregon to the U.S. border with Canada, the southern extent of POP distribution. The overall conclusion is that the stock is relatively stable at approximately 28% of its unfished biomass ($B_{28\%}$). Many cases were presented in the rebuilding analysis and, based on SSC advice, the Council chose the one based on the full Bayesian posterior distribution where recruits were resampled to project future recruitment (Case C). Using the full Bayesian posterior distribution captured more of the assessment model uncertainty than using the maximum of the posterior density function. Resampling recruits rather than recruits per spawner was recommended because only the southern fringe of the stock occurs in waters off the U.S. West Coast. One would want to resample recruits per spawner if measured recruitment is a function of measured stock size. However, it is unlikely that the recruitment measured off the U.S. West Coast is wholly from the portion of the parental stock occurring in these same waters. Therefore, resampling recruits was advised.

A Pacific ocean perch rebuilding plan was adopted by the Council and submitted for incorporation in the groundfish FMP under Amendment 16-2. The rebuilding plan established a target rebuilding year of 2027 and the harvest control rule of F = 0.0082 (with a P_{MAX} of 70%) (Table 2.-3).

2.4.1.7 Widow Rockfish

Distribution and Life History

Widow rockfish (*Sebastes entomelas*) range from Albatross Bank of Kodiak Island to Todos Santos Bay, Baja California, Mexico (Eschmeyer *et al.* 1983; Miller and Lea 1972a; NOAA 1990). They occur over hard bottoms along the continental shelf (NOAA 1990) and prefer rocky banks, seamounts, ridges near canyons, headlands, and muddy bottoms near rocks. Large widow rockfish concentrations occur off headlands such as Cape Blanco, Cape Mendocino, Point Reyes, and Point Sur. Adults form dense, irregular, midwater and semi-demersal schools deeper than 100 m at night and disperse during the day (Eschmeyer *et al.* 1983; NOAA 1990; Wilkins 1986). All life stages are pelagic, but older juveniles and adults are often associated with the bottom (NOAA 1990). All life stages are fairly common from Washington to California (NOAA 1990). Pelagic larvae and juveniles co-occur with yellowtail rockfish, chilipepper, shortbelly rockfish, and bocaccio larvae and juveniles off Central California (Reilly *et al.* 1992).

Widow rockfish are ovoviviparous, have internal fertilization, and brood their eggs until released as larvae (NOAA 1990; Ralston *et al.* 1996a; Reilly *et al.* 1992). Mating occurs from late fall-early winter. Larval release occurs from December through February off California, and from February through March off Oregon. Juveniles are 21 mm to 31 mm at metamorphosis, and they grow to 25 cm to 26 cm over three years. Age and size at sexual maturity varies by region and sex, generally increasing northward and at older ages and larger sizes for females. Some mature in three years (25 cm to 26 cm), 50% are mature by four years to five years (25 cm to 35 cm), and most are mature in eight years (39 cm to 40 cm) (NOAA 1990). The maximum age of widow rockfish is 28 years, but rarely over 20 years for females and 15 years for males (NOAA 1990). The largest size is 53 cm and about 2.1 kg (Eschmeyer *et al.* 1983; NOAA 1990).

Widow rockfish are carnivorous. Adults feed on small pelagic crustaceans, midwater fishes (such as age-one or younger Pacific whiting), salps, caridean shrimp, and small squids (Adams 1987; NOAA 1990). During spring, the most important prey item is salps, during the fall fish are more important, and during the winter widow rockfish primarily eat sergestid shrimp (Adams 1987). Feeding is most intense in the spring after spawning (NOAA 1990). Pelagic juveniles are opportunistic feeders, and their prey consists of various life stages of calanoid copepods, and euphausiids (Reilly *et al.* 1992).

Stock Status and Management History

Widow rockfish are an important commercial species from British Columbia to central California, particularly since 1979, when Oregon trawl fisherman demonstrated the ability to make large catches at night using midwater trawl gear. Since that time, many more participants entered the fishery and landings of widow rockfish increased rapidly (Love *et al.* 2002). Widow rockfish are a minor component of the recreational groundfish fisheries.

Williams (2000) assessed the widow rockfish in 2000. The spawning output level (8,223 mt), based on that assessment and a revised rebuilding analysis (Punt and MacCall 2002) adopted by the Council in June 2001, was at 23.6% of the unfished level (33,490 mt) in 1999. This result was computed using the average recruitment from 1968 to 1979 multiplied by the spawning output-per-recruit at F = 0. The analysis concluded the rebuilding period in the absence of fishing is 22 years, and with a mean generation time of 16 years, the maximum allowable time to rebuild (T_{MAX}) is 38 years. Widow rockfish were declared overfished in 2001 based on these analyses. A rebuilding plan is being developed for incorporation into the FMP through Amendment 16-3.

The most recent assessment (He *et al.* 2003b) concluded that the widow rockfish stock size is 22.4% of the unfished biomass, but indicates that stock productivity is considerably lower than previously thought. Data sparseness was a significant problem in this widow rockfish assessment (Conser *et al.* 2003; He *et al.* 2003b). Limited logbook data prior to 1990 is available from bottom trawl fisheries, a questionable data source for a midwater species. The NMFS laboratory at Santa Cruz conducts a midwater trawl survey from which a juvenile index is derived. This index has been highly variable in its ability to predict recruitment in part due to the survey's limited geographical area relative to the overall distribution of widow rockfish. The widow rockfish rebuilding analysis considered a wide range of model formulations that investigated different hypothesis on natural mortality, stock-recruitment variability, and the use of a power coefficient to reduce variability of the Santa Cruz midwater juvenile survey. The SSC recommended model formulations that pre-specify the recruitment for 2003-2005, do not use a stock-recruitment relationship (recruits per spawner ratios were used instead to project future recruitment), and vary the power coefficient between two and four in the Santa Cruz midwater juvenile survey. The SSC did not recommend a power coefficient higher than four because the relationship between the Santa Cruz midwater survey recruitment index and other recruitment indices changed dramatically with higher powers. The previous rebuilding analysis (Punt and MacCall 2002) had used a power coefficient of 10 that dampened the estimate of recruitment variability and suggested much higher stock productivity.

Many of the strategic rebuilding parameters for widow rockfish did not change dramatically with the new rebuilding analysis (Table 2-3). The rebuilding period in the absence of fishing increased to 25 years and, with a mean generation time of 16 years, the maximum allowable time to rebuild (T_{MAX}) is 41 years. However, the harvest rate associated with these rebuilding trajectories has dropped significantly in response to the new understanding of decreased stock productivity. The interim rebuilding OY for 2003 using the 2000 rebuilding analysis was 832 mt. Under the 2003 rebuilding analysis (He *et al.* 2003a), the OY for 2004 is 284 mt using the base model (Model 8, which uses a power coefficient of three).

2.4.1.8 Yelloweye Rockfish

Distribution and Life History

Yelloweye rockfish (*Sebastes ruberrimus*) range from the Aleutian Islands, Alaska, to northern Baja California, Mexico, and are common from Central California northward to the Gulf of Alaska (Eschmeyer *et al.* 1983; Hart 1988; Love 1991; Miller and Lea 1972b; O'Connell and Funk 1986). Yelloweye rockfish occur in water 25 m to 550 m deep with 95% of survey catches occurring from 50 m to 400 m (Allen and Smith 1988). Yelloweye rockfish are bottom dwelling, generally solitary, rocky reef fish, found either on or just over reefs (Eschmeyer *et al.* 1983; Love 1991; Miller and Lea 1972b; O'Connell and Funk 1986). Boulder areas in deep water (>180 m) are the most densely populated habitat type, and juveniles prefer shallow-zone broken-rock habitat (O'Connell and Carlile 1993). They also reportedly occur around steep cliffs and offshore pinnacles (Rosenthal *et al.* 1982). The presence of refuge spaces is an important factor affecting their occurrence (O'Connell and Carlile 1993).

Yelloweye rockfish are ovoviviparous and give birth to live young in June off Washington (Hart 1988). The age of first maturity is estimated at six years and all are estimated to be mature by eight years (Wyllie Echeverria 1987). They can grow to 91 cm (Eschmeyer *et al.* 1983; Hart 1988) and males and females probably grow at the same rates (Love 1991; O'Connell and Funk 1986). The growth rate levels off at approximately 30 years of age (O'Connell and Funk 1986) but they can live to be 114 years old (Love 1991; O'Connell and Funk 1986). Yelloweye rockfish are a large predatory reef fish that usually feeds close to the bottom (Rosenthal *et al.* 1982). They have a widely varied diet, including fish, crabs, shrimps and snails, rockfish, cods, sand lances, and herring (Love 1991). Yelloweye rockfish have been observed underwater capturing smaller rockfish with rapid bursts of speed and agility. Off Oregon the major food items of the yelloweye rockfish include cancroid crabs, cottids, righteye flounders, adult rockfishes, and pandalid shrimps (Steiner 1978). Quillback and yelloweye rockfish have many trophic features in common (Rosenthal *et al.* 1982).

Stock Status and Management History

The first ever yelloweye rockfish stock assessment was conducted in 2001 (Wallace 2002). This assessment incorporated two area assessments: one from Northern California using CPUE indices constructed from Marine Recreational Fisheries Statistical Survey (MRFSS) sample data and CDFG data collected on board commercial passenger fishing vessels, and the other from Oregon using Oregon Department of Fish and Wildlife (ODFW) sampling data. The assessment concluded current yelloweye rockfish stock biomass is about 7% of unexploited biomass in Northern California and 13% of unexploited biomass in Oregon. The assessment revealed a thirty-year declining biomass trend in both areas with the last above average recruitment occurring in the late 1980s. The assessment's conclusion that yelloweye rockfish biomass was well below the 25% of unexploited biomass threshold for overfished stocks led to this stock being separated from the rockfish complexes in which it was previously listed. Until 2002, when yelloweye rockfish were declared overfished, they were listed in the "remaining rockfish" complex on the shelf in the Vancouver, Columbia, and Eureka INPFC areas and the "other rockfish" complex on the shelf in the Monterey and Conception areas. As with the other overfished stocks, yelloweye rockfish harvest is now tracked separately.

In June 2002 the SSC recommended that managers should conduct a new assessment incorporating Washington catch and age data. This recommendation was based on evidence that the biomass distribution of yelloweye rockfish on the West Coast was centered in waters off Washington and that useable data from Washington were available. Based on that testimony, the Council recommended completing a new assessment in the summer of 2002, before a final decision was made on 2003 management measures. Methot *et al.* (2002b) did the assessment, which was reviewed by a STAR Panel in August 2002. The assessment result was much more optimistic than the one prepared by Wallace (2002), largely due to the incorporation of Washington fishery data. While the overfished status of the stock was confirmed (24% of unfished biomass), Methot *et al.* (2002b) provided evidence of higher stock productivity than originally assumed (Table 2-2). The assessment also treated the stock as a coastwide assemblage. This assessment was reviewed and approved by the SSC and the Council at the September 2002 Council meeting.

2.4.2 Precautionary Zone Stocks

2.4.2.1 Dover Sole

Distribution and Life History

Dover sole (*Microstomus pacificus*) are distributed from the Navarin Canyon in the northwest Bering Sea and westernmost Aleutian Islands to San Cristobal Bay, Baja California, Mexico (Hagerman 1952; Hart 1988; NOAA 1990). Dover sole are a dominant flatfish on the continental shelf and slope from Washington to Southern California. Adults are demersal and are found from 9 m to 1,450 m, with highest abundance below 200 m to 300 m (Allen and Smith 1988). Adults and juveniles show a high affinity toward soft bottoms of fine sand and mud. Juveniles are often found in deep nearshore waters. Dover sole are considered to be a migratory species. In the summer and fall, mature adults and juveniles can be found in shallow feeding grounds, as shallow as 55 m off British Columbia (Westrheim and Morgan 1963). By late fall, Dover sole begin moving offshore into deep waters (400 m or more) to spawn. Although there is an inshore-offshore seasonal migration, little north-south coastal migration occurs (Westrheim and Morgan 1963).

Spawning occurs from November through April off Oregon and California (Hart 1988; NOAA 1990; Pearcy *et al.* 1977) in waters 80 m to 550 m depth at or near the bottom (Hagerman 1952; Hart 1988; Pearcy *et al.* 1977). Dover sole are oviparous and fertilization is external. Larvae are planktonic and are transported to offshore nursery areas by ocean currents and winds for up to two years. Settlement to benthic living occurs mid-autumn to early spring off Oregon, and February through July off California (Markle *et al.* 1992). Juvenile fish move into deeper water with age and begin seasonal spawning and feeding migrations upon reaching maturity.

Dover sole larvae eat copepods, eggs, and nauplii, as well as other plankton. Juveniles and adults eat polychaetes, bivalves, brittlestars, and small benthic crustaceans. Dover sole feed diurnally by sight and smell (Dark and Wilkins 1994; Gabriel and Pearcy 1981; Hart 1988; NOAA 1990). Dover sole larvae are eaten by pelagic fishes like albacore, jack mackerel and tuna, as well as sea birds. Juveniles and adults are preyed upon by sharks, demersally feeding marine mammals, and to some extent by sablefish (NOAA 1990). Dover sole compete with various eelpout species, rex sole, English sole, and other fishes of the mixed species flatfish assemblage (NOAA 1990).

Stock Status and Management History

The 1997 Dover sole assessment north of the Conception area provided landed catch OYs based on the $F_{40\%}$ harvest rate (Brodziak *et al.* 1997). The Groundfish Management Team (GMT) recommended a 2001 total catch OY of 7,151 mt, which is the average of yields calculated for 2000 through 2002 at $F_{40\%}$ (with the 40-10 adjustment), inflated to reflect 5% discard. The Groundfish FMP set the original ABC for the Conception Area at 1,000 mt based on average landings. For 1998, this was inflated to reflect 5% discard for a total catch ABC of 1,053 mt. The coastwide total catch ABC is 8,204 mt. To calculate the total catch OY (7,677 mt), the GMT reduced the Conception area's OY contribution by 50% (to 526 mt), consistent with the new harvest policy. The coastwide landed catch target was then calculated to be 95% of OY, or 7,293 mt.

The 1997 Dover sole stock assessment treated the entire population from the Monterey area through the U.S./Vancouver area as a single stock based on recent research addressing the genetic structure of the population. The assessment author generated projections of spawning biomass and expected landings for 1998 to 2000 under a variety of harvest policies and three recruitment scenarios. The hypothetical harvest policies ranged from an immediate reduction to the $F_{45\%}$ harvest rate to an increase up to the $F_{20\%}$ harvest rate. In all cases, for each of the low, medium, and high projected recruitments, the expected spawning biomass increased from the estimated year-end level in 1997 through the year 2000 due to growth of the exceptionally large 1991 year class and to the lower catches observed in the fishery since 1991.

Researchers carried out a new Dover sole stock assessment in 2001, resulting in an estimated spawning stock size that is about 29% of the unexploited biomass (Sampson and Wood 2001). Although there is no recent clear trend in abundance, stocks steadily declined from the 1950s until the mid-1990s. The 1991 year class was the last strong one, which confirms the findings of the 1997 assessment. Poor ocean conditions associated with the El Niños in the 1990s have likely affected Dover sole recruitment. The 2001 assessment authors projected five years of Dover sole harvest levels based on preferred, optimistic, and pessimistic projections of recruitment. These options varied the harvest rate from F40% (the current F_{MSY} proxy) to F50%. The Council adopted an ABC of 8,510 mt and an OY of 7,440 mt, which is calculated using the current FMSY proxy and the 40-10 adjustment.

2.4.2.2 Sablefish

Distribution and Life History

Sablefish (*Anoplopoma fimbria*) are abundant in the north Pacific, from Honshu Island, Japan, north to the Bering Sea, and southeast to Cedros Island, Baja California, Mexico. There are at least three genetically distinct populations off the West Coast of North America: one south of Monterey characterized by slower growth rates and smaller average size, one that ranges from Monterey to the U.S./Canada border that is characterized by moderate growth rates and size, and one ranging off British Columbia and Alaska characterized by fast growth rates and large size. Large adults are uncommon south of Point Conception (Hart 1988; Love 1991; McFarlane and Beamish 1983a; McFarlane and Beamish 1983b; NOAA 1990). Adults are found as deep as 1,900 m, but are most abundant between 200 m and 1,000 m (Beamish and McFarlane 1988; Kendall and Matarese 1987; Mason *et al.* 1983). Off Southern California , sablefish are abundant to depths of 1,500 m (MBC 1987). Adults and large juveniles commonly occur over sand and mud (McFarlane and Beamish 1983a; NOAA 1990) in deep marine waters. They were also reported on hard-packed mud and clay bottoms in the vicinity of submarine canyons (MBC 1987).

Spawning occurs annually in the late fall through winter in waters greater than 300 m (Hart 1988; NOAA 1990). Sablefish are oviparous with external fertilization (NOAA 1990). Eggs hatch in about 15 days (Mason *et al.* 1983; NOAA 1990) and are demersal until the yolk sac is absorbed (Mason *et al.* 1983).

Age-zero juveniles become pelagic after the yolk sac is absorbed. Older juveniles and adults are benthopelagic. Larvae and small juveniles move inshore after spawning and may rear for up to four years (Boehlert and Yoklavich 1985; Mason *et al.* 1983). Older juveniles and adults inhabit progressively deeper waters. Estimates indicate that 50% of females are mature at five years to six years (24 inches) and 50% of males are mature at five years (20 inches).

Sablefish larvae prey on copepods and copepod nauplii. Pelagic juveniles feed on small fishes and cephalopods—mainly squids (Hart 1988; Mason *et al.* 1983). Demersal juveniles eat small demersal fishes, amphipods, and krill (NOAA 1990). Adult sablefish feed on fishes like rockfishes and octopus (Hart 1988; McFarlane and Beamish 1983a). Larvae and pelagic juvenile sablefish are heavily preyed upon by seabirds and pelagic fishes. Juveniles are eaten by Pacific cod, Pacific halibut, lingcod, spiny dogfish, and marine mammals, such as Orca whales (Cailliet *et al.* 1988; Hart 1988; Love 1991; Mason *et al.* 1983; NOAA 1990). Sablefish compete with many other co-occurring species for food, mainly Pacific cod and spiny dogfish (Allen 1982).

Stock Status and Management History

There are at least three genetically distinct populations on the West Coast of North America: one south of Monterey characterized by slower growth rates and smaller average size, one that ranges from Monterey to the U.S./Canada border that is characterized by moderate growth rates and size, and one ranging off British Columbia and Alaska characterized by fast growth rates and large size. The Council actively assesses and manages the stock found between California and Washington.

The 2001 sablefish ABC (7,661 mt) was based on the proxy $F_{45\%}$ harvest rate, and the OY (6,895 mt) on application of the 40-10 harvest policy (the stock was estimated at 37% of the initial biomass). The OY applied north of 36° N latitude. A 22% trawl discard rate was based on discard rates observed in the mid to late 1980s. The GMT assumed an average mortality rate of 70% for discarded fish, which may have been too low for a predominantly summer fishery and too high for a winter fishery.

In 2001 two stock assessments were done for the sablefish stock north of Monterey (Hilborn *et al.* 2001; Schirripa and Methot 2001). The assessments incorporated new survey and fishery data and extended the assessment area south from 36° N latitude to 34° 27' N latitude (Point Conception). Both assessments indicated a normal decline in biomass since the late 1970s due to the fishing down of the unfished stock and an unexpected decline in recruitment during the early 1990s. A change in environmental conditions may have been responsible for the abrupt decline in recruitment in the 1990s (see section 2.3.1), or this low recruitment may have been the natural consequence of the gradual decline in spawning biomass. The sablefish stock is currently estimated to be between 27% and 38% of the unfished biomass, depending on the assessment scenario and the basis for estimating unfished biomass. Recruitment scenarios in both assessments hinge on two different hypotheses: whether sablefish recruitment has been most affected by density dependence, or by environmental regime shifts. Because of this uncertainty, two 2002 ABC estimates were produced and reviewed by the Council: an ABC of 4,786 mt based on the current F_{MSY} proxy of $F_{45\%}$, and an ABC of 4,062 mt based on a reduced harvest rate of $F_{50\%}$. The Council adopted the ABC based on the proxy harvest rate, but adjusted it to reflect the distribution north and south of 36° N latitude. This was done because a plan amendment would be needed to change the management area since groundfish FMP Amendment 14, permit stacking, specified only the area north of 36° N latitude. The OY was based on the 40-10 adjustment. The Council also wanted to verify industry reports of a large abundance of juvenile sablefish, an observation that was confirmed to some extent by preliminary results from the 2001 NMFS slope survey. Based on these considerations, the Council recommended a new expedited assessment be done in 2002.

Schirripa (2002) recently re-assessed the stock under the terms of reference developed by the SSC for expedited stock assessments. Under these terms of reference, the assessment would be updated with new survey and fishery data, but would not be restructured in any substantive fashion. This allowed an expedited but less rigorous review of the updated assessment, compared to an assessment that uses a new model. The expedited assessment confirmed fishers' anecdotal reports of a large 1999 year class, which is also apparent in the preliminary results of the 2001 slope survey. This new assessment also suggests that 2000 produced a relatively strong year class.

2.4.2.3 Shortspine Thornyhead

Distribution and Life History

Shortspine thornyhead (*Sebastolobus alascanus*) are found from northern Baja California, Mexico, to the Bering Sea and occasionally to the Commander Islands north of Japan (Jacobson and Vetter 1996). They are common from Southern California northward (Love 1991). Shortspine thornyhead inhabit areas over the continental shelf and slope (Erickson and Pikitch 1993; Wakefield and Smith 1990). Although they can occur as shallow as 26 m (Eschmeyer *et al.* 1983), shortspine thornyhead mainly occur between 100 m and 1,400 m off Oregon and California, most commonly between 100 m to 1,000 m (Jacobson and Vetter 1996).

Spawning occurs in February and March off California (Wakefield and Smith 1990). Shortspine thornyhead are thought to be oviparous (Wakefield and Smith 1990), although there is no clear evidence to substantiate this (Erickson and Pikitch 1993). Eggs rise to the surface to develop and hatch. Larvae are pelagic for about 12 months to 15 months. During January to June, juveniles settle onto the continental shelf and then move into deeper water as they become adults (Jacobson and Vetter 1996). Off California, they begin to mature at five years; 50% are mature by 12 years to 13 years; and all are mature by 28 years (Owen and Jacobson 1992). Although it is difficult to determine the age of older individuals, Owen and Jacobson (1992) report that off California, they may live to over 100 years of age. The mean size of shortspine thornyhead increases with depth and is greatest at 1,000 m to 1,400 m (Jacobson and Vetter 1996).

Benthic individuals are ambush predators that rest on the bottom and remain motionless for extended periods of time (Jacobson and Vetter 1996). Off Alaska, shortspine thornyhead eat a variety of invertebrates such as shrimps, crabs, and amphipods, as well as fishes and worms (Owen and Jacobson 1992). Longspine thornyhead are a common item found in the stomachs of shortspine thornyhead. Cannibalism of newly settled juveniles is important in the life history of thornyheads (Jacobson and Vetter 1996).

Stock Status and Management History

Shortspine thornyhead are a major component of the deepwater fishery on the continental slope, especially the trawl fishery for Dover sole, thornyheads, and sablefish (referred to as the DTS complex). The status of this stock is subject to substantial public debate; the species is one of the most numerous components of the slope ecosystem. However, this is an especially long-lived species and cannot sustain aggressive harvest rates. It is taken coincidentally with Dover sole, sablefish, and longspine thornyhead, especially in the upper slope and lower shelf; in deeper water, longspine thornyhead is a more predominate species. The two thornyhead species are often difficult to distinguish, and historical landings data combine the two into a single category. Shortspine thornyhead is a "constraining species" in the deepwater fishery; that is, coincidental catch of this species prevents full harvest of Dover sole and sablefish.

The individual assessments for shortspine thornyhead and longspine thornyhead in 1997 covered the area from Central California at 36° N latitude (the southern boundary of the Monterey management area) to the U.S./Canada border (the northern boundary of the U.S./Vancouver management area) (Rogers *et al.* 1997). The STAR Panel expressed concern that management requires more detailed information on thornyheads than could be obtained from the available data. Given the kinds and quality of data, the more accurate assessments are difficult because, (1) growth and natural mortality for shortspine thornyhead is uncertain, (2) it is difficult to differentiate between longspine and shortspine thornyheads in the historic landings, (3) year class strength is not easily estimated, and (4) true discard rates are unknown.

The 2001 shortspine thornyhead ABC (757 mt) was based on a synthesis of two stock assessments prepared in 1998 (NMFS STAT and OT STAT 1998; Rogers *et al.* 1998) and application of the $F_{50\%}$ harvest rate. The 2001 shortspine thornyhead ABCs and OYs were separately specified north and south of 36° N latitude, which is the northern boundary of the Conception area. The stock size was estimated to be 32% of the unfished abundance in 1999. The 2001 OY (689 mt) was based on $F_{50\%}$ and the 40-10 policy. The landed catch equivalent reflected a 20% reduction for discard.

There were a range of uncertainties in the most recent assessment of shortspine thornyhead, in 2001, not the least of which was the estimated biomass (Piner and Methot 2001). The assessment was extended south to Point Conception (in contrast to past surveys, which were limited to stocks north of 36° N latitude management area boundary). The authors concluded the 2001 spawning biomass ranged between 25% and 50% of unexploited spawning biomass. The uncertainty in abundance largely revolved around the uncertainty in recruitment and survey Q, or catchability, of shortspine thornyhead in slope surveys. The authors also concluded that the trend in stock biomass was increasing and the stock was not overfished. Based on estimated biomass and application of the GMT-recommended F=0.75M principle (which approximates an $F_{50\%}$ proxy harvest rate for shortspine thornyhead), the assessment authors and GMT recommended a slight increase in the ABC and OY for 2002 and combining the previous Monterey area north and Conception area specifications to a coastwide one. Despite the uncertainty in biomass estimates and determination of whether shortspine thornyhead should be treated as a "precautionary zone" stock, these recommendations did treat the stock as such by applying the 40-10 adjustment. The Council adopted the GMT-recommended coastwide ABC of 1,004 mt, and the associated total catch OY of 955 mt for 2002 management.

2.4.3 Stocks at or Above Target Levels

2.4.3.1 Arrowtooth Flounder

Arrowtooth flounder (*Atheresthes stomias*) range from the southern coast of Kamchatka to the northwest Bering Sea and Aleutian Islands to San Simeon, California. Arrowtooth flounder is the dominant flounder species on the outer continental shelf from the western Gulf of Alaska to Oregon. Eggs and larvae are pelagic; juveniles and adults are demersal (Garrison and Miller 1982; NOAA 1990). Juveniles and adults are most commonly found on sand or sandy gravel substrates, but occasionally occur over low-relief rock-sponge bottoms. Arrowtooth flounder exhibit a strong migration from shallow water summer feeding grounds on the continental shelf to deep water spawning grounds over the continental slope (NOAA 1990). Depth distribution may vary from as little as 50 m in summer to more than 500 m in the winter (Garrison and Miller 1982; NOAA 1990; Rickey 1995).

Arrowtooth flounder are oviparous with external fertilization. Spawning may occur deeper than 500 m off Washington (Rickey 1995). Larvae eat copepods, their eggs, and copepod nauplii (Yang 1995; Yang and Livingston 1985). Juveniles and adults feed on crustaceans (mainly ocean pink shrimp and krill) and fish (mainly gadids, herring, and pollock) (Hart 1988; NOAA 1990). Arrowtooth flounder exhibit two feeding peaks, at noon and midnight.

2.4.3.2 Bank Rockfish

Bank rockfish (*Sebastes rufus*) are found from Newport, Oregon, to central Baja California, Mexico, most commonly from Fort Bragg southward (Love 1992). Bank rockfish occur offshore (Eschmeyer*et al.* 1983) from depths of 31 m to 247 m (Love 1992), although adults prefer depths over 210 m (Love *et al.* 1990). Observations of commercial catches indicate juveniles occupy the shallower part of the species range (Love *et al.* 1990). Bank rockfish are a midwater, aggregating species and are found over hard bottoms (Love 1992), over high relief or on bank edges (Love *et al.* 1990), and along the ledge of Monterey Canyon (Sullivan 1995). They also frequent deep water over muddy or sandy bottoms (Miller and Lea 1972a). Spawning occurs from December to May (Love *et al.* 1990). Peak spawning of bank rockfish in the Southern California Bight occurs in January and a month later in Central and Northern California. Off California, bank rockfish are multiple brooders (Love *et al.* 1990). Females grow to a larger maximum size (50 cm) than males (44 cm), but grow at a slightly slower rate (Cailliet *et al.* 1996). Males reach first maturity at 28 cm, 50% maturity at 31 cm, and 100% at 38 cm. Females reach first maturity at 31 cm, 50% at 36 cm, and 100% maturity at 39 cm (Love *et al.* 1990). Bank rockfish are midwater feeders, eating mostly gelatinous planktonic organisms such as tunicates, but also preying on small fishes and krill (Love 1992).

2.4.3.3 Black Rockfish

Black rockfish (*Sebastes melanops*) are found from Southern California (San Miguel Island) to the Aleutian Islands (Amchitka Island) and they occur most commonly from San Francisco northward (Hart 1988; Miller and Lea 1972a; Phillips 1957; Stein and Hassler 1989). Black rockfish occur from the surface to greater than 366 m; however, they are most abundant at depths less than 54 m (Stein and Hassler 1989). Off California, black rockfish are found along with the blue, olive, kelp, black-and-yellow, and gopher rockfishes (Hallacher and Roberts 1985). Adults are usually observed well up in the water column (Hallacher and Roberts 1985). The abundance of black rockfish in shallow water declines in the winter and increases in the summer (Stein and Hassler 1989). Densities of black rockfish decrease with depth during both the upwelling and non-upwelling seasons (Hallacher and Roberts 1985; PFMC 1996). Off Oregon, larger fish seem to be found in deeper water (20 m to 50 m) (Stein and Hassler 1989). Black rockfish off the northern Washington coast and outer Strait of Juan de Fuca exhibit no significant movement. However, fish appear to move from the Central Washington coast southward to the Columbia River, but not into waters off Oregon. Movement displayed by black rockfish off the northern Oregon coast is primarily northward to the Columbia River (Culver 1986). Black rockfish form mixed sex, midwater schools, especially in shallow water (Hart 1988; Stein and Hassler 1989). Black rockfish larvae and young juveniles (<40 mm to 50 mm) are pelagic, but are benthic at larger sizes (Laroche and Richardson 1980).

Black rockfish have internal fertilization and annual spawning (Stein and Hassler 1989). Parturition occurs from February through April off British Columbia, January through March off Oregon, and January through May off California (Stein and Hassler 1989). Spawning areas are unknown, but spawning may occur in offshore waters because gravid females have been caught well offshore (Dunn and Hitz 1969; Hart 1988; Stein and Hassler 1989). Black rockfish can live to be more than 20 years in age. The maximum length attained by the black rockfish is 60 cm (Hart 1988; Stein and Hassler 1989). Off Oregon, black rockfish primarily prey on pelagic nekton (anchovies and smelt) and zooplankton such as salps, mysids, and crab megalops. Off Central California, juveniles eat copepods and zoea, while adults prey on juvenile rockfish, euphausiids, and amphipods during upwelling periods. During periods without upwelling they primarily consume invertebrates. Black rockfish feed almost exclusively in the water column (Culver 1986). Black rockfish are known to be eaten by lingcod and yelloweye rockfish (Stein and Hassler 1989).

2.4.3.4 Blackgill Rockfish

Blackgill rockfish *(Sebastes melanostomus)* are distributed from Washington to Punta Abreojos in central Baja California, Mexico (Love 1991; Moser and Ahlstrom 1978). Adult blackgill rockfish are found offshore at depths of 219 m to 768 m (Eschmeyer *et al.* 1983). Blackgill rockfish usually inhabit rocky or hard bottom habitats along steep drop-offs, such as the edges of submarine canyons and over seamounts (Love 1991).

However, they may also occur over soft bottoms (Eschmeyer *et al.* 1983). Blackgill rockfish are a transitional species, occupying both midwater and benthic habitats (Love *et al.* 1990), although they are rarely taken at more than 9 m above the bottom (Love 1991). Blackgill are considered an aggregating species (Love 1991).

Blackgill rockfish spawn from January to June (peaking in February) off Southern California , and in February off Central and northern California (Love 1991; Love *et al.* 1990; Moser and Ahlstrom 1978). The largest blackgill rockfish on record is 61 cm (Eschmeyer *et al.* 1983, Love 1991, Love *et al.* 1990). Blackgill rockfish primarily prey on such planktonic prey as euphausiids and pelagic tunicates, as well as small fishes (e.g., juvenile rockfishes and Pacific whiting, anchovies, and lantern fishes), and squid (Love *et al.* 1990).

2.4.3.5 Chilipepper Rockfish

Chilipepper rockfish (*Sebastes goodei*) are found from Magdalena Bay, Baja California, Mexico, to as far north as the northwest coast of Vancouver Island, British Columbia (Allen 1982); Hart, 1988 #231, (Miller and Lea 1972a). Chilipepper have been taken as deep as 425 m, but nearly all in survey catches were taken between 50 and 350 m (Allen and Smith 1988). Adults and older juveniles usually occur over the shelf and slope; larvae and small juveniles are generally found near the surface. In California, chilipepper are most commonly found associated with deep, high relief rocky areas and along cliff drop-offs (Love *et al.* 1990), as well as on sand and mud bottoms (MBC 1987). They are occasionally found over flat, hard substrates (Love *et al.* 1990). Love (1991) does not consider this to be a migratory species. Chilipepper may migrate as far as 45 m off the bottom during the day to feed (Love 1991).

Chilipeppers are ovoviviparous and eggs are fertilized internally (Reilly *et al.* 1992). Chilipepper school by sex just prior to spawning (MBC 1987). In California, fertilization of eggs begins in October and spawning occurs from September to April (Oda 1992) with the peak occurring during December to January (Love *et al.* 1990). Chilipepper may spawn multiple broods in a single season (Love *et al.* 1990). Females of the species are significantly larger, reaching lengths of up to 56 cm (Hart 1988). Males are usually smaller than 40 cm (Dark and Wilkins 1994). Males mature at two years to six years of age, and 50% are mature at three years to four years. Females mature at two years to five years with 50% mature at three years to four years (MBC 1987). Females may attain an age of about 27 years, whereas the maximum age for males is about 12 years (MBC 1987).

Larval and juvenile chilipepper eat all life stages of copepods and euphausiids, and are considered to be somewhat opportunistic feeders (Reilly *et al.* 1992). In California, adults prey on large euphausiids, squid, and small fishes such as anchovies, lanternfish, and young hake (Hart 1988; Love *et al.* 1990). Chilipepper are found with widow rockfish, greenspotted rockfish, and swordspine rockfish (Love *et al.* 1990). Juvenile chilipepper compete for food with bocaccio, yellowtail rockfish, and shortbelly rockfish (Reilly *et al.* 1992).

2.4.3.6 English Sole

English sole (*Parophrys vetulus*) are found from Nunivak Island in the southeast Bering Sea and Agattu Island in the Aleutian Islands, to San Cristobal Bay, Baja California Sur, Mexico (Allen and Smith 1988). In research survey data, nearly all occurred at depths greater than 250 m (Allen and Smith 1988). Adults and juveniles prefer soft bottoms composed of fine sands and mud (Ketchen 1956), but also occur in eelgrass habitats (Pearson and Owen 1992). English sole use nearshore coastal and estuarine waters as nursery areas (Krygier and Pearcy 1986; Rogers *et al.* 1988). Adults make limited migrations. Those off Washington show a northward post-spawning migration in the spring on their way to summer feeding grounds and a southerly movement in the fall (Garrison and Miller 1982). Tagging studies have identified separate stocks based on this species' limited movements and meristic characteristics (Jow 1969).

Spawning occurs over soft-bottom mud substrates (Ketchen 1956) from winter to early spring, depending on the stock. Eggs are neritic and buoyant, but sink just before hatching (Hart 1988); juveniles and adults are demersal (Garrison and Miller 1982). Small juveniles settle in the estuarine and shallow nearshore areas all along the coast, but are less common in southerly areas, particularly south of Point Conception. Large juveniles commonly occur up to depths of 150 m. Although many postlarvae may settle outside of estuaries, most will enter estuaries during some part of their first year of life (Gunderson *et al.* 1990). Some females mature as three-year-olds (26 cm), but all females over 35 cm long are mature. Males mature at two years (21 cm).

Larvae are planktivorous. Juveniles and adults are carnivorous, eating copepods, amphipods, cumaceans, mysids, polychaetes, small bivalves, clam siphons, and other benthic invertebrates (Allen 1982; Becker 1984; Hogue and Carey 1982; Simenstad *et al.* 1979). English sole feed primarily by day, using sight and smell, and sometimes dig for prey (Allen 1982; Hulberg and Oliver 1979). A juvenile English sole's main predators are probably piscivorous birds such as great blue heron (*Ardia herodias*), larger fishes, and marine mammals. Adults may be eaten by marine mammals, sharks, and other large fishes.

2.4.3.7 Longspine Thornyhead

Longspine thornyhead (*Sebastolobus altivelis*) are found from the southern tip of Baja California, Mexico, to the Aleutian Islands (Eschmeyer *et al.* 1983, Jacobson and Vetter 1996, Love 1991, Miller and Lea 1972, Smith and Brown 1983), but are abundant from Southern California northward (Love 1991). Juvenile and adult longspine thornyhead are demersal and occupy the benthic surface (Smith and Brown 1983). Off Oregon and California, longspine thornyhead mainly occur at depths of 400 m to 1,400 plus m, most between 600 m and 1,000 m in the oxygen minimum zone (Jacobson and Vetter 1996). Thornyhead larvae (*Sebastolobus* spp.) have been taken in research surveys up to 560 km off the California coast (Cross 1987; Moser *et al.* 1993). Juveniles settle on the continental slope at about 600 m to 1,200 m (Jacobson and Vetter 1996). Longspine thornyhead live on soft bottoms, preferably sand or mud (Eschmeyer *et al.* 1983, Jacobson and Vetter 1996, Love 1991). Longspine thornyheads neither school nor aggregate (Jacobson and Vetter 1996).

Spawning occurs in February and March at 600 m to 1,000 m (Jacobson and Vetter 1996, Wakefield and Smith 1990). Longspine thornyhead are oviparous and are multiple spawners, spawning two to four batches per season (Love 1991, Wakefield and Smith 1990). Eggs rise to the surface to develop and hatch. Floating egg masses can be seen at the surface in March, April, and May (Wakefield and Smith 1990). Juveniles (<5.1 cm long) occur in midwater (Eschmeyer *et al.* 1983). After settling, longspine thornyhead are completely benthic (Jacobson and Vetter 1996). Longspine thornyhead can grow to 38 cm (Eschmeyer *et al.* 1983, Jacobson and Vetter 1996, Miller and Lea 1972) and live more than 40 years (Jacobson and Vetter 1996). Longspine thornyhead reach the onset of sexual maturity at 17 cm to 19 cm total length (10% of females mature) and 90% are mature by 25 cm to 27 cm (Jacobson and Vetter 1996).

Longspine thornyhead are ambush predators (Jacobson and Vetter 1996). They consume fish fragments, crustaceans, bivalves, and polychaetes and occupy a tertiary consumer level in the food web. Pelagic juveniles prey largely on herbivorous euphausiids and occupy a secondary consumer level in the food web (Love 1991, Smith and Brown 1983). Longspine thornyhead are commonly found in shortspine thornyhead stomachs. Cannibalism in newly settled longspine thornyhead may occur, because juveniles settle directly onto adult habitat (Jacobson and Vetter 1996). Sablefish commonly prey on longspine thornyhead.

2.4.3.8 Pacific Cod

Pacific cod (*Gadus macrocephalus*) are widely distributed in the coastal north Pacific, from the Bering Sea to Southern California in the east, and to the Sea of Japan in the west. Adult Pacific cod occur as deep as 875 m (Allen and Smith 1988), but the vast majority occurs between 50 m and 300 m (Allen and Smith 1988, Hart 1986, Love 1991, NOAA 1990). Along the West Coast, Pacific cod prefer shallow, soft-bottom habitats in marine and estuarine environments (Garrison and Miller 1982), although adults have been found associated with coarse sand and gravel substrates (Garrison and Miller 1982; Palsson 1990). Larvae and small juveniles are pelagic; large juveniles and adults are parademersal (Dunn and Matarese 1987; NOAA 1990). Adult Pacific cod are not considered to be a migratory species. There is, however, a seasonal bathymetric movement from deep spawning areas of the outer shelf and upper slope in fall and winter to shallow middle-upper shelf feeding grounds in the spring (Dunn and Matarese 1987; Hart 1988; NOAA 1990; Shimada and Kimura 1994).

Pacific cod have external fertilization (Hart 1986, NOAA 1990) with spawning occurring from late fall to early spring. Their eggs are demersal. Larvae may be transported to nursery areas by tidal currents (Garrison and Miller 1982). Half of females are mature by three years (55 cm) and half of males are mature by two years (45 cm) (Dunn and Matarese 1987, Hart 1986). Juveniles and adults are carnivorous and feed at night (Allen and Smith 1988; Palsson 1990) with the main part of the adult Pacific cod diet being whatever prey species is most abundant (Kihara and Shimada 1988; Klovach *et al.* 1995). Larval feeding is poorly understood. Pelagic fish and sea birds eat Pacific cod larvae, while juveniles are eaten by larger demersal fishes, including Pacific cod. Adults are preyed upon by toothed whales, Pacific halibut, salmon shark, and larger Pacific cod (Hart 1986, Love 1991, NOAA 1990, Palsson 1990). The closest competitor of the Pacific cod for resources is the sablefish (Allen 1982).

2.4.3.9 Pacific Whiting

Distribution and Life History

Pacific whiting (*Merluccius productus*), also known as Pacific hake, are a semi-pelagic merlucciid (a cod-like fish species) that range from Sanak Island in the western Gulf of Alaska to Magdalena Bay, Baja California Sur, Mexico. They are most abundant in the California Current System (Bailey 1982; Hart 1988; Love 1991; NOAA 1990). Smaller populations of Pacific whiting occur in several of the larger semi-enclosed inlets of the northeast Pacific Ocean, including the Strait of Georgia, Puget Sound, and the Gulf of California (Bailey *et al.* 1982; Stauffer 1985). The highest densities of Pacific whiting are usually between 50 m and 500 m, but adults occur as deep as 920 m and as far offshore as 400 km (Bailey 1982; Bailey *et al.* 1982; Dark and Wilkins 1994; Dorn 1995; Hart 1988; NOAA 1990). Pacific whiting school at depth during the day, then move to the surface and disband at night for feeding (McFarlane and Beamish 1986; Sumida and Moser 1984; Tanasich *et al.* 1991). Coastal stocks spawn off Baja, California in the winter, then the mature adults begin moving northward and inshore following food supply and Davidson Currents (NOAA 1990). Pacific whiting reach as far north as southern British Columbia by fall. They then begin a southern migration to spawning grounds further offshore (Bailey *et al.* 1982; Dorn 1995; Smith 1995; Stauffer 1985).

Spawning occurs from December through March, peaking in late January (Smith 1995). Pacific whiting are oviparous with external fertilization. Eggs of the Pacific whiting are neritic and float to neutral buoyancy (Bailey 1982; Bailey *et al.* 1982; NOAA 1990). Hatching occurs in five days to six days, and within three months to four months juveniles are typically 35 mm (Hollowed 1992). Juveniles move to deeper water as they get older (NOAA 1990). Females mature at three years to four years (34 cm to 40 cm) and nearly all males are mature by three years (28 cm). Females grow more rapidly than males after four years; growth ceases for both sexes at 10 years to 13 years (Bailey *et al.* 1982).

All life stages feed near the surface late at night and early in the morning (Sumida and Moser 1984). Larvae eat calanoid copepods, as well as their eggs and nauplii (McFarlane and Beamish 1986; Sumida and Moser 1984). Juveniles and small adults feed chiefly on euphausiids (NOAA 1990). Large adults also eat amphipods, squid, herring, smelt, crabs, and sometimes juvenile whiting (Bailey 1982; Dark and Wilkins 1994; McFarlane and Beamish 1986; NOAA 1990). Eggs and larvae of Pacific whiting are eaten by pollock, herring, invertebrates, and sometimes Pacific whiting. Juveniles are eaten by lingcod, Pacific cod, and rockfish species. Adults are preyed on by sablefish, albacore, pollock, Pacific cod, marine mammals, soupfin sharks, and spiny dogfish (Fiscus 1979; McFarlane and Beamish 1986; NOAA 1990).

Stock Status and Management History

The history of the coastal whiting fishery is characterized by rapid changes brought about by the development of foreign fisheries in 1966, joint-venture fisheries in the early 1980s, and domestic fisheries in 1990s. Whiting are assessed annually by a joint technical team of U.S. and Canadian scientists. The 2001 assessment (Helser *et al.* 2002) incorporated 2001 hydroacoustic survey data and showed the spawning stock biomass declined substantially and had been lower during the past several years than previously estimated. The stock assessment estimated the biomass in 2001 was 0.7 million mt, and the female spawning biomass was less than 20% of the unfished biomass. This was substantially lower than indicated in the 1998 assessment (Dorn *et al.* 1999), which estimated the biomass to be at 39% of its unfished biomass. Therefore, NMFS declared the whiting stock overfished in April 2002. The stock was projected to be near 25% of the unfished biomass in 2002 and above $B_{25\%}$ in 2003. In retrospect, revised biomass estimates based on the results of the 2001assessment indicate the exploitation rates in 1999 (28%), 2000 (24%) and 2001 (31%) were above the overfishing level.

The most recent whiting stock assessment (Helser *et al.* 2004), incorporating new data from the 2003 hydro-acoustic survey, estimates current biomass between 47% and 51% of unfished biomass; the stock is therefore not currently overfished, nor is it in the precautionary zone. Furthermore, because the 1999 year class was larger than previously estimated, estimates of the 2001 biomass in the current stock assessment range from 27% to 33% of unfished biomass, indicating that the stock approached, but never fell below, the $B_{25\%}$ minimum stock size threshold (Whiting STAR Panel 2004). On April 30, 2004, NMFS announced that Pacific whiting is no longer considered an overfished stock (69 FR 23667). This removes the requirement to prepare a rebuilding plan and manage the stock accordingly.

2.4.3.10 Petrale Sole

Petrale sole (*Eopsetta jordani*) are found from Cape Saint Elias, Alaska to Coronado Island, Baja California, Mexico. The range may possibly extend into the Bering Sea, but the species is rare north and west of southeast Alaska and in the inside waters of British Columbia (Garrison and Miller 1982; Hart 1988). Nine separate breeding stocks have been identified, although stocks intermingle on summer feeding grounds (Hart 1988; NOAA 1990). Of these nine, one occurs off British Columbia, two off Washington, two off Oregon, and four off California. Adults are found from the surf line to 550 m, but their highest abundance is deeper than 300 m. Adults migrate seasonally between deepwater, winter spawning areas to shallower, spring feeding grounds. They show an affinity to sand, sandy mud, and occasionally muddy substrates (NOAA 1990).

Spawning occurs over the continental shelf and continental slope to as deep as 550 m. Spawning occurs in large spawning aggregations in the winter. Eggs are pelagic and juveniles and adults are demersal (Garrison and Miller 1982). Eggs and larvae are transported from offshore spawning areas to nearshore nursery areas by oceanic currents and wind. Larvae metamorphose into juveniles at six months (22 cm) and settle to the bottom of the inner continental shelf (Pearcy *et al.* 1977). Petrale sole tend to move into deeper water with increased age and size. Petrale sole begin maturing at three years. Half of males mature by seven years (29 cm to 43 cm) and half of the females are mature by eight years (>44 cm) (Pearcy *et al.* 1977; Pedersen 1975a; Pedersen 1975b). Near the Columbia River, petrale sole mature one to two years earlier (Pedersen 1975a; Pedersen 1975b).

Larvae are planktivorous. Small juveniles eat mysids, sculpins, and other juvenile flatfishes. Large juveniles and adults eat shrimps and other decapod crustaceans, as well as euphausiids, pelagic fishes, ophiuroids, and juvenile petrale sole (Garrison and Miller 1982; Hart 1988; Pearcy *et al.* 1977; Pedersen 1975a; Pedersen 1975b). 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, and larger flatfishes and pelagic fishes (NOAA 1990). Petrale sole competes with other large flatfishes. It has the same summer feeding grounds as lingcod, English sole, rex sole, and Dover sole (NOAA 1990).

2.4.3.11 Shortbelly Rockfish

Shortbelly rockfish (*Sebastes jordani*) are found from San Benito Islands, Baja California, Mexico, to La Perouse Bank, British Columbia (Eschmeyer *et al.* 1983; Lenarz 1980). The habitat of the shortbelly rockfish is wide ranging (Eschmeyer *et al.* 1983). Shortbelly rockfish inhabit waters from 50 m to 350 m in depth (Allen and Smith 1988) on the continental shelf (Chess *et al.* 1988) and upper-slope (Stull and Tang 1996). Adults commonly form very large schools over smooth bottoms near the shelf break (Lenarz 1992). Shortbelly rockfish have also been observed along the Monterey Canyon ledge (Sullivan 1995). During the day shortbelly rockfish are found near the bottom in dense aggregations. At night they are more dispersed (Chess *et al.* 1988). During the summer shortbelly rockfish tend to move into deeper waters and to the north as they grow, but they do not make long return migrations to the south in the winter to spawn (Lenarz 1980).

Shortbelly rockfish are viviparous, bearing advanced yolk sac larvae (Ralston *et al.* 1996a). Shortbelly rockfish spawn off California during January through April (Lenarz 1992). Larvae metamorphose to juveniles at 27 mm and appear to begin forming schools at the surface at that time (Laidig *et al.* 1991; Lenarz 1980). A few shortbelly rockfish mature at age two, while 50% are mature at age three, and nearly all are mature by age four (Lenarz 1992). They live to be about ten years old (Lenarz 1980; MacGregor 1986) with the maximum recorded age being 22 years (Lenarz 1992).

Shortbelly rockfish feed primarily on various life stages of euphausiids and calanoid copepods both during the day and night (Chess *et al.* 1988; Lenarz *et al.* 1991). Shortbelly rockfish play a key role in the food chain as they are preyed upon by chinook and coho salmon, lingcod, black rockfish, Pacific whiting, bocaccio, chilipepper, pigeon guillemots, western gull, marine mammals, and other taxa (Chess *et al.* 1988; Eschmeyer *et al.* 1983; Hobson and Howard 1989; Lenarz 1980).

2.4.3.12 Splitnose Rockfish

Splitnose rockfish (*Sebastes diploproa*) occur from Prince William Sound, Alaska to San Martin Island, Baja California, Mexico (Miller and Lea 1972). Splitnose rockfish occur from zero m to 800 m, with most survey catches occurring in depths of 100 m to 450 m (Allen and Smith 1988). The relative abundance of juveniles (<21 cm) is quite high in the 91 m to 272 m depth zone and then decreases sharply in the 274 m to 475 m depth zone (Boehlert 1980). Splitnose rockfish have a pelagic larval stage, a prejuvenile stage, and a benthic juvenile stage (Boehlert 1977). Benthic splitnose rockfish associate with mud habitats (Boehlert 1980). Young occur in shallow water, often at the surface under drifting kelp (Eschmeyer *et al.* 1983). The major types of vegetation juveniles are found under are *Fucus* spp. (dominant), eelgrass, and bull kelp (Shaffer *et* *al.* 1995). Juvenile splitnose rockfish off Southern California are the dominant rockfish species found under drifting kelp (Boehlert 1977).

Splitnose rockfish are ovoviviparous and release yolk sac larvae (Boehlert 1977). They may have two parturition seasons, or may possibly release larvae throughout the year (Boehlert 1977). In general, the main parturition season get progressively shorter and later toward the north (Boehlert 1977). Splitnose rockfish growth rates vary with latitude, being generally faster in the north. Splitnose rockfish mean sizes increase with depth in a given latitudinal area. Mean lengths of females are generally greater than males (Boehlert 1980). Off California, 50% maturity occurs at 21 cm, or five years of age, whereas off British Columbia 50% of males and females are mature at 27 cm (Hart 1988). Adults can achieve a maximum size of 46 cm (Boehlert 1980, Eschmeyer *et al.* 1983, Hart 1986). Females have surface ages to 55 years and section ages to 81 years.

Adult splitnose rockfish off Southern California feed on midwater plankton, primarily euphausiids (Allen 1982). Juveniles feed mainly on planktonic organisms, including copepods and cladocerans during June and August. In October, their diets shift to larger epiphytic prey and are dominated by a single amphipod species. Juvenile splitnose rockfish actively select prey (Shaffer *et al.* 1995)) and are probably diurnally active (Allen 1982). Adults are probably nocturnally active, at least in part (Allen 1982).

2.4.3.13 Yellowtail Rockfish

Yellowtail rockfish (*Sebastes flavidus*) range from San Diego, California, to Kodiak Island, Alaska (Fraidenburg 1980; Gotshall 1981; Lorz *et al.* 1983; Love 1991; Miller and Lea 1972a; Norton and MacFarlane 1995). The center of yellowtail rockfish abundance is from Oregon to British Columbia (Fraidenburg 1980). Yellowtail rockfish are a common, demersal species abundant over the middle shelf (Carlson and Haight 1972; Fraidenburg 1980; Tagart 1991; Weinberg 1994). Yellowtail rockfish are most common near the bottom, but not on the bottom (Love 1991; Stanley *et al.* 1994). Yellowtail rockfish adults are considered semi-pelagic (Stanley *et al.* 1994; Stein *et al.* 1992) or pelagic, which allows them to range over wider areas than benthic rockfish (Pearcy 1992). Adult yellowtail rockfish occur along steeply sloping shores or above rocky reefs (Hart 1986). They can be found above mud with cobble, boulder and rock ridges, and sand habitats; they are not, however, found on mud, mud with boulder, or flat rock (Love 1991, Stein *et al.* 1992). Yellowtail rockfish form large (sometimes greater than 1,000 fish) schools and can be found alone or in association with other rockfishes (Love 1991, Pearcy 1992, Rosenthal *et al.* 1982, Stein *et al.* 1992, Tagart 1991). These schools may persist at the same location for many years (Pearcy 1992).

Yellowtail rockfish are viviparous (Norton and MacFarlane 1995) and mate from October to December. Parturition peaks in February and March and from November to March off California (Westrheim 1975). Young-of-the-year pelagic juveniles often appear in kelp beds beginning in April and live in and around kelp in midwater during the day, descending to the bottom at night (Love 1991, Tagart 1991). Male yellowtail rockfish are 34 cm to 41 cm in length (five years to nine years) at 50% maturity, females are 37 cm to 45 cm (six years to ten years) (Tagart 1991). Yellowtail rockfish are long-lived and slow-growing; the oldest recorded individual was 64 years old (Fraidenburg 1981, Tagart 1991). Yellowtail rockfish have a high growth rate relative to other rockfish species (Tagart 1991). They reach a maximum size of about 55 cm in approximately 15 years (Tagart 1991). Yellowtail rockfish feed mainly on pelagic animals, but are opportunistic, occasionally eating benthic animals as well (Lorz *et al.* 1983). Large juveniles and adults eat fish (small Pacific whiting, Pacific herring, smelt, anchovies, lanternfishes, and others), along with squid, krill, and other planktonic organisms (euphausiids, salps, and pyrosomes) (Love 1991, Phillips 1964, Rosenthal *et al.* 1982, Tagart 1991).

2.4.3.14 Groundfish Stock Complexes

Rockfish Stock Complexes

Rockfish species, excluding thornyheads, are divided into categories north and south of Cape Mendocino (40º 10' N latitude) depending on the depths where they are most often caught; nearshore, shelf, and slope (see Figure 2-4). South of Cape Mendocino, the minor nearshore complex is further divided into three categories; shallow nearshore species, deeper nearshore species, and California scorpionfish. The shallow nearshore category includes black-and-yellow rockfish, China rockfish, gopher rockfish, grass rockfish, and kelp rockfish. The deeper nearshore category includes black rockfish, blue rockfish, brown rockfish, calico rockfish, copper rockfish, olive rockfish, quillback rockfish, and treefish.

Other Groundfish Stock Complexes

"Other Fish" are those FMP groundfish species or species groups for which there is no specified landing limit, size limit, quota, or harvest guideline (as defined in federal regulation at 50 CFR 660.302).

"Other Flatfish" are those species that do not have individual ABC/OYs and include butter sole, curlfin sole, flathead sole, Pacific sanddab, rex sole, rock sole, sand sole, and starry flounder. Life history descriptions of these species may be found in the EFH Appendix to the groundfish FMP (EFH Core Team for West Coast Groundfish 1998).

TABLE 2-1. Latitudinal and depth distributions of groundfish species (adults) managed under the Pacific Coast Groundfish Fishery Management Plan.[a/] (Page 1 of 3)

		Latitudinal Distribution		Depth Distribution (fm)	
Common name	**Scientific name**	**Overall**	**Highest Density**	**Overall**	**Highest Density**
		Flatfish Species			
Arrowtooth flounder	*Atheresthes stomias*	N. 34°N. lat.	N. 40°N. lat.	10-400	27-270
Butter sole	*Isopsetta isolepis*	N. 34°N. lat.	N. 34°N. lat.	0-200	0-100
Curlfin sole	*Pleuronichthys decurrens*	Coastwide	Coastwide	4-291	4-50
Dover sole	*Microstomus pacificus*	Coastwide	Coastwide	10-500	110-270
English sole	*Parophrys vetulus*	Coastwide	Coastwide	0-300	40-200
Flathead sole	*Hippoglossoides elassodon*	N. 38°N. lat.	N. 40°N. lat.	3-300	100-200
Pacific sanddab	*Citharichthys sordidus*	Coastwide	Coastwide	0-300	0-82
Petrale sole	*Eopsetta jordani*	Coastwide	Coastwide	10-250	160-250
Rex sole	*Glyptocephalus zachirus*	Coastwide	Coastwide	10-350	27-250
Rock sole	*Lepidopsetta bilineata*	Coastwide	N. 32°30'N. lat.	0-200	summer 10-44 winter 70-150
Sand sole	*Psettichthys melanostictus*	Coastwide	N. 33°50'N. lat.	0-100	0-44
Starry flounder	*Platichthys stellatus*	Coastwide	N. 34°20'N. lat.	0-150	0-82
		Rockfish Species			
Aurora rockfish	*Sebastes aurora*	Coastwide	Coastwide	100-420	82-270
Bank rockfish	*Sebastes rufus*	S. 39°30'N. lat.	S. 39°30'N. lat.	17-135	115-140
Black rockfish	*Sebastes melanops*	N. 34°N. lat.	N. 34°N. lat.	0-200	0-30
Black-and-yellow rockfish	*Sebastes chrysomelas*	S. 40°N. lat.	S. 40°N. lat.	0-20	0-10
Blackgill rockfish	*Sebastes melanostomus*	Coastwide	S. 40°N. lat.	48-420	125-300
Blue rockfish	*Sebastes mystinus*	Coastwide	Coastwide	0-300	13-21
Bocaccio[b/]	*Sebastes paucispinis*	Coastwide	S. 40° N. lat., N. 48° N. lat.	15-180	54-82
Bronzespotted rockfish	*Sebastes gilli*	S. 37°N. lat.	S. 37°N. lat.	41-205	110-160
Brown rockfish	*Sebastes auriculatus*	Coastwide	S. 40°N. lat.	0-70	0-50
Calico rockfish	*Sebastes dallii*	S. 38°N. lat.	S. 33°N. lat.	10-140	33-50
California scorpionfish rockfish	*Scorpaena gutatta*	S. 37°N. lat.	S. 34°27'N. lat.	0-100	0-100
Canary rockfish	*Sebastes pinniger*	Coastwide	Coastwide	50-150	50-100
Chameleon rockfish	*Sebastes phillipsi*	37°- 33°N. lat.	37°- 33°N. lat.	95-150	95-150
Chilipepper	*Sebastes goodei*	Coastwide	34°- 40°N. lat.	27-190	27-190
China rockfish	*Sebastes nebulosus*	N. 34°N. lat.	N. 35°N. lat.	0-70	2-50
Copper rockfish	*Sebastes caurinus*	Coastwide	S. 40°N. lat.	0-100	0-100
Cowcod	*Sebastes levis*	S. 40°N. lat.	S. 34°27'N. lat.	22-203	100-130
Darkblotched rockfish	*Sebastes crameri*	N. 33°N. lat.	N. 38°N. lat.	16-300	96-220
Dusky rockfish[c/]	*Sebastes ciliatus*	N. 55°N. lat.	N. 55°N. lat.	0-150	0-150
Dwarf-Red rockfish[d/]	*Sebastes rufinanus*	33° N. lat.	33°N. lat.	>100	>100
Flag rockfish	*Sebastes rubrivinctus*	S. 38° N. lat.	S. 37°N. lat.	17-100	shallow
Freckled rockfish	*Sebastes lentignosus*	S. 33° N.l at.	S. 33° N. lat.	22-92	22-92
Gopher rockfish	*Sebastes carnatus*	S. 40° N. lat.	S. 40°N. lat.	0-30	0-16
Grass rockfish	*Sebastes rastrelliger*	S. 44°40' N. lat.	S. 40°N. lat.	0-25	0-8
Greenblotched rockfish	*Sebastes rosenblatti*	S. 38°N. lat.	S. 38° N. lat.	33-217	115-130
Greenspotted rockfish	*Sebastes chlorostictus*	S. 47° N. lat.	S. 40° N. lat.	27-110	50-100
Greenstriped rockfish	*Sebastes elongatus*	Coastwide	Coastwide	33-220	27-136
Halfbanded rockfish	*Sebastes semicinctus*	S. 36°40' N. lat.	S. 36°40' N. lat.	32-220	32-220
Harlequin rockfish[e/]	*Sebastes variegatus*	N. 40° N. lat.	N. 51° N. lat.	38-167	38-167
Honeycomb rockfish	*Sebastes umbrosus*	S. 36°40' N. lat.	S. 34°27' N. lat.	16-65	16-38
Kelp rockfish	*Sebastes atrovirens*	S. 39° N. lat.	S. 37° N. lat.	0-25	3-4
Longspine thornyhead	*Sebastolobus altivelis*	Coastwide	Coastwide	167->833	320-550
Mexican rockfish	*Sebastes macdonaldi*	S. 36°20' N. lat.	S. 36°20' N. lat.	50-140	50-140

TABLE 2-1. Latitudinal and depth distributions of groundfish species (adults) managed under the Pacific Coast Groundfish Fishery Management Plan.[a/] (Page 2 of 3)

		Latitudinal Distribution		Depth Distribution (fm)	
Common name	**Scientific name**	**Overall**	**Highest Density**	**Overall**	**Highest Density**
Olive rockfish	*Sebastes serranoides*	S. 41°20' N. lat.	S. 40° N. lat.	0-80	0-16
Pacific ocean perch	*Sebastes alutus*	Coastwide	N. 42° N. lat.	30-350	110-220
Pink rockfish	*Sebastes eos*	S. 37° N. lat.	S. 35° N. lat.	40-200	40-200
Pinkrose rockfish	*Sebastes simulator*	S. 34° N. lat.	S. 34° N. lat.	54-160	108
Puget Sound rockfish	*Sebastes emphaeus*	N. 40° N. lat.	N. 40° N. lat.	6-200	6-200
Pygmy rockfish	*Sebastes wilsoni*	N. 32°30' N.l at.	N. 32°30' N. lat.	17-150	17-150
Quillback rockfish	*Sebastes maliger*	N. 36°20' N. lat.	N. 40° N. lat.	0-150	22-33
Redbanded rockfish	*Sebastes babcocki*	Coastwide	N. 37° N. lat.	50-260	82-245
Redstripe rockfish	*Sebastes proriger*	N. 37° N. lat.	N. 37° N. lat.	7-190	55-190
Rosethorn rockfish	*Sebastes helvomaculatus*	Coastwide	N. 38° N. lat.	65-300	55-190
Rosy rockfish	*Sebastes rosaceus*	S. 42° N. lat.	S. 40° N. lat.	8-70	30-58
Rougheye rockfish	*Sebastes aleutianus*	Coastwide	N. 40° N. lat.	27-400	27-250
Semaphore rockfish	*Sebastes melanosema*	S. 34°27' N. lat.	S. 34°27' N. lat.	75-100	75-100
Sharpchin rockfish	*Sebastes zacentrus*	Coastwide	Coastwide	50-175	50-175
Shortbelly rockfish	*Sebastes jordani*	Coastwide	S. 46°N. lat.	50-175	50-155
Shortraker rockfish	*Sebastes borealis*	N. 39°30' N. lat.	N. 44° N. lat.	110-220	110-220
Shortspine thornyhead	*Sebastolobus alascanus*	Coastwide	Coastwide	14->833	55-550
Silvergray rockfish	*Sebastes brevispinis*	Coastwide	N. 40° N. lat.	17-200	55-160
Speckled rockfish	*Sebastes ovalis*	S. 38° N. lat.	S. 37° N. lat.	17-200	41-83
Splitnose rockfish	*Sebastes diploproa*	Coastwide	Coastwide	50-317	55-250
Squarespot rockfish	*Sebastes hopkinsi*	S. 38° N. lat.	S. 36° N. lat.	10-100	10-100
Starry rockfish	*Sebastes constellatus*	S. 38° N. lat.	S. 37° N. lat.	13-150	13-150
Stripetail rockfish	*Sebastes saxicola*	Coastwide	Coastwide	5-230	5-190
Swordspine rockfish	*Sebastes ensifer*	S. 38° N. lat.	S. 38° N. lat.	38-237	38-237
Tiger rockfish	*Sebastes nigrocinctus*	N. 35° N. lat.	N. 35° N. lat.	30-170	35-170
Treefish	*Sebastes serriceps*	S. 38° N. lat.	S. 34°27' N. lat.	0-25	3-16
Vermillion rockfish	*Sebastes miniatus*	Coastwide	Coastwide	0-150	4-130
Widow rockfish	*Sebastes entomelas*	Coastwide	N. 37° N. lat.	13-200	55-160
Yelloweye rockfish	*Sebastes ruberrimus*	Coastwide	N. 36° N. lat.	25-300	27-220
Yellowmouth rockfish	*Sebastes reedi*	N. 40° N. lat.	N. 40° N. lat.	77-200	150-200
Yellowtail rockfish	*Sebastes flavidus*	Coastwide	N. 37° N. lat.	27-300	27-160
Roundfish Species					
Cabezon	*Scorpaenichthys marmoratus*	Coastwide	Coastwide	0-42	0-27
Kelp greenling	*Hexagrammos decagrammus*	Coastwide	N. 40° N. lat.	0-25	0-10
Lingcod	*Ophiodon elongatus*	Coastwide	Coastwide	0-233	0-40
Pacific cod	*Gadus macrocephalus*	N. 34° N. lat.	N. 40° N. lat.	7-300	27-160
Pacific whiting	*Merluccius productus*	Coastwide	Coastwide	20-500	27-270
Sablefish	*Anoplopoma fimbria*	Coastwide	Coastwide	27->1,000	110-550
Shark and Skate Species					
Big skate	*Raja binoculata*	Coastwide	S. 46° N. lat.	2-110	27-110
California skate	*Raja inornata*	Coastwide	S. 39° N. lat.	0-367	0-10
Leopard shark	*Triakis semifasciata*	S. 46°N. lat.	S. 46° N. lat.	0-50	0-2
Longnose skate	*Raja rhina*	Coastwide	N. 46° N. lat.	30-410	30-340
Soupfin shark	*Galeorhinus zyopterus*	Coastwide	Coastwide	0-225	0-225
Spiny dogfish	*Squalus acanthias*	Coastwide	Coastwide	0->640	0-190
Other Species					
Finescale codling	*Antimora microlepis*	Coastwide	N. 38° N. lat.	190-1,588	190-470

TABLE 2-1. Latitudinal and depth distributions of groundfish species (adults) managed under the Pacific Coast Groundfish Fishery Management Plan.[a/] (Page 3 of 3)

		Latitudinal Distribution		Depth Distribution (fm)	
Common name	**Scientific name**	**Overall**	**Highest Density**	**Overall**	**Highest Density**
Pacific rattail	*Coryphaenoides acrolepis*	Coastwide	N. 38° N. lat. Coastwide	85-1,350	500-1,350
Ratfish	*Hydrolagus colliei*	Coastwide	Coastwide	0-499	55-82

a/ Data from Casillas *et al.* 1998, Eschmeyer *et al.* 1983, Hart 1973, Miller and Lea 1972, and NMFS survey data. Depth distributions refer to offshore distributions, not vertical distributions in the water column.

b/ Only the southern stock of bocaccio south of 40°10' N latitude is listed as overfished.

c/ Dusky rockfish do not occur on the U.S. West Coast south of 49° N latitude The species needs to be removed from the FMP.

d/ Dwarf-Red rockfish are a very rare species with only one occurrence listed in the literature (2 specimens from an underwater explosion off San Clemente Is., California in 1970; Eschmeyer *et al.* 1983). The species is not in the FMP.

e/ Only 2 occurrences of harlequin rockfish south of 51° N latitude (off Newport, Oregon and La Push, Washington; Casillas *et al.* 1998).

TABLE 2-2. Current rebuilding parameter/target estimates specified for overfished West Coast groundfish: shelf species. (Page 1 of 2)

	Shelf rockfish & lingcod				
Rebuilding Parameter/Target	**Bocaccio**[a/]	**Canary**[b/]	**Cowcod**[c/]	**Lingcod**[d/]	**Yelloweye**[e/]
T_0 (year declared overfished)	1999	2000	2000	1999	2002
T_{MIN} (minimum time to achieve B_{MSY}; F = 0)	2018	2057	2062	2007	2027
Mean generation time	14 years	19 years	37 years	NA	44 years
T_{MAX} (maximum time to achieve B_{MSY})	2032	2076	2099	2009	2071
P_{MAX} (P to achieve B_{MSY} by T_{MAX})[f/]	70%	60%	60%	60%	92%
Most recent stock assessment	MacCall 2003a	Methot and Piner 2002a	Butler *et al.* 1999	Jagielo *et al.* 2000	Methot *et al.* 2002
Most recent rebuilding analysis	MacCall 2003b	Methot and Piner 2002b	Butler and Barnes 2000	Jagielo and Hastie 2001	Methot and Piner 2002
B_0 (estimated unfished biomass)	13,387 B eggs in 2003	31,550 mt	3,367 mt	22,882 mt N 20,971 mt S	3,875 mt
$B_{CURRENT}$ (current estimated biomass)	984 B eggs in 2003	2,524 mt in 2002	238 mt in 1998	3,527 mt N 3,220 mt S in 2000	934 mt in 2002
$B_{CURRENT}$ % Unfished Biomass	7.4% in 2003	8% in 2002	7% in 1998	17% N 15% S in 2000	24% in 2002
MSST (minimum stock size threshold = 25% of B_0)	3,347 B eggs	7,888 mt	842 mt	5,720 mt N 5,243 mt S	969 mt
B_{MSY} (rebuilding biomass target = 40% of B_0)	5,355 B eggs	12,620 mt	1,350 mt	9,153 mt N 8,389 mt S	1,550 mt
MFMT (maximum fishing mortality threshold = F_{MSY})	$F_{50\%}$	$F_{73\%}$	$F_{50\%}$	$F_{45\%}$: F = 0.12 N F = 0.14 S	$F_{57\%}$
Harvest control rule[f/]	F ≈ 0.0498	F = 0.0220	F = 0.009	F = 0.053 N F = 0.061 S	F = 0.0153
T_{TARGET}[f/]	2023	2074	2090	2009	2058

TABLE 2-2. Current rebuilding parameter/target estimates specified for overfished West Coast groundfish: shelf species. (Page 2 of 2)

	Shelf rockfish & lingcod				
Rebuilding Parameter/Target	**Bocaccio**[a/]	**Canary**[b/]	**Cowcod**[c/]	**Lingcod**[d/]	**Yelloweye**[e/]

a/ Bocaccio were assessed by MacCall (2003a) in the Conception and Monterey INPFC areas combined. Biomass estimates are spawning output in billions of eggs. All rebuilding parameters based on model STATc in the most recent rebuilding analysis (MacCall 2003b). The strategic rebuilding parameters (T_{TARGET}, the harvest control rule (F), and P_{MAX}) are interpolated from model STATc results. A rebuilding plan for bocaccio south of 40°10' N latitude is being adopted by groundfish FMP Amendment 16-3.

b/ The canary rockfish rebuilding plan was adopted by Amendment 16-2.

c/ Cowcod were assessed in the Conception area. All parameters/targets are for the Conception area, although 2004 harvest specifications and management measures are for the Conception and Monterey INPFC areas combined. A rebuilding plan for cowcod is being adopted by groundfish FMP Amendment 16-3.

d/ West coast lingcod were assessed as two stocks north (Columbia and U.S. Vancouver INPFC areas) and south (Eureka, Monterey, and Conception INPFC areas). The lingcod rebuilding plan was adopted by Amendment 16-2.

e/ Yelloweye rockfish rebuilding parameters are from the most recent rebuilding analysis (Methot and Piner 2003). A rebuilding plan for yelloweye rockfish is being adopted by groundfish FMP Amendment 16-3.

f/ According to adopted rebuilding plans or the preferred alternative in the Amendment 16-3 FEIS.

TABLE 2-3. Current rebuilding parameter/target estimates specified for overfished West Coast groundfish: slope and midwater species. (Page 1 of 2)

	Slope rockfish		Midwater species
Rebuilding Parameter/Target	**Darkblotched**[a/]	**POP**[b/]	**Widow**[c/]
T_0 (year declared overfished)	2000	1999	2001
T_{MIN} (minimum time to achieve B_{MSY} @ F = 0)	2011	2011	2026
Mean generation time	33 years	28 years	16 years
T_{MAX} (maximum time to achieve B_{MSY})	2044	2042	2042
P_{MAX} (P to achieve B_{MSY} by T_{MAX})[d/]	>90%	>70%	60%
Most recent stock assessment	Rogers 2003	Hamel *et al.* 2003	He *et al.* 2003a
Most recent rebuilding analysis	Rogers 2003	Punt *et al.* 2003	He *et al.* 2003b
B_0 (estimated unfished biomass)[d/]	30,775 mt	37,230 units of spawning output	43,580 M eggs
$B_{CURRENT}$ (current estimated biomass)	3,385 mt in 2003	10,313 units of spawning output in 2003	9,756 M eggs in 2002
% Unfished Biomass	11% in 2003	27.7% in 2003	22.4% in 2002
MSST (minimum stock size threshold = 25% of B_0)	7,694 mt	9,308 units of spawning output	10,895 M eggs
B_{MSY} (rebuilding biomass target = 40% of B_0)	12,310 mt	14,892 units of spawning output	17,432 M eggs
MFMT (maximum fishing mortality threshold = F_{MSY})	$F_{50\%}$	$F_{50\%}$	$F_{50\%}$
Harvest control rule[d/]	F = 0.032	F = 0.0257	F = 0.0093
T_{TARGET}[d/]	2030	2027	2038

TABLE 2-3. Current rebuilding parameter/target estimates specified for overfished West Coast groundfish: slope and midwater species. (Page 2 of 2)

	Slope rockfish		Midwater species
Rebuilding Parameter/Target	**Darkblotched**[a/]	**POP**[b/]	**Widow**[c/]

a/ A darkblotched rockfish rebuilding plan was adopted by Amendment 16-2. In setting 2004 harvest specifications the harvest control rule (F) was changed from 0.027 estimated in the previous rebuilding analysis (Methot and Rogers 2001) and specified in FMP Amendment 16-2 to 0.032 estimated in the recent rebuilding analysis (Rogers 2003). However, the target rebuilding year of 2030 was not revised, resulting in an increased probability of rebuilding by T_{MAX} (P_{MAX} increases from 80% to >90%). Rebuilding parameters are based on an intermediate model run.

b/ A Pacific ocean perch rebuilding plan was adopted by Amendment 16-2. In setting 2004 harvest specifications the harvest control rule (F) was changed from 0.0082 estimated in the previous rebuilding analysis (Punt and Ianelli 2001) and specified in FMP Amendment 16-2 to 0.0257 estimated in the most recent rebuilding analysis (Punt *et al.* 2003). However, the target rebuilding year of 2027 was not revised, resulting in an increased probability of rebuilding by T_{MAX} (P_{MAX} increases from 70% to >70%).

c/ The widow rockfish stock was assessed in 2003. All rebuilding parameters estimated in the most recent rebuilding analysis (He *et al.* 2003). Rebuilding spawning biomass parameters (i.e., B_0, B_{MSY}, $B_{CURRENT}$, MSST) are in millions of eggs. A rebuilding plan for coastwide widow rockfish is being adopted by groundfish FMP Amendment 16-3 scheduled for 2004.

d/ According to Council-adopted rebuilding plans or the preferred alternative in the Amendment 16-3 FEIS.

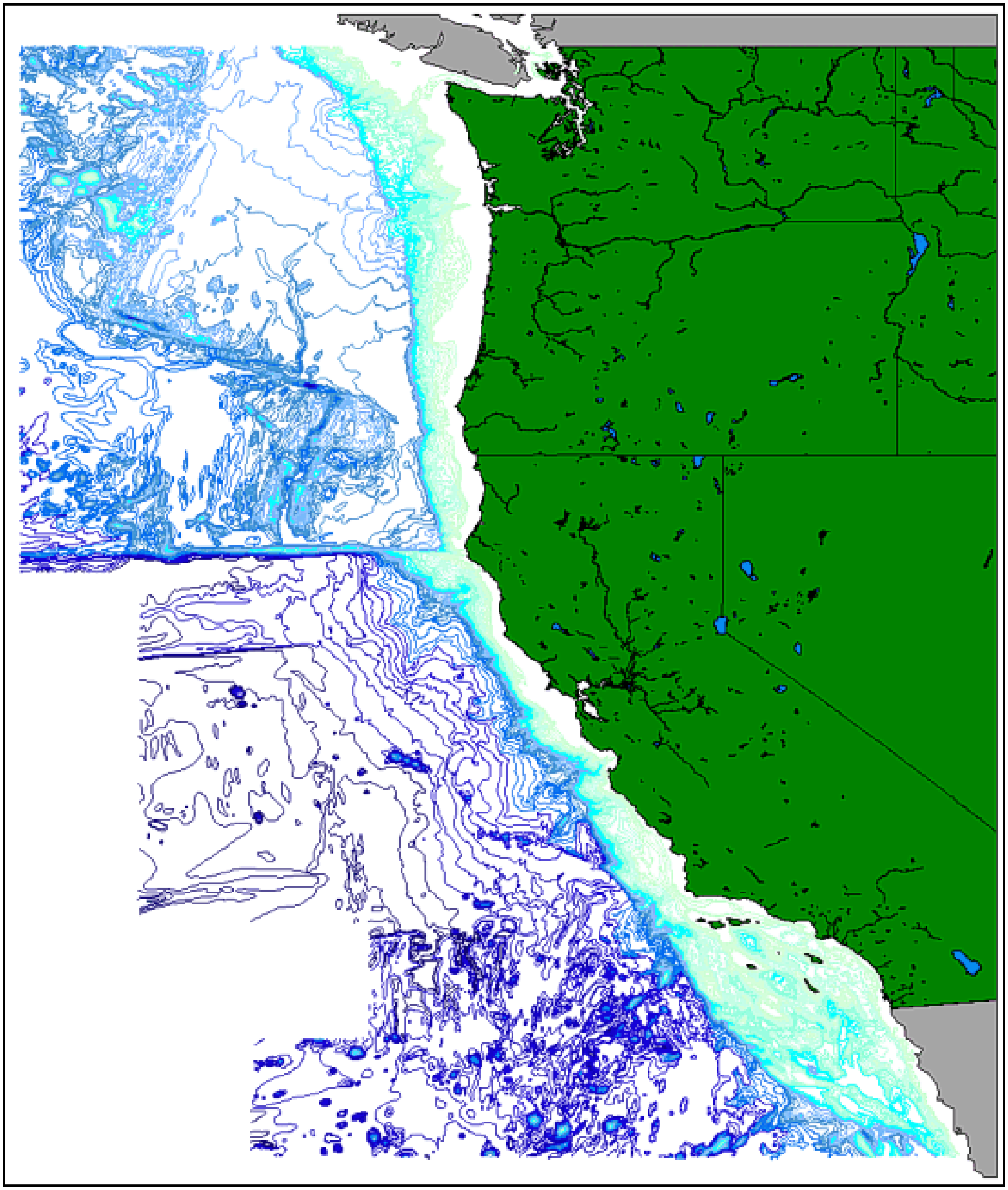

FIGURE 2-1. Bathymetry of the West Coast, 100 m contours. (Source: USGS GLORIA Imagery and Bathymetry from the U.S. EEZ off Washington, Oregon, and California.)

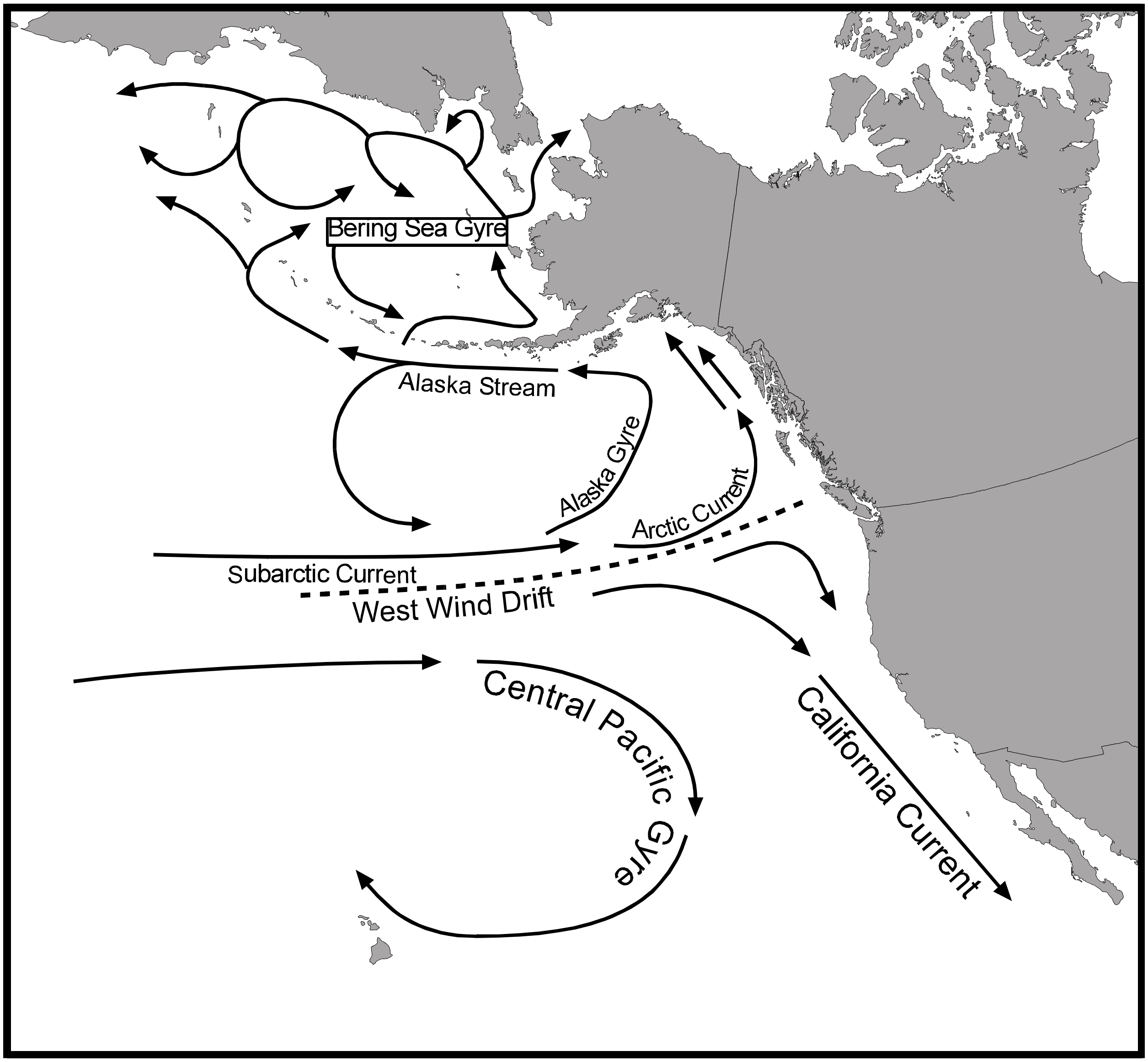

FIGURE 2-2. Surface current systems of the northeast Pacific Ocean.

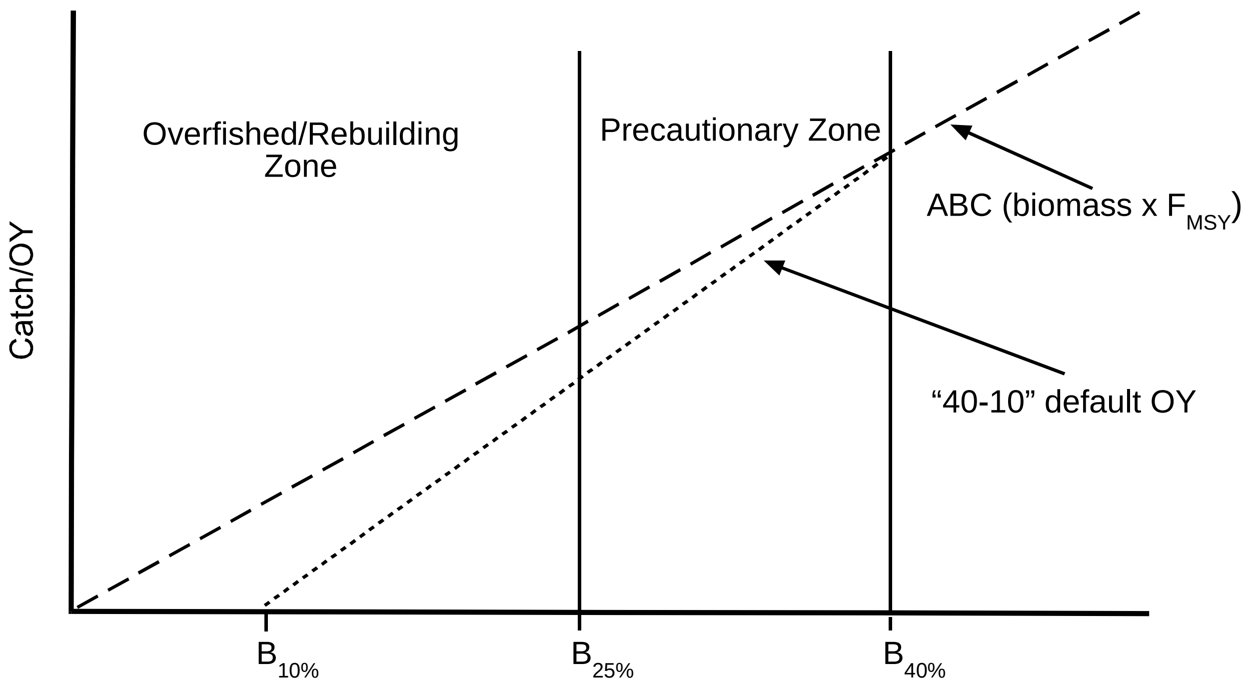

FIGURE 2-3. 40-10 Rule.

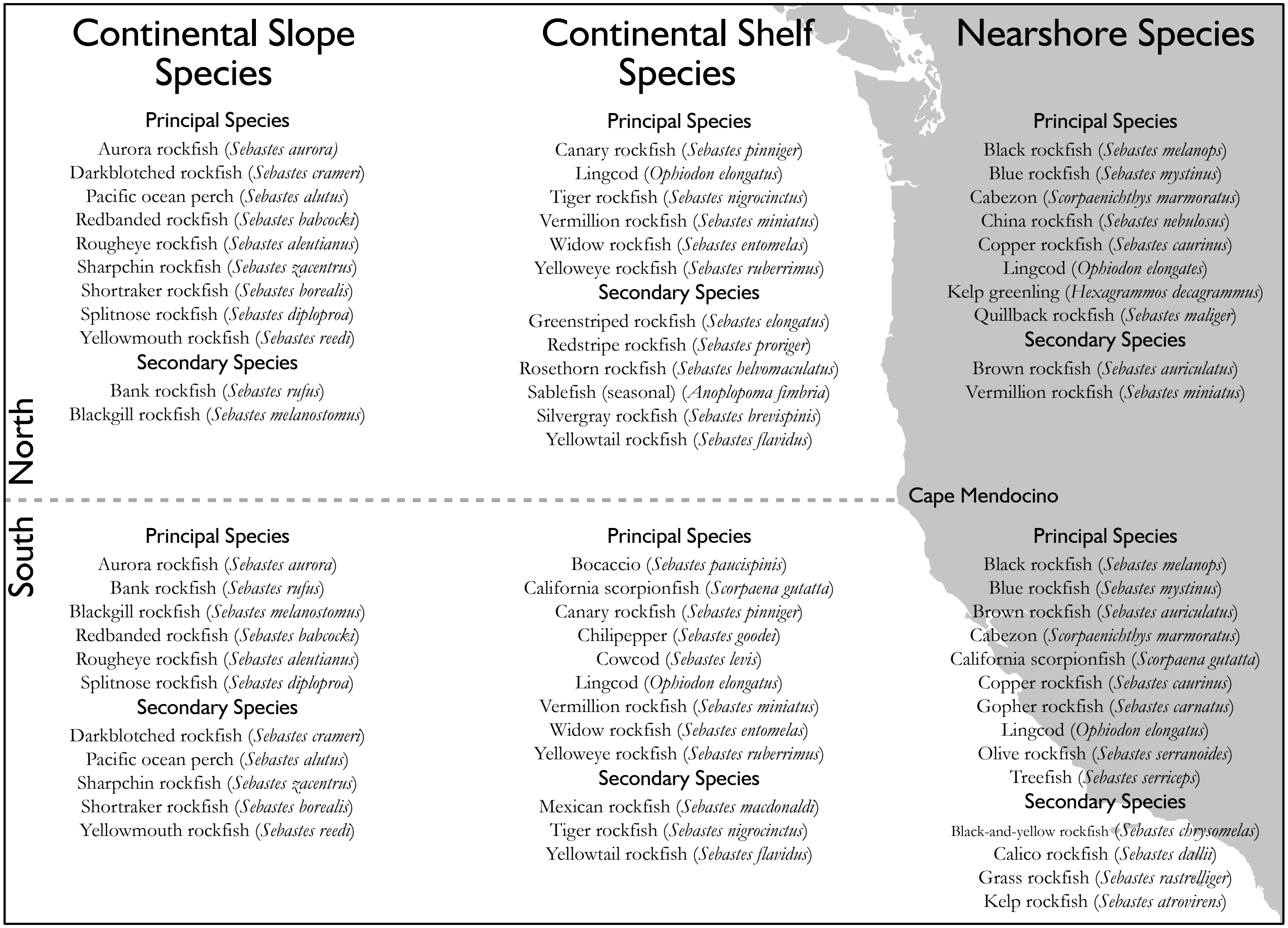

FIGURE 2-4. Geographic distribution of rockfish and allied species (lingcod, cabezon, kelp greenling, and California scorpionfish).

3.0 Other Stocks and Fisheries Potentially Affected by Groundfish Management

Nongroundfish species and fisheries targeting them often need to be considered in groundfish management for two reasons. First, they may be caught incidentally in fisheries targeting groundfish. Thus, management measures that change total fishing effort in groundfish fisheries could increase or decrease fishing mortality on incidentally-caught species. Second, those fisheries targeting nongroundfish species may be affected by management measures intended to reduce or eliminate incidental catches of overfished groundfish species in these fisheries. This section describes these species and associated fisheries. Tabular information on catches of groundfish in nongroundfish fisheries may be found in the 2004 groundfish harvest specifications FEIS (PFMC 2004).

3.1 California Halibut

California halibut (*Paralichthys californicus*) are a left-eyed flatfish of the family *Bothidae*. They range from Northern Washington at approximately the Quileute River to southern Baja California, Mexico, (Eschmeyer *et al.* 1983), but are most common south of Oregon. They are predominantly associated with sand substrates from nearshore areas just beyond the surf line to about 183 m. California halibut feed on fishes and squids and can take their prey well off the bottom.

The commercial California halibut fishery extends from Bodega Bay in northern California to San Diego in Southern California, and across the international border into Mexico. California halibut, a state-managed species, is targeted with hook-and-line, setnets and trawl gear, all of which intercept groundfish. Fishing with 4.5-inch minimum mesh size trawl nets is permitted in federal waters, but prohibited within state waters, except in the designated “California halibut trawl grounds,” where a 7.5-inch minimum mesh size must be used. These areas are also closed seasonally. Historically, commercial halibut fishers have preferred setnets, because of these restrictions. Setnets with 8.5-inch mesh and maximum length of 9,000 feet are the main gear type used in Southern California. Setnets are prohibited in certain designated areas, including a Marine Resources Protection Zone (MRPZ), covering state waters (to 3 nm) south of Point Conception and waters around the Channel Islands to 70 fm, but extending seaward no more than one mile. In comparison to trawl and setnet landings, commercial hook-and-line catches are historically insignificant. Over the last decade they have ranged from 11% to 23% of total California halibut landings. Most of those landings were made in the San Francisco Bay area by salmon fishers mooching or trolling slowly over the ocean bottom (Kramer *et al.* 2001).

3.2 California Sheephead

California sheephead (*Semicossyphus pulcher*) are a large member of the wrasse family *Labridae*. They range from Monterey Bay south to Guadalupe Island in central Baja California and the Gulf of California, in Mexico, but are uncommon north of Point Conception. They are associated with rocky bottom habitats, particularly in kelp beds to 55 m, but more commonly at depths of 3 m to 30 m.

They can live to 50 years of age and a maximum length of 91 cm (16 kg). Like some other wrasse species, California sheephead change sex starting first as a female, but changing to a male at about 30 cm in length.

3.3 Coastal Pelagic Species (CPS)

CPS are schooling fish, not associated with the ocean bottom, that migrate in coastal waters. These species include: northern anchovy (*Engraulis mordax*), Pacific sardine (*Sardinops sagax*), Pacific (chub) mackerel (Scomber japonicus), jack mackerel (*Trachurus symmetricus*), and market squid (Decapoda spp.). Until 1999, northern anchovy was managed under the Council’s Northern Anchovy FMP. Amendment 8 to the Northern

Anchovy FMP brought the remaining CPS species under federal management and renamed the FMP the Coastal Pelagic Species FMP. This FMP was implemented in December 1999.

Sardines inhabit coastal subtropical and temperate waters, and at times, have been the most abundant fish species in the California current. During times of high abundance, Pacific sardine range from the tip of Baja California, Mexico, to southeastern Alaska. When abundance is low, Pacific sardine do not occur in large quantities north of Point Conception, California. Pacific mackerel in the northeastern Pacific range from Banderas Bay, Mexico to southeastern Alaska. They are common from Monterey Bay, California to Cabo San Lucas, Baja California, and most abundant south of Point Conception, California. The central subpopulation of northern anchovy ranges from San Francisco, California to Punta Baja, Mexico. Jack mackerel are a pelagic schooling fish that range widely throughout the northeastern Pacific; however, much of their range lies outside the U.S. EEZ. Adult and juvenile market squid are distributed throughout the Alaska and California current systems, but are most abundant between Punta Eugenio, Baja California, Mexico, and Monterey Bay, Central California.

Recent (December 1999 and July 1999, respectively) stock assessments indicate Pacific sardine and Pacific mackerel are increasing in relative abundance. Pacific sardine biomass in U.S. waters was estimated to be 1,581,346 mt in 1999; Pacific mackerel biomass (in U.S. waters) was estimated to be 239,286 mt. Pacific sardine landings for the directed fisheries off California and Baja California, Mexico, reached the highest level in recent history during 1999, with a combined total of 115,051 mt harvested. In 1998 70,799 mt of Pacific mackerel were landed, representing near-record levels for the combined directed fisheries off California and Baja California. Population dynamics for market squid are poorly understood, and annual fluctuations in commercial catch vary from less than 10,000 mt to 90,000 mt. Amendment 10 to the CPS FMP describes and analyzes several approaches for estimating an MSY proxy for market squid. Amendment 10 was adopted by the Council in June 2002 and implemented by NMFS on January 27, 2003 (68 FR 3819). They are thought to have an annual mortality rate approaching 100%, which means the adult population is almost entirely new recruits and successful spawning is crucial to future years' abundance.

CPS are largely landed with round haul gear (purse seines and lampara nets); vessels using round haul gear are responsible for 99% of total CPS landings and revenues per year. These fisheries are concentrated in California, but CPS fishing also occurs in Washington and Oregon. In Washington, the sardine fishery is managed under the Emerging Commercial Fishery provisions as a trial commercial fishery. The target of the trial fishery is sardines; however, anchovy, mackerel, and squid are also landed. The fishery is limited to vessels using purse seine gear. It is also prohibited inside of three miles and logbooks are required. Eleven of the 45 permits holders participated in the fishery in 2000, landing 4,791 mt of sardines (Robinson 2000). Three vessels accounted for 88% of the landings. Of these, two fished out of Ilwaco and one out of Westport. In Oregon, the sardine fishery is managed under the Development Fishery Program under annually-issued permits, which have ranged from 15 in 1999 and 2000 to 20 in 2001. Landings, almost all by purse seine vessels, have rapidly increased in Oregon: from 776 mt in 1999 to 12,798 mt in 2001. The number of vessels increased from three to 18 during this period (McCrae 2001; McCrae 2002). The Southern California round haul fleet is the most important sector of the CPS fishery in terms of landings. This fleet is primarily based in Los Angeles Harbor, along with fewer vessels in the Monterey and Ventura areas. The fishery harvests Pacific bonito, market squid, and tunas as well as CPS. The fleet consists of about 40 active purse seiners averaging 20 m in length. Approximately one-third of the this fleet are steel-hull boats built during the last 20 years, the remainder are wooden-hulled vessels built from 1930 to 1949, during the boom of the Pacific sardine fleet. Because stock sizes of these species can radically change in response to ocean conditions, the CPS FMP takes a flexible management approach. Pacific mackerel and Pacific sardine are actively managed through annual harvest guidelines based on periodic assessments. Northern anchovy, jack mackerel, and market squid are monitored through commercial catch data. If appropriate, one third of the harvest guideline is allocated to Washington, Oregon, and northern California (north of 35°40' N latitude) and two-thirds is allocated to Southern California (south of 35°40' N latitude). An open access CPS fishery is in place north of 39° N latitude and a limited entry fishery is in place south of 39° N latitude. The Council does not set harvest guidelines for anchovy, jack mackerel, or market squid (PFMC 1998).

3.4 Dungeness Crab

The Dungeness crab (*Cancer magister*) is distributed from the Aleutian Islands, Alaska, to Monterey Bay, California. They live in bays, inlets, around estuaries, and on the continental shelf. Dungeness crab are found to a depth of about 180 m. Although it is found at times on mud and gravel, this crab is most abundant on sand bottoms; frequently it occurs among eelgrass. The Dungeness crab, which are typically harvested using traps (crab pots), ring nets, by hand (scuba divers), or dip nets are incidentally taken or harmed unintentionally by groundfish gears.

Dungeness crab are managed by the states of Oregon and California, and by the State of Washington in cooperation with Washington Coast treaty tribes, and with inter-state coordination through the Pacific States Marine Fisheries Commission. The Dungeness crab fishery is divided between treaty sectors, covering catches by Indian Tribes, and a non-treaty sector. This fishery is managed on the basis of simple "3-S" principles: sex, season, and size. Only male crabs may be retained in the commercial fishery (thus protecting the reproductive potential of the populations), the fishery has open and closed seasons, and a minimum size limit is imposed on commercial landings of male crabs (Hankin and Warner 2001). In Washington, the Dungeness crab fishery is managed under a limited entry system with two tiers of pot limits and a December 1 through September 15 season. In Oregon, 306 vessels made landings in 1999 during a season that generally starts on December 1. In California, distinct fisheries occur in Northern and Central California, with the northern fishery covering a larger area. California implemented a limited entry program in 1995, and as of March 2000 about 600 California residents and 70 non-residents had limited entry permits. Nonetheless, effort has increased with the entry of larger multipurpose vessels from other fisheries. Landings have not declined, but this effort increase has resulted in a "race for fish" with more than 80% of total landings made during the month of December (Hankin and Warner 2001).

3.5 Highly Migratory Species (HMS)

Highly migratory species (HMS) include tunas, billfish, dorado, and sharks—species that range great distances during their lifetime, extending beyond national boundaries into international waters and among the EEZs of many nations in the Pacific. In 2003, the Council adopted a Highly Migratory Species FMP to federally regulate the take of HMS within and outside the U.S. West Coast EEZ. NMFS approved the FMP, allowing implementation, on January 30, 2004. The FMP (PFMC 2003c) describes management unit species in detail; these are five tuna species, five shark species, striped marlin, swordfish, and dorado (dolphinfish). A much longer list of species, constituting all those that have been caught in HMS fisheries and not already under state or federal management, will be monitored, but are not part of the management unit.

Management of HMS is complex due to the multiple management jurisdictions, users, and gear types targeting these species. Adding to this complexity are oceanic regimes that play a major role in determining species availability and which species will be harvested off the U.S. West Coast in a given year. There are five distinctive gear types used to harvest HMS commercially, with hook-and-line gear being the oldest and most common. Other gear types used to target HMS are driftnet, pelagic longline, purse seine, and harpoon. While hook-and-line can be used to take any HMS species, traditionally it has been used to harvest tunas. The principal target species in these fisheries include albacore and other tunas, swordfish and other billfish, several shark species, and dorado. Albacore is the most important species, in terms of landings and is commonly caught with troll gear. The majority of albacore are taken by troll and jig-and-bait gear (92% in 1999), with a small portion of fish landed by gillnet, drift longline, and other gear. These gears vary in the incidence of groundfish interception depending on the area fished, time of year, as well as gear type. Overall, nearly half of the total coastwide landings of albacore, by weight, were landed in California. Other HMS gear includes pelagic longline, used to target swordfish, shark and tunas; drift gillnet gear for swordfish, tunas, and sharks off California and Oregon; purse seine gear for tuna off California and Oregon; and harpoon for swordfish off California and Oregon. Some vessels, especially longliners and purse seiners, fish outside of the U.S. EEZ, but may deliver to West Coast ports. Drift gillnet is most likely to intercept groundfish, including whiting, spiny dogfish, and yellowtail rockfish.

3.6 Ocean Whitefish

Ocean whitefish (*Caulolatilus princeps)* occur as far north as Vancouver Island in British Columbia, but are rare north of Central California. A solitary species, they inhabit rocky bottoms and are also found on soft sand and mud bottoms. Whitefish dig into the substrate for food.

3.7 Pacific Pink Shrimp

Pacific pink shrimp (*Pandalus jordani*) are found from Unalaska in the Aleutian Islands to San Diego, California, at depths of 25 fm to 200 fm (46 m to 366 m). Off the U.S. West Coast these shrimp are harvested with trawl gear from Northern Washington to Central California between 60 fm and 100 fm (110 m to 180 m). The majority of the catch is taken off the coast of Oregon. Concentrations of pink shrimp are associated with well-defined areas of green mud and muddy-sand bottoms. Shrimp trawl nets are usually constructed with net mesh sizes smaller than the net mesh sizes for legal groundfish trawl gear. Thus, it is shrimp trawlers that commonly take groundfish in association with shrimp, rather than the reverse.

Pacific shrimp fisheries are managed by the states of Washington, Oregon, and California. The pink shrimp fishery is managed by the states of Washington, Oregon, and California. The Council has no direct management authority. In 1981, the three coastal states established uniform coastwide regulations for the pink shrimp fishery. The season runs from April 1 through October 31. Pink shrimp may be taken for commercial purposes only by trawl nets or pots. Most of the pink shrimp catch is taken with trawl gear with minimum mesh size of one inch to three-eighths inch between knots. In some years the pink shrimp trawl fishery has accounted for a significant share of canary rockfish incidental catch. The Council has discussed methods to control shrimp fishing activities, such as requiring all vessels to use bycatch reduction devices (finfish excluders). In 2002, finfish excluders in the pink shrimp fisheries were mandatory in California, Oregon, and Washington. Many vessels that participate in the shrimp trawl fishery also have groundfish limited entry permits. When participating in the pink shrimp fishery, they must abide by the same rules as vessels that do not have limited entry permits. However, all groundfish landed by vessels with limited entry permits are included in the limited entry total.

3.8 Pacific Halibut

Pacific halibut (*Hippoglossus stenolepis*) belong to a family of flounders called *Pleuronectidae*. Pacific halibut can be found along the continental shelf in the North Pacific and Bering Sea. They have flat, diamond-shaped bodies and are able to migrate long distances. Most adult fish tend to remain on the same grounds year after year, making only a seasonal migrations from the more shallow feeding grounds in summer to deeper spawning grounds in winter. Halibut are usually found in deep water (40 m to 200 m).

Pacific halibut are managed by the bilateral (U.S./Canada) International Pacific Halibut Commission (IPHC) with implementing regulations set by Canada and the U.S. in their own waters. The Pacific Halibut Catch Sharing Plan for waters off Washington, Oregon, and California (Area 2A) specifies IPHC management measures for Pacific halibut on the West Coast. Implementation of IPHC catch levels and regulations is the responsibility of the Council, the states of Washington, Oregon, and California, and the Pacific halibut treaty tribes. A license from the IPHC is required to participate in the commercial Pacific halibut fishery. The commercial sector in Area 2A has both a treaty and non-treaty sector. The directed commercial fishery in Area 2A is confined to south of Point Chehalis, Washington, Oregon, and California. In the non-treaty commercial sector, 85% of the harvest is allocated to the directed halibut fishery and 15% to the salmon troll fishery to cover incidental catch. When the Area 2A total allowable catch (TAC) is above 900,000 pounds, halibut may be retained in the limited entry primary sablefish fishery north of Point Chehalis, Washington (46° 53' 18" N latitude). In 2003, the TAC was above this level, and the allocation was 70,000 pounds. Final landings for this fishery in 2003 were 65,325 pounds; 56% (47,946 pounds) of the allocation was harvested. Area 2A licenses, issued for the directed commercial fishery, have decreased from 428 in 1997 to 320 in 2001.

3.9 Ridgeback Prawn

Ridgeback prawns (*Sicyonia ingentis*) are found south of Monterey, California to Baja California, Mexico, in depths of 145 metric feet to 525 metric feet (Sunada *et al.* 2001). They are more abundant south of Point Conception and are the most common invertebrate appearing in trawls. Their preferred habitat is sand, shell and green mud substrate, and relatively sessile. Although information about their feeding habits is limited, these prawns probably are detritus feeders. In turn, they are prey for sea robins, rockfish, and lingcod. Unlike other shrimp species, which carry their eggs during maturation, ridgeback prawns release their eggs into the water column. They spawn seasonally from June to October. Surveys recorded increasing abundance of ridgeback prawns from 1982, when surveys began, to 1985; the population then declined; more recent CPUE data suggest increased abundance in the 1990s. These changes may be due to climate phenomena, particularly El Niño events.

The Ridgeback prawn fishery occurs exclusively in California, centered in the Santa Barbara Channel and off Santa Monica Bay. In 1999, 32 boats participated in the ridgeback prawn fishery. Traditionally, a number of boats fish year-round for both ridgeback and spot prawns, targeting ridgeback prawns during the closed season for spot prawns and vice versa. Most boats typically use single-rig trawl gear. The ridgeback prawn fishery is managed by the State of California and, similar to spot prawn and pink shrimp, is considered an "exempted" trawl gear in the federal open access groundfish fishery, entitling the fishery to groundfish trip limits.

Following a 1981 decline in landings, the California Fish and Game Commission adopted a June through September closure to protect spawning female and juvenile ridgeback prawns. An incidental take of 50 pounds of prawns or 15% by weight is allowed during the closed period. During the season, a maximum of 1,000 pounds of other finfish may be landed with ridgeback prawns, of which federal regulations require no more than 300 pounds per trip be groundfish. Any amount of sea cucumbers may be landed with ridgeback prawns as long as the vessel owner/operator possesses a sea cucumber permit. Other regulations include a prohibition on trawling within state waters, a minimum fishing depth of 25 fm, a minimum mesh size of 1.5 inches for single-walled codends or 3 inches for double-walled codends and a logbook requirement. Ridgeback prawn trawl logs have been required since 1986.

3.10 Sea Cucumber

Two sea cucumber species are targeted commercially: the California sea cucumber (*Parastichopus californicus*), also known as the giant red sea cucumber, and the warty sea cucumber (*P. parvimensis*) (Rogers-Bennett and Ono 2001). These species are tube-shaped Echinoderms, a phylum that also includes sea stars and sea urchins. The California sea cucumber occurs as far north as Alaska, while the warty sea cucumber is uncommon north of Point Conception and does not occur north of Monterey. Both species are found in the intertidal zone to as deep as 300 feet (the California sea cucumber). These bottom-dwelling organisms feed on detritus and small organisms found in the sand and mud. Because sea cucumbers consume bottom sediment and remove food from it, they can alter the substrate in areas where they are concentrated. They can also increase turbidity as they excrete ingested sand or mud particles. They are preyed upon by sea stars, crabs, various fishes, and sea otters. They spawn by releasing gametes into the water column, and spawning occurs simultaneously for different segments of a population. During development, they go through several planktonic larval stages, settling to the bottom two months to three months after fertilization of the egg. Little is known about the population status of these two species; and assessment is difficult, because of their patchy distribution. However, density surveys suggest abundance has declined since the late 1980s. This is not unexpected since a commercial fishery for these species began in the late 1970s and expanded substantially after 1990.

Along the West Coast, sea cucumbers are harvested by diving or trawling. They are managed by the states. The warty sea cucumber is fished almost exclusively by divers. The California sea cucumber is caught principally by trawling in Southern California, but is targeted by divers in Northern California. Only the trawl fishery for sea cucumbers lands an incidental catch of groundfish.

California implemented a permit program in 1992. In 1997 the state established separate, limited entry permits for the dive and trawl sectors. Permit rules encourage transfer to the dive sector, and this has lead to growth in this sector, which now accounts for 80% of landings. There are currently 113 sea cucumber dive permittees and 36 sea cucumber trawl permittees. Many commercial sea urchin and/or abalone divers also hold sea cucumber permits and began targeting sea cucumbers more heavily beginning in 1997. At up to $20 per pound wholesale for processed sea cucumbers, there is a strong incentive to participate in this fishery.

Sea cucumber fisheries have expanded worldwide and, on this coast, there is a dive fishery for warty sea cucumbers in Baja California, Mexico, and dive fisheries for California sea cucumbers in Washington, Oregon, Alaska, and British Columbia, Canada (Rogers-Bennett and Ono 2001). In Washington, the sea cucumber fishery only occurs inside Puget Sound and the Straight of Juan de Fuca. Most of the harvest is taken by diving, although the tribes can also trawl for sea cucumbers in these waters.

3.11 Salmon

Salmon are anadromous fish, spending a part of their life in ocean waters, but returning to freshwater rivers and streams to spawn and then die. After rearing in freshwater for up to two years (depending on species), young fish migrate to the ocean for rearing until they are ready to return to their natal rivers to spawn. Council-managed ocean salmon fisheries mainly catch chinook and coho salmon (*Oncorhynchus tshawytscha* and *O. kisutch*); pink salmon (*O. gorbuscha*) are also caught in odd-numbered years, principally off of Washington. Historical and contemporary habitat modification and degradation, primarily in and along rivers and streams that are critical to spawning and juvenile survival—along with poor ocean conditions and past high harvest rates—have led to precipitous declines in West Coast salmon populations. As a result, several salmon stocks have been listed as either threatened or endangered under the Endangered Species Act (ESA). Adult returns also fluctuate from year to year due to variability in juvenile production and survival rates. Salmon originating from hatcheries have become an important component of all West Coast fisheries. Hatcheries have been established primarily for mitigation of development (hydropower, irrigation, etc.) and for fishery augmentation.

Both chinook and coho salmon have specific life history features. Chinook show considerable life history variation. In addition to age of maturity and timing of entry to freshwater, stream-type and ocean-type races have been identified. Stream-type fish spend one to two years in freshwater as juveniles before moving to the ocean. Adults enter freshwater in spring and summer, and spawn upriver in late summer or early fall. Juvenile ocean-type fish spend a few days to several months in freshwater, but may spend a long time in estuarine areas. The timing of adult entry varies from late summer-early fall into winter months. In some river systems, chinook may enter freshwater throughout a good portion of the year. However, not all runs types are equally abundant. In Oregon and Washington, spring (March through May) and fall (August through November) chinook runs are most common; a few stocks run in summer (May through July). In California there are also late fall and winter runs (December through July) in the Sacramento River. (A late fall run has also been reported from the Eel River.) Chinook salmon mature and return to spawn between two to six years of age, although most returning fish are three to five years old. Precocious males that return to spawn early, at age two or three, are called jacks. In contrast to chinook, coho salmon have a relatively fixed residence time in fresh and salt water and mature predominantly as age 3 fish. Juveniles spend at least a year in freshwater and usually 18 months at sea before maturity. Like chinook, precocious male coho jacks return to spawn early. Although their historic range stretches south to Monterey Bay, California, most production currently occurs north of California. Most coho spawning sites are in smaller, low gradient streams and tributaries. Unlike the year round distribution of chinook runs, coho generally return to spawn in the fall. Pink salmon are caught in significant numbers in odd numbered years, such as 2003. Pink salmon spawn in areas close to salt water, and have a very short freshwater residence time as juveniles, migrating to the ocean soon after emergence. Adults return almost exclusively as 2 year olds.

The ocean commercial salmon fishery, both non-treaty and treaty, is under federal management with a suite of seasons and total allowable harvest. The Council manages fisheries in the EEZ while the states manage fisheries in their waters (zero nm to three nm). All ocean commercial salmon fisheries off the West Coast states use troll gear. Chinook and coho are the principle target species with limited pink salmon landings in odd-years. However, commercial coho landings fell precipitously in the early 1990s and remain very low. Because many wild salmon stocks have been listed under the ESA, the management regime is largely structured around so-called “no jeopardy standards” developed through the ESA-mandated consultation process. Ocean fisheries are managed according to zones reflecting the distribution of salmon stocks and are structured to allow and encourage capture of hatchery-produced stocks while depressed natural stocks are avoided. The Columbia River, on the Oregon/Washington border, the Klamath River in Southern Oregon, and the Sacramento River in Central California support the largest runs of returning salmon.

The salmon troll fishery has an incidental catch of Pacific halibut and groundfish, including yellowtail rockfish. The historical data show that trips where no halibut are landed have a higher range of groundfish landings (11-149 mt) in comparison to trips where halibut was landed (1-19 mt). However, looking at groundfish catch frequency, either by vessel or trips, reveals that groundfish are caught more often by vessels or on trips catching halibut. Small amounts of rockfish and other groundfish are taken as incidental catch in salmon troll fisheries. Although the gillnet/tangle net fishery does not technically occur in Council-managed waters, it may have some impact on groundfish that migrate through that area during part of their life cycle. To account for yellowtail rockfish landed incidentally while not promoting targeting on the species, a federal regulation was adopted in 2001 that allowed salmon trollers to land up to one pound of yellowtail per two pounds of salmon, not to exceed 300 pounds per month (north of Cape Mendocino).

3.12 Spot Prawn

Spot prawn (*Pandalus platyceros*) are the largest of the pandalid shrimp and range from Baja California, Mexico, north to the Aleutian Islands and west to the Korean Strait (Larson 2001). They inhabit rocky or hard bottoms including coral reefs, glass sponge reefs, and the edges of marine canyons. They have a patchy distribution, which may result from active habitat selection and larval transport. Spot prawn are hermaphroditic, first maturing as males at about three years of age. They enter a transition phase after mating at about four years of age when they metamorphose into females.

Spot prawn are targeted with both trawl and pot gear. Although these fisheries are state-managed, for the purposes of managing incidentally-caught groundfish, the trawl fishery is categorized in the open access sector. California has the largest and oldest trawl fishery with about 54 vessels operating from Bodega Bay south to the U.S./Mexico border. (Most vessels operate out of Monterey, Morro Bay, Santa Barbara, and Ventura, although some Washington-based vessels participate in this fishery during the fall and winter.) Standard gear is a single-rig shrimp trawl with roller gear, varying in size from eight-inch disks to 28-inch tires. Washington state phased out its trawl fishery by converting its trawl permits to pot/trap permits in 2003. In California, area and season closures for the trawl fleet were instituted in 1984 to protect spot prawns during their peak egg-bearing months of November through January. In 1994, the trawl area and season closure was expanded to include the entire Southern California Bight. As of 2003, the trawl fishery was closed. These closures, along with the development of ridgeback prawn, sea cucumber, and other fisheries, and also greater demand for fresh fish, have kept spot prawn trawl landings low and facilitated growth of the trap fishery. The trap fishery began in 1985 with a live prawn segment developing subsequently. The fleet operates from Monterey Bay, where 6 boats are based, to Southern California, where a 30 to 40 boat fleet results in higher production. In both fishing areas traps are set at depths of 600 feet to 1,000 feet along submarine canyons or along shelf breaks. Between 1985 and 1991 trapping accounted for 75% of statewide landings; trawling accounted for the remaining 25% (Larson 2001). Landings continued to increase through 1998, when they reached a historic high of 780,000 pounds. Growth in participation and a subsequent drop in landings led to the development of a limited entry program, which is still in the process of being implemented. Other recent regulations include closures, trap limits, bycatch reduction measures for the trawl fishery, and an observer program.

3.13 White Seabass and the Gillnet Complex

Since the setnet fishery for white seabass was prohibited in 1994, white seabass have been primarily targeted with driftnet gear. White seabass may also be caught with commercial hook-and-line gear in the early spring, when large seabass are available. Regulations covering white seabass have been in effect since 1931 and have included a minimum size limit, closed seasons, bag limits, and fishing gear restrictions. Such regulations are in effect today, with slight variations. An FMP for white seabass is presently being adopted, and the need for additional regulations will be considered (Vojkovich and Crooke 2001).

The gillnet complex is managed by the State of California and comprises two gear types. Fishers use setnets to target California halibut, white seabass, white croaker, swordfish, and sharks. Driftnets are used for California halibut, white croaker, and angel shark. Southeast Asian refugees (mainly Vietnamese), many of whom had fished with this gear in their home country, entered this fishery and began targeting white croaker, resulting in a shift in fishing effort from Southern California to Central California. Most of the commercial catch is sold in the fresh fish market, although a small amount is used for live bait (Moore and Wild 2001). Currently, the only restriction on catches of white croaker off California is a small no-take zone off Palos Verdes peninsula. In the early 1990s, California's set gillnet fishery was subject to increasingly restrictive state regulations addressing high marine bird and mammal bycatch mortality. This forced the fleet into deeper water where shelf rockfish became their primary target. However, as open access rockfish limits became smaller, there was a shift from targeting shelf rockfish with setnets to the use of line gear in the more lucrative nearshore live-fish fishery. Thus, many fishers that were historically setnet fishers have changed their target strategy in response to increasing restrictions and changing market value.

3.14 Miscellaneous Species

Little information is available on other nongroundfish species that are incidentally captured in the groundfish fishery. Other than those species mentioned above, documentation from the whiting fishery indicates that species such as American shad (*Alosa sapidissima*) and walleye pollock (*Theragra chalcogramma*) are taken incidentally. About 112 mt of shad and 280 mt of pollock were taken as incidental catch in the at-sea sector of the Pacific whiting fishery in 2001. American shad was also taken in the shore-based whiting fishery. Introduced in 1885, they have flourished throughout the lower Columbia River, producing a record run of 2.2 million fish in 1988 (ODFW and WDF 1989). Walleye pollock are found in the waters of the Northeastern Pacific Ocean from the Sea of Japan, north to the Sea of Okhotsk, east in the Bering Sea and Gulf of Alaska, and south in the Northwestern Pacific Ocean along the Canadian and U.S. West Coast to Carmel, California. In 2002 trawlers began targeting this species off Washington after the primary whiting fishery closed, based on reports of larger concentrations of the fish in these waters. Since this species is not managed under any of the Council's FMPs, there are no harvest levels, management measures, or observer requirements specified for this fishery.

4.0 Essential Fish Habitat

4.1 Defining Groundfish Essential Fish Habitat

The MSA, as revised by the Sustainable Fisheries Act (SFA) requires Councils to describe Essential Fish Habitat (EFH), and potential threats to EFH, in their FMPs. Federal agencies must consult with NMFS on activities that may adversely affect EFH. A source document, referred to as the EFH Appendix (because it is appended to the groundfish FMP) describes EFH for groundfish FMU species in detail, including information about each life history stage (EFH Core Team for West Coast Groundfish 1998). NMFS is currently updating this document in support of the preparation of a programmatic EIS evaluating measures to identify and classify EFH (see Section 4.5 below).

The more than 80 groundfish species in the management unit occur throughout the EEZ and occupy diverse habitats at all stages in their life histories. Some species are widely dispersed during certain life stages, particularly those with pelagic eggs and larvae; the EFH for these species/stages is correspondingly large. On the other hand, other species/stages, the adults of many nearshore rockfishes for example—which show strong affinities to a particular location or type of substrate—rely on EFH covering a comparatively small area. As a consequence of the large number of groundfish FMU species and their diverse habitat associations, when all the individual EFHs are taken together, all waters from the mean higher high water line, and the upriver extent of saltwater intrusion in river mouths, along the coasts of Washington, Oregon, and California seaward to the boundary of the U.S. EEZ become EFH.

Therefore, the FMP groups the various EFH descriptions into seven units called composite EFHs. This approach focuses on ecological relationships among species and between the species and their habitat, reflecting an ecosystem approach in defining EFH. Seven major habitat types are proposed as the basis for such assemblages or composites. These major habitat types are readily recognizable by those who potentially may be required to consult about impacts to EFH, and their distributions are relatively stationary and measurable over time and space.

The seven composite EFH identifications are as follows.

1. **Estuarine -** Those waters, substrates and associated biological communities within bays and estuaries of the coasts of Washington, Oregon, and California, seaward from the high tide line (MHHW) or extent of upriver saltwater intrusion. These areas are delineated from the U.S. Fish and Wildlife Service's National Wetlands Inventory (NWI) and supplemented from NOAA's Coastal Assessment Framework for the water portion of the Estuarine Drainage Areas for two small estuaries (Klamath River and Rogue River), the Columbia River, and San Francisco Bay. NWI defines estuaries as areas with water greater than 0.5 ppt ocean-derived salt.

2. **Rocky Shelf -** Those waters, substrates, and associated biological communities living on or within ten meters (5.5 fathoms) overlying rocky areas, including reefs, pinnacles, boulders and cobble, along the continental shelf, excluding canyons, from the high tide line (MHHW) to the shelf break (~200 meters or 109 fathoms).

3. **Non-Rocky Shelf -** Those waters, substrates, and associated biological communities living on or within ten meters (5.5 fathoms) overlying the substrates of the continental shelf, excluding the rocky shelf and canyon composites, from the high tide line (MHHW) to the shelf break (~200 meters or 109 fathoms).

4. **Canyon -** Those waters, substrates, and associated biological communities living within submarine canyons, including the walls, beds, sea floor, and any outcrops or landslide morphology, such as slump scarps and debris fields.

5. **Continental Slope/Basin -** Those waters, substrates, and biological communities living on or within 20 meters (11 fathoms) overlying the substrates of the continental slope and basin below the shelf break (~200 meters or 109 fathoms) and extending to the western boundary of the EEZ.

6. **Neritic Zone -** Those waters and biological communities living in the water column more than ten meters (5.5 fathoms) above the continental shelf.

7. **Oceanic Zone -** Those waters and biological communities living in the water column more than 20 meters (11 fathoms) above the continental slope and abyssal plain, extending to the westward boundary of the EEZ.

The EFH Appendix provides all the supporting information used for these identifications, including life history descriptions, lists of data sets and references utilized to identify EFH, and a glossary of terms. Geographic information system (GIS) maps of the distribution of species' life stages in survey and fishery data sets are included as available. For each life stage, tables of known habitat associations, life history traits, reproductive traits and EFH information levels are also provided in the EFH Appendix. The four EFH information levels are:

Level 1: Presence/absence distribution data are available for some or all portions of the geographic range of the species.
Level 2: Habitat-related densities of the species are available.
Level 3: Growth, reproduction, or survival rates within habitats are available.
Level 4: Production rates by habitat are available.

The scientific basis for the composite EFHs is rooted in the EFH identifications for individual species' life stages. When Level 1 information is available, EFH for a species' life stage is its general distribution, the geographic area of known habitat associations containing most (e.g., about 95%) of the individuals. If known, areas uncommonly utilized are excluded. Data on West Coast groundfish are not readily available to evaluate the extent of areas most commonly utilized by these species at each life stage. However, for adults of many species, Allen and Smith (1988) report the depth ranges in which about 95% of each species was taken during research surveys in the north Pacific Ocean. When such estimates are available, the EFH is identified as this percentage of its general distribution; otherwise, the general distribution corresponds to the full documented range and habitat associations of the life stage within the EEZ. Rare observations that extend a species range during anomalous environmental conditions are not considered part of its EFH. When no information about the distribution of a species' life stage is available and ancillary information is inadequate to infer its distribution, EFH is not identified for that species' life stage.

When Level 2 information is available, the alternatives of using the general distribution or known concentrations to define EFH for species' life stages may be considered. For adults of a few species, sufficient data are available to evaluate their frequencies of occurrence and densities in all or a portion of their distribution, and areas of known concentrations could be identified. Based on risk-averse and ecosystem approaches and the best scientific information available, EFH is defined as for Level 1 information, (i.e., EFH is the geographic area of known habitat associations [general distribution]), in order to maintain healthy populations and ecosystems and sustain productive fisheries.

Relying on known concentrations alone to designate EFH would not ensure that adequate areas were protected as EFH. Areas of known concentrations based on current information do not adequately address unpredictable annual differences in spatial distributions of a life stage, nor changes due to long-term shifts in oceanographic regimes. There are significant areal (primarily from 50 meters to 350 meters depth on the continental shelf) and seasonal (chiefly spring and summer) limitations on the survey information upon which descriptions of known concentrations would be primarily based, whereas the general distribution is based on the best available scientific information, as well as fishery and local knowledge of a species' life stage. Also, all habitats occupied by a species contribute to production at some level, and observed concentrations or densities do not necessarily reflect all habitat essential to maintain healthy stocks within the ecosystem. Although contributions from individual locations may be small, collectively they can account for a significant part of total production. A species' long-term productivity is based on both high and low levels of abundance and the entire distribution may be required during times of high abundance. Finally, there is no discrete or definitive basis for the distinction between known concentrations and general distribution of a species' life stage.

4.2 Groundfish Habitats

Pacific coastal waters are some of the most productive in the United States. The waters and substrate that comprise the EFH under jurisdiction of the Council are diverse, widely distributed, and closely affiliated with other aquatic and terrestrial environments. These characteristics make them susceptible to human activities.

From a broad perspective, fish habitat is the geographic area where the species occurs at any time during its life. This area can be described in terms of ecological characteristics, location, and time. Ecologically, essential habitat includes waters and substrate that focus distribution (e.g., rocky reefs, intertidal salt marshes, or submerged aquatic vegetation) and other characteristics that are less distinct (e.g., turbidity zones, salinity gradients). Spatially, habitats and their use may shift over time due to climatic change, human activities and impacts. The type of habitat available, its attributes, and its functions are important to species productivity, diversity, health, and survival. Of the seven EFH composites described above, the estuarine, rocky shelf and nonrocky shelf habitat composites are probably the most susceptible to deleterious impacts from nonfishing activities.

Estuaries are the bays and inlets influenced by both the ocean and a river and serve as the transitional zone between fresh and salt water (Botkin *et al.* 1995). Estuaries support a community of plants and animals that are adapted to the zone where fresh and salt waters mix (Zedler *et al.* 1992). Estuaries are naturally dynamic and complex, and human actions that degrade or eliminate estuarine conditions have the effect of stabilizing and simplifying this complexity (Williams *et al.* 1996), reducing their ability to function in a manner beneficial to anadromous and marine fish. Habitat degradation and loss adversely affect inshore and riverine ecosystems critical to living marine resources (Chambers 1992). In addition, the cumulative effects of small changes in many estuaries may have a large systematic impact on estuarine and coastal oceanic carrying capacity (Monaco *et al.* 1990).

Fox (1992) states: "The ability of habitats to support high productivity levels of marine resources is diminishing, while pressures for their conversion to other uses are continuing." Point and nonpoint discharges, waste dumps, eutrophication, acid rain, and other human impacts reduce this ability (Fox 1992). Population growth and demands for international business trade along the Pacific Rim exert pressure to expand coastal towns and port facilities, resulting in net estuary losses (Fawcett and Marcus 1991; Kagan 1991). Carefoot (1977), discussing Pacific seashores, states "Estuaries are complex systems which can succumb to humankind's massive and pervasive assaults."

Estuarine habitats fulfill fish and wildlife needs for reproduction, feeding, refuge, and other physiological necessities (Good 1987; Phillips 1984; Simenstad *et al.* 1991). Coastal fish populations depend upon both the quantity and quality of the available habitat (Peters and Cross. 1992). Almost all marine and intertidal waters, wetlands, swamps and marshes are critical to fish (Fedler and Crookshank 1992). For example, seagrass beds protect young fish from predators, provide habitat for fish and wildlife, improve water quality, and control sediments (Hoss and Thayer 1993; Lockwood 1990; Phillips 1984; Thayer *et al.* 1984). In addition, seagrass beds are critical to nearshore food web dynamics (Wyllie-Echeverria and Phillips 1994).

Studies have shown seagrass beds to be among the areas of highest primary productivity in the world (Herke and Rogers 1993; Hoss and Thayer 1993). This primary production, combined with other nutrients, provide high rates of secondary production in the form of fish (Emmett *et al.* 1991; Good 1987; Herke and Rogers 1993; Sogard and Able 1991).

Other estuarine habitats such as mud flats, high salt marsh, and saltmarsh creeks also provide productive shallow water habitat for epibenthic fishes and decapods (Sogard and Able 1991). Simenstad, *et al.* (1990) found that coarse sediment tidal flats were productive benthic infauna areas.

Woody debris plays a significant role in salt marsh ecology (Maser and Sedell 1994). Reductions in woody debris input to the estuaries may affect the ecological balance of the estuary. Large woody debris also play a significant role in benthic ocean ecology, where deep-sea wood borers convert the wood to fecal matter, providing terrestrial based carbon to the ocean food chain (Maser and Sedell 1994). Dams and commercial in-river harvest of large woody debris have dwindled the supply of wood, jeopardizing the ecological link between the forest and the sea (Maser and Sedell 1994).

Estuarine zone fisheries are of great economic importance across the nation (Herke and Rogers 1993). Three-fourths of the fish species caught in the United States are supported by estuarine habitats (Hinman 1992). Clams, crabs, oysters, mussels, scallops, and estuarine and nearshore small commercial fishes contributed an average dockside revenue of $389 million nationally from 1990 to 1992 (NMFS 1993). Using NMFS data, Chambers (1992) determined that 75% of all commercial fish and shellfish landings are of estuarine-dependent species. At least 31 groundfish species inhabit estuaries and nearshore kelp forests for part, or all, of their life cycle.

Of the habitats associated with the rocky shelf habitat composite, kelp forests are of primary importance. Lush kelp forest communities (e.g., giant kelp, bull kelp, elk kelp, and feather boa kelp) are found relatively close to shore along the open coast. These subtidal communities provide vertically-structured habitat through the water column on the rocky shelf, made up of a canopy of tangled stipes from the water line to a depth of 10 feet, a mid-kelp, water-column region and the bottom, holdfast region. The stands provide nurseries, feeding grounds and/or shelter to a variety of groundfish species and their prey (Ebeling *et al.* 1980; Feder *et al.* 1974). Giant kelp communities are highly productive; relative to other habitats including wetlands, shallow and deep sand bottoms and rock bottom artificial reefs, kelp habitats are substantially more productive in the fish communities they support (Bond *et al.*, 1998). Their net primary production is an important component to the energy flow within food webs. Foster and Schiel (Foster and Schiel 1985) reported that the net primary productivity of kelp beds may be the highest of any marine community. The net primary production of seaweeds in a kelp forest is available to consumers in three forms: living tissue on attached plants; drift in the form of whole plants or detached pieces; and, dissolved organic matter exuded by attached and drifting plants (Foster and Schiel 1985).

4.3 Identification of Adverse Impacts of Fishing Gear on EFH

There is little information on the effects of fishing gear on the habitat of Pacific coast groundfish, although there are numerous theories and a great deal of speculation about the effects of various fishing gears on structural habitat. The Council faces a major challenge in addressing gear effects on EFH because of this lack of information, and if the Council chooses to impose restrictions in the short term, such decisions would likely have to be based on the assumption that general information about the effects of gear in other environments is applicable to the specific case of the Pacific coast environment.

The available information on the effects of fishing gear on marine fish habitat comes from research that has been concentrated in heavily fished areas off the east coast of Canada and the United States, and in the North Sea. There are substantial differences in sea floor topography, other physical features, and biological characteristics between those regions and the West Coast of the United States. In addition, most research in those areas focused on trawl and dredge gears, with little information on the effects of non-mobile (fixed) gears. There is ongoing debate about the applicability of that research to the West Coast environment, however information from those areas will be used by the Council as appropriate. West Coast trawl adaptations, such as tire roller gear for improving gear performance in rocky areas, have only recently been explored outside of tropical habitats. Habitat protection will be considered as a tool in groundfish stock restoration.

A marine ecosystem in a "virgin" or unfished state would support a specific number and complexity of fish species. As a marine area is fished, the qualities of the ecosystem change in relation to the number of fish of each species removed from the ecosystem and the effects of fishing gear on the habitat(s) of species using that area. After a number of years of fishing, the habitat quality and nature of that marine ecosystem might be significantly different from the virgin ecosystem. Habitat modified by fishing pressure would support a different set of fish species from those supported by virgin habitat for that same area. In general, marine habitats that have been less altered by fishing and other activities are more complex in structure and more productive in lower level organisms such as worms and crustaceans than highly altered habitats. Marine habitats with greater complexity at lower trophic levels and with greater structural complexity tend to support a more complex mix of fish species in greater abundances than altered habitats. In some cases, however, activities that add nutrients to the system can increase total productivity but reduce complexity. Thus, productivity alone should not be used as a measure of environmental integrity.

It is likely there are few, if any, large virgin marine habitats off the Pacific coast. Due to the high relief, rocky nature of Pacific coast bottom habitat, however, there may be pockets of habitat that have undergone few alterations by trawl gear. High relief rock piles that are not accessible to trawl gear are usually accessible to commercial longline and recreational hook-and-line gear. Similarly, marine canyons that have not been trawled may be used by commercial longliners. The Pacific coast groundfish species mix, with a high proportion of rockfish, is evidence that there are several remaining complex habitat areas. The numerous, long-lived rockfish species have evolved to take advantage of varied rock habitats along the length of the coast. As rockfish stocks have been fished down to lower levels, there is little evidence of new increases in stocks of short-lived species that do not rely on high habitat complexity. Thus, alterations to rockfish habitat may not be accompanied by improvements in stocks that are better adapted to the altered habitat. For this reason, protection of rockfish and rockfish habitat is extremely important to long-term sustainability of the groundfish fishery.

Trawl gear, particularly doors and foot ropes, can alter marine habitat complexity. Changes to physical characteristics of the sea floor would include leveling of rock formations, re-suspending sediments, and other disturbances. These effects depend on towing speed, substrate type, strength of tides and currents, and gear configuration (Jones 1992). It has been found that otter doors tend to penetrate the substrate one cm to 30 cm; one cm on sand and rock substrates, and 30 cm in some mud substrates (Brylinsky *et al.* 1994; Jones 1992; Krost *et al.* 1990). Another factor that will cause variation in the depth of the troughs made by the otter doors is the size (weight) of the doors (i.e., the heavier the doors the deeper the trough) (Jones 1992). These benthic troughs can disappear in as little as a few hours or days in mud and sand sediments over which there is strong tide or current action (Caddy 1973; Jones 1992), or they can last much longer, from between a few months to over five years in seabeds with a mud or sandy-mud substrate at depths greater than 100 m with weak or no current flow (Brylinsky *et al.* 1994; Jones 1992; Krost *et al.* 1990). Footropes that are designed to roll over the sea floor cause little physical alteration other than smoothing the substrate and minor compression (Brylinsky *et al.* 1994; Kaiser and Spencer 1996). However, since a trawler may re-trawl the same area several times, these minor compressions can cause a "packing" of the substrate (Schwinghamer *et al.* 1996). Further compression of the substrate can occur as the net becomes full and is dragged along the bottom. Trawl gear used off the West Coast is often modified with a "roller gear" footrope, where rubber tires are packed together along the footrope, allowing the base of the net to bounce along the bottom, or to drag over obstructions without snagging the net. Development of roller gear has allowed trawlers to work in formerly inaccessible rocky areas. Research in the Gulf of Alaska on the impacts of roller gear on bottom habitat may soon provide documentation on the effects of this gear on bottom habitat (Heifetz 1997). Whatever the direct habitat impacts of roller gear may be, roller gear is effective in allowing trawlers to work in formerly inaccessible, rocky areas.

Similarly, longline gear has been seen to disturb or remove marine plants, corals, and sessile organisms. Observations of halibut longline gear made by NMFS scientists during submersible dives off Southeast Alaska provide some information:

> Setline gear often lies slack on the sea-floor and meanders considerably along the bottom. During the retrieval process the line sweeps the bottom for considerable distances before lifting off the bottom. It snags on whatever objects are in its path, including rocks and corals. Smaller rocks are upended, hard corals are broken, and soft corals appear unaffected by the passing line. Invertebrates and other light weight objects are dislodged and pass over or under the line. Fish, notably halibut, frequently moved the groundline numerous feet along the bottom and up into the water column during escape runs disturbing objects in their path. This line motion was noted for distances of 50 feet or more on either side of the hooked fish. (NPFMC 1992)

Further observations by scientist divers monitoring longline gear off Alaska noted that longlines swept the sea floor, entangling scallops and corals, bringing those animals to the surface during line retrieval (High 1998).

Although there has been no research conducted on pot gear effects on habitat along the West Coast, pot gear may damage demersal plants and animals as it settles, and longlined pots may drag through and damage bottom fauna during gear retrieval. Similarly, anchoring the pot lines or the ends of the longlines may have crushing or dragging effects. In addition to direct bottom habitat alteration, fishing gear that is lost at sea and left to "ghost fish" may cause changes to habitat. Pacific coast groundfish regulations include trap gear restrictions that require trap construction with biodegradable escape panels, so that traps will no longer ghost fish after the escape panels have degraded. Depending on the number of pots that are lost each year and where they are fished, lost pots may alter marine habitat simply by providing a different type of relief than the natural habitat.

Setnets (or gillnets) and trammel nets, which are only used in this fishery south of 38º N latitude, are also known to ghost fish. Ghost fishing gillnets have been observed entangling fish, seabirds, mammals, crabs, and other invertebrates (High 1998). Unlike trap gear, however, gillnets do not biodegrade and likely do not change the relief of marine habitat other than acting as a constant entangling force in areas where they are lost.

Beyond bottom habitat, there may also be fishing impacts to the water column. Although there are presumably few, if any, direct effects from mid-water trawling on EFH, this fishery may alter species complexity in the water column. Off the West Coast, there is a large mid-water trawl fishery for Pacific whiting north of 42º N latitude. There may be negative effects from the offal and processing slurry discard associated with these fisheries. Prolonged offal discards from some large-scale fisheries have redistributed prey food away from midwater and bottom feeding organisms to surface-feeding organisms, usually resulting in scavenger and seabird population increases (Evans *et al.* 1994; Hill and Wassenberg. 1990). Conversely, large offal discards in low-current environments, when not preyed upon by surface scavengers, can also collect and decompose on the ocean floor, creating anoxic bottom conditions. West Coast marine habitat is generally characterized by strong current and tide conditions, but there may be either undersea canyons affected by at-sea discard, or bays and estuaries affected by discard from shoreside processing plants (Stevens and Haaga 1994). As with bottom trawling off the West Coast, little is known about the environmental effects of mid-water trawling and processing discards on habitat conditions.

4.4 Adverse Impacts of Nonfishing Related Activities

This section generally describes non-fishing related activities that directly or cumulatively, and temporarily or permanently, may threaten the physical, chemical, and biological properties of groundfish EFH. The direct result of these threats is that the function of EFH may be eliminated, diminished, or disrupted. The list includes common and not so common activities that all have known or potential impacts to EFH. The list is not prioritized nor is it all-inclusive. The potential adverse effects described below, however, do not necessarily apply to the described activities in all cases, as the specific circumstances of the proposed activity or project just be carefully considered on a case-by-case basis. Furthermore, some of the activities described below may also have beneficial effects on habitat, which need to be considered in any analysis of an action's net effect.

4.4.1 Dredging

Dredging navigable waters is a continuous impact primarily to benthic habitats, but also to adjacent habitats in the construction and operation of marinas, harbors, and ports. Routine dredging—that is, the excavation of soft bottom substrates—is required to provide or create navigational access for ships and boats to docking facilities (ports and marinas). Dredging is used to create deepwater navigable channels or to maintain existing channels that periodically fill with sediments that flow into these channels from rivers or move by wind, wave, and tidal dynamics. In the process of dredging, excessive quantities and associated qualities of the sea floor are removed, disturbed, and re-suspended. Turbidity plumes may arise. Legal mandates covering dredging are the Federal Water Pollution Control Act of 1972 (33 U.S.C. 1251 et seq.) and the River and Harbor Act of 1899 (33 U.S.C. 401 et seq.).

Dredging may adversely affect infaunal and bottom-dwelling organisms at the site by removing immobile organisms such as polychaete worms and other prey types or forcing mobile animals such as fish to migrate. Benthic plants and animals present prior to a discharge are unlikely to re-colonize if the composition of the deeper layers of sediment are drastically different.

Dredging events using certain types of dredging equipment can result in greatly elevated levels of fine-grained mineral particles, usually smaller than silt, and organic particles in the water column. These turbidity plumes of suspended particulates may reduce light penetration and lower the rate of photosynthesis (e.g., in adjacent eelgrass beds) and the primary productivity of an aquatic area if suspended for extended periods of times. If suspended particulates persist, fish may suffer reduced feeding ability and sensitive habitats such as submerged aquatic vegetation beds, which provide source of food and shelter, may be damaged. The contents of the suspended material may react with the dissolved oxygen in the water and result in short-term oxygen depletion to aquatic resources. Toxic metals and organics, pathogens, and viruses absorbed or adsorbed to fine-grained particulates in the material may become biologically available to organisms either in the water column or through food chain processes.

Dredging as well as the equipment used in the process, such as pipelines may damage or destroy spawning, nursery, and other sensitive habitats, such as emergent marshes and subaquatic vegetation, including eelgrass beds and kelp beds. Dredging may also modify current patterns and water circulation in the habitat by changing the direction or velocity of water flow, water circulation, or otherwise changing the dimensions of the water body traditionally utilized by fish for food, shelter or reproductive purposes.

The following references were used in compiling this description: Collins (Collins 1995), Farnworth, *et al.* (1979), LaSalle, *et al.* (1991), and Port of Long Beach, et. al. (1990).

4.4.2 Dredge Material Disposal/Fills

The discharge of dredged materials subsequent to dredging operations or the use of fill material in the construction/development of harbors results in sediments (e.g., dirt, sand, mud) covering or smothering existing submerged substrates. Usually these covered sediments are of a soft-bottom nature as opposed to rock or hard-bottom substrates.

The disposal of dredged or fill material can result in varying degrees of change in the physical, chemical, and biological characteristics of the substrate. Discharges may adversely affect infaunal and bottom-dwelling organisms at the site by smothering immobile organisms (e.g., prey invertebrate species) or forcing mobile animals (e.g., benthic-oriented fish species) to migrate from the area. Infaunal invertebrate plants and animals present prior to a discharge are unlikely to re-colonize if the composition of the discharged material is drastically different. Erosion, slumping, or lateral displacement of surrounding bottom of such deposits can also adversely affect substrate outside the perimeter of the disposal site by changing or destroying benthic habitat. The bulk and composition of the discharged material and the location, method, and timing of discharges may all influence the degree of impact on the substrate.

The discharge of dredged or fill material can result in greatly elevated levels of fine-grained mineral particles, usually smaller than silt, and organic particles in the water column (i.e., turbidity plumes). These suspended particulates may reduce light penetration and lower the rate of photosynthesis and the primary productivity of an aquatic area if suspended for lengthy intervals. Aquatic vegetation such as eelgrass beds and kelp beds may also be affected. Groundfish and other fish species may suffer reduced feeding ability leading to limited growth and lowered resistance to disease if high levels of suspended particulates persist. The contents of the suspended material may react with the dissolved oxygen in the water and result in oxygen depletion. Toxic metals and organics, pathogens, and viruses absorbed or adsorbed to fine-grained particulates in the material may become biologically available to organisms either in the water column or through food chain processes.

The discharge of dredged or fill material can change the chemistry and the physical characteristics of the receiving water at the disposal site by introducing chemical constituents in suspended or dissolved form. Reduced clarity and excessive contaminants can reduce, change or eliminate the suitability of water bodies for populations of groundfish, other fish species and their prey. The introduction of nutrients or organic material to the water column as a result of the discharge can lead to a high biochemical oxygen demand (BOD), which in turn can lead to reduced dissolved oxygen, thereby potentially affecting the survival of many aquatic organisms. Increases in nutrients can favor one group of organisms such as polychaetes or algae to the detriment of other types.

The discharge of dredged or fill material can modify current patterns and water circulation by obstructing flow, changing the direction or velocity of water flow, changing the direction or velocity of water flow and circulation, or otherwise changing the dimensions of a water body. As a result, adverse changes can occur in the location, structure, and dynamics of aquatic communities; shoreline and substrate erosion and deposition rates; the deposition of suspended particulates; the rate and extent of mixing of dissolved and suspended components of the water body; and water stratification.

Disposal events may lead to the full or partial loss of habitat functions due to extent of the burial at the site. Loss of habitat function can be temporary or permanent.

The following references were used in compiling this description: Peddicord and Herbich (1979) and NOAA (1991).

4.4.3 Oil/Gas Exploration/Production

Offshore exploration and production of natural gas and oil reserves have been and will continue to be important aspects of the U. S. economy as demand for energy resources grows. Oil exploration/production occurs in varying water depths and usually over soft-bottom substrates, although hard-bottom habitats may be present in the general vicinity. Oil exploration/production areas are vulnerable to an assortment of physical, chemical, and biological disturbances resulting from activities used to locate oil and gas deposits such as high energy seismic surveys and physical disruption resulting from the use and/or installation of anchors, chains, drilling templates, dredging, pipes, platform legs and biofouling communities associated with the platform jacket. During actual operations, the predominant emissions from oil platforms are drilling muds and cuttings, produced water, and sanitary wastes.

The impacts of oil exploration-related seismic energy release may cause fish to disperse from the acoustic pulse with possible disruption to their feeding patterns. The uses of these high energy sound sources may also disrupt or damage marine life. While available data on fish species does limit concerns regarding potential effects on marine life to sensitive egg and larval stages within a few meters of the sound source, whether this data pertains to all groundfish species is questioned.

Adjacent hard-bottom habitats can be severely impacted by anchoring operations during exploratory operations resulting in the crushing, removal or burial of substrate used for feeding or shelter purposes. Disturbances to the associated epifaunal communities may also result.

The discharge of exploratory drill muds and cuttings can result in varying degrees of change on the sea floor and affect the feeding, nursery, and shelter habitat for various life stages of groundfish and shellfish species that are important to commercial and recreational fishers. Drilling muds and cuttings may adversely affect bottom-dwelling organisms (e.g, prey) at the site by burial of immobile forms or forcing mobile forms to migrate. Exploratory activities may also result in resuspension of fine-grained mineral particles, usually smaller than silt in the water column. These suspended particulates may reduce light penetration and lower the rate of photosynthesis and thus primary productivity especially if suspended for lengthy intervals. Groundfish and other fish species may suffer reduced feeding ability leading to limited growth if high levels of suspended particulates persist. The contents of the suspended material may react with the dissolved oxygen in the water and result in oxygen depletion.

Benthic forms, especially prey species, present prior to the oil/gas operations may be unlikely to re-colonize if the composition of the substrate is altered drastically. This may be especially true during actual oil/gas production operations when filter-feeding organisms such as mussel colonies may periodically become dislodged from the oil platform and form biological debris mounds on the bottom. This alteration to the sea floor may affect naturally occurring feeding opportunities and spawning habitat.

The discharge of oil drilling muds can change the chemistry and physical characteristics of the receiving water at the disposal site by introducing toxic chemical constituents. Changes in the clarity and the addition of contaminants can reduce or eliminate the suitability of water bodies for habituation of fish species and their prey.

The following references were used in compiling this description: Battelle Ocean Sciences (1988), Coats (1994) Hyland, *et al.* (1994), MEC Analytical Systems (1995).

4.4.4 Water Intake Structures

The withdrawal of ocean water by offshore water intakes structures is a common coastwide occurrence. Water may be withdrawn to provide sources of cooling water for coastal power generating stations or as a source of potential drinking water as in the case of desalinization plants. If not properly designed, these structures may create unnatural and vulnerable conditions to various fish life stages and their prey. In addition, freshwater withdrawals from riverine systems to support industrial and agricultural operations also occurs.

The withdrawal of seawater can create unnatural conditions to the EFH of many species. Various life stages can be affected by water intake operations, such as entrapment through water withdrawal, impingement on intake screens, and entrainment through the heat exchange systems or discharge plumes of both heated and cooled effluent.

High approach velocities along with unscreened intake structures can create an unnatural current, making it difficult for fish species and their prey to escape. These structures may withdraw most larval and post-larval marine fishery organisms, and some proportion of more advanced life stages. Periods of low light (e.g, turbid waters, nocturnal periods) may also entrap adult and subadult species, many of which are caught by commercial or recreational fishers or serve as the prey of these species. Freshwater withdrawal also reduces the volume and perhaps timing of freshwater reaching estuarine environments, thereby potentially altering circulation patterns, salinity, and the upstream migration of the saltwater wedge.

The following reference was used in compiling this description: Helvey (1985)

4.4.5 Aquaculture

The culture of estuarine, marine, and freshwater species in coastal areas can reduce or degrade habitats used by native stocks. The location and operation of these facilities will determine the level of impact on the marine environment.

Aquaculture operations may discharge organic waste and/or antibiotics from the farms into the marine environment. Wastes are composed primarily of feces and excess feed and the buildup of waste products into the receiving waters will depend on water depths and circulation patterns. The release of these wastes may introduce nutrients or organic materials into the surrounding water body and lead to a high BOD, which may reduce dissolved oxygen, thereby potentially affecting the survival of many aquatic organisms in the area. Nutrient overloads at the discharge site can also favor one group of organisms to the detriment of other, more desirable prey types such as polychaete worms.

In the case of cage mariculture operations, cultured organisms may escape into the environment. Such operations may also impact the sea floor below the cages or pens. The composition and diversity of the bottom-dwelling community (e.g., prey organisms) due to the build-up of organic materials on the sea floor may be impacted. Growth of submerged aquatic vegetation, which may provide shelter and nursery habitat for a number of fish species and their prey, may be inhibited by shading effects.

The following reference was used in compiling this description: Water Management Branch (1990)

4.4.6 Wastewater Discharge

The discharge of wastewater from commercial activities, including municipal wastewater treatment plants, power generating stations, industrial plants (e.g., pulp mills, desalination plants), and storm water from drains into open ocean waters, bay, or estuarine waters can introduce chemical constituents or salinities potentially detrimental to estuarine and marine habitats. These constituents include pathogens, nutrients, sediments, heavy metals, oxygen demanding substances, hydrocarbons, and toxics. Historically, wastewater discharges have been one of the largest sources of contaminants into coastal waters. However, whereas wastewater discharges have been regulated under increasingly more stringent requirements over the last 25 years, non-point source/stormwater runoff has not been regulated to the same degree and continues to be a significant remaining source of pollution to the coastal areas and ocean. Changes in community structure and function, and health and abundance may result due to these discharges. Many of these changes can be long lasting.

Wastewater effluent and non-point source/stormwater discharges may affect the growth and condition of groundfish, other species of fish, and prey species if high contaminant levels are discharged (e.g., chlorinated hydrocarbons, trace metals, polynuclear aromatic hydrocarbons, pesticides, and herbicides). If contaminants are present, their effects may be manifested by absorption across the gills or through bioaccumulation as a result of consuming contaminated prey. Outfall sediments may alter the composition and abundance of benthic community invertebrates living in or on the sediments. Due to bioturbation, diffusion, and other upward transport mechanisms that move buried contaminants to the surface layers and eventually to the water column, pelagic and nektonic biota may also be exposed.

The use of biocides (e.g., chlorine, heat treatments) to prevent biofouling or the discharge of brine as a byproduct of desalinization can reduce or eliminate the suitability of water bodies for fish species and their prey in the general vicinity of the discharge pipe. The impacts of chlorination and heat treatments, if any, are minimized due to their intermittent use and regulation pursuant to state and/or federal National Pollutant Discharge Elimination System (NPDES) permit requirements. These compounds may change the chemistry and the physical characteristics of the receiving water at the disposal site by introducing chemical constituents in suspended or dissolved form. In addition to chemical and thermal effects, discharge sites may also create adverse impacts to sensitive areas, such as emergent marshes, sea grasses, and kelp beds, if located improperly.

Extreme discharge velocities of the effluent may also cause scouring at the discharge point as well as entrain particulates and thereby create turbidity plumes. These turbidity plumes may reduce light penetration and lower the rate of photosynthesis (e.g., in adjacent eelgrass beds or kelp beds) and the primary productivity of an aquatic area if suspension persists. Groundfish and other fish may suffer reduced feeding ability, especially if suspended particulates persist. The contents of the suspended material may react with the dissolved oxygen in the water and result in oxygen depletion.

Mass emissions of suspended solids, contaminants and nutrient overloading from these outfalls may also affect submerged aquatic vegetation sites, including eelgrass beds and kelp beds. These beds are frequently utilized by groundfish and other fish species for shelter and protection from predators and for food by consuming organisms associated with these beds.

The byproduct of desalinated seawater is brine, which has a salinity about double that of seawater. The waste brine may be discharged directly to the ocean or discharged through sewage outfalls (where it may be diluted). Because this technology is fairly new, little is known about the toxicity of waste brine, but its potential impacts to early life stages of fish and their prey should be considered .

Storm water runoff, which can include both urban and agricultural runoff, is also a large source of particular contaminants to the marine environment affecting both water column and benthic habitats. These contaminants may find their way into the food web through benthic infaunal communities and subsequently bioaccumulate in numerous fish species.

The following references were used in compiling this description: Bay and Greenstien (1994), USEPA (1995), Ferraro, *et al.* (1991), Leonard (1994), Stull and Haydock (1989), USEPA (1993), Raco-Rands (1996).

4.4.7 Discharge of Oil or Release of Hazardous Substances

Accidental spills of oil or the release of a hazardous substance into estuarine and marine habitats can create significant pollution events. These inadvertent releases occur during the production, transportation, refining and use of hazardous materials from both facilities and vessels.

Exposure to petroleum products and hazardous substances from spills or other unauthorized releases can have both acute and chronic effects on groundfish, other fish species, and prey organisms, and also potentially reduce the marketability of target species. Direct physical contact with discharged oil or released hazardous substances (e.g., toxics such as oil dispersants and mercury) or indirect exposure resulting from food chain processes can produce a number of biological responses in fish resources and their prey. Exposure can occur in a variety of habitats, including the water column, sea floor, bays, and estuaries. Depending on the biological pathway involved, these biological responses may include death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions (including malfunctions in reproduction), or physical deformations of fish that are important to commercial and recreational fishers.

Other issues related to the category include efforts to cleanup spills or releases that in themselves can create serious harm to the habitat. For example, the use of potentially toxic dispersants to break up an oil spill may adversely effect the egg and larval stages of most groundfish species.

The following references were used in compiling this description: Armstrong, *et al.* (1995), Sowby (1998), SCCWRP (1992).

4.4.8 Fish Enhancement Structures

Construction of fish enhancement structures, commonly called artificial reefs, is a popular management tool employed by state and federal governments and private groups. These structures have been used for centuries to enhance fishery resources and fishing opportunities and usually entail placing miscellaneous materials in ocean or estuarine environments void of physical or “hard-bottom” relief. While scientists still debate whether reefs attract and/or produce fish biomass, the proliferation of artificial reefs continues. This popularity results from increased demands on fish stocks by both commercial and recreational fishermen and losses of habitat productivity due to development and pollution. However, the introduction of artificial reef material into the marine or estuarine environment can also produce negative impacts.

The use of artificial reefs can adversely impact the aquatic environment in at least two ways. First, habitat upon which the reef material is placed is lost. Usually, reef materials are set upon flat, relatively barren sandy sea floor; such placement may bury or smother faunal and bottom-dwelling organisms at the site or even prevent mobile forms (e.g., benthic-oriented fish species) from using the area. This effect has been shown in Hawaii. The second potential adverse impact results from use of inappropriate materials, such as automobile tires or compressed incinerator ash, which may degrade the marine habitat degradation. For example, automobile tires may release toxic substances into the marine environment and may cause physical damage to existing habitat if they break free of their anchoring systems.

The following references were used in compiling this description: Buckley (1989), Livingston (1994), McGurrin, *et al.* (1989), Nelson, *et al.* (1994), Polovina (1989).

4.4.9 Coastal Development Impacts

Coastal development involves changes in land use by the construction of urban, suburban, commercial, and industrial centers and the corresponding infrastructure. Vegetated areas are removed by cut-and-fill activities for enhancing the development potential of the land. Portions of the natural landscape are converted to impervious surfaces resulting in increased runoff volumes. Runoff from these developments may include heavy metals, sediments, nutrients, and organics, including synthetic and petroleum hydrocarbons, yard trimmings, litter, debris, and pet droppings. As residential, commercial and industrial growth continues, the demand for water escalates. As groundwater resources become depleted or contaminated, greater demands are placed on surface water through dam and reservoir construction or other methods of freshwater diversion. The consumptive use and redistribution of significant volumes of surface freshwater causes reduced river flows that can affect salinity regimes as saline waters intrude further upstream.

Development activities within watersheds and in coastal marine areas often impact groundfish habitat and other fish species on both long-term and short-term scales. Toxic runoff from development sites reduces the quality and quantity of suitable fish habitat by the introduction of pesticides, fertilizers, petrochemicals, and construction chemicals (e.g., concrete products, seals and paints). Sediment runoff can also restrict tidal flows resulting in losses of important fauna and flora (e.g., submerged aquatic vegetation). Shoreline stabilization projects that affect reflective wave energy can impede or accelerate natural movements of sand, thereby harming intertidal and sub-tidal habitats. Wetlands serve an important function for exporting nutrients and energy, as well as serving as fish nursery areas, and loss or reduction of this function results from both reduction of geographic size and by input material exceeding processing capacity. Reduced freshwater flow into estuaries and wetlands can reduce productivity and habitat quality for fish by impacting the extent and location of the mixing or entrapment zone.

The following references were used in compiling this description: Baird (1996), Drinkwater and Frank (1994), McLusky, *et al.* (1992), Paul, *et al.* (Paul *et al.* 1992), Rozengurt, *et al.* (Rozengurt *et al.* 1994), Turek, *et al.* (1987), USEPA (1993).

4.4.10 Introduction of Exotic Species

Over the past two decades, there has been an increase in introductions of exotic species into marine habitats. Introductions can be intentional (e.g., for the purpose of stock or pest control) or unintentional (e.g., fouling organisms).

Exotic species introductions create five types of negative impacts: (1) habitat alteration, (2) trophic alteration; (3) gene pool alteration, (4) spatial alteration, and (5) introduction of diseases. Habitat alteration includes the excessive colonization of exotic species (e.g., San Diego bivalve and *Spartina* grass), which preclude endemic organisms (e.g., eelgrass). The introduction of exotic species may alter community structure by predation on native species (e.g., Japanese oyster drill, Chinese mitten crab, *Tilapia,* Oriental goby, striped bass) or by population explosions of the introduced species (e.g., Asian clam, green crab). Spatial alteration occurs when territorial introduced species compete with and displace native species. Although hybridization is rare, gene pool deterioration may occur between native and introduced species. One of the most severe threats to a native fish community is the introduction of bacteria, viruses, and parasites that reduce the quality of the habitat.

The following reference was used in compiling this description: Kohler and Courtenay (1986).

4.4.11 Agricultural Practices

Agricultural operations can result in the introduction of fertilizers, herbicides, insecticides, and other chemicals into the aquatic environment from the uncontrolled nonpoint source runoff draining agricultural lands. Additionally, agricultural runoff transports animal wastes and sediments into riverine, estuarine, and marine environments. Excessive uncontrolled or improper irrigation practices often exacerbate contaminant flushing.

The introduction of fertilizers, herbicides, insecticides, animal wastes, and other chemicals into the aquatic environment, especially estuaries, can affect the growth of aquatic plants, which in turn affects groundfish and other fish, invertebrates and the general ecological balance of the water body. Pollutants associated with these products include oxygen demanding substances; nutrients such as nitrogen and phosphorous, organic solids, microorganisms like bacteria and viruses, and salts. These pollutants and wastes may make habitat unsuitable for shelter, feeding, spawning; and if conditions are extreme, they result in fish kills.

The following reference was used in compiling this description: USEPA (1993).

4.4.12 Large Woody Debris Removal

Natural events (e.g., storms) and timber practices create situations where fallen trees end up in river systems and eventually work their way into estuaries and coastal waters. This timber or woody debris play a significant role in salt marsh ecology.

for a variety of reasons—including dam operations, aesthetics and commercial use of the wood—woody debris are often removed before reaching estuarine and coastal waters. Reductions in woody debris inputs to estuarine and coastal ecosystems may affect the ecological balance. For example, large woody debris play a significant role in benthic ocean ecology, where deep-sea wood borers convert the wood to fecal matter, supplying carbon from terrestrial sources to the ocean food chain. The dwindling supply of wood may jeopardize the ecological link between the forest and the sea.

The following reference was used in compiling this description: Maser and Sedell (1994).

4.4.13 Kelp Harvesting

The giant kelp forest canopy serves as a nursery, feeding grounds, and/or shelter for a variety of groundfish species and their prey. In addition, when kelp plants are naturally broken free of their holdfasts, the kelp is carried by waves and currents along the bottom to deep-water habitats and in surface waters to beaches and rocky intertidal areas. Kelp detritus supports high secondary production and prey for many fishes.

The commercial harvest of giant kelp forests has been a thriving industry in California since 1910. Harvesting is undertaken by ships designed specifically for cutting the surface canopy no lower than 1.2 m below the surface in a strip eight meters wide, much like a lawn mower. Regulations are imposed by the State of California to ensure that harvesting activities have a minimal impact on kelp forests. Kelp canopies cut according to this regulation generally grow back within several weeks to a few months.

Kelp harvesting can have a variety of possible impacts on kelp forests and nearshore communities. For example, giant kelp is a source of food for other marine communities, and unregulated harvest of kelp can potentially remove a substantial portion of this source. The kelp canopy also serves as habitat for canopy-dwelling invertebrates and has may have an enhancing effect on fish recruitment and abundance; these functions can be severely impeded by unregulated harvesting operations. Removal of the canopy can displace fish such as young-of-the-year rockfishes. Extensive or permanent loss of kelp canopy could have adverse impacts on local fish recruitment and abundance.

The following references were used in compiling this description: California Department of Fish and Game (1995), Cross and Allen (1993), Feder, *et al.* (1974), Foster and Schiel (1985), and Vetter (1995).

4.5 Current Efforts to Identify and Conserve EFH

NMFS is currently preparing an EIS 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)). This EIS is gathering more information about the effects of fishing in order to evaluate alternatives to minimize fishing effects on EFH to the extent practicable, as required by the MSA. A predictive risk assessment model is being developed for this project (MRAG Americas Inc. and TerraLogic GIS Inc. 2003), which will be used to develop alternatives for the designation and protection of EFH. In addition to any direct outcome of this EIS, such as establishing additional protection measures for EFH, it may be possible to adapt the assessment model to predict the effects of other actions, such as setting harvest specifications. The DEIS is scheduled for release in February 2005, and the EIS process will be completed (by signing of the Record of Decision) in February 2006.

5.0 Protected Species

Protected species fall under three overlapping categories, reflecting four mandates: the Endangered Species Act of 1973 (ESA), the Marine Mammal Protection Act of 1972 (MMPA), the Migratory Bird Treaty Act (MBTA), and EO 13186. These mandates, and the species thus protected, are described below.

5.1 ESA-listed Species

The ESA protects species in danger of extinction throughout all or a significant part of their range and mandates the conservation of the ecosystems on which they depend. "Species" is defined by the Act to mean a species, a subspecies, or—for vertebrates only—a distinct population. Under the ESA, a species is listed as endangered if it is in danger of extinction throughout a significant portion of its range and threatened if it is likely to become an endangered species within the foreseeable future throughout all, or a significant part, of its range.

5.1.1 Salmon

Salmon caught in West Coast fisheries have life cycle ranges that include coastal streams and river systems from Central California to Alaska and marine waters along the U.S. and Canada seaward into the north central Pacific Ocean, including Canadian territorial waters and the high seas. Some of the more critical portions of these ranges are the freshwater spawning grounds and migration routes.

Chinook, or king salmon (*Oncorhynchus tshawytscha*), and coho, or silver salmon (*O. kisutch*), are the main species caught in Council-managed ocean salmon fisheries. In odd-numbered years, catches of pink salmon (*O. gorbuscha*) can also be significant, primarily off Washington and Oregon. NMFS issues a Biological Opinion for fisheries with a potential interaction with protected salmon species listed under the ESA (Table 5-1), specifying the allowable take given ESA conservation constraints. Additional information on Council-managed salmon fisheries and affected stocks may be found in the most recent environmental assessment for the ocean salmon fishery, prepared each April by the Council (available upon request from Council offices).

Salmon are caught incidentally in both the at-sea and shore-based segments of the whiting fishery. This bycatch is closely monitored through an at-sea observer program and dockside sorting of shore deliveries. A salmon bycatch reduction plan has also been implemented in this fishery. Because several chinook salmon runs are listed under the ESA, bycatch of chinook salmon is a concern in the at-sea whiting fishery. In 2002, the catcher-processor fleet caught 970 chinook for a bycatch rate of 0.0235 chinook per metric ton of whiting, the non-tribal mothership fleet caught 709 chinook for a bycatch rate of 0.0269 , and the tribal whiting fishery caught 1,018 chinook for a bycatch rate of 0.467 (NMFS 2003a). Vessels supplying fish to shore-based processors caught 1,062 chinook for a bycatch rate of .023 (NMFS 2003d). Table 5-2 provides the equivalent data for the years 1999-2001. It can be seen that bycatch rates both fluctuate year-to-year and differ among sectors.

The estimated coastwide bycatch of chinook in the whiting fishery, including the shore-based component, has averaged 7,067 annually since 1991. Limits on chinook bycatch in the whiting fishery were established as result of the September 27, 1993, Biological Opinion (BO) issued pursuant to the ESA. This opinion established the bycatch rate of 0.05 chinook salmon/mt of whiting with an 11,000 fish threshold for the entire whiting fishery (at-sea and shore-base sectors combined). Re-initiation of the BO is required if both the bycatch rate and bycatch limit are exceeded (NMFS 2003c). Table 5-3 shows the incidental annual catch of chinook salmon for all sectors of the whiting fleet combined (at-sea and shore-based), from 1991 to 2001. Values in bold indicate years in which the threshold established in the biological opinion was exceeded.

5.1.2 Sea Turtles

Sea turtles are highly migratory, and four of the six species found in U.S. waters have been sighted off the West Coast. These are loggerhead *(Caretta caretta*), green (*Chelonia mydas),* leatherback (*Dermochelys coriacea*), and olive ridley (*Lepidochelys olivacea*) sea turtles. Little is known about the interactions between sea turtles and West Coast fisheries. Directed fishing for sea turtles in West Coast groundfish fisheries is prohibited because of their ESA listings; however, incidental take of sea turtles by longline or trawl gear may occur. (Green, leatherback, and olive ridely sea turtles are listed as endangered; loggerheads are listed as threatened.) The management and conservation of sea turtles is shared between NMFS and the U.S. Fish and Wildlife Service (FWS).

The following species descriptions are taken from Appendix A to the groundfish bycatch mitigation draft programmatic EIS (DPEIS) (NMFS 2004b).

5.1.2.1 Loggerhead Sea Turtle

Loggerhead sea turtles (*Caretta caretta)* are widespread, inhabiting shallower continental areas in the subtropical and temperate waters (Eckert 1993; MMS 1992). Their population is estimated at about 300,000 (NMFS and USFWS 1998c; Pitman 1990) and with peak abundance summer and fall off southern California (NMFS and USFWS 1998c). The loggerhead turtle is listed as a threatened species throughout its range under the ESA.

Juvenile and subadult loggerheads are omnivorous, foraging on pelagic crabs, molluscs, jellyfish, and vegetation captured at or near the surface. The maximum recorded diving depth for a loggerhead is 233 meters (Eckert 1993).

The primary fishery threats to the loggerheads in the Pacific are longline and gillnet fisheries (NMFS and USFWS 1998c).

5.1.2.2 Green Sea Turtle

Green sea turtles *(Chelonia mydas)* are a cosmopolitan, highly migratory species, nesting mainly in tropical and subtropical regions. Green turtles have been declining throughout the Pacific Ocean, probably due to overexploitation and habitat loss (Eckert 1993) and are listed as threatened, except for breeding populations found in Florida and the Pacific coast of Mexico, which are listed as endangered.

The maximum recorded dive depth for an adult green turtle was 110 meters, while subadults routinely dive 20 m for 9 to 23 minutes, with a maximum recorded dive of 66 minutes (Eckert 1993). It is presumed that drift lines or surface current convergences are preferential zones due to increased densities of likely food items.

The primary green turtle nesting grounds in the eastern Pacific are located in Michoacán, Mexico, and the Galapagos Islands, Ecuador. More than 165,000 turtles were harvested from 1965 to 1977 in the Mexican Pacific. The nesting population at the two main nesting beaches in Michoacán decreased from 5,585 females in 1982 to 940 in 1984 (NMFS and USFWS 1998b).

5.1.2.3 Leatherback Sea Turtle

Leatherback sea turtles *(Dermochelys coriacea)* are distributed in most open ocean waters and range into higher latitudes than other sea turtles, as far north as Alaska (NMFS and USFWS 1998a), possibly associated with El Niño events. Leatherbacks are commonly sighted near Monterey Bay, mainly in August (Starbird *et al.* 1993). The leatherback turtle is listed as an endangered species under the ESA throughout its range.

Leatherbacks are the largest of the sea turtles, possibly to maintain warmer body temperature over longer time periods. Prey include jellyfish, siphonophores, and tunicates (Eckert 1993). Leatherbacks are reported diving to depths exceeding 1000 m (Lutz and Musick 1997).

Primary threats to leatherbacks in the Pacific are the killing of nesting females and eggs at the nesting beaches and the incidental take in coastal and high seas fisheries (NMFS and USFWS 1998a).

5.1.2.4 Olive Ridley Sea turtle

Olive Ridley sea turtles *(Lepidochelys olivacea)* are the most abundant sea turtle in the Pacific basin. However, although these turtles remain relatively widespread and abundant, most nest sites support only small or moderate-scale nesting, and most populations are known or thought to be depleted. The olive ridley populations on the Pacific coast of Mexico are listed as endangered; all other populations are listed as threatened.

This sea turtle species appears to forage throughout the eastern tropical Pacific Ocean, often in large groups, or flotillas. Occasionally they are found entangled in scraps of net or other floating debris. Despite its abundance, there are surprisingly few data relating to the feeding habits of the olive ridley. However, those reports that do exist suggest that the diet in the western Atlantic and eastern Pacific includes crabs, shrimp, rock lobsters, jellyfish, and tunicates. In some parts of the world, it has been reported that the principal food is algae. Although they are generally thought to be surface feeders, olive ridleys have been caught in trawls at depths of 80 to 110 m (NMFS and USFWS 1998d).

5.2 Marine Mammals

The waters off Washington, Oregon, and California support a wide variety of marine mammals. Approximately 30 species, including seals and sea lions, sea otters, whales, dolphins, and porpoise, occur within the EEZ. Many marine mammal species seasonally migrate through West Coast waters, while others are year-round residents. Table 5-4 lists marine mammal species occurring off the West Coast.

5.2.1 Regulatory Status of Marine Mammals

In addition to the ESA, the federal MMPA guides marine mammal species protection and conservation policy. Under the MMPA, on the West Coast NMFS is responsible for the management of cetaceans and pinnipeds, while the FWS manages sea otters. Stock assessment reports review new information every year for strategic stocks and every three years for non-strategic stocks. (Strategic stocks are those whose human-caused mortality and injury exceeds the potential biological removal [PBR].) Marine mammals, whose abundance falls below the optimum sustainable population (OSP), are listed as “depleted” according to the MMPA.

Fisheries that interact with species listed as depleted, threatened, or endangered (Table 5-4) may be subject to management restrictions under the MMPA and ESA. NMFS publishes an annual list of fisheries in the *Federal Register* separating commercial fisheries into one of three categories based on the level of serious injury and mortality of marine mammals occurring incidentally in that fishery. The categorization of a fishery in the list of fisheries determines whether participants are subject to certain provisions of the MMPA, such as registration, observer coverage, and take reduction plan requirements. West Coast groundfish fisheries are in Category III, denoting a remote likelihood of, or no known, serious injuries or mortalities to marine mammals.

5.2.2 Species Descriptions

The following species descriptions are taken from Appendix A to the groundfish bycatch mitigation DPEIS (NMFS 2004b). Those descriptions are drawn from the most recent Stock Assessment Reports (SAR) prepared by NMFS as required by the MMPA.

5.2.2.1 California Sea Lion

California sea lions *(Zalophus californianus)* range from British Columbia south to Tres Marias Islands off Mexico. Breeding grounds are mainly on offshore islands from the Channel Islands south into Mexico. Breeding takes place in June and early July within a few days after the females give birth. NMFS conducts annual pup censuses at established rookeries (Lowry 1999) and uses a correction factor to obtain a total estimated population of 214,000 sea lions (Carretta *et al.* 2001). The stock appears to be increasing at about 6.2% per year while fishery mortality also is increasing (Lowry *et al.* 1992). California sea lions are not endangered or threatened under the Endangered Species Act (ESA) nor depleted under the MMPA. This stock is also not listed as a strategic under the MMPA and total human-caused mortality (1,352 sea lions) is less than the 6,591 sea lions allowed under the Potential Biological Removal formula (Carretta *et al.* 2001).

During the summer breeding season, most adults are present near rookeries principally located on the southern California Channel Islands and Año Nuevo Island near Monterey Bay. Males migrate northward in the fall, going as far north as Alaska and returning to their rookeries in the spring. Adult females generally do not migrate far away from rookery areas. Juveniles remain near rookery areas or move into waters off central California. Diet studies indicate that California sea lions feed on squid, octopus, and a variety of fishes: anchovies, sardine, mackerel, herring, rockfish, hake, and salmon (Antonelis *et al.* 1984; Lowry *et al.* 1990; NMFS 1997).

Incidental mortalities of California sea lions have been documented in set and drift gillnet fisheries (Carretta *et al.* 2001; Hanan *et al.* 1993). Skippers' logs and at-sea observations have shown that California sea lions have been incidentally killed in Washington, Oregon, and California groundfish trawls and during Washington, Oregon, and California commercial passenger fishing vessel fishing activities (Carretta *et al.* 2001).

5.2.2.2 Harbor Seal

Harbor seals *(Phoca vitulina richardsi*) inhabit nearshore and estuarine areas ranging from Baja California, Mexico, to the Pribilof Islands, Alaska. MMPA stock assessment reports recognize six stocks along the U.S. west coast: California, Oregon/ Washington outer coastal waters, Washington inland waters, and three stocks in Alaska coastal and inland waters (Carretta *et al.* 2001). Using the latest complete aerial survey (Hanan 1996) and appropriate corrections for counting bias, Carretta, *et al.* (2001) estimates the California stock at 30,293 seals, the Oregon/ Washington Coast stock at 26,180 seals, and the Washington inland-water stock at 16,056 seals. These estimates combine for a West Coast total of 72,529 seals. The population appears to be growing and fishery mortality is declining. Harbor seals are not endangered or threatened under the ESA nor depleted under the MMPA. This stock is also not listed as a strategic under the MMPA and total human-caused mortality (666 seals) is less than the 1,678 harbor seals allowed under the Potential Biological Removal formula (Carretta *et al.* 2001).

Harbor seals do not migrate extensively, but have been documented to move along the coast between feeding and breeding locations (Brown 1988; Herder 1986; Jeffries 1985). The harbor seal diet includes herring, flounder, sculpin, cephalopods, whelks, shrimp, and amphipods (Bigg 1981; NMFS 1997).

Combining mortality estimates from California set net, northern Washington marine set gillnet, and groundfish trawl results in an estimated mean mortality rate in observed groundfish fisheries of 667 harbor seals per year along Washington, Oregon, and California (Carretta *et al.* 2001).

5.2.2.3 Northern Elephant Seal

Northern elephant seals *(Mirounga angustirostris*) range from Mexico to the Gulf of Alaska. Breeding and whelping occurs in California and Baja California, during winter and early spring (Stewart and Huber 1993) on islands and recently at some mainland sites. Stewart *et al*. (1994) estimated the population at 127,000 elephant seals in the U.S. and Mexico during 1991. The population is growing and fishery mortality may be declining, and the number of pups born may be leveling off in California during the last five years (Carretta *et al.* 2001). Northern elephant seals are not endangered or threatened under the ESA nor depleted under the MMPA. This stock is also not listed as a strategic under the MMPA and total human-caused mortality (33 seals) is less than the 2,142 elephant seals allowed under the Potential Biological Removal formula (Carretta *et al.* 2001).

Northern elephant seals are polygynous breeders with males forming harems and defending them against other mature males in spectacular battles on the beach. Female give birth in December and January, mate about three weeks later, after which the pups are weaned (Reeves *et al.* 2002). They were hunted for their oil to near extinction and the current population is composed of the descendants of a few hundred seals that survived off Mexico (Stewart *et al.* 1994). They feed mainly at night in very deep water, consuming whiting, hake, skates, rays, sharks, cephalopods, shrimp, euphasiids, and pelagic red crab (Antonelis *et al.* 1987). Males feed in waters off Alaska, and females off Oregon and California (Le Boeuf *et al.* 1993; Stewart and Huber 1993).

There are no recent estimated incidental kills of Northern elephant seals in groundfish fisheries along Washington, Oregon, and California; however, they have been caught in setnet fisheries (Carretta *et al.* 2001).

5.2.2.4 Guadalupe Fur Seal

The historical distribution and abundance of the Guadalupe fur seal *(Arctocephalus townsendi)* are uncertain because commercial sealers and other observers failed to distinguish between this species and northern fur seals. However, the species likely ranged from Islas Revillagigedo, Mexico (18° N) to Point Conception, California (34° N latitude) and possibly as far north as the Farallon Islands, California (37° N). At the present time, this species ranges from Cedros Island, Mexico, to the northern Channel Islands. Remains have been found in Indian trash middens throughout the southern California bight and individual seals frequent Channel Island sea lion colonies (Stewart *et al.* 1987). This species was once thought to be extinct; however, Gallo (1994) estimated a total of about 7,408 animals in 1993, and a growth rate of about 13.7% per year (Carretta *et al.* 2001). Guadalupe fur seals are protected under Mexican law (Guadalupe Island is a marine sanctuary), the U.S. MMPA (depleted and strategic), the U.S. ESA (threatened), the California Fish and Game Code (fully protected), and the California Fish and Game Commission (threatened).

In 1892, only seven of these seals could be found; they were presumed extinct until 1926, when a group of 60 animals was discovered on Isla de Guadalupe, Mexico (Hubbs and Wick 1951). Although the primary breeding colony is on Guadalupe Island, Mexico, a pup was born at San Miguel Island, California (Melin and DeLong 1999). Males defend territories during May through July and mate with the females approximately one week after the birth of single pups. Guadalupe fur seals are reported to feed on fish including hake, rockfish, and cephalopods (Fleischer 1987) and probably require about 10% of their own body weight in fish per day.

There have been no U.S. reports of mortalities or injuries for Guadalupe fur seals (Cameron and Forney 1999; Julian 1997; Julian and Beeson 1998), although there have been reports of stranded animals with net abrasions and imbedded fish hooks (Hanni *et al.* 1997).

5.2.2.5 Northern Fur Seal

Northern fur seals *(Callorhinus ursinus)* range in the eastern north Pacific Ocean, from southern California to the Bering Sea. Two separate stocks of northern fur seals are recognized within U.S. waters: an Eastern Pacific stock and a San Miguel Island stock. Nearly hunted to extinction for its fur, the San Miguel Island stock is estimated at 4,336 seals (Carretta *et al.* 2001) and the Eastern Pacific stock at 941,756 seals (Angliss and Lodge 2002). The San Miguel Island stock is not endangered or threatened under the ESA nor depleted under the MMPA. This stock is also not listed as a strategic under the MMPA and total human-caused mortality (zero seals) is less than the 100 fur seals allowed under the Potential Biological Removal formula (Carretta *et al.* 2001). "The Eastern Pacific stock is classified as strategic because it is designated as depleted under the MMPA" (Angliss and Lodge 2002).

Prior to harvesting, northen fur seal populations were mainly located on the Pribilof Islands of Alaska, and were estimated at two million animals. Northern fur seals were harvested commercially from the 1700s to 1984. San Miguel Island is the only place in California where northern fur seals breed and pup. Offshore, they dive to depths of 20 to 130 m, usually at night, to feed opportunistically on pollock, herring, lantern fish, cod, rockfish, squid, loons, and petrels (Fiscus 1978; Gentry 1981; Kajimura 1984; Kooyman *et al.* 1976).

Fur seals are a pelagic species spending many months at sea migrating throughout the eastern North Pacific Ocean including off Oregon and California (Roppel 1984). There were no reported mortalities of northern fur seals in any observed fishery along the west coast of the continental U.S. during the period 1994-1998 (Carretta *et al.* 2001), although there were incidental mortalities in trawl and gillnet fisheries off Alaska (Angliss and Lodge 2002).

5.2.2.6 Northern or Steller Sea Lion

The northern or Steller sea lion *(Eumetopias jubatus*) ranges along the North Pacific Ocean from Japan to California (Loughlin *et al.* 1984). Two stocks are designated in U.S. waters with the eastern stock extending from Cape Suckling, Alaska to southern California (Loughlin 1997) with a total of 6,555 animals off Washington, Oregon and California. The eastern stock of Steller sea lion has a threatened listing under the ESA, depleted under the MMPA, and therefore is classified as a strategic stock (Angliss and Lodge 2002).

They do not make large migrations, but disperse after the breeding season (late May-early July), feeding on rockfish, sculpin, capelin, flatfish, squid, octopus, shrimp, crabs, and northern fur seals (Fiscus and Baines 1966).

Eastern stock Steller sea lions were observed taken incidentally in West Coast groundfish trawls and marine set gillnet fisheries (Angliss and Lodge 2002). Total estimated mortalities of this stock (44) is less than the 1,396 Steller sea lions allowed under the Potential Biological Removal formula (Angliss and Lodge 2002).

5.2.2.7 Southern Sea Otter

Southern sea otters *(Enhydra lutris nereis*) range along the mainland coast from Half Moon Bay, San Mateo County south to Gaviota, Santa Barbara County; an experimental population currently exists at San Nicolas Island, Ventura County (VanBlaricom and Ames 2001). Prior to the harvest that drove the population to near extinction, sea otters ranged from Oregon to Punta Abreojos, Baja California, Mexico (Wilson *et al.* 1991).

The 2002 spring survey of 2,139 California sea otters reflects an overall decrease of 1.0% from the 2001 spring survey of 2,161 individuals, according to scientists at the U.S. Geological Survey. Observers recorded 1,846 independents in 2002 (adults and subadults), down 0.9% from the 2001 count of 1,863 independents; 293 pups were counted in 2002, down by 1.7% from the 2001 count of 298 pups (USGS 2002). The U.S. Fish and Wildlife Service declared the southern sea otter a threatened species in 1977 under the ESA and therefore the stock is also designated as depleted under the MMPA (VanBlaricom and Ames 2001).

Harvest for their fur reduced the sea otter population to very few animals and presumed extinction until California Department of Fish and Game biologists and wardens discovered a remnant group near Point Sur. In 1914, the total California population was estimated to be about 50 animals (CDFG 1976). Sea otters eat large-bodied bottom dwelling invertebrates such as sea urchins, crabs, clams, mussels, abalone, other shellfish, as well as market squid. Otters can dive up to 320 feet to forage (VanBlaricom and Ames 2001).

During the 1970s and 1980s considerable numbers of sea otters were observed caught in gill and trammel entangling nets in central California. This was projected as a significant source of mortality for the stock until gillnets were prohibited within their feeding range. During 1982 to 1984 an average of 80 sea otters were estimated to drown in gill and trammel nets (Wendell *et al.* 1986). More recent mortality data (Pattison *et al.* 1997) suggest similar patterns during a period of increasing trap and pot fishing for groundfish and crabs (Estes *et al.* In Press). This elevated mortality appears to be the main reason for both sluggish population growth and periods of decline in the California sea otter population (Estes *et al.* In Press).

5.2.2.8 Sea Otter

Sea otters *(Enhydra lutris kenyoni*, Washington stock) range from Pillar Point south to Destruction Island. In an effort to return the extirpated sea otters to Washington state waters, otters were transplanted from Amchitka Island, Alaska in 1969 and 1970; 59 otters were introduced (Jameson *et al.* 1982). The experiment worked, sea otter numbers increased, and they are re-occupying former range (Richardson and Allen 2000). The highest count for the 2001 survey was 555 sea otters, an increase of 10% from 2000 (USGS 2002). The rate of increase for this population since 1989 is about 8.8%. The Washington sea otter has no formal Federal listing under ESA or MMPA but is designated as endangered by the State of Washington.

Sea otters eat bottom dwelling invertebrates such as sea urchins, crabs, sea cucumbers, clams, mussels, abalone, and other shellfish, as well as market squid. Otters can dive up to 320 feet to forage (VanBlaricom and Ames 2001).

Gillnet and trammel net entanglements were a significant source of mortality for southern sea otters (Wendell *et al.* 1986) and some sea otters were taken incidentally in setnets off Washington (Kajimura 1990). Evidence from California and Alaska suggests that incidental take of sea otter in crab pots and tribal set-net fisheries may also occur. Sea otters are also quite vulnerable to oil spills due to oiled fur interfering with thermoregulation, ingested oil disintegrating the intestinal track, and inhaled fumes eroding the lungs (Richardson and Allen 2000).

5.2.2.9 Harbor Porpoise

Harbor porpoises *(Phocoena phocoena*) are small and inconspicuous. They range in nearshore waters from Point Conception, California, into Alaska and do not make large scale migrations (Gaskin 1984). Harbor porpoise in California are split into two separate stocks based on fisheries interactions: the central California stock, Point Conception to the Russian River, and the northern California stock in the remainder of northen California (Barlow and Hanan 1995). Oregon and Washington harbor porpoise are combined into a coastal stock and an inland Washington stock is also designated for inland waterways. The most recent abundance estimates, based on aerial surveys are 7,579 in central California, 15,198 in northern California, 44, 644 in Oregon/Washington coastal, and 3,509 in inland Washington. There are no clear trends in abundance for these stocks (Carretta *et al.* 2001). Harbor porpoise are not listed as threatened or endangered under the ESA nor as depleted under the MMPA. "The average annual mortality for 1996-99 (80 harbor porpoise) is greater than the calculated PBR (56) for central California harbor porpoise; therefore, the central California harbor porpoise population is strategic under the MMPA" (Carretta *et al.* 2001).

Although usually found in nearshore waters, "distinct seasonal changes in abundance along the west coast have been noted, and attributed to possible shifts in distribution to deeper offshore waters during late winter" (Barlow 1988; Carretta *et al.* 2001; Dohl *et al.* 1983). The harbor porpoise diet is mainly composed of cephalopods and fishes, and they prefer schooling non-spiny fishes, such as herrings, mackerels, and sardines (Reeves *et al.* 2002).

Harbor porpoise are very susceptible to incidental capture and mortalities in setnet fisheries (Julian and Beeson 1998). Off Oregon and Washington, fishery mortalities of harbor porpoise have been recorded in the northern Washington marine set and drift gillnet fisheries (Carretta *et al.* 2001).

5.2.2.10 Dall's Porpoise

Dall's porpoises *(Phocoenoides dalli*) are common in shelf, slope and offshore waters in the north eastern Pacific Ocean down to southern California (Morejohn 1979). As a deep-water oceanic porpoise, they are often sighted nearshore over deep-water canyons. These porpoise are abundant and widely distributed, with at least 50,000 off California, Oregon, and Washington; however, because of their habit of approaching vessels at sea, it may be difficult to obtain an unbiased estimate of abundance (Reeves *et al.* 2002). They are not endangered or threatened under the ESA nor depleted under the MMPA. This stock is also not listed as strategic under the MMPA and total human-caused mortality (12) is less than the 737 porpoise allowed under the Potential Biological Removal formula (Carretta *et al.* 2001).

Dall's porpoise calf between spring and fall after a 10 to 11 month gestation period (Reeves *et al.* 2002). Carretta, *et al*. (2001) observe that "north-south movement between California, Oregon and Washington occurs as oceanographic conditions change, both on seasonal and inter-annual time scales." Dall's porpoise feed on squid, crustaceans, and many kinds of fish including jack mackerel (Leatherwood *et al.* 1982; Scheffer 1953).

There is a harpoon fishery for Dall's porpoise in Japan where large numbers are killed (Reeves *et al.* 2002). Observers document that Dall's porpoise have been caught in the California, Oregon, and Washington domestic groundfish trawl fisheries (Perez and Loughlin 1991) but the estimated annual take is less than two porpoise per year.

5.2.2.11 Pacific White-Sided Dolphin

Pacific white-sided dolphins *(Lagenorhynchus obliquidens*) are abundant, gregarious and found in the cold temperate waters of the North Pacific Ocean. Along the west coast of north America they are rarely observed south of Baja California, Mexico. Aerial surveys have exceeded 100,000 white-sided dolphins over the California continental shelf and slope waters (Reeves *et al.* 2002). These dolphins are not endangered or threatened under the ESA nor depleted under the MMPA. The stock is not listed as strategic under the MMPA and total human-caused mortality (seven) is less than the 157 dolphins allowed under the Potential Biological Removal formula (Carretta *et al.* 2001).

Little is known of their reproductive biology, although a 29 year old pregnant female is reported, indicating a relatively long reproductive span (Reeves *et al.* 2002). White-sided dolphins inhabit California waters during winter months moving northward into Oregon and Washington during spring and summer (Green *et al.* 1992). Shifts in abundance likely represent changes in prey abundance or migration of prey species. They are opportunistic feeders and often work collectively to concentrate and feed small schooling fish, including anchovies, hakes, herrings, sardines, and octopus.

Observers have documented mortalities in the California, Oregon, and Washington groundfish trawl fisheries for whiting (Perez and Loughlin 1991). The total estimated kill of white-sided dolphins in these fisheries averages less than one dolphin per year (Carretta *et al.* 2001).

5.2.2.12 Risso's Dolphin

Risso's dolphins (*Grampus griseus*) have world-wide distribution in warm-temperate waters of the upper continental slope in waters depths averaging 1,000 feet. They commonly move into shallow areas in pursuit of squid (Reeves *et al.* 2002). Reeves *et al*. (2002) also report up to 30,000 Risso's dolphins off the U.S. west coast. They are not endangered or threatened under the ESA nor depleted under the MMPA. The stock is not listed as strategic under the MMPA and total human-caused mortality (six) is less than the 105 dolphins allowed under the Potential Biological Removal formula (Carretta *et al.* 2001).

The reproductive biology of this species is not well known. Risso's dolphins feed at night on fish, octopus and squid, but they concentrate on squid. They are usually observed in groups of 10-40 animals and may form loose aggregations of 100 to 200 animals (Reeves *et al.* 2002). It has been speculated that changes in ecological conditions and an El Niño event off southern California may have resulted in this species filling a niche previously occupied by pilot whales (Reeves *et al.* 2002).

There have been no recent Risso's dolphin moralities in west coast groundfish fisheries (Carretta *et al.* 2001), although Reeves *et al*. (2002) report that Risso's are a bycatch in some longline and trawl fisheries.

5.2.2.13 Short-Beaked Common Dolphin

Short-beaked common dolphins *(Delphinus delphis)* commonly inhabit tropical and warm temperate oceans. Their distribution along the U.S. west coast extends from southern California to Chile and westward to 135° W longitude (Reeves *et al.* 2002). "The 1991-96 weighted average abundance estimate for California, Oregon and Washington waters based on the three ship surveys is 373,573 short-beaked common dolphins" (Barlow 1997; Carretta *et al.* 2001). They are not endangered or threatened under the ESA nor depleted under the MMPA. The stock is not listed as strategic under the MMPA and total human-caused mortality (79) is less than the 3,188 dolphins allowed under the Potential Biological Removal formula (Carretta *et al.* 2001).

Reproductive activity is non-seasonal in tropical waters calving peaks in spring and summer in more temperate waters (Reeves *et al.* 2002). Short-beaked common dolphins feed nearshore on squid, octopus, and schooling fish like anchovies, hake, lantern fish, deep-sea smelt or herring. These dolphins are often seen in very large schools of hundreds or thousands and are active bow riders.

Common dolphin mortality has been estimated for set gillnets in California (Julian and Beeson 1998); however, the two species (short-beaked and long-beaked) were not reported separately. Reeves *et al*. (2002) relate that short-beaked common dolphins are also a bycatch in some trawl fisheries.

5.2.2.14 Long-Beaked Common Dolphin

Long-beaked common dolphins *(Delphinus capensis)* were recognized as a distinct species in 1994 (Heyning and Perrin 1994; Rosel *et al.* 1995). Their distribution overlaps with the short-beaked common dolphin, although they are more typically observed in nearshore waters. "The 1991-96 weighted average abundance estimate for California, Oregon and Washington waters based on the three ship surveys is 32,239 long-beaked common dolphins" (Barlow 1997; Carretta *et al.* 2001). They are not endangered or threatened under the ESA nor depleted under the MMPA. The stock is not listed as strategic under the MMPA and total human-caused mortality (14) is less than the 250 dolphins allowed under the Potential Biological Removal formula (Carretta *et al.* 2001).

Reproductive activity is similar to short-beaked: non-seasonal in tropical waters spring and summer peaks in more temperate waters (Reeves *et al.* 2002). Long-beaked common dolphins feed nearshore on squid, octopus, and schooling fish like anchovies or herring. They are also active bow riders and break the water surface frequently when swimming in groups averaging 200 animals.

Common dolphin mortality has been estimated for set gillnets in California (Julian and Beeson 1998); however, short-beaked and long-beaked dolphin mortalities were not reported separately. Reeves *et al.* (Reeves *et al.* 2002) relate that long-beaked common dolphins are also a bycatch in some trawl fisheries.

5.2.2.15 Short-Finned Pilot Whale

Short-finned pilot whales *(Globicephala macrorhynchus*) favor a tropical and warm temperate distribution and are considered abundant (Reeves *et al.* 2002). They were common to Southern California, especially the isthmus of Santa Catalina Island during the winter (Dohl *et al.* 1980). However, following the 1982-83 El Niño they have been rarely observed (Barlow 1997). "The 1991-96 weighted average abundance estimate for California, Oregon and Washington waters based on three ship surveys is 970 short-finned pilot whales" (Barlow 1997; Carretta *et al.* 2001). They are not endangered or threatened under the ESA nor depleted under the MMPA. The stock is not listed as strategic under the MMPA and total human-caused mortality (three) is less than the six short-finned pilot whales allowed under the Potential Biological Removal formula (Carretta *et al.* 2001).

They form social groups of 15- 50 individuals often traveling in long lines two to three animals wide. A typical sex ratio is one mature male to eight mature females; mating occurs in August through January with a 15 month gestation period (Reeves *et al.* 2002).

Short-finned pilot whales feed somewhat exclusively on market squid, *Loligo opalescens,* and were believed by fishermen to significantly compete with squid purse seine operations off Southern California. There were many records and observations of short-finned pilot whale shootings by fishermen (Heyning and Perrin 1994; Miller *et al.* 1983). Although the squid fishery has become the largest fishery in California since 1992 (Vojkovich 1998), coinciding with reduced short-finned pilot whales numbers, there have been no recent reports of mortalities in this fishery (Carretta *et al.* 2001).

5.2.2.16 Gray Whale

The gray whale *(Eschrichtius robustus*) is represented as the Eastern Pacific stock along the west coast of North America. Currently, the population is estimated at about 26,000 whales (Reeves *et al.* 2002) with rates of increase just above two percent (Angliss and Lodge 2002). They are not endangered or threatened under the ESA nor depleted under the MMPA. The stock is not listed as strategic under the MMPA and total human-caused mortality (48) is less than the 432 gray whales allowed under the Potential Biological Removal formula (Angliss and Lodge 2002).

Gray whales breed as they migrate through warmer waters; gestation lasts 12 to 13 months with females calving every 2 to 3 years (Reeves *et al.* 2002). At 5,000 miles, their migration from summer feeding grounds in the waters of Alaska to calving areas in bays and estuaries of Baja California, Mexico, is one of the longest for any mammal. The Eastern North Pacific stock feeds by filtering from the bottom sediments small, bottom-dwelling amphipods, crustaceans, and polychaete worms off Alaska during summer months (Rice and Wolman 1971).

The Eastern Pacific gray whale stock was removed from the ESA List of Endangered and Threatened Wildlife in 1994. They have been an incidental catch in set net fisheries, but there have been no recent takes in groundfish fisheries (Angliss and Lodge 2002).

5.2.2.17 Minke Whale

Minke whales *(Balaenoptera acutorostrata*) are one of the most widely distributed of baleen whales, ranging from South America to Alaska. For management, NMFS recognizes a California, Oregon, and Washington stock within the EEZ. "The number of minke whales is estimated as 631 (CV = 0.45) based on ship surveys in 1991, 1993, and 1996 off California and in 1996 off Oregon and Washington" (Barlow 1997; Carretta *et al.* 2001). They are not endangered or threatened under the ESA nor depleted under the MMPA. The stock is not listed as strategic under the MMPA and total human-caused mortality (zero) is less than the four minke whales allowed under the Potential Biological Removal formula (Carretta *et al.* 2001).

Little is known of their reproductive biology; presumably they calve in winter in tropical waters after about a ten-month gestation (Reeves *et al.* 2002). They are the smallest of the rorqual whales and only the pygmy right whale is smaller. Some migrate as far north as the ice edge in summer. The diet of Minke whales consists of plankton, krill, and small fish, including schools of sardines, anchovies and herring.

They have occasionally been caught in coastal gillnets off California (Hanan *et al.* 1993), in salmon drift gillnet in Puget Sound, Washington, and in drift gillnets off California and Oregon (Carretta *et al.* 2001). There have been no recent takes in groundfish fisheries off California, Oregon, or Washington (Carretta *et al.* 2001).

5.2.2.18 Sperm Whale

Sperm whales occur throughout the oceans and seas of the world near canyons and the continental slope. They are observed along the coasts of Oregon, and Washington (Carretta *et al.* 2001; Dohl *et al.* 1983). "Recently, a combined visual and acoustic line-transect survey conducted in the eastern temperate North Pacific in spring 1997 resulted in estimates of 24,000 (CV=0.46) sperm whales based on visual sightings, and 39,200 (CV=0.60) based acoustic detections and visual group size estimates" (Carretta *et al.* 2001). Sperm whales are ESA listed as endangered; therefore, this stock is automatically considered as depleted and strategic under the MMPA. Annual human-caused mortality (1.7 whales) is less than the 2.1 sperm whales allowed under the Potential Biological Removal formula (Carretta *et al.* 2001).

Mating occurs in the spring, and the calving interval is a minimum of four to six years. Combined with a gestation period of 18 months, this results in extremely low population growth rates (Reeves *et al.* 2002). All age classes and both sexes move throughout tropical waters, while males range farther and farther from the equator. Sperm whales feed near the ocean bottom, diving as deep as one mile to eat large squid (including giant squid), octopuses, rays, sharks, and fish (Reeves *et al.* 2002).

There are no recent observations of sperm whale incidental catches in West Coast groundfish fisheries.

5.2.2.19 Humpback Whale

Humpback whales *(Megaptera novaeangliae)* have a worldwide distribution and along Washington, Oregon, and California. NMFS recognizes the eastern North Pacific stock which is observed frequently in coastal areas. "The North Pacific total now almost certainly exceeds 6,000 humpback whales" (Calambokidis *et al.* 1997; Carretta *et al.* 2001). Humpback whales are ESA listed as endangered; therefore, this stock is automatically considered as depleted and strategic under the MMPA. Annual human-caused mortality (>0.2 whales) is less than the 1.9 whales allowed under the Potential Biological Removal formula (Carretta *et al.* 2001).

male humpback whale songs are one of the most famous breeding behaviors of all the marine mammals. They breed during winter with a two to three year gestation and calving in the tropics (Reeves *et al.* 2002). Their migrations can be as long as 5,000 miles (one way) from the higher latitude feeding grounds to the tropics for breeding and calving. They feed on krill and pelagic schooling fish.

There are no recent observations of humpback whale incidental catches in West Coast groundfish fisheries.

5.2.2.20 Blue Whale

The blue whale *(Balaenoptera musculus*) is the largest animal ever to exist on this planet. They inhabit most oceans and seas of the world. The eastern north Pacific stock summers off California to feed and migrates as far south as the Costa Rica Dome. "The best estimate of blue whale abundance is the average of the line transect and mark-recapture estimates, weighted by their variances, or 1,940" (Carretta *et al.* 2001) whales in this stock. Blue whales are ESA listed as endangered; therefore, this stock is automatically considered as depleted and strategic under the MMPA. Annual human-caused mortality (zero whales) is less than the 1.7 whales allowed under the Potential Biological Removal formula (Carretta *et al.* 2001).

Blue whale mating is unknown but calving takes place in winter after an eleven-month gestation. Calving interval is about two to three years. They feed on krill and possibly pelagic crabs (Reeves *et al.* 2002).

There are no recent observations of blue whale incidental catches in West Coast groundfish fisheries.

5.2.2.21 Fin Whale

Fin whales *(Balaenoptera physalus)* occur in the major oceans of the world and tend to be more prominent in temperate and polar waters. The California, Oregon, and Washington Stock was estimated at 1,851 fin whales, based on ship surveys in summer/autumn of 1993 and 1996 (Barlow and Taylor 2001). Fin whales are ESA listed as endangered; therefore, this stock is automatically considered as depleted and strategic under the MMPA. Annual human-caused mortality (1.5 whales) is less than the 3.2 whales allowed under the Potential Biological Removal formula (Carretta *et al.* 2001).

Little is known of their reproductive behavior, breeding, or calving areas. The female calving cycle is two to three years with an eleven or twelve-month gestation period following winter breeding. They probably do not make large-scale migrations and feed on krill and small pelagic fish such as herring (Reeves *et al.* 2002).

There are no recent observations of fin whale incidental catches in West Coast groundfish fisheries.

5.2.2.22 Killer Whale

Killer whales *(Orcinus orca*) inhabit most oceans and seas without respect to water temperature or depth, but are more prevalent in the higher colder latitudes (Reeves *et al.* 2002). Off Washington, Oregon, and California three stocks are recognized, based on behavior, photographic identification, and genetics differences. Those stocks are: Eastern North Pacific Offshore Stock, Eastern North Pacific Transient Stock, and Eastern North Pacific Southern Transient Stock (Carretta *et al.* 2001). "Based on summer/fall shipboard line-transect surveys in 1991, 1993 and 1996 (Barlow 1997), the total number of killer whales within 300 nm of the coasts of California, Oregon and Washington was recently estimated to be 819 animals. There is currently no way to reliably distinguish the different stocks of killer whales from sightings at sea..." (Carretta *et al.* 2001). Killer whales are not listed as endangered or threatened under the ESA nor depleted under the MMPA. None of the three stocks is listed as strategic under the MMPA and total human-caused mortality is less than that allowed under the Potential Biological Removal formula (Carretta *et al.* 2001).

A coalition of environmental groups recently filed a petition to protect the southern population of resident killer whales under the ESA. (This population lives in both U.S. and Canadian waters.) In June 2002, NMFS ruled this population of killer whales does not merit protection under the ESA. NMFS said the stock met two criteria: that it was a separate group and that it was in danger of extinction. But the third criteria—that of being a "significant" group—was not met because the southern population is considered part of the general killer whale population in the North Pacific, which is considered healthy. NMFS favors depleted status, with some protections under the MMPA. In December 2002, environmental groups filed a lawsuit on agency's ruling.

Killer whales give birth in all months with the peak in calving during winter. Movement seems to track prey items; along the West Coast, movements from Southeast Alaska to central California are documented (Goley and Straley 1994). Resident killer whales feed on fish, including salmon, and other large bodied fish. Transient killer whales feed on other marine mammals including sea otters, seals, porpoise, and baleen whales (Baird 2000). Offshore killer whales probably feed on squid and fish.

The only incidental take recorded by groundfish fishery observers was in the Bering Sea/Aleutian Islands (BSAI) groundfish trawl fishery (Carretta *et al.* 2001). There are also reports of interactions between killer whales and longline vessels (Perez and Loughlin 1991). (Longline fishers in the Aleutian Islands reported several cases where orcas removed sablefish from longlines as the gear was retrieved.) There are no other reports of killer whale takes in West Coast groundfish fisheries (Carretta *et al.* 2001).

5.2.2.23 Sei Whale

Sei whales *(Balaenoptera borealis)* occur in subtropical and tropical waters and into the higher latitudes, occupying both oceanic and coastal waters. "Seis are known worldwide for their unpredictable occurrences, with a sudden influx into an area followed by disappearance and subsequent absence for years or even decades" (Reeves *et al.* 2002). They are rare off Washington, Oregon, and California and there are no estimates of abundance or population trends for this stock. Sei whales in the eastern North Pacific (east of 180° W longitude) are considered a separate stock and listed as endangered under the ESA. Consequently, the eastern North Pacific stock is automatically considered as a depleted and strategic stock under the MMPA (Carretta *et al.* 2001).

Sei whales usually travel alone or in small groups and little is known of their behavior. They breed and calve in winter after a 11 to 12 month gestation. They forage on small fish, squid, krill, and copepods.

There are no observations of sei whale incidental catches in west coast fisheries, therefore no estimated groundfish fishery related losses.

5.2.2.24 Common Bottlenose Dolphin

Common bottlenose dolphins *(Tursiops truncatus)* are distributed worldwide in tropical and warm-temperate waters. For the MMPA stock assessment reports, bottlenose dolphins within the Pacific U.S. EEZ are divided into three stocks: California coastal stock; California, Oregon, and Washington offshore stock; and Hawaiian stock.

California coastal bottlenose dolphins are found within about one kilometer of shore, primarily from Point Conception south into Mexican waters. El Niño events appear to influence the distribution of animals along the California coast; since the 1982-83 El Niño they have been consistently sighted in central California as far north as San Francisco. Studies have documented north-south movements of coastal bottlenose dolphins (Defran *et al.* 1999; Hansen 1990). Coastal bottlenose dolphins spend an unknown amount of time in Mexican waters, where they are subject to mortality in Mexican fisheries. The best estimate of the average number of coastal bottlenose dolphins in U.S. waters is 169, based on two surveys conducted in 1994 and 1999 that covered virtually the entire U.S. range of this species. The minimum population size estimate for U.S. waters is 154 coastal bottlenose dolphins. The PBR level for this stock is 1.5 coastal bottlenose dolphins per year. This is calculated by multiplying the minimum population size by one half the default maximum net growth rate for cetaceans (half of 4%) times a recovery factor of 0.50 (for a species of unknown status with no known fishery mortality (Wade and Angliss 1997).

Due to its exclusive use of coastal habitats, this bottlenose dolphin population is susceptible to fishery-related mortality in coastal set net fisheries. However, from 1991 to 1994 observers saw no bottlenose dolphins taken in this fishery, and in 1994 the Sate of California banned coastal set gillnet fishing within 3 nm of the Southern California coast. In central California, set gillnets have been restricted to waters deeper than 30 fathoms (56 m) since 1991 in all areas except between Point Sal and Point Arguello. These closures greatly reduced the potential for mortality of coastal bottlenose dolphins in the California set gillnet fishery. Coastal gillnet fisheries are still conducted in Mexico and probably take animals from this population, but no details are available.

Coastal bottlenose dolphins are not listed as threatened or endangered under the ESA nor as depleted under the MMPA. Because no recent fishery takes have been documented, coastal bottlenose dolphins are not classified as a strategic stock under the MMPA, and the total fishery mortality and serious injury for this stock can be considered to be insignificant and approaching zero.

California/Oregon/Washington Offshore Stock: On surveys conducted off California, offshore bottlenose dolphins have been found at distances greater than a few kilometers from the mainland and throughout the Southern California Bight. They have also been documented in offshore waters as far north as about 41° N latitude, and they may range into Oregon and Washington waters during warm water periods. Sighting records off California and Baja California, Mexico (Lee 1993; Mangels and Gerrodette 1994) suggest that offshore bottlenose dolphins have a continuous distribution in these two regions. The most comprehensive multi-year average abundance for California, Oregon, and Washington waters, based on the 1991-96 ship surveys, is 956 offshore bottlenose dolphins (Barlow 1997). The minimum population size estimate of offshore bottlenose dolphins is 850. The PBR level for this stock is 8.5 offshore bottlenose dolphins per year.

In 1997, a Take Reduction Plan for the California drift gillnet (non-groundfish) fishery was implemented, which included skipper education workshops and required the use of pingers and minimum 6-fathom extenders. Overall cetacean entanglement rates in the drift gillnet fishery dropped considerably (Barlow and

Cameron 1999). Based on 1997-98 data, the estimate of offshore bottlenose dolphins taken annually in the U.S. fishery is zero. Drift gillnet fisheries for swordfish and sharks are also conducted along the entire Pacific coast of Baja California and may take animals from the same population.

Offshore bottlenose dolphins are not listed as threatened or endangered under the ESA nor as depleted under the MMPA. Because no recent fishery takes have been documented, offshore bottlenose dolphins are not classified as a strategic stock under the MMPA, and the total fishery mortality and serious injury for this stock can be considered to be insignificant and approaching zero.

5.2.2.25 Striped Dolphin

Striped dolphins *(Stenella coeruleoalba)* are distributed world-wide in tropical and warm-temperate pelagic waters. For the MMPA stock assessment reports, striped dolphins within the Pacific U.S. EEZ are divided into two discrete, noncontiguous areas: 1) waters off California, Oregon, and Washington and 2) waters around Hawaii.

<u>California/Oregon/Washington Stock:</u> On recent shipboard surveys extending about 300 nm offshore of California, striped dolphins were sighted within about 100 nm to 300 nm from the coast. No sightings have been reported for Oregon and Washington waters, but striped dolphins have stranded in both states (Oregon Department of Fish and Wildlife, unpublished data; Washington Department of Fish and Wildlife, unpublished data). Striped dolphins are also commonly found in the central North Pacific, but sampling between this region and California has been insufficient to determine whether the distribution is continuous. Based on sighting records off California and Mexico, striped dolphins appear to have a continuous distribution in offshore waters of these two regions (Mangels and Gerrodette 1994; Perrin *et al.* 1985).

The abundance estimate for California, Oregon and Washington waters is 20,235 striped dolphins (Barlow 1997). The minimum population size estimate is 17,995. The PBR level for this stock is 180 striped dolphins per year, calculated as the minimum population size (17,995) times one half the default maximum net growth rate for cetaceans (half of 4%) times a recovery factor of 0.50 (for a species of unknown status with no known fishery mortality; Wade and Angliss 1997).

Drift gillnet fisheries for swordfish and sharks conducted along the Pacific coast of Baja California, Mexico, may take animals from this population.

Striped dolphins are not listed as threatened or endangered under the ESA nor as depleted under the MMPA. Including U.S. driftnet information only for years after implementation of the Take Reduction Plan (1997-98), the average annual human-caused mortality in the years 1994 to 1998 is zero. Because recent mortality is zero, striped dolphins are not classified as a strategic stock under the MMPA, and the total fishery mortality and serious injury for this stock can be considered to be insignificant and approaching zero.

5.3 Seabirds

5.3.1 Overview and Regulatory Status

The highly productive California Current System, an eastern boundary current that stretches from Baja California, Mexico, to southern British Columbia, supports more than two million breeding seabirds and at least twice that number of migrant visitors. Tyler, *et al.* (1993) reviewed seabird distribution and abundance in relation to oceanographic processes in the California Current System and found that over 100 species have been recorded within the EEZ, including albatross, shearwaters, petrels, storm-petrels, cormorants, pelicans, gulls, terns, and alcids (murres, murrelets, guillemots, auklets, and puffins). In addition to these "classic" seabirds, millions of other birds are seasonally abundant in this oceanic habitat including: waterfowl, waterbirds (loons and grebes), and shorebirds (phalaropes). Not surprisingly, there is considerable overlap of fishing areas and areas of high bird density in this highly productive upwelling system. The species composition and abundance of birds varies spatially and temporally. The highest seabird biomass is found over the continental shelf, and bird density is highest during the spring and fall when local breeding species and migrants predominate.

The FWS is the primary federal agency responsible for seabird conservation and management. Four species found off the Pacific Coast are listed under the ESA, as noted in Table 5-5. In 2002, the FWS classified several seabird species that occur off the Pacific Coast as "Species of Conservation Concern." These species include the black-footed albatross (*Phoebastria nigripes*), ashy storm-petrel (*Oceanodroma homochroa*), gull-billed tern (*Sterna nilotica*), elegant tern (*Sterna elegans*), arctic tern (*Sterna paradisaea*), black skimmer (*Rynchops niger*), and Xantus's murrelet (*Synthliboramphus hypoleucus*).

The Migratory Bird Treaty Act (MBTA) implements various treaties and conventions between the U.S. and Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. Under the Act, taking, killing, or possessing migratory birds is unlawful. In addition to the MBTA, an Executive Order, Responsibilities of Federal Agencies to Protect Migratory Birds (EO 13186), directs federal agencies to negotiate Memoranda of Understanding with the FWS that would obligate agencies to evaluate the impact on migratory birds as part of any NEPA process. The FWS and NMFS are working on a Memorandum of Understanding concerning seabirds.

Under the Magnuson-Stevens Act, NMFS must ensure fishery management actions comply with other laws designed to protect seabirds. NMFS is also required to consult with FWS if fishery management plan actions may affect seabird species listed as endangered or threatened. Taken together, these laws and directives underscore the need to consider impacts to seabirds in decision making and consider ways to reduce potential impacts of the proposed action. In February 2001, NMFS adopted a National Plan of Action (NPOA) to Reduce the Incidental Take of Seabirds in Longline Fisheries. This NPOA contains guidelines that are applicable to relevant groundfish fisheries and would require seabird incidental catch mitigation if a significant problem is found to exist. During the first two years of NPOA implementation, NMFS regions were tasked with assessing the incidental take of seabirds in longline fisheries. In the limited entry groundfish longline fleet off the coast of Washington, Oregon, and California during September 2001–October 2002, there were no incidental seabird takes documented by West Coast Groundfish Observers. (During the assessment period, approximately 30% of landings by the limited entry fixed gear fleet had observer coverage.)

5.3.2 Seabird Species Descriptions

The following species descriptions are taken from Appendix A to the groundfish bycatch mitigation DPEIS (NMFS 2004b).

5.3.2.1 Albatross

Albatross range extensively throughout waters off the Pacific Coast. In particular, three albatross species, the short-tailed albatross (*Phoebastria albatrus*), the black-footed albatross (*Phoebastria nigripes*), and the Laysan albatross (*Phoebastria immutabilis*) occur in the waters off Washington, Oregon, and California.

Once considered the most common albatross ranging over the continental shelf, the short-tailed albatross was hunted to near extinction in the early 1900s and is now thought to be one of the rarest birds in the world.

Short-tailed albatross range widely in the North Pacific: breeding occurs off Japan and sightings extend from the Aleutian Islands to southern California (West Coast Groundfish Observer Program, NMFS, unpublished data, 2002). There are two known short-tailed albatross breeding colonies, one on Torishima Island and one on Minami-kojima Island, in the waters off Japan. Historical records indicate that there were over 100,000 individuals at the Torishima Island colony at the turn of the century and during 1998 and 1999 just over 400 breeding adults were found at the colony. The population on Torishima Island is now growing at an annual rate of 7.8%. The current estimate of the short-tailed albatross world population is about 1700 individuals (Hasegawa 2002; START 2002).

The short-tailed albatross feeds at the water's surface on squid, crustaceans, and various fish species. They sometimes follow fishing vessels and feed on offal. Chicks are fed a mixture of stomach oil and partially digested food that is regurgitated; nestlings are often fed squid, flying fishes, and crustaceans. Threats to short-tailed albatross include volcanic eruptions on the primary nesting island, Torishima, incidental take in commercial fisheries, ingestion of plastic, and the potential threat of oil spills.

Much like the short-tailed albatross, the black-footed albatross ranges throughout the North Pacific. Breeding occurs in the Northwestern Hawaiian Islands and Torishima Island, and the species disperses from the Bering Sea south along the Pacific Coast to California.

The black-footed albatross is the most numerous albatross species along the Pacific Coast and is present throughout the year (Briggs *et al.* 1987). The global black-footed albatross population is estimated at about 56,500 breeding pairs and thought to be decreasing (Naughton 2003). This species is classified as vulnerable by the IUCN (International Union for the Conservation of Nature and Natural Resources) based on a 19% population decrease during 1995 to 2000 and a projected future decline of more than 20% over the next 60 years owing to interactions with longline fisheries for tuna, billfish, and groundfish in the North Pacific (2001).

Black-footed albatross fed on fish, sea urchins, amphipods, and squid; foraging is done at night and prey is caught at the ocean's surface. This species will also follow fishing vessels and feed on discard. Besides interactions with longline fisheries, other threats to black-footed albatross include nest loss due to waves, pollution, introduced predators, oiling, ingestion of plastic, and volcanic eruptions on Torishima (2001).

The most abundant North Pacific albatross species is the Laysan albatross. The vast majority of the Laysan albatross population breeds in the Northwestern Hawaiian Islands, fewer numbers breed on the Japanese Ogasawara Islands, and still fewer pairs breed on islands off Baja California, Mexico (Guadalupe Island, Alijos Rocks, and in the Revillagigedo Islands). When at sea, the Laysan albatross ranges from the Bering Sea, to California, to Japan.

The FWS counts this species at Midway Atoll once every four years and counts or samples density at French Frigate Shoals and Laysan Island every year. These monitoring sites account for 93% of the world population of about 393,000 breeding pairs. At these three sites breeding populations have declined at an average rate of 3.2% per year since 1992. This represents a 32% decline in annual breeding attempts over a 10-year period (Naughton 2003).

Similar to the other North Pacific albatross species, Laysan albatross feed on schooling fish and squid at the ocean's surface. The primary threat to their population is interactions with fisheries.

5.3.2.2 California brown pelican

Brown pelicans *(Pelecanus occidentalis californicus)* range along the Pacific Coast from British Columbia south to central America. Historically, breeding colonies were found at Point Lobos, California, and from the Channel Islands south to Baja California, Mexico. They are found in coastal areas, on rocky shores and cliffs, in sloughs, and may also be found on breakwaters, jetties, pilings, and sandbars in harbors. While the California brown pelican still occurs throughout its original range, the breeding colonies in California, located in the Channel Islands National Park, West Anacapa Island, and the Santa Barbara Islands, are in decline (CDFG 2000).

In the 1970s, California brown pelicans were threatened with extinction by the widespread use of the pesticide DDT (dichlorodiphenyltrichloroethane). This chemical is transmitted via the food chain and becomes concentrated in top predators. DDT affects the pelican's ability to metabolize calcium, resulting in thin-shelled eggs that break during incubation. The use of DDT was banned in 1972 and the California brown pelican population subsequently began its recovery (CDFG 2000).

In the early 2000s, it was estimated that the brown pelican breeding population in California was about 9,000 adults (CDFG 2001). While the brown pelican population is thought stable, food availability is a cause for concern. Pacific mackerel, Pacific sardine, and the northern anchovy are important prey for brown pelicans, especially during the breeding season. However, commercial over-harvesting of these coastal pelagic species has reduced the quantity of prey that is available to pelicans (CDFG 2000).

The primary threats to California brown pelicans are human development in coastal regions, entanglement in abandon recreational fishing gear, and oil spills (CDFG 2000).

5.3.2.3 Terns

Nine species of terns occur along the West Coast, they are the arctic tern (*Sterna paradisaea*), common tern (*Sterna hirundo*), black tern (*Chlidonias niger*), California least tern (*Sterna antillarum browni*), Caspian tern (*Sterna caspia*), Forster's tern (*Sterna forsteri*), gull-billed tern (*Sterna nilotica*), royal tern (*Sterna maxima*), and elegant tern (*Sterna elegans*).

The populations of most tern species found along the Pacific Coast are stable; however, some tern species are listed under the ESA or are considered Species of Conservation Concern by the USFWS.

The range of the California least tern is limited to California and Baja California. During 1988 and 1989 in California, the population was estimated to be about 1,250 pairs. As with most species of terns, California least tern are found along seacoasts, beaches, bays, estuaries, lagoons, lakes, and rivers. Terns usually nest on open, flat beaches along lagoons or estuary margins. California least terns usually nest in the same area during successive years and tend to return to the natal site to nest.

Terns obtain their prey by diving from the air into shallow water and their diet is predominately small fishes (e.g., anchovy, surf-perch).

Primary threats to the California least tern population, and possible threats to other tern populations, include human development of nesting habitat and predation of adults, eggs, and young by other birds and introduced mammals.

5.3.2.4 Murrelets

Four species of murrelets occur along the Pacific coast, they are the marbled murrelet (*Brachyramphus marmoratus*), Craveri's murrelet (*Synthliboramphus craveri*), Xantus's murrelet (*Synthliboramphus hypoleucus*), and the ancient murrelet (*Synthliboramphus antiquus*).

The marbled murrelet has an extensive range along the Pacific Coast, extending from Alaska to California and breeding occurs throughout their range. These birds are found in coastal areas, mainly in salt water, often in bays and sounds. They are also found up to 5 km offshore and are occasionally sighted on lakes and rivers within 20 km of the coast. Most populations are dependent upon large coniferous trees in old-growth forests as suitable nesting habitat.

The marbled murrelet population has probably declined substantially throughout the region and it is estimated that 10,000 to 20,000 individuals remain (Carter *et al.* 1995).

The diet of marbled murrelets includes fishes (e.g., sandlance, capelin, herring), crustaceans, and mollusks. Birds may also feed exclusively on freshwater prey for several weeks. Marbled murrelets typically forage in waters up to 80 m in depth and two kilometers from shore. Birds dive to capture prey; dives may extend down 30 m below the water's surface.

The continued harvest of old-growth and mature coastal coniferous forest threatens critical nesting habitat throughout the marbled murrelet range. Additional threats to this population are interactions with gillnet fisheries and oil spills.

The ancient murrelet ranges along the Pacific Coast from Alaska to California. The estimated global population is on the order of half a million breeding pairs, with just over half found on the Queen Charlotte Islands of British Columbia. This species nests in rocky offshore islands in crevices, under rocks, at the base of trees, and in burrows. Declines in the ancient murrelet population are often attributed to the introduction of predators onto offshore islands used for breeding. Rats, raccoons, and foxes have reduced what was once the world's the largest colony (Langara Island, British Columbia) from about 200,000 pairs in 1969 to 15,000 pairs in 1994. Ancient murrelets are also threatened by food availability, which is subject to pesticide pollution, and changes in marine currents controlling local productivity.

Xantus's and Craveri's murrelets have relatively restricted ranges, when compared to other Pacific Coast murrelets, and are primarily found in California. Both species breed on islands; the Craveri's breeds in the Gulf of California and along the western coast of Baja California, Mexico, while the Xantus's breeds on islands off central California and western Baja California.

The population of the Craveri's murrelets is estimated to be between 6,000 and 10,000 individuals. Xantus's murrelets persist in very low numbers and the breeding population is estimated to be between 2,000 and 5,000 individuals. Both species are threatened by predators introduced onto breeding islands—specifically, rats and feral cats—and oil spills, especially from offshore platforms in Santa Barbara Channel and oil tanker traffic in Los Angeles harbor (Carter *et al.* 1995).

5.3.2.5 Northern Fulmars

Northern fulmars (*Fulmarus glacialis*) range along the Pacific Coast from Alaska to Oregon and they are primarily pelagic.

The estimated total population of northern fulmars in the North Pacific is between 3 and 3.5 million individuals (Hatch 1993). This species primarily breeds in Alaska at colonies on sea cliffs and, less frequently, on low, flat rocky islands. Northern fulmars show strong mate and nest site fidelity (Shallenberger 1984). Nests are often raided by weasels and gulls.

Northern fulmars are surface feeders, they swim or float upon the ocean's surface while feeding on organisms found just below the surface. The diet of this species includes fishes, mollusks, crustaceans, and cephalopods. Northern fulmars have also been observed following fishing vessels, presumably to feed on offal.

Primary threats to northern fulmars are oil pollution, plastic debris, entanglement in fishing gear, and introduced predators and human disturbance on breeding islands (Hatch 1993).

5.3.2.6 Storm-Petrels

Seven species of storm-petrels occur along the Pacific Coast, they include the black storm-petrel (*Oceanodroma melania*), fork-tailed storm-petrel (*Oceanodroma furcata*), ashy storm-petrel (*Oceanodroma homochroa*), least storm-petrel (*Oceanodroma microsoma*), Galapagos storm-petrel (*Oceanodroma tethys*), Wilson's storm-petrel (*Oceanites oceanicus*), and Leach's storm-petrel (*Oceanodroma leucorhoa*).

Populations of storm-petrel species found along the Pacific Coast, along with the amount of information known about different populations, varies considerably. In the North Pacific, Leach's storm-petrel is the most abundant species (a conservative total population estimate is between 10 and 15 million individuals) followed by the fork-tailed storm-petrel (total population estimate is between 5 and 10 million individuals). Conversely, the populations of ashy storm-petrels (total population estimated at fewer than 10,000 individuals), black storm-petrels (population estimate ranges between 10, 000 and 100,000 individuals), and least storm-petrels (population estimate ranges between 10,000 and 50,000 individuals) may be at risk (Boersma and Groom 1993).

Storm-petrels are pelagic, spending the majority of their lives at sea and returning to land only to breed. When at the breeding colonies, storm-petrels are nocturnal, an adaptation that reduces their susceptibility to diurnal predators (e.g., gulls) (Speich and Wahl 1989). Nests are often located in burrows, rocky crevices, or grassy slopes on small coastal islands. Some species of storm-petrels nest in the same burrow in successive years (Spendelow and Patton 1988).

Storm-petrels feed at the water's surface, rarely diving beneath the surface in pursuit of food. They catch prey by "dipping and pattering," that is they hover on outstreched wings, paddle the water with their webbed feet, and dip their bills into the water (Ainley 1984b). The diet of storm-petrels includes such things as plankton, small fishes, crustaceans, and small squid.

Primary threats to storm-petrels include introduced predators on breeding islands, pesticides and contaminants, pollution, and oil spills.

5.3.2.7 Shearwaters

Eight species of shearwaters range along the Pacific Coast, they include Townsend's shearwater (*Puffinus auricularis*), black-vented shearwater (*Puffinus opisthomelas*), wedge-tailed shearwaters (*Puffinus pacificus*), sooty shearwater (*Puffinus griseus*), short-tailed shearwater (*Puffinus tenuirostris*), pink-footed shearwater (*Puffinus creatopus*), flesh-footed shearwater (*Puffinus carneipes*), and Buller's shearwater (*Puffinus bulleri*).

The populations of most shearwater species found along the Pacific Coast are stable; however, some shearwater populations are considered at risk by the IUCN. Many species of shearwaters move between hemispheres to take advantage of the best feeding conditions (Shallenberger 1984).

The black-vented shearwater breeds on a handful of small islands off the coast of Baja California; the wedge-tailed and Townsend's shearwater breed on islands off the coasts of Mexico and Hawaii. The five remaining species of shearwater breed in the southern hemisphere on islands off the coast of Chile, Australia, and New Zealand. Much like storm-petrels, shearwaters nest in burrows and rocky crevices and their activities at breeding colonies are largely nocturnal.

When foraging, shearwaters may feed at the water's surface, plunge from just above the water's surface, or dive to depths of 50 m. Their diet includes small fishes (e.g., northern anchovies, Pacific sardines), squid, plankton, and crustaceans.

Shearwater populations are primarily threatened by predation by feral mammals (e.g., cats, pigs, mongoose, rats) and loss of habitat on breeding islands. Other threats associated with urbanization include collisions with power lines and attraction to lights.

5.3.2.8 Cormorants

Three species of cormorants occur along the Pacific Coast: Brandt's cormorant (*Phalacrocorax penicillatus*), double-crested cormorant (*Phalacrocorax auritus*), and pelagic cormorant (*Phalacrocorax pelagius*).

Brandt's cormorants are by far the most abundant cormorant species nesting along the coast of Oregon and California. In Washington, however, they have never been numerous or widespread (Spendelow and Patton 1988). Brant's cormorants are typically found in inshore, coastal areas, especially in areas having kelp beds, brackish bays, sheltered inlets, and quiet bays. Large numbers of birds breed in California and Oregon with fewer numbers breeding in Washington. Brandt's cormorant usually nests on offshore islands or, less frequently, on inaccessible mainland bluffs and wide cliff ledges near the water (Speich and Wahl 1989). Resident throughout the year near nesting areas, birds range more widely during non-breeding periods.

Double-crested cormorants are widespread and breeding populations along the Pacific Coast seem to be increasing in number (Carter *et al.* 1995; Spendelow and Patton 1988). They can be found along seacoasts, marine islands, coastal bays, swamps, lagoons, rivers, and lakes. Double-crested cormorants nest in variety of habitats. Along the coast, they nest on offshore rocks and islands, exposed dunes, abandoned wharf timbers, and power poles. Birds nesting inland often use trees or snags (Sowls *et al.* 1980; Speich and Wahl 1989). Birds are usually found within a few hours of their roosting or breeding sites (Ainley 1984a).

Breeding populations of pelagic cormorants are relatively evenly distributed from Washington to California (Spendelow and Patton 1988), and in recent years populations have been increasing in number. Pelagic cormorants occur in outer coastal habitats, bays, and inlets, especially in rock-bottom habitats and often in water less than 100 m and within 1 - 2 km of shore. These birds will often nest with other pelagic cormorants or near other species of seabirds. Nesting occurs on island cliff ledges, crevices, and in sea caves by building nests out of seaweed (Sowls *et al.* 1980).

Cormorants are classified as diving birds; their strong swimming ability enables them to pursue and capture their prey underwater. Their diet includes small fishes, squid, crabs, marine worms, and amphipods.

Cormorant populations are threatened by pesticides, human disturbance at nesting sites, oiling, and interactions with fisheries.

5.3.2.9 Jaegers

Three species of jaegers occur along the Pacific Coast: the pomarine jaeger (*Stercorarius pomarinus*), parasitic jaeger (*Stercorarius parasiticus*), and long-tailed jaeger (*Stercorarius longicaudus*).

All three species of jaegers are primarily pelagic, but may be found in bays and harbors. Jaegers breed in the arctic and sub-arctic. Non-breeding birds and breeders during the non-breeding season can be found off Washington, Oregon, and California.

The diet of jaegers includes small mammals, birds, bird eggs, fishes, invertebrates, and offal from fishing vessels. Jaegers are well known for their habit of pursing other seabirds on the wing (Maher 1984), forcing the other birds to disgorge their food, and then stealing the food before it hits the ground.

5.3.2.10 Gulls

Eleven species of gulls occur along the Pacific Coast, these include the glaucous gull (*Larus hyperboreus*), glaucous-winged gull (*Larus glaucescens*), western gull (*Larus accidentalis*), herring gull (*Larus argentatus*), California gull (*Larus californicus*), Thayer's gull (*Larus thayeri*), ring-billed gull (*Larus delawarensis*), mew gull (*Larus canus*), Heermann's gull (*Larus heermanni*), Bonaparte's gull (*Larus philadelphia*), and Sabine's gull (*Larus sabini*).

For most marine-nesting species in the North Pacific, only rough estimates of nesting populations exist and reproductive success has only been investigated for one to two years (Vermeer *et al.* 1993). However, it is thought that most gull populations along the Pacific Coast are stable and not considered to be at risk.

Most gulls along the Pacific Coast occur during the non-breeding season or are non-breeding individuals. Birds can be found at sea, along the coast, on rocky shores or cliffs, bays, estuaries, beaches, and garbage dumps. Only two species of gulls breed along the Pacific Coast. The glaucous-winged gull has breeding colonies in British Columbia and Washington and the western gull has breeding colonies in California (most are located on the Farallon Islands), Oregon, and Washington (Drury 1984). Breeding habitat for these gulls includes coastal cliffs, rocks, grassy slopes, or offshore rock or sandbar islands.

Pacific Coast gulls feed at the ocean's surface and their diet typically includes fishes, mollusks, crustaceans, carrion, and garbage.

Primary threats to gulls include human disturbance at nesting locations.

5.3.2.11 Black-Legged Kittiwakes

Black-legged kittiwakes *(Rissa tridactyla)* range along the Pacific Coast from Alaska to Mexico (Drury 1984). While they are primarily pelagic, black-legged kittiwakes can also be found along sea coasts, bays, and estuaries.

It is estimated that there are approximately 2.6 million black-legged kittiwakes at colonies in the North Pacific. This species breeds on mainland and island sites in the Arctic and along the Aleutian islands.

Black-legged kittiwakes feed at the ocean's surface and their diet typically includes small fishes, mollusks, crustaceans, and plankton (Hatch 1993).

Primary threats to black-legged kittiwakes are unknown.

5.3.2.12 Common Murres

Common murres *(Uria aalge)* range along the Pacific Coast from Alaska to central California. While they are primarily pelagic, common murres can also be found along rocky sea coasts.

Common murres are the dominant member of the breeding seabird community along the Pacific Coast, but numbers have declined substantially in central California and Washington. In the mid-1800s, over 14 million murre eggs were harvested from Southeast Farallon Island to feed residents of the San Francisco Bay area (Manuwal 1984). The Washington population has been almost extirpated over the last decade due to a combination of oceanographic conditions, gillnets, low-flying aircrafts, and oil spills, and has not recovered. In contrast, the population of common murres in Oregon and California has been stable or increasing despite human disturbance (Carter *et al.* 1995). In the late 1980s, the Pacific Coast population was estimated to be greater than 600,000 individuals. Nesting typically occurs in large, dense colonies on mainland and island cliff ledges or on rocky, low-lying islands. Common murres do not build nests but lay their eggs directly on the bare soil or rock (Spendelow and Patton 1988).

Common murres are diving birds, capturing their prey underwater, and can descend to depths of 180 m. Their diet includes fishes, squid, mysids, and shrimp.

Primary threats to common murres include predators on breeding islands, increasing sea surface temperature, oil spills, gill-net mortality, and military practice bombing activity.

5.3.2.13 Pigeon Guillemots

Pigeon guillemots *(Cepphus columba)* range along the Pacific Coast from Alaska to southern California. While these birds are primarily pelagic, they can be found along rocky coasts and in bays and inlets.

In the late 1980s, the pigeon guillemot breeding population along the Pacific Coast was estimated to be greater than 20,000 individuals. Breeding occurs along coasts, on islands, on cliffs, in rock crevices, in abandoned burrows, or they may dig their own burrows. Pigeon guillemots have a spectacular courtship behavior (Manuwal 1984) and may use the same nest in successive years (Spendelow and Patton 1988).

Pigeon guillemots forage underwater; their diet includes small fishes, and inshore benthic species, mollusks, such as crustaceans, and marine worms.

Primary threats to pigeon guillemots include introduced predators on breeding islands, inshore gillnet fisheries, and oil spills (Erwins *et al.* 1993).

5.3.2.14 Auklets

Three species of auklets occur along the Pacific Coast: the parakeet auklet (*Aethia psittacula*), the rhinoceros auklet (*Cerorhinca monocerata*), and the Cassin's auklet (*Ptychoramphus aleuticus*).

In the eastern North Pacific, the estimated population of Cassin's auklets is over three million and the estimated population of parakeet auklets is approximately 200,000 (Springer *et al.* 1993). The estimated breeding population of rhinoceros auklets along the Pacific Coast is just over 60,000 (Spendelow and Patton 1988).

Auklets are primarily pelagic; however, they are also found along rocky coasts. The parakeet auklet only breeds in Alaska, while the rhinorceros and Cassin's auklets breed on offshore islands between Alaska and

Baja California. Nesting generally occurs in areas with low vegetation, in burrows, or under rocks. Some nesting sites are used in successive years. Auklets may be diurnal as well as nocturnal.

Auklets dive from the water's surface when foraging. Their diet generally includes small fishes, crustaceans, and squid.

Primary threats to auklets include introduced predators on nesting islands; long-term oceanographic changes in the California Current System, which caused a decline in zooplankton populations; and oil spills.

5.3.2.15 Puffins

Two species of puffins occur along the Pacific Coast: the horned puffin (*Fratercula corniculata*) and the tufted puffin (*Fratercula cirrhata*). These colorful puffins are primarily pelagic but they can also be found along the coast (Manuwal 1984).

In the North Pacific, the estimated breeding population of tufted puffins and horned puffins is 3.5 million and 1.5 million, respectively (Byrd *et al.* 1993). Puffins breed on offshore islands or along the coast; nesting occurs in ground burrows, under and among rocks, and occasionally under dense vegetation. Horned puffins only nest in Alaska, while tufted puffins nest all along the Pacific Coast from Alaska to California.

Puffins are diving birds and capture their prey underwater. Their diet includes fish, cephalopods, crustaceans, and polychatetes.

Primary threats to puffins include introduced predators on breeding islands, oil spills, and gillnet fisheries. The low numbers of tufted puffins in California may be due to oil pollution and/or declines in the sardine population.

5.3.2.16 South Polar Skuas

South polar skuas (*Stercorarius maccormicki*) range along the Pacific Coast from Alaska to Mexico. While these birds are primarily pelagic and solitary, they can sometimes be found in small, loose groupings in and around harbors.

South polar skuas breed in and around Antarctica. Non-breeders can be found spring through fall along the Pacific Coast.

The diet of south polar skuas is diverse (Maher 1984). At sea, they pursue foraging seabirds until the other birds relinquish their prey, as well as following fishing vessels to forage on offal. On the breeding grounds, their diet includes fish, seabirds, small mammals, krill, penguin eggs and young, and carrion.

Because south polar skuas breed in such remote locations, there are relatively few threats to the breeding population. Additionally, they are relatively immune to threats during the non-breeding season because they spend the majority of their time at sea.

5.3.2.17 Black Skimmers

Black skimmers (*Rynchops niger*) can be found in California. This species is primarily found nearshore in coastal waters including bays, estuaries, lagoons, and mudflats.

In the late 1970s to early 1980s, the estimated breeding population of black skimmers throughout the United States was about 65,000 individuals and increasing. In California, however, less than 100 breeding individuals were found (Spendelow and Patton 1988).

Nesting generally occurs near coasts on sandy beaches, shell banks, coastal and estuary islands, salt pond levees, and on dredged material sites. Black skimmers are often nesting in association with or near terns.

As their name suggests, black skimmers forage by flying low over the water and skimming food off the surface with their lower mandible. The diet primarily includes small fish and crustaceans.

Primary threats to black skimmers include predation and human disturbance on nesting islands.

TABLE 5-1. Protected salmon species on the West Coast with their protected species designations. (Page 1 of 1)

Species and Stock	Scientific Name
Salmon species listed as endangered under the ESA	
Chinook salmon- Sacramento River Winter; Upper Columbia Spring	*Oncorhynchus tshawytscha*
Sockeye salmon- Snake River	*Oncorhynchus nerka*
Steelhead- Southern California; Upper Columbia	*Oncorhynchus mykiss*
Salmon species listed as threatened under the ESA	
Coho salmon- Central California, Southern Oregon, and Northern California Coasts	*Oncorhynchus kisutch*
Chinook salmon- Snake River Fall, Spring, and Summer; Puget Sound; Lower Columbia; Upper Willamette; Central Valley Spring; California Coastal	*Oncorhynchus tshawytscha*
Chum salmon- Hood Canal Summer; Columbia River	*Oncorhynchus keta*
Sockeye salmon- Ozette Lake	*Oncorhynchus nerka*
Steelhead- South-Central California, Central California Coast, Snake River Basin, Lower Columbia, California Central Valley, Upper Willamette, Middle Columbia, Northern California	*Oncorhynchus mykiss*

TABLE 5-2. Total catch of salmon (number) and chinook salmon bycatch rates (number of salmon/mt of whiting) taken by the at-sea and shore-based processing fleets, 1999-2001. (Page 1 of 1)

	Catcher-processors		Non-tribal Motherships		Tribal Mothership		Shore-based	
Species	Catch (no.)	Bycatch Rate	Catch (no.)	Bycatch Rate	Catch (no.)	Bycatch Rate	Catch (no.)	Bycatch Rate
2001								
Chinook	847	0.014	1,721	0.048	959	0.158	2,634	0.036
Other Salmon	146		624		16		371	
2000								
Chinook	1,839	0.027	4,420	0.094	1,947	0.312	3,321	0.039
Other Salmon	88	0.001	27	0.001	16	0.003	24	
1999								
Chinook	2,704	0.040	1,687	0.036	4,497	0.174	1696	0.020
Other Salmon	296		506		278		16	

Sources: NMFS. 2003. Implementation of an observer program for at-sea processing vessels in the Pacific Coast groundfish fishery. National Marine Fisheries Service, Northwest Region, Seattle, June 2003. NMFS. 2003. Implementing a monitoring program to provide a full retention opportunity in the shore-based whiting fishery; Preliminary draft environmental assessment. National Marine Fisheries Service, Northwest Region, Seattle, September 2003.

TABLE 5-3. Incidental catch of chinook salmon in the whiting fishery 1991-2001, all sectors. (Page 1 of 1)

Year	Whiting (mt)	Chinook Salmon (no.)[a/]	Bycatch Rate (no/mt whiting)[a/]
1991	222,114	6,194	0.0279
1992	201,168	4,753	0.0236
1993	135,516	5,387	0.0398
1994	248,768	4,605	0.0185
1995	175,255	**15,062**	**0.0859**
1996	212,739	2,327	0.0109
1997	232,958	5,896	0.0253
1998	232,587	5262	0.0226
1999	224,459	10,579	0.0471
2000	202,527	**11,516**	**0.0569**
2001	173,857	6,161	0.0354
2002	130,004	3,759	0.0289

a/ Values in bold indicate years in which the threshold established in the biological opinion was exceeded. Source: NMFS. 2003. Implementation of an observer program for at-sea processing vessels in the Pacific Coast groundfish fishery. National Marine Fisheries Service, Northwest Region, Seattle, June 2003.

TABLE 5-4. Marine mammals occurring off the West Coast. (Page 1 of 2)

Common Name	Scientific Name	ESA Status	MMPA Status
Pinnipeds			
California sea lion	*Zalophus californianus*		
Pacific harbor seal	*Phoca vitulina richardsi*		
Northern elephant seal	*Mirounga angustirostris*		
Guadalupe fur seal	*Arctocephalus townsendi*	T	D
Northern fur seal	*Callorhinus ursinus*		
Northern or Steller sea lion	*Eumetopias jubatus*	T	D
Sea otters			
Southern	*Enhydra lutris nereis*	T	
Washington	*Enhydra lutris kenyoni*		
Cetaceans			
Minke whale	*Balaenoptera acutorostrata*		
Short-finned pilot whale	*Globicephala macrorhyncus*		
Gray Whale	*Eschrichtius robustus*		
Harbor porpoise	*Phocoena phocoena*		
Dall's porpoise	*Phocoenoides dalli*		
Pacific white-sided dolphin	*Lagenorhynchus obliquidens*		
Short-beaked common dolphin	Delphinus delphis		
Long-beaked common dolphin	*Delphinus capensis*		
The following cetaceans are present within the area managed by this FMP but not likely to interact with groundfish fisheries or have not been documented having had interactions in observed groundfish fisheries:			
Bottlenose dolphin	*Tursiops truncatus*		
Striped Dolphin	*Stenella coeruleoalba*		
Sei whale	*Balaenoptera borealis*	E	
Blue whale	*Balaenoptera musculus*	E	D
Fin whale	*Balaenoptera physalus*	E	D
Sperm whale	*Physeter macrocephalus*	E	D
Humpback whale	*Megaptera novaeangliae*	E	D
Bryde's whale	*Balaenoptera edeni*		
Sei whale	*Balaenoptera*	E	
Killer whale	*Orcinus orca*		D
Baird's beaked whale	*Berardius bairdii*		
Cuvier's beaked whale	*Ziphius cavirostris*		
Pygmy sperm whale	*Kogia breviceps*		

TABLE 5-4. Marine mammals occurring off the West Coast. (Page 2 of 2)

Common Name	Scientific Name	ESA Status	MMPA Status
Risso's dolphin	*Grampus griseus*		
Striped dolphin	*Stenella coeruleoalba*		
Northern right-whale dolphin	*Lissodelphis borealis*		

(Source: Groundfish bycatch draft programmatic EIS, 2004.)

TABLE 5-5. Protected seabirds on the West Coast with their protected species designations.

Species	Scientific Name
Seabirds listed as endangered under the ESA	
Short-tail albatross	*Phoebastria (=Diomedea) albatrus*
California brown pelican	*Pelecanus occidentalis*
California least tern	*Sterna antillarum browni*
Seabirds listed as threatened under the ESA	
Marbled murrelet	*Brachyramphs marmoratus*

6.0 Harvest Sectors

The Pacific Coast groundfish fishery is a multi-species fishery that takes place off the coasts of Washington, Oregon, and California. Maintaining year-round fishing opportunities for groundfish has been one of the primary management objectives for the fishery. Pacific Coast groundfish support or contribute to a wide range of commercial, recreational, and tribal fisheries. These activities have a secondary impact on the fish buyers and processors, and ultimately the fishing-dependent communities where vessels dock and fishing families live. These parts of the socioeconomic environment are described in Sections 7 and 8.

According to PacFIN data, of 4,579 vessels active during November 2000 through October 2001, 1,341 (37% of the fleet) landed some groundfish and were responsible for 47% of the value of all West Coast landings (groundfish and nongroundfish species). Commercial fisheries targeting groundfish are, for the most part, regulated under a license limitation (or limited entry) program implemented in 1994 (see Section 1.2.4). Other fisheries, which either target groundfish or catch them incidentally, but do not hold groundfish limited entry permits, are considered "open access" fisheries. (As noted in Section 1.2.4, these vessels may possess limited entry licenses for other, nongroundfish fisheries.) The Council allocates harvest limits (expressed as optimum yields, or OYs) between different regulatory and fishery sectors, including limited entry and open access fisheries.

Marine recreational fisheries consist of both charter and private vessels. Charter vessels are larger vessels for hire, which typically can fish farther offshore than most vessels in the private recreational fleet. Fishing opportunity both in nearshore areas and farther out on the continental shelf are important for West Coast recreational groundfish fishermen. Recreational fisheries are described in Section 6.2.

Indian tribes in Washington, primarily the Makah, Quileute, and Quinault, also harvest groundfish in the EEZ. There are set tribal allocations for sablefish and Pacific whiting, while the other groundfish species' allocations are determined through the Council process in coordination with the tribes, states, and NMFS. Commercial tribal groundfish fisheries are described in Section 6.3.

Tables 6-1a, 6-1b, and 6-1c list 1981–2002 commercial landings by round weight, exvessel revenue in current dollars, and exvessel revenue in inflation-adjusted dollars for commercially important species on the West Coast. Tables 6-2a, 6-2b, and 6-2c summarize commercial groundfish landings by state, also in round weight and exvessel value terms. Table 6-3 lists historical landings separately for the limited entry trawl, limited entry fixed gear, and open access fleets.

6.1 Commercial Fisheries

In 1994, NMFS implemented Amendment 6 to the groundfish FMP, a license limitation program intended to restrict vessel participation in the directed commercial groundfish fisheries off Washington, Oregon, and California. The limited entry permits that were created through that program specify the gear type a permitted vessel may use to participate in the limited entry fishery and the vessel length associated with the permit.

Most of the Pacific Coast non-tribal commercial groundfish harvest is taken by the limited entry fleet. The groundfish limited entry program includes most vessels using trawl, longline, and trap (or pot) gears. There are also several open access fisheries that take groundfish incidentally or in small amounts; participants in those fisheries may use, among other gear types, longline, vertical hook-and-line, troll, pot, setnet, trammel net, shrimp and prawn trawl, California halibut trawl, and sea cucumber trawl. Vessels in the open access sector are described in Section 6.1.3. These vessels do not hold groundfish limited entry permits yet may target groundfish or catch them incidentally; although their groundfish landings are much smaller, they are part of the economic make-up for West Coast groundfish vessels

As of March, 2002, there were 450 vessels with Pacific Coast groundfish limited entry permits, of which approximately 54% were trawl vessels, 40% were longline vessels, and 6% were trap vessels. The number of vessels registered for use with limited entry permits has decreased since because of the implementation of the permit stacking program for sablefish-endorsed limited entry fixed gear permits 2001 and the limited entry trawl vessel buyback program, completed in late 2003. (Section 1.2.4 describes these programs.)

Limited entry permits may be sold and leased out by their owners, so the distribution of permits between the three states often shifts. In 2002, roughly 23% of the limited entry permits were assigned to vessels making landings in California, 39% to vessels making landings in Oregon, and 37% to vessels making landings in Washington. In 1999, this division of permits was approximately 41% for California, 37% for Oregon, and 21% for Washington. This change in state distribution of limited entry permits may also be due to the implementation of the permit stacking program. Vessels operating from northern ports may have purchased or leased sablefish-endorsed permits from vessels that had been operating out of California ports.

Figure 6-1 graphs historical groundfish landings data from Table 6-1a and Figure 6-2 shows equivalent information, in inflation adjusted dollars, from Table 6-1c. The large volume of Pacific whiting landings dominate Figure 6-1 and the emergence of shore-based processing of this species is evident. (Note that the at-sea sector includes joint venture fisheries occurring in the 1980s. "Americanization" ultimately replaced foreign processors with domestic ones.) Landings peaked in 1994, although landings of species other than whiting continued a long-term declining trend during this period. (Note that flatfish, sablefish, and rockfish landings all peaked in 1982, the first full year of groundfish FMP management. Some decline in landings is to be expected, however, as standing stocks are "fished down" to MSY biomass.) Landings in all species categories declined steeply after 1998, when various groundfish began to be designated overfished; rockfish show the most precipitous fall—by about three-quarters from 1998 to 2002. Figure 6-2 provides a different perspective; inflation adjusted values allow direct comparison of landings value between years. Low-value whiting is a much less prominent component of landings when measured this way. Rockfish have been, and continue to be, an important part of landings value, as have sablefish, and to a lesser degree, flatfish. Measured in constant dollars, the change in rockfish landings between 1998 and 2002 is still severe, falling by a little more than half , but the decline in value of sablefish catches is slight while flatfish landings actually increased very slightly during this period. Overall, groundfish landings measured by weight peaked in 1994 at 305,312 mt and have declined by about half since then; measured in constant dollars, landings value was greatest in 1997 at almost $93 million and by 2002 had fallen by about 45%.

Figures 6-3 through 6-9 graph the seasonal distribution of landings and at-sea deliveries of groundfish and non-groundfish species during 2002. Figures 6-9 through 6-14 repeat the same information in terms of exvessel revenue. Figures 6-3 and 6-8 highlight the relative unimportance of groundfish in total landings in California, and the relatively high level of nongroundfish landings there, especially during the winter months. Figures 6-4 shows the pronounced spike in total groundfish landings in Oregon during the summer months. However figure 6-10 confirms that these landings are primarily relatively low-value species, such as whiting. Comparing these two figures also shows an increase in relatively high-value landings of nongroundfish species (mostly Dungeness crab) in Oregon during December and January. Figures 6-5 and 6-11 show a similar pattern of landings in Washington as in Oregon, except with a much lower midsummer spike in groundfish landings. Figures 6-6 and 6-12 show the seasonal landings distribution coastwide, combining the data for the three states. Figure 6-12 shows how the pronounced midsummer spike in groundfish landings has a much smaller effect on total exvessel revenues. Figures 6-7 and 6-13 show the additional landings and revenue generated in 2002 by the at-sea whiting sector. Note the near absence of non-groundfish species landed by the at-sea sector. Finally Figures 6-8 and 6-14 combine the at-sea data from figures 6-7 and 6-13 with the coastwide totals in figures 6-6 and 6-12. Note the additional spike in groundfish caught during May due to the inclusion of the at-sea data.

6.1.1 Limited Entry Trawl Fisheries

West Coast limited entry trawl vessels use midwater gear to target Pacific whiting and yellowtail and widow rockfish, or bottom gear for flatfish species (on the continental shelf and slope) and the Dover sole–thornyhead–sablefish (DTS) complex in deep water. Some continental shelf and slope rockfish species have also been important targets in the limited entry trawl fishery. Although trawlers may catch a wide range of species, the following species account for the bulk of landings (other than Pacific whiting) measured by weight: Dover sole, arrowtooth flounder, petrale sole, sablefish, thornyheads, and yellowtail rockfish. Although some rockfish species were important component of landings in the past, management measures intended to reduce the directed and incidental catch of overfished rockfish and other depleted species have significantly reduced the rockfish catches in recent years (see Table 6-4).

Trawlers take the vast majority of the groundfish harvest measured by weight but somewhat less if measured by value. In 2002, groundfish trawlers landed 98% of total groundfish harvest by weight but only 74% by value. Non-trawl vessels, in contrast, while only taking the remaining 3%, realized greater value per landed weight, primarily due to relatively large landings of high-value sablefish. Pacific whiting, although accounting for a large share of groundfish landings—83% by weight in 2002—are a low-value product, accounting for only 26% of groundfish exvessel revenue in that year. Since whiting are caught almost exclusively by limited entry trawl vessels, they skew the overall value per unit weight calculations for this sector.

The whiting trawl fishery, prosecuted by limited entry permit holders, is concentrated in the Columbia area and the U.S. portion of the Vancouver area (see Figure 1-6). Large-scale harvesting of Pacific whiting in the U.S. EEZ began in 1966 when factory trawlers from the then Soviet Union began targeting Pacific whiting. During the mid-1970s, factory trawlers from Poland, the Federal Republic of Germany, the former German Democratic Republic, and Bulgaria also participated in the fishery. From 1966 to 1979, the catch in U.S. waters averaged 137,000 mt per year. A joint-venture fishery began in 1978 with two U.S. trawlers supplying fish to Soviet factory trawlers acting as motherships. By 1982, the joint-venture catch surpassed the foreign catch. In the late 1980s, joint-ventures involved fishing companies from Poland, Japan, the former Soviet Union, the Republic of Korea, and the People's Republic of China. In 1989 the U.S. fleet capacity had grown to a level sufficient to harvest the entire quota, and no foreign fishing was allowed.

Historically, the foreign and joint-venture fisheries produced fillets and headed-and-gutted products. In 1989, Japanese motherships began producing surimi from Pacific whiting, using a newly developed process to inhibit deterioration of the flesh resulting from myxozoan-induced proteolysis. In 1990, domestic catcher-processors and motherships entered the Pacific whiting fishery in the U.S. zone. Previously, these vessels had engaged primarily in Alaskan pollock fisheries. The development of surimi production techniques made Pacific whiting a viable alternative. In 1991 the joint-venture fishery for Pacific whiting ended, because of the high level of participation by domestic catcher-processors and motherships and the growth of shore-based processing capacity. Shore-based processors of Pacific whiting had been constrained historically by a limited domestic market for Pacific whiting fillets and headed-and-gutted products. The construction of surimi plants in Newport and Astoria led to a rapid expansion of shore-based landings in the early 1990s.

Table 6-4 shows groundfish and nongroundfish limited entry trawl landings in major species categories north and south of 40°10' N latitude. This line of latitude, about 20 miles south of Cape Mendocino, is the primary demarcation used in groundfish management. Cumulative trip limits, for example, usually differ north and south of this line. For management purposes this line supplanted the boundary between the Eureka and Monterey management areas, at 40º30' N latitude. Because important fishing grounds straddle that boundary, using a line slightly to the south simplifies management and enforcement.

As shown in Table 6-4, most limited entry trawl landings occur north of 40º10' N latitude—146,660 mt of groundfish in 2002, or 97% of that year's landings. Again, Pacific whiting account for a large part of these landings since that fishery occurs almost exclusively in the north. Excluding whiting, limited entry trawlers landed 16,418 mt of groundfish in the north, worth $18.2 million, compared to 4,986 mt, worth $6.2 million, in the south. Important groundfish trawl fisheries, aside from whiting, include the deepwater DTS fishery, and bottom trawling on the continental shelf for flatfish—principally arrowtooth flounder, petrale sole and Dover sole—and other bottom-dwellers. Fisheries targeting rockfish by bottom and midwater trawl were more important in the past; management restrictions necessary to prevent overfishing and rebuild overfished stocks, which are mostly rockfish species, have diminished these fisheries. Rockfish were a more important component of trawl landings in the south as recently as 2002, however. Looking at Table 6-4, rockfish accounted for 33% of non-whiting landings in the south versus 22% in the north. In 1998, before overfishing declarations triggered more restrictive management measures, the share was more comparable—55% in the north versus 46% in the south.

6.1.2 Limited Entry Fixed Gear Fisheries

Vessels deploying longlines and traps (pots) comprise the bulk of the limited entry fixed gear sector. These gear types also may be used by vessels in the open access sector, but preferential harvest limits favor license holders. High-value sablefish have been the principal target species for these vessels; this species accounts for the bulk of landings, especially when measured by exvessel value. (According to Table 6-5, sablefish generated $7.5 million in revenues in 2002, close to three-quarters of the $10.6 million in landings generated by this sector during the year.) Not unexpectedly, this sector has been plagued by overcapacity, although a series of management initiatives have largely addressed the problem. In the early to mid 1990s the fishery was a "derby" managed by very short seasons of two weeks or less. Amendment 9, requiring an permit endorsement to participate in the primary sablefish fishery, and Amendment 14, introducing permit stacking, have helped to alleviate the symptoms of over capacity in the fixed gear sablefish fishery, effectively eliminating the short, derby season. (Permit stacking allows up to three sablefish-endorsed permits to be used per vessel. Through a tier system, landing limits vary with the number and type of permits held. Section 1.2.4 describes this management regime in more detail.)

Table 6-5 shows limited entry fixed gear landings by major species groups north and south of 40°10' N latitude. Overall, landings were about three times greater in the north than in the south in 2002, although rockfish landings are almost equal in the two regions, making these species a more important component of catches in the south.

6.1.3 The Open Access Sector

The open access sector comprises vessels that do not hold a federal groundfish limited entry permit and target or incidentally catch groundfish with a variety of gears, excluding groundfish trawl gear. As discussed in Section 1.2.4, the "open access" appellation can be confusing because vessels in this sector may hold limited entry permits for other, nongroundfish fisheries issued by the federal or state governments. However, groundfish catches by these vessels are regulated under the groundfish FMP. For example, open access vessels must comply with cumulative trip limits established for this sector and are subject to the operational restrictions imposed by the Groundfish Conservation Areas.

Fishery managers divide this sector into directed and incidental categories. The directed fishery comprises vessels targeting groundfish while the incidental fishery category applies to vessels targeting other groundfish but landing some groundfish in the process. (Section 3 describes nongroundfish species and associated fisheries that may also land some groundfish.) In practice it can be difficult to segregate vessels into these two categories because, ultimately, the choice depends on the intention of the fisher (which the manager does not know). Over the course of a year—or even during a single trip—a fisher may engage in several different strategies, switching between the directed and incidental categories. Such changes in strategy are likely the result of a variety of factors, but especially the potential economic return from landing a particular mix of species. Because of these complexities, managers typically distinguish directed from incidental vessels by applying a 50% threshold value to the landings composition for a particular vessel (or trip, depending on the kind of analysis): open access vessels with more than half of their total landings value coming from groundfish are considered in the directed fishery while the remainder are assumed to be landing groundfish incidentally while targeting other species. Based on this criterion, the number of unique vessels targeting groundfish in the open access fishery between 1995 and 1998 coastwide was 2,723, while 2,024 unique vessels landed groundfish as incidental catch (1,231 of these vessels participated in both) (SSC Economic Subcommittee 2000).

Fisheries are generally distributed along the coast in patterns governed by factors such as location of target species and ports with supporting marine supplies and services, and restrictions or regulations imposed by state and federal governments. The majority of landings by the directed groundfish fishery, by weight, occur off California, while Oregon shows the next highest landings, followed by Washington. In the incidental groundfish fisheries, Washington also has the lowest groundfish landings by the incidental fishery, by weight of incidental groundfish (Hastie 2001). A research report reiterates these findings:

> [participation in] both directed and bycatch contents of the open access fishery is much greater in California than in Oregon and Washington combined. For instance, in 1998, 779 California boats, 232 Oregon boats, and 50 Washington boats participated in the directed fishery. In that same year, 520 California boats, 305 Oregon boats, and 40 Washington boats participated in the bycatch fishery (SSC Economic Subcommittee 2000).

Table 6-6 shows open access landings by major species groups north and south of 40°10' N latitude. It can be seen that this sector is more important in the south, measured by landings and landings revenue. Also, open access fishers in the south earned more per pound of landed fish, reflecting more lucrative markets—for live fish among others—in that region. Overall, open access groundfish landings in 2002 (472 mt) were down 59% compared to 1998 (1,162 mt). But the fall in landings during this period in the south—a 70% decline—is much steeper than in north. The net result is that the landings differential between the two regions is now less dramatic. In 1998 vessels in the south landed almost three and a half times as much groundfish as those in the north; by 2002 it was less than one and half times as much. Shrinking cumulative trip limits for open access vessels during this period are the main contributor to these changes (aside from the effects of groundfish license limitation). Rockfish were an important component of open access groundfish landings in the south—75% of landings by weight in 1998. Limits imposed because of overfishing declarations for certain rockfish species, bocaccio and cowcod in particular, partly explain the steep drop in landings in the south. to declines in this sector.

Participation in the directed open access fishery segment decreased from 1,357 vessels in 1994 to 1,032 in 1999. Participants may be moving into other, more profitable fisheries, or may have quit fishing altogether. Fishers use various gears types to target particular groundfish species. Hook-and-line gear, the most common gear type, is generally used to target sablefish, rockfish, and lingcod; pot gear generally is used when targeting sablefish and some thornyheads and rockfish. Though largely restricted from use under current regulations, in the past in Southern and Central California setnet gear has been used to target rockfish, including chilipepper, widow rockfish, bocaccio, yellowtail rockfish, and olive rockfish, and to a lesser extent vermillion rockfish.

Another important distinction in the directed segment is between fishers landing fish alive. Although groundfish targeted by open access fishers are typically landed and sold dead, higher prices for live fish have stimulated landings in this category. Live fish harvests are a recent but growing component of the directed fishery: in 2001, 20% of fish landed (by weight, coastwide) by directed open access fishers was alive, compared to only 6% in 1996.[17/] In the live-fish fishery the fish are caught using pots, stick gear, and rod-and-reel, and kept aboard the vessel in a seawater tank, to be delivered to foodfish markets—such as the large immigrant Asian communities in California—that pay a premium for live fish. Currently, Oregon and California are drafting nearshore fishery management plans that would transition some species of groundfish landed in the live fish fishery from federal to state management.

Many fishers catch groundfish incidentally when targeting other species, because of the kind of gear they use and the co-occurrence of target and groundfish species in a given area. Managers classify vessels in the open access incidental fishery if groundfish comprise 50% or less of their landings, measured by dollar value. Fisheries targeting pink shrimp, spot prawn, ridgeback prawn, California and Pacific halibut, Dungeness crab, salmon, sea cucumber, coastal pelagic species, California sheephead, highly migratory species, and the mix of species caught in the gillnet complex comprise this incidental segment of the open access sector. These fisheries and associated target species are described in Section 3.

6.2 Recreational Fisheries

Recreational fishing has been part of the culture and economy of West Coast fishing communities for more than 50 years. Along the northern coast, recreational fishing traditionally targeted salmon, but rockfish and lingcod often provided a bonus to anglers. Recreational fisheries have contributed substantially to fishing communities, bringing in dollars and also contributing to tourism in general.

The distribution of resident and non-resident ocean anglers among the West Coast states in 2000 is shown in Table 6-7. The table demonstrates the importance of recreational fishing, especially in Southern California. The estimated number of recreational marine anglers in Southern California was two and a half times the number in the next most numerous region, Washington state. While the bulk of recreational fishers in all areas were residents of those areas, a significant share were non-residents. Oregon had the greatest share of non-resident fishers at more than one-fifth of total ocean anglers.

Recreational fishing in the open ocean has generally been on an increasing trend since 1996 (see Table 6-8); however, charter effort has decreased while private effort increased during that period. Part of this increase is likely the result of longer salmon seasons associated with increased abundance. Some effort shift from salmon to groundfish likely occurred prior to 1996 when salmon seasons were shortened. Groundfish are both targeted and caught incidentally when other species, such as salmon, are targeted. While the contribution of groundfish catches to the overall incentive to engage in a recreational fishing trip is uncertain, it seems likely that the possibility or frequency of groundfish catch on a trip adds to overall enjoyment and perceived value.

Almost half of the total recreational groundfish harvest occurred in Northern California on the West Coast in 2002 and nearshore rockfish species accounted for one half of this groundfish catch (PFMC 2004). More than two-thirds of shelf rockfish species caught were in Southern California. California claimed more than two thirds of the recreational groundfish harvested, and almost three quarters of the total recreational harvest. Half of the total salmon recreational harvest was landed in Washington. This comprised more than 80% of

17/ Managers are faced with a similar problem as discussed above in determining landings from this fishery. Landings data do distinguish live fish sales, but the price information suggests that this classification is inaccurate. Therefore, in practice, only those sales of species other than sablefish that garner a landed price above $2.50 per pound are classified in the live fish sector (see Table 3.5.2-10 in PFMC 2004 for a price breakdown).

Washington's total recreational harvest. While Northern California's salmon catch was nearly as great as Washington's, it comprised less than half of the region's total recreational harvest.

Fishing effort is related to weather, with relatively more effort occurring in the milder months of summer, and relatively less in winter (Table 6-9). As might be expected, this effect is more pronounced in higher latitudes, although the reasons include opportunity as well as climate. Salmon seasons are longer in California than in Oregon, which in turn are longer than in Washington. Until recently, groundfish seasons were also more restrictive in Washington, with the lingcod season being closed from November through March.

6.2.1 Recreational Charter Industry

The distribution of West Coast charter vessels engaged in ocean fishing in 2001 is shown in Table 6-10. More than half of the charter vessels operated from California ports, again demonstrating the importance of recreational fishing industry in that state.

6.2.2 Private Vessels and the Recreational Fishing Experience Market

Just as West Coast commercial groundfish is only one segment of a broader food market, the groundfish recreational fishery represents only one segment of a broader recreational market. Other types of marine recreational angler trips, freshwater angling, and other recreational activities are, to varying degrees, potential substitutes for ocean groundfish fishing.

Demand for recreational trips and estimates of the economic impacts resulting from recreational fishing are related to numbers of anglers. Unfortunately, reliable data are not available on the number of West Coast anglers targeting specific species.

However, data are available on the total number of saltwater anglers, and it is evident the presence of opportunities to catch species other than directly targeted ones increases the propensity of anglers to fish and the value of the overall recreational fishing experience. In the U.S., over 9 million anglers took part in 76 million marine recreational fishing trips in 2000. The West Coast accounted for about 22% of these participants and 12% of trips. Seventy percent of West Coast trips were made off California, 19% off Washington, and 11% from Oregon.

Although California's marine recreational fishery dominates the other West Coast states both in terms of numbers of anglers and trips, Oregon attracts the largest share of non-resident anglers, probably chiefly due to the access it affords to the seasonal salmon fisheries at the mouth of the Columbia River.

Table 6-8 shows that in three of the four West Coast regions, groundfish catch, either targeted or incidental, accompanied a significant share of both charter and private recreational trips. This effect was greatest in Oregon where groundfish catch was consistently associated with over half the recreational trips each year. Only in Southern California did groundfish appear to be a relatively minor part of regional marine recreational effort.

6.3 Tribal Fisheries

In 1994 the U.S. government formally recognized that four Washington coastal tribes (Makah, Quileute, Hoh, and Quinault) have treaty rights to fish for groundfish. In general terms, they may take half of the harvestable surplus of groundfish available in the tribes' usual and accustomed (U&A) fishing areas (described at 60 CFR 660.324, also see Section 1.1.3.2). West Coast treaty tribes have formal allocations for sablefish, black rockfish, and Pacific whiting. Members of the four coastal treaty tribes participate in commercial, ceremonial, and subsistence fisheries for groundfish off the Washington coast. 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.

There are several groundfish species taken in tribal fisheries for which the tribes have no formal allocations, and some species for which no specific allocation has been determined. Rather than try to reserve specific allocations of these species, the tribes annually recommend trip limits for these species to the Council, who try to accommodate these fisheries. Tribal trip limits for groundfish species without tribal allocations are usually intended to constrain direct catch and incidental retention of overfished species in the tribal groundfish fisheries.

Twelve 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.

The bulk of tribal groundfish landings occur during the March-April halibut and sablefish fisheries. Most continental shelf species taken in the tribal groundfish fisheries are taken during the halibut fisheries, and most slope species are similarly taken during the tribal sablefish fisheries. Approximately one-third of the tribal sablefish allocation is taken during an open competition fishery, in which vessels from the four tribes on the Washington coast 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 between the tribes according to a mutually agreed-upon allocation scheme. Specific sablefish allocations are managed by the individual tribes. The fishery begins in March and goes until some time in the autumn, depending on the number of vessels participating in the fishery. Participants in the halibut and sablefish fisheries tend to use hook-and-line gear, as required by the IPHC. For equity reasons, the tribes have agreed to also use snap-line gear in the fully competitive halibut and sablefish fisheries. Therefore, someone participating in a fully competitive sablefish fishery, and did not land any halibut, would not have to meet any IPHC requirements. But according to tribal regulations, they would still have to use snap-line gear.

In addition to these hook-and-line fisheries, the Makah tribe annually harvests a whiting allocation using mid-water trawl gear. Since 1996, a portion of the U.S. whiting OY has been allocated to the Pacific Coast treaty tribes. The tribal allocation is subtracted from the whiting OY before allocation to the nontribal 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 fished on the tribal whiting allocation. Makah vessels fit with mid-water trawl gear have also been targeting widow rockfish and yellowtail rockfish in recent years.

Table 6-11 shows recorded landings of groundfish species by treaty tribes from 1995 to 2002. Since 1996, Pacific whiting have comprised the vast bulk of tribal landings, even though in 2000 and 2001 whiting landings were relatively low due to reduced coastwide allocations. As shown in Table 6-12, in terms of exvessel revenue, sablefish landings provided well over half of total tribal groundfish revenue each year except 1998, 1999, and 2002.

6.4 *Impact-Related Fishery Characteristics*

6.4.1 Bycatch of Overfished Species

6.4.1.1 Limited Entry Trawl Bycatch

Of the West Coast limited entry trawl fisheries, those targeting Pacific whiting have the best accountability of overfished species bycatch (Table 6-13). Bycatch rates of overfished species appear to have declined in recent years, possibly due to industry efforts to avoid bycatch of overfished species. Much of the bycatch often occurs in single “disaster tows” in which the dominant species is not Pacific whiting. The at-sea sectors (motherships and catcher-processors) have had a long-standing, 100% observer program with direct estimation of bycatch. The Council and NMFS have annually adopted an exempted fishing permit (EFP) that suspends at-sea sorting requirements in the shoreside whiting fishery, enabling port sampling of the entire catch. The tribes, primarily the Makah Tribe, account for their landings and report them to PacFIN.

Limited entry trawl landings of overfished shelf rockfish species in the non-whiting trawl fisheries were reduced dramatically by small footrope restrictions imposed in 2000 (Table 6-14, also see Section 1.4.2.2). However, with the absence of direct observations to determine discarded bycatch, other methods were needed to estimate the total catch of overfished groundfish species in the West Coast limited entry trawl fishery. NMFS began developing a trawl bycatch model in 2001 (Hastie 2001; Hastie [2003]). Endorsed by the SSC and Council in November 2001, it was first used to estimate total catch mortality (landed catch plus bycatch) of five overfished groundfish species (bocaccio, canary rockfish, darkblotched rockfish, lingcod, and Pacific ocean perch) based on the application of proposed management measures. It also predicts trawl vessel participation and effort shifts given different fishing opportunities (vessel landing limits by species and species complex). The model uses co-occurrence rates for overfished species relative to the weight of key target groundfish species and complexes. The model has been updated and refined to incorporate overfished additional species, changing management measures, and newly available data. When RCAs were implemented in late 2002, information on catch of species by depth was integrated into the model in order to estimate the effect of different closed area configuration on bycatch. When observer data became available early in 2003, bycatch rates from these observations substituted for rates then in use and thought to be less reliable. Originally bycatch (or co-occurrence catch rates) was stratified by time period, area, and fishery, based on data from logbooks and other reporting; in 2003 only one year of observer data was available and coverage was not sufficient to allow this degree of stratification. The data were therefore grouped in fewer categories. In 2004 this bycatch model will be further updated, using data from the second year of the groundfish observer program to expand bycatch projections to the limited entry fixed gear sector.

6.4.1.2 Limited Entry Fixed Gear Bycatch

Two major classes of fishing gear are used in the limited entry fixed gear sector: traps and longlines. These gears are both effective in catching sablefish, the most important target species in this sector, but have different rates of observed bycatch of the overfished species. Baited longlines, whether deployed horizontally on the bottom or deployed vertically in the water column, are much more effective at capturing rockfish, and therefore, more prone to incidentally catch overfished rockfish species than traps.

Limited entry fixed gear fisheries have primarily targeted rockfish and sablefish on the shelf and slope. Groundfish landings of overfished species by this sector are depicted in Table 6-14. With no corresponding bycatch model for this fishery, discard in the fishery is not as well known as in the limited entry trawl fishery. Fixed gear fisheries do not account for a significant proportion of overfished slope rockfish bycatch. Limited entry and open access fixed gears have accounted for only 3.0% and 0.2% of the average total landings of darkblotched rockfish and Pacific ocean perch, respectively, during 1981 through 2001 on the West Coast. Therefore, fixed gear opportunities targeting slope rockfish and sablefish on the continental slope may not pose a risk for overfished groundfish species.

The proportion of shelf rockfish species landed with fixed gear has increased in recent years. This has been especially true since the small footrope restrictions were imposed on the trawl fishery in 2000. Yelloweye rockfish landings in 1999-2001 were higher in this sector than in other groundfish sectors (PFMC 2004), which is a management concern given the low harvest levels considered for rebuilding this stock. Some shelf rockfish species, such as canary rockfish and yelloweye rockfish, have been a highly valued target for this sector of the fishery. Yelloweye rockfish are particularly vulnerable to targeting due to their sedentary nature. Longline gears are particularly effective gears for targeting yelloweye rockfish in the high relief habitats they inhabit. In Washington, where yelloweye are most abundant, 97.5% of all rockfish landed in commercial directed line fisheries in 2001 were yelloweye rockfish. In 1999, there were 23 mt of yelloweye rockfish landed in Washington fixed gear fisheries.

6.4.1.3 Open Access Sector Bycatch

Directed open access fisheries that target groundfish use the same fixed gear types and fish in the same areas as the limited entry fixed gear sector. Rockfish and sablefish are primary target species for this sector as well. Table 6-14 shows landings of overfished species by open access vessels (distinguishing the shrimp fishery and other open access fisheries). These landings include both targeted and incidentally caught groundfish. An open access vessel may combine opportunities to target federally-managed groundfish and nongroundfish species during a single trip. Further disaggregation of landings data between the direct open access and the incidental open access sectors is therefore somewhat arbitrary and dependent on the filtering criterion. (In other words, if more than 50% of the landed catch in a trip is groundfish, the trip qualifies as directed open access.) It is, therefore, more difficult to infer the proportion of recent landings of overfished groundfish species that were targeted versus incidentally-caught in open access fisheries.

Section 3 describes fisheries targeting nongroundfish stocks that may harvest groundfish incidentally. The 2004 groundfish harvest specifications EIS (PFMC 2004) provides additional information on groundfish bycatch in these fisheries.

6.4.1.4 Recreational Fisheries Bycatch

Table 6-15 shows estimated recreational catch of overfished groundfish species from 1998 through 2002 by subregion and type of vessel. Values in the table were derived from RecFIN data gathered through MRFSS and other port sampling programs. (Note that catch estimates for 2002 are preliminary.)

There is no recreational fishery where darkblotched rockfish is either targeted or taken incidentally. Also, no significant amounts of POP are caught recreationally. There are, however, significant recreational catch of several other species. For example, canary rockfish are harvested primarily in Northern California and Oregon, with smaller amounts taken in Southern California and Washington. The bulk of canary rockfish were taken by charter vessels in all years shown except for 2002.

Lingcod is landed coastwide, but the majority of harvest occurs in Northern California and Oregon. Unlike canary rockfish, the bulk of lingcod were taken by private boats. Of the overfished species, lingcod were by far the most commonly caught species in the ocean recreational fisheries each year.

Other overfished groundfish species caught in the recreational fishery include bocaccio, cowcod, widow rockfish, and yelloweye rockfish. Note that bocaccio is only considered overfished in Southern California. Cowcod are encountered almost exclusively in Southern California. Cowcod catch has diminished in recent years due to more restrictive management measures. Widow rockfish are caught primarily in Northern California, and occasionally in Oregon, but rarely in Southern California or Washington. Yelloweye rockfish are caught throughout Washington, Oregon, and Northern California, especially north of Cape Mendocino. Yelloweye rockfish are rarely caught in Southern California. The estimated discard mortality of yelloweye rockfish in the Oregon recreational fishery during 2002 was equivalent to about 23% of the landed catch. Discard mortality of canary was estimated to be about 8% of the landed catch (PFMC 2004).

6.4.1.5 Tribal Sector Bycatch

Tribal directed groundfish fisheries are subject to full retention. 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, and yellowtail rockfish. These trip limits are intended to constrain direct catches while allowing for small incidental catches. Such trip limits are in place for longspine and shortspine thornyheads combined, canary rockfish, yelloweye rockfish, minor shelf rockfish, and minor slope rockfish. For all other species, limited entry trip limits apply. Rockfish trip limits do not apply during fully competitive fisheries for Pacific halibut nor 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. Trip limit overages in all other fisheries are forfeited to the tribes. In 2002, the midwater yellowtail fishery accounted for all of the rockfish trip limit overages.

6.4.2 Dependence On and Involvement In Groundfish Fisheries

The concepts of dependence and involvement in fisheries are derived from national standard 8 in the MSA. This standard requires consideration of the effect of conservation and management measures on fishing communities. The Act defines a fishing community as “a community which is substantially dependent on or substantially engaged in the harvest or processing of fishery resources.” These concepts are, by extension, used to characterize fishing fleets and processors coastwide, with the term involvement substituting for engagement, which is not defined in guidelines. Dependence refers to the proportion of a fishery sector’s revenues derived from fishery management unit species. Vessels and processors having a higher proportion of groundfish in their catch or product, for example, are more dependent on groundfish. Involvement refers to the relative importance of a fishery sector in terms of the proportion of the total catch of managed species they account for. A fishery sector or community that accounts for a relatively high proportion of the total groundfish catch, for example, is considered more involved in groundfish fisheries. A community or fishery sector may be heavily involved in groundfish fisheries even if income from these species account for a relatively small proportion of the local economy or, in the case of a fishery sector, a small proportion of total exvessel revenue. Seattle, for example, is substantially involved in groundfish fisheries, but groundfish - related revenue and income account for a small part of the local economy.

Dependence and involvement may vary seasonally. Catcher vessel owners and captains employ a variety of strategies to fill out a year of fishing. Fishers from the northern ports may fish in waters off of Alaska, as well as in the West Coast groundfish fishery. Others may change their operations throughout the year, targeting on salmon, shrimp, crab, or albacore, in addition to various high-value groundfish species, so as to spend more time in waters close to their communities. Factory trawlers and motherships fishing for or processing Pacific whiting off of the West Coast usually also participate in the Alaska pollock seasons, allowing the vessels and crews to spend a greater percentage of the year at work on the ocean. Commercial fisheries landings for species other than groundfish vary along the length of the coast. Dungeness crab landings are particularly high in Washington state. Squid, anchovies, and other coastal pelagics figure heavily in California commercial landings. Landings of salmon, shrimp, and highly migratory species like albacore are more widely distributed, and vary from year to year.

There is some degree of gear loyalty for groundfish vessels participating in nongroundfish fisheries. For example, a notable proportion of the nongroundfish fishery participation by groundfish trawl vessels occurs in the shrimp and prawn trawl fisheries. Similarly, the hook-and-line groundfish fisheries show high participation in the troll albacore and troll salmon fisheries. And, while all three gear groups participate in pot fisheries for crab, groundfish pot vessels show the greatest percentage of gear group participation in pot fisheries for crab and other crustaceans.

Table 6-16 summarizes vessel involvement in groundfish and other West Coast fisheries by relating vessels making the greatest landings, measured in dollars, in all fisheries compared to groundfish fisheries.

Tables 6-17a and 6-17b provide information on the number of vessels and gross revenues by level of dependence in the fishery.

Tables 6-18a and b 6-18b provide similar information by vessel size and level of dependence.

Table 6-19 relates vessel size to gear type and the species harvested by typical depth range for the species.

TABLE 6-1a. Total domestic shoreside landings and at-sea deliveries (round weight mt) from West Coast (WA, OR, CA) ocean area fisheries (0-200 miles) coastwide, 1981-2002 (includes commercial tribal fisheries, based on PacFIN data and Council [1997]). (page 1 of 2)

Year	Lingcod	Whiting, At Sea	Whiting, Shoreside	Flatfish	Sablefish	Rockfish	Other Groundfish	Total Groundfish	Total Groundfish - Less Whiting	Total Groundfish - Less At Sea Whiting	Pink Shrimp	Spot Prawn, Trawl	Spot Prawn, Pot	Ridgeback Prawn, Trawl	Pacific Halibut
1981	3,307	73,557	838	25,972	11,419	59,774	1,729	176,596	102,201	103,039	18,202	174	4	87	160
1982	3,822	67,465	1,027	32,613	18,625	61,470	1,277	186,299	117,807	118,834	12,704	162	8	61	164
1983	4,163	72,100	1,051	29,639	14,685	48,157	889	170,684	97,533	98,584	6,052	58	1	70	322
1984	4,060	78,889	2,721	27,703	14,077	40,020	1,079	168,549	86,939	89,660	4,488	29	0	259	598
1985	3,883	31,692	3,894	30,400	14,308	37,347	967	122,491	86,905	90,799	12,408	26	4	357	536
1986	1,894	81,639	3,463	26,127	13,290	37,012	661	164,086	78,984	82,447	26,330	12	13	130	748
1987	2,586	105,997	4,795	28,796	12,784	40,242	2,644	197,844	87,052	91,847	31,060	21	14	85	307
1988	2,656	135,781	6,867	27,043	10,876	40,980	3,788	227,991	85,343	92,210	32,334	23	41	55	260
1989	3,580	203,578	7,414	29,880	10,439	45,334	2,694	302,919	91,927	99,341	35,550	30	48	61	212
1990	2,932	175,685	8,115	27,701	9,179	43,265	1,813	268,690	84,890	93,005	24,553	19	101	34	153
1991	3,167	200,594	21,040	30,515	9,496	35,282	2,978	303,072	81,438	102,478	19,064	21	103	52	169
1992	1,883	148,186	56,127	24,796	9,360	37,000	3,255	280,607	76,294	132,421	35,710	35	65	27	217
1993	2,200	91,640	42,108	22,107	8,145	38,252	3,483	207,935	74,187	116,295	22,451	51	105	33	252
1994	2,834	162,923	73,611	19,284	7,661	35,361	3,638	305,312	68,778	142,389	14,981	133	66	71	179
1995	1,700	98,376	74,967	19,706	7,951	32,171	2,135	237,006	63,663	138,630	11,342	136	42	187	142
1996	1,790	123,419	85,127	20,807	8,339	30,487	2,559	272,528	63,982	149,109	13,800	178	54	264	150
1997	1,652	142,726	87,410	19,508	7,951	25,576	2,271	287,094	56,958	144,368	17,456	263	79	177	201
1998	506	142,810	88,601	16,722	4,410	22,619	2,180	277,848	46,437	135,038	4,342	257	117	197	223
1999	441	139,940	83,637	20,213	6,660	16,408	1,627	268,926	45,349	128,986	12,404	185	93	632	220
2000	145	120,411	85,843	16,315	6,296	11,702	1,498	242,210	35,956	121,799	14,653	121	81	705	223
2001	156	99,875	73,475	13,863	5,646	7,806	1,427	202,248	28,898	102,373	17,595	92	95	161	331
2002	205	84,494	45,808	13,220	3,830	5,974	2,115	155,646	25,344	71,151	25,302	99	79	215	422
1981-2002 Avg	*2,253*	*117,354*	*38,997*	*23,770*	*9,792*	*34,193*	*2,123*	*228,481*	*72,130*	*111,127*	*18,763*	*97*	*55*	*178*	*281*
1991-2002 Avg	*1,390*	*129,616*	*68,146*	*19,755*	*7,145*	*24,887*	*2,430*	*253,369*	*55,607*	*123,753*	*17,425*	*131*	*82*	*227*	*227*
1998-2002 Avg	*291*	*117,506*	*75,473*	*16,067*	*5,368*	*12,902*	*1,769*	*229,376*	*36,397*	*111,869*	*14,859*	*151*	*93*	*382*	*284*

NOTE: For 1981-1990, at-sea whiting catch estimates are from Council 1997.

TABLE 6-1a. Total domestic shoreside landings and at-sea deliveries (round weight mt) from West Coast (WA, OR, CA) ocean area fisheries (0-200 miles) coastwide, 1981-2002 (includes commercial tribal fisheries, based on PacFIN data and Council [1997]). (page 2 of 2)

Year	California Halibut	Salmon	Sea Cucumber	California Sheephead	Gillnet Complex	CPS Squid	CPS Wetfish	HMS	Dungeness Crab	Other Crus-taceans	Other Species	Total Non-groundfish	Total
1981	191	7,967	0	0	1,258	23,510	105,357	152,465	9,011	1,480	38,365	360,212	534,827
1982	180	8,831	63	0	1,173	16,360	79,436	115,923	7,623	1,233	46,247	292,150	476,468
1983	289	2,936	74	0	678	1,959	32,076	114,644	7,169	1,403	48,437	218,151	386,852
1984	239	2,180	24	0	829	993	38,084	85,203	6,239	1,849	37,260	180,258	346,822
1985	149	5,043	0	0	1,954	11,071	26,657	34,004	7,703	1,754	43,790	147,441	267,947
1986	197	7,384	35	0	1,801	21,290	28,817	36,916	7,402	1,567	51,113	185,741	347,841
1987	224	9,410	49	0	1,370	19,985	36,860	35,902	8,464	1,447	56,546	203,731	399,588
1988	249	12,518	72	0	1,082	37,232	37,902	36,616	16,715	1,430	59,874	238,391	464,392
1989	273	6,869	0	0	875	40,936	35,160	27,446	16,045	1,806	67,110	234,410	535,341
1990	190	4,682	67	0	775	28,447	39,198	16,088	13,529	2,223	49,672	181,721	448,422
1991	235	3,734	264	0	851	37,388	45,047	11,135	6,185	2,035	31,752	160,026	461,107
1992	272	2,049	0	0	379	13,116	39,219	13,899	15,125	1,607	26,641	150,353	428,968
1993	218	2,214	295	0	309	42,889	31,397	17,300	17,411	1,773	20,341	159,032	364,974
1994	188	1,802	298	118	208	55,489	26,669	20,349	17,682	1,221	17,421	158,869	462,186
1995	262	4,756	268	115	276	70,363	52,963	18,538	16,937	1,462	17,857	197,641	432,652
1996	306	3,306	381	115	347	80,715	49,154	29,396	24,564	1,498	18,931	225,155	495,685
1997	415	3,700	209	141	340	70,471	70,617	26,406	12,347	2,010	22,731	229,560	514,655
1998	415	1,850	349	119	255	2,931	68,576	29,640	11,748	1,720	10,671	135,408	411,294
1999	385	2,709	272	63	394	92,122	76,092	17,702	15,783	1,478	11,901	234,434	501,575
2000	218	3,707	291	79	333	117,984	103,360	14,534	13,015	1,619	13,496	286,419	526,692
2001	245	3,358	323	68	264	85,959	106,105	14,816	11,234	1,643	12,530	256,820	457,100
2002	309	4,660	426	52	353	72,958	106,754	12,908	15,505	1,465	16,639	260,148	415,793
1981-2002 Avg	*257*	*4,803*	*171*	*40*	*732*	*42,917*	*56,159*	*40,083*	*12,611*	*1,624*	*32,697*	*211,466*	*440,054*
1991-2002 Avg	*289*	*3,154*	*281*	*73*	*359*	*61,865*	*64,663*	*18,885*	*14,795*	*1,628*	*18,409*	*202,492*	*456,057*
1998-2002 Avg	*314*	*3,257*	*332*	*76*	*320*	*74,391*	*92,177*	*17,920*	*13,457*	*1,585*	*13,047*	*232,646*	*462,491*

NOTE: For 1981-1990, at-sea whiting catch estimates are from Council 1997.

TABLE 6-1b. Total domestic shoreside landings and at-sea deliveries (exvessel revenue, thousands of current dollars) from West Coast (WA, OR, CA) ocean area fisheries (0-200 miles) coastwide, 1981-2002 (includes commercial tribal fisheries, based on PacFIN data and Council [1997]). (page 1 of 2)

Year	Lingcod	Whiting, At Sea	Whiting, Shoreside	Flatfish	Sablefish	Rockfish	Other Groundfish	Total Groundfish	Total Groundfish - Less Whiting	Total Groundfish - Less At Sea Whiting	Pink Shrimp	Spot Prawn, Trawl	Spot Prawn, Pot	Ridgeback Prawn, Trawl	Pacific Halibut
1981	1,662	12,264	141	14,834	5,258	22,339	757	57,254	44,850	44,991	20,160	780	38	165	411
1982	2,088	11,863	182	19,727	10,282	26,479	695	71,315	59,271	59,452	14,278	811	87	157	433
1983	2,284	12,783	186	17,735	7,691	23,775	529	64,983	52,014	52,200	9,753	370	13	141	805
1984	2,184	11,739	406	16,361	6,684	22,111	637	60,122	47,977	48,383	4,526	217	1	327	1,105
1985	2,241	4,631	571	18,633	10,564	23,223	576	60,440	55,238	55,809	9,648	245	47	483	1,226
1986	1,321	10,605	452	17,425	10,985	25,675	479	66,943	55,886	56,338	30,975	118	117	234	2,489
1987	2,151	14,662	664	22,235	13,423	31,069	1,949	86,153	70,827	71,491	46,534	203	176	209	1,250
1988	2,137	22,440	1,136	20,796	12,499	29,323	2,241	90,572	66,996	68,132	29,129	240	444	154	1,106
1989	2,768	29,256	1,071	20,521	10,796	32,137	1,570	98,119	67,792	68,863	28,615	215	503	176	863
1990	2,290	22,583	1,049	17,253	9,661	32,496	983	86,315	62,683	63,732	26,577	159	1,101	101	905
1991	2,457	23,437	2,396	21,246	14,330	28,922	1,669	94,457	68,624	71,020	23,407	222	1,189	148	1,077
1992	1,617	17,968	5,885	16,452	13,633	31,616	1,838	89,009	65,156	71,041	27,293	433	878	131	1,037
1993	1,846	7,071	2,843	14,669	10,009	32,530	1,774	70,742	60,827	63,670	16,472	610	1,545	140	972
1994	2,421	12,931	4,904	13,069	13,970	35,811	2,023	85,130	67,294	72,198	19,326	1,713	1,000	212	908
1995	1,683	10,194	7,821	15,367	23,640	39,581	1,721	100,007	81,992	89,814	18,088	1,898	670	476	676
1996	1,821	13,604	5,107	15,597	25,897	33,805	1,940	97,770	79,060	84,167	18,171	2,578	844	777	764
1997	1,740	19,195	8,162	14,323	27,878	27,883	2,044	101,224	73,867	82,029	15,224	3,721	1,235	690	891
1998	718	13,538	4,845	12,514	11,380	24,997	2,946	70,938	52,554	57,400	5,052	3,697	1,859	762	794
1999	715	11,723	6,871	13,679	17,103	20,497	2,547	73,134	54,541	61,411	12,822	2,682	1,577	1,545	962
2000	345	10,885	7,969	13,980	20,325	17,398	2,639	73,540	54,686	62,656	12,951	2,182	1,635	1,793	1,209
2001	387	10,569	5,748	12,631	17,512	12,880	1,957	61,684	45,367	51,115	10,293	1,703	1,905	532	1,474
2002	506	9,119	4,540	11,828	11,810	11,066	2,615	51,485	37,825	42,365	15,358	1,755	1,592	633	1,818
1981-2002	*1,699*	*14,230*	*3,316*	*16,403*	*13,879*	*26,619*	*1,642*	*77,788*	*60,242*	*63,558*	*18,848*	*1,207*	*839*	*454*	*1,053*
1991-2002	*1,355*	*13,353*	*5,591*	*14,613*	*17,290*	*26,416*	*2,143*	*80,760*	*61,816*	*67,407*	*16,205*	*1,933*	*1,327*	*653*	*1,048*
1998-2002	*534*	*11,167*	*5,995*	*12,926*	*15,626*	*17,368*	*2,541*	*66,156*	*48,995*	*54,989*	*11,295*	*2,404*	*1,714*	*1,053*	*1,251*

NOTE: For 1981-1990, at-sea whiting catch estimates are from Council 1997.

TABLE 6-1b. Total domestic shoreside landings and at-sea deliveries (exvessel revenue, thousands of current dollars) from West Coast (WA, OR, CA) ocean area fisheries (0-200 miles) coastwide, 1981-2002 (includes commercial tribal fisheries, based on PacFIN data and Council [1997]). (page 2 of 2)

Year	California Halibut	Salmon	Sea Cucumber	California Sheephead	Gillnet Complex	CPS Squid	CPS Wetfish	HMS	Dungeness Crab	Other Crus-taceans	Other Species	Total Non-groundfish	Total
1981	567	31,772	0	0	2,082	5,080	14,183	199,799	18,259	3,401	28,852	327,528	382,801
1982	551	37,410	25	0	1,897	3,581	9,636	134,490	18,155	3,944	27,199	254,636	323,970
1983	929	9,090	26	0	1,161	838	5,460	117,933	23,427	3,827	28,978	204,734	267,735
1984	897	10,748	10	0	1,397	500	6,852	95,099	21,798	6,705	17,509	169,674	227,811
1985	592	20,869	0	0	2,669	4,065	4,880	42,061	24,628	4,180	22,910	140,488	198,943
1986	865	25,187	16	0	2,483	4,527	4,857	44,987	22,709	5,309	23,395	170,254	235,213
1987	1,067	46,073	23	0	2,282	3,960	5,508	49,233	25,735	5,178	29,109	218,528	302,694
1988	1,246	68,050	32	0	1,936	7,868	6,461	59,069	43,507	5,758	34,883	261,873	350,457
1989	1,340	26,754	0	0	1,919	6,962	6,020	39,944	39,896	6,308	40,777	202,279	298,409
1990	985	21,966	36	0	1,649	4,748	5,420	24,676	45,598	7,187	47,905	191,004	275,329
1991	1,247	14,203	187	0	1,766	6,086	7,063	17,225	21,446	6,860	51,898	156,015	248,481
1992	1,443	9,271	0	0	939	2,497	6,270	26,177	38,884	6,710	47,608	171,562	258,580
1993	1,146	8,931	353	0	904	10,194	3,824	31,130	42,735	5,966	38,135	165,050	233,797
1994	1,117	7,260	424	750	541	14,369	3,882	37,482	52,617	5,742	35,903	185,237	268,371
1995	1,566	15,443	416	701	797	22,342	5,368	27,140	63,482	7,567	38,784	207,408	305,419
1996	1,738	9,337	544	694	982	21,908	5,452	45,587	74,352	8,091	39,254	233,068	328,845
1997	2,180	10,105	232	860	1,315	20,707	8,259	40,516	51,854	10,528	34,802	205,117	304,343
1998	2,107	5,712	456	693	892	1,631	6,860	40,274	46,281	8,658	11,416	139,141	208,080
1999	2,080	9,688	418	452	1,482	33,405	7,408	33,021	67,236	6,167	17,862	200,806	271,944
2000	1,349	13,943	605	593	1,280	27,076	11,935	32,941	61,658	8,197	20,248	201,595	273,136
2001	1,545	10,578	581	515	1,095	16,866	12,322	31,505	51,301	8,515	17,890	170,621	230,303
2002	1,988	13,015	792	391	1,504	18,261	11,944	22,032	57,848	8,257	15,082	174,272	225,757
1981-2002 Avg	*1,297*	*19,337*	*235*	*257*	*1,499*	*10,794*	*7,267*	*54,196*	*41,518*	*6,502*	*30,473*	*195,776*	*273,655*
1991-2002 Avg	*1,626*	*10,624*	*417*	*471*	*1,125*	*16,278*	*7,549*	*32,086*	*52,475*	*7,605*	*30,740*	*182,161*	*263,088*
1998-2002 Avg	*1,814*	*10,587*	*570*	*529*	*1,251*	*19,448*	*10,094*	*31,954*	*56,865*	*7,959*	*16,500*	*175,287*	*241,844*

NOTE: For 1981-1990, at-sea whiting catch estimates are from Council 1997.

TABLE 6-1c. Total domestic shoreside landings and at-sea deliveries (exvessel revenue, thousands of inflation adjusted 2002 dollars) from West Coast (WA, OR, CA) ocean area fisheries (0-200 miles) coastwide, 1981-2002 (includes commercial tribal fisheries, based on PacFIN data and Council [1997]). (page 1 of 2)

Year	Lingcod	Whiting, At Sea	Whiting, Shoreside	Flatfish	Sablefish	Rockfish	Other Groundfish	Total Groundfish	Total Groundfish - Less Whiting	Total Groundfish - Less At Sea Whiting	Pink Shrimp	Spot Prawn, Trawl	Spot Prawn, Pot	Ridgeback Prawn, Trawl	Pacific Halibut
1981	945	6,975	80	8,437	2,990	12,705	430	32,564	25,508	25,589	11,466	443	21	94	234
1982	1,260	7,159	110	11,904	6,205	15,979	419	43,036	35,767	35,877	8,616	490	53	95	261
1983	1,432	8,019	117	11,126	4,825	14,915	332	40,766	32,629	32,746	6,118	232	8	88	505
1984	1,422	7,641	264	10,649	4,351	14,391	415	39,132	31,227	31,491	2,946	141	0	213	719
1985	1,503	3,106	383	12,497	7,085	15,575	386	40,536	37,046	37,430	6,471	164	31	324	823
1986	905	7,269	310	11,944	7,530	17,599	329	45,886	38,308	38,617	21,232	81	80	161	1,706
1987	1,514	10,324	467	15,657	9,453	21,878	1,372	60,667	49,875	50,343	32,768	143	124	147	880
1988	1,556	16,341	827	15,144	9,102	21,353	1,632	65,955	48,787	49,614	21,212	175	324	112	805
1989	2,092	22,110	810	15,509	8,159	24,287	1,187	74,153	51,234	52,043	21,625	163	380	133	652
1990	1,798	17,726	823	13,543	7,583	25,507	772	67,752	49,202	50,026	20,861	124	864	80	710
1991	1,996	19,040	1,946	17,260	11,642	23,496	1,356	76,736	55,750	57,696	19,016	180	966	120	875
1992	1,344	14,932	4,891	13,672	11,330	26,275	1,527	73,972	54,149	59,040	22,682	360	730	109	861
1993	1,569	6,013	2,417	12,472	8,510	27,659	1,508	60,149	51,719	54,137	14,005	518	1,314	119	826
1994	2,102	11,229	4,259	11,348	12,130	31,096	1,757	73,921	58,434	62,692	16,781	1,488	868	184	788
1995	1,491	9,033	6,931	13,617	20,947	35,073	1,525	88,617	72,654	79,584	16,028	1,682	593	422	599
1996	1,644	12,283	4,611	14,082	23,382	30,523	1,752	88,277	71,383	75,994	16,406	2,327	762	702	690
1997	1,597	17,619	7,492	13,147	25,590	25,595	1,876	92,916	67,805	75,297	13,974	3,416	1,134	633	818
1998	667	12,565	4,497	11,614	10,562	23,200	2,734	65,838	48,776	53,273	4,689	3,432	1,725	707	737
1999	673	11,038	6,469	12,879	16,103	19,299	2,398	68,859	51,352	57,821	12,072	2,525	1,485	1,455	906
2000	332	10,471	7,667	13,449	19,553	16,738	2,539	70,749	52,611	60,278	12,459	2,100	1,573	1,725	1,163
2001	381	10,409	5,661	12,440	17,247	12,685	1,927	60,751	44,681	50,342	10,137	1,677	1,876	524	1,452
2002	506	9,119	4,540	11,828	11,810	11,066	2,615	51,485	37,825	42,365	15,358	1,755	1,592	633	1,818
1981-2002	*1,306*	*11,383*	*2,981*	*12,919*	*11,640*	*21,223*	*1,399*	*62,851*	*48,487*	*51,468*	*14,860*	*1,074*	*750*	*399*	*856*
1991-2002	*1,192*	*11,979*	*5,115*	*13,151*	*15,734*	*23,559*	*1,960*	*72,689*	*55,595*	*60,710*	*14,467*	*1,788*	*1,218*	*611*	*961*
1998-2002	*512*	*10,720*	*5,767*	*12,442*	*15,055*	*16,598*	*2,443*	*63,536*	*47,049*	*52,816*	*10,943*	*2,298*	*1,650*	*1,009*	*1,215*

NOTE: For 1981-1990, at-sea whiting catch estimates are from Council 1997.

TABLE 6-1c. Total domestic shoreside landings and at-sea deliveries (exvessel revenue, thousands of inflation adjusted 2002 dollars) from West Coast (WA, OR, CA) ocean area fisheries (0-200 miles) coastwide, 1981-2002 (includes commercial tribal fisheries, based on PacFIN data and Council [1997]). (page 2 of 2)

Year	California Halibut	Salmon	Sea Cucumber	California Sheephead	Gillnet Complex	CPS Squid	CPS Wetfish	HMS	Dungeness Crab	Other Crus-taceans	Other Species	Total Non-groundfish	Total
1981	322	18,070	0	0	1,184	2,889	8,067	113,636	10,385	1,934	16,409	187,137	217,719
1982	332	22,575	15	0	1,144	2,161	5,815	81,158	10,956	2,380	16,413	154,447	195,501
1983	583	5,702	16	0	728	525	3,425	73,982	14,696	2,401	18,179	129,173	167,956
1984	584	6,995	6	0	909	325	4,460	61,897	14,188	4,364	11,396	111,129	148,276
1985	397	13,996	0	0	1,790	2,726	3,273	28,209	16,517	2,803	15,365	94,875	133,425
1986	593	17,265	11	0	1,702	3,103	3,329	30,837	15,566	3,639	16,036	117,327	161,229
1987	751	32,444	17	0	1,607	2,789	3,879	34,669	18,122	3,646	20,498	154,471	213,151
1988	907	49,555	24	0	1,410	5,730	4,705	43,015	31,682	4,193	25,402	191,239	255,207
1989	1,013	20,219	0	0	1,450	5,261	4,550	30,187	30,151	4,767	30,817	153,357	225,522
1990	773	17,242	29	0	1,294	3,727	4,255	19,369	35,792	5,641	37,602	150,353	216,115
1991	1,013	11,538	152	0	1,435	4,944	5,738	13,993	17,423	5,573	42,161	127,119	201,864
1992	1,199	7,705	0	0	781	2,075	5,211	21,754	32,315	5,576	39,566	142,916	214,896
1993	974	7,594	300	0	769	8,668	3,252	26,469	36,336	5,072	32,425	140,635	198,790
1994	970	6,304	368	651	470	12,477	3,371	32,547	45,689	4,986	31,175	161,110	233,035
1995	1,388	13,684	369	621	706	19,798	4,756	24,049	56,251	6,705	34,367	184,013	270,633
1996	1,569	8,430	491	627	887	19,781	4,922	41,161	67,133	7,305	35,443	210,631	296,915
1997	2,001	9,276	213	790	1,207	19,008	7,581	37,190	47,598	9,664	31,946	188,446	279,365
1998	1,956	5,301	423	643	828	1,513	6,367	37,378	42,954	8,035	10,596	129,281	193,121
1999	1,959	9,121	393	426	1,395	31,452	6,975	31,090	63,306	5,807	16,817	189,183	256,045
2000	1,298	13,413	582	571	1,232	26,048	11,482	31,691	59,318	7,886	19,480	194,020	262,770
2001	1,522	10,418	572	507	1,078	16,611	12,136	31,029	50,525	8,386	17,619	168,071	226,820
2002	1,988	13,015	792	391	1,504	18,261	11,944	22,032	57,848	8,257	15,082	174,272	225,757
1981-2001	*1,095*	*14,539*	*217*	*238*	*1,160*	*9,540*	*5,886*	*39,425*	*35,216*	*5,410*	*24,309*	*154,972*	*217,914*
1991-2002	*1,486*	*9,650*	*388*	*435*	*1,024*	*15,053*	*6,978*	*29,199*	*48,058*	*6,938*	*27,223*	*165,478*	*238,334*
1998-2002	*1,744*	*10,254*	*553*	*507*	*1,207*	*18,777*	*9,781*	*30,644*	*54,790*	*7,674*	*15,919*	*168,965*	*232,902*

TABLE 6-2a. Total domestic shoreside landings and at-sea deliveries (round weight mt) from West Coast ocean area fisheries (0-200 miles) North and South of Cape Mendocino and by state (WA, OR and CA), 1981-2002 (includes commercial tribal fisheries, based on PacFIN data (August, 2003) and Council (1997). (Page 1 of 1)

	All Groundfish							All Species						
	At-Sea Included		Not Including At Sea					At-Sea Included		Not Including At Sea				
Year	North of Cape Mendocino	South of Cape Mendocino	WA	OR	CA	Total	Total with At-Sea	North of Cape Mendocino	South of Cape Mendocino	WA	OR	CA	Total	Total with At-Sea
1981	151,004	25,592	23,290	37,315	42,434	103,039	176,596	200,657	334,063	33,937	66,554	360,779	461,270	534,827
1982	152,292	34,007	25,200	40,999	52,635	118,834	186,299	183,276	293,142	32,915	57,250	318,838	409,003	476,468
1983	143,709	26,973	22,912	35,103	40,567	98,583	170,683	164,636	222,109	30,740	44,898	239,115	314,752	386,852
1984	141,626	26,923	20,888	28,178	40,593	89,659	168,548	158,876	187,813	26,158	36,598	205,177	267,933	346,822
1985	96,178	26,312	19,166	28,967	42,665	90,798	122,490	125,107	142,474	27,921	43,062	165,272	236,255	267,947
1986	137,395	26,692	15,939	24,883	41,625	82,448	164,087	178,713	168,874	27,489	47,623	191,090	266,202	347,841
1987	174,325	23,519	20,097	30,531	41,219	91,847	197,844	220,706	178,523	31,820	58,994	202,778	293,591	399,588
1988	208,073	19,917	20,332	32,125	39,753	92,210	227,991	266,841	197,210	39,009	62,679	226,923	328,611	464,392
1989	279,717	23,202	20,012	36,836	42,492	99,341	302,919	340,343	194,791	36,795	72,104	222,864	331,763	535,341
1990	246,481	22,210	18,329	35,509	39,168	93,006	268,691	293,533	154,619	30,679	61,455	180,603	272,737	448,422
1991	283,082	19,989	16,941	49,750	35,786	102,477	303,071	314,390	146,533	24,777	66,239	169,497	260,513	461,107
1992	260,347	20,260	15,729	81,919	34,773	132,421	280,607	320,508	108,325	29,845	114,385	136,552	280,782	428,968
1993	191,730	16,205	17,018	71,211	28,066	116,295	207,935	241,100	123,751	34,261	92,938	146,135	273,334	364,974
1994	290,828	14,483	23,558	94,096	24,733	142,388	305,311	332,743	129,364	37,800	110,440	151,021	299,262	462,186
1995	219,667	17,339	18,455	91,644	28,531	138,630	237,006	255,753	176,863	32,695	107,495	194,086	334,276	432,652
1996	254,533	17,995	25,267	95,828	28,014	149,109	272,528	305,790	189,844	43,337	118,468	210,460	372,266	495,685
1997	270,417	16,675	19,106	95,875	29,333	144,314	287,093	313,325	201,296	30,163	116,860	224,838	371,862	514,655
1998	266,072	11,775	22,094	89,899	22,816	134,809	277,847	296,576	114,582	33,611	103,710	130,739	268,060	411,294
1999	260,219	8,707	21,496	92,089	14,863	128,448	268,926	296,771	204,567	32,007	112,253	216,505	360,765	501,575
2000	235,332	6,878	19,645	85,680	16,033	121,358	242,210	288,562	237,931	35,606	118,637	251,469	405,712	526,692
2001	196,620	5,627	24,197	66,450	11,403	102,051	202,247	263,965	192,980	49,532	104,343	202,565	356,440	457,100
2002	149,348	6,118	19,300	49,861	15,220	84,381	155,646	243,531	170,027	57,899	99,966	183,794	341,659	413,791

TABLE 6-2b. Total domestic shoreside landings and at-sea deliveries (total exvessel revenue in thousands of current dollars) from West Coast ocean area fisheries (0-200 miles) North and South of Cape Mendocino and by state (WA, OR and CA), 1981-2002 (includes commercial tribal fisheries, based on PacFIN data (August, 2003) and Council (1997). (Page 1 of 1)

	All Groundfish							All Species						
	At-Sea Included		Not Including At Sea					At-Sea Included		Not Including At Sea				
Year	North of Cape Mendocino	South of Cape Mendocino	WA	OR	CA	Total	Total with At-Sea	North of Cape Mendocino	South of Cape Mendocino	WA	OR	CA	Total	Total with At-Sea
1981	43,673	14,083	9,260	14,668	21,457	45,384	57,755	124,664	261,459	28,873	56,592	288,307	373,773	386,144
1982	52,488	19,467	11,499	20,311	28,175	59,985	71,955	112,705	214,126	27,604	49,663	237,638	314,906	326,875
1983	49,245	16,228	11,354	18,481	22,758	52,593	65,473	93,782	175,823	28,109	37,254	191,506	256,868	269,748
1984	43,988	16,620	10,465	15,183	23,125	48,773	60,608	79,459	149,935	21,926	30,324	165,566	217,816	229,650
1985	42,792	18,082	12,542	17,217	26,451	56,209	60,874	93,699	105,604	27,766	42,294	125,645	195,705	200,370
1986	46,710	20,733	10,805	16,920	29,033	56,759	67,443	116,557	119,748	29,218	54,216	142,853	226,287	236,972
1987	66,641	20,029	16,711	24,330	30,879	71,920	86,669	164,019	138,934	41,100	83,247	165,416	289,762	304,512
1988	73,678	17,480	15,790	24,075	28,708	68,573	91,158	180,675	170,343	49,657	79,775	200,706	330,137	352,722
1989	78,660	20,026	13,663	25,367	30,229	69,260	98,684	165,710	133,661	42,383	72,001	156,322	270,706	300,130
1990	67,143	19,627	11,560	23,358	29,150	64,068	86,770	157,006	119,100	38,322	67,567	148,189	254,078	276,780
1991	76,062	19,007	14,159	29,957	27,363	71,479	95,068	132,078	117,744	30,437	58,415	137,650	226,500	250,089
1992	69,942	19,761	11,508	31,291	28,798	71,597	89,705	156,874	103,586	38,194	71,983	132,318	242,494	260,603
1993	54,932	16,104	10,967	29,116	23,852	63,935	71,037	133,399	101,206	41,155	58,456	128,061	227,672	234,773
1994	68,657	16,845	15,075	32,768	24,672	72,515	85,502	155,262	114,126	47,434	63,620	145,508	256,562	269,549
1995	76,306	24,055	17,816	37,895	34,419	90,131	100,361	168,664	137,737	58,833	76,310	161,129	296,272	306,501
1996	73,856	24,312	16,350	34,195	33,962	84,508	98,167	187,014	143,017	60,775	81,808	173,937	316,521	330,180
1997	78,835	22,516	16,329	33,824	31,975	82,128	101,351	159,828	144,789	44,696	67,947	172,862	285,505	304,731
1998	53,942	16,985	10,831	22,807	23,609	57,248	70,928	119,165	88,726	35,858	48,969	109,490	194,316	208,050
1999	58,418	14,747	12,379	27,559	21,094	61,033	73,165	147,541	124,473	46,496	66,844	146,589	259,929	272,062
2000	59,687	13,815	11,330	29,842	21,074	62,247	73,502	154,273	118,605	46,139	77,806	137,788	261,733	272,994
2001	50,659	11,025	10,809	23,392	16,664	50,866	61,684	138,307	91,850	48,123	66,860	104,493	219,477	230,303
2002	40,596	10,856	9,398	18,020	16,410	43,827	51,485	125,241	98,325	51,411	52,675	112,011	216,097	223,755

TABLE 6-3. Historical harvests by West Coast commercial fisheries sectors (landed roundweight in mt and exvessel revenue in thousands of current dollars). (Page 1 of 1)

	Limited Entry Trawl			Limited Entry Non-Trawl			Open Access			TOTAL		
	Groundfish	Non-Groundfish	Total	Groundfish	Non-Groundfish	Total	Groundfish	Non-Groundfish	Total	Groundfish	Non-Groundfish	Total
Landed Roundweight (mt)												
1998	271,882	4,690	276,572	4,845	4,306	9,152	1,162	130,590	131,752	277,889	139,586	417,475
1999	263,150	5,265	268,415	5,145	4,218	9,363	642	229,408	230,050	268,937	238,891	507,828
2000	237,135	4,464	241,599	4,594	4,164	8,758	455	281,349	281,804	242,183	289,978	532,161
2001	197,737	4,732	202,470	3,915	4,285	8,200	484	251,792	252,276	202,136	260,809	462,946
2002	151,646	9,587	161,232	3,233	4,914	8,146	472	254,958	255,430	155,350	269,458	424,808
Exvessel Revenue ($,000)												
1998	55,216	1,833	57,050	12,332	797	13,129	2,793	130,539	133,332	70,342	133,169	203,510
1999	54,335	1,518	55,853	15,608	1,012	16,620	2,539	189,886	192,425	72,482	192,416	264,898
2000	53,678	882	54,560	16,611	895	17,506	2,686	191,658	194,344	72,975	193,436	266,410
2001	42,001	1,149	43,150	13,335	1,328	14,663	2,555	159,985	162,541	57,892	162,462	220,354
2002	37,980	1,822	39,802	10,590	2,145	12,735	2,463	166,343	168,807	51,034	170,311	221,345

TABLE 6-4. Historical harvests of species groups by the Limited Entry Trawl commercial fishery sector North and South of Cape Mendocino (landed roundweight in mt and exvessel revenue in thousands of current dollars). (Page 1 of 2)

	Lingcod	Whiting, At Sea	Whiting, Shoreside	Flatfish	Sablefish	Rockfish	Other Groundfish	Total Groundfish	Pink Shrimp	Spot Prawn, Trawl	Spot Prawn, Pot	Ridgeback Prawn, Trawl	Pacific Halibut	California Halibut
Landed Roundweight (mt)														
North														
1998	340	142,938	88,678	13,505	1,766	14,490	1,389	263,107	0	0	0	0	0	13
1999	277	140,065	83,711	16,534	2,627	12,232	1,004	256,452	0	0	0	0	0	3
2000	66	120,519	85,919	13,102	2,292	9,184	756	231,838	0	0	0	0	1	0
2001	57	99,965	73,539	11,148	2,241	5,669	858	193,476	0	0	0	0	0	4
2002	96	84,494	45,748	10,222	1,204	3,572	1,323	146,660	0	0	0	0	0	0
South														
1998	40	0	2	3,182	427	4,860	263	8,774	0	0	0	0	0	303
1999	44	0	0	3,649	559	2,332	114	6,698	0	0	0	0	0	271
2000	11	0	1	3,201	425	1,594	64	5,296	0	0	0	0	0	138
2001	10	0	1	2,683	373	1,119	75	4,261	0	0	0	0	0	159
2002	16	0	0	2,841	397	1,654	79	4,986	0	0	0	0	0	176
Exvessel Revenue ($,000)														
North														
1998	389	13,538	4,844	9,665	4,388	13,245	733	46,802	0	0	0	0	0	56
1999	343	11,724	6,870	10,552	5,734	11,698	469	47,390	0	0	0	0	0	13
2000	130	11,177	7,968	11,002	6,198	10,528	443	47,447	0	0	0	0	1	2
2001	111	7,837	5,747	9,867	5,941	6,884	520	36,905	0	0	0	0	1	16
2002	180	9,119	4,535	9,070	2,866	5,001	1,043	31,814	0	0	0	0	0	1
South														
1998	60	0	2	2,781	882	4,597	93	8,414	0	0	0	0	0	1,463
1999	70	0	0	3,052	1,046	2,738	38	6,945	0	0	0	0	0	1,374
2000	23	0	0	2,913	898	2,371	25	6,231	0	0	0	0	0	787
2001	21	0	0	2,667	794	1,586	27	5,095	0	0	0	0	0	946
2002	30	0	0	2,651	874	2,581	31	6,166	0	0	0	0	0	1,019

TABLE 6-4. Historical harvests of species groups by the Limited Entry Trawl commercial fishery sector North and South of Cape Mendocino (landed roundweight in mt and exvessel revenue in thousands of current dollars). (Page 2 of 2)

	Salmon	Sea Cucumber	California Sheephead	Gillnet Complex	CPS Squid	CPS Wetfish	HMS	Dungeness Crab	Other Crustaceans	Other Species	Total Non-groundfish	Grand Total
Landed Roundweight (mt)												
North												
1998	0	0	0	0	27	258	0	0	18	0	2,314	265,422
1999	4	0	0	0	18	913	2	2	2	0	2,943	259,395
2000	4	0	0	0	6	283	1	0	2	0	2,298	234,136
2001	5	0	0	0	30	527	1	0	4	0	2,572	196,048
2002	2	0	0	0	14	13	0	0	1	5,337	7,370	154,029
South												
1998	0	62	0	0	4	7	1	2	0	0	2,375	11,150
1999	0	46	0	0	1	2	1	1	2	0	2,322	9,020
2000	0	27	0	0	1	1	0	0	0	0	2,167	7,463
2001	0	0	0	0	0	0	0	0	0	0	2,161	6,422
2002	0	0	0	0	1	0	1	1	3	34	2,217	7,203
Exvessel Revenue ($,000)												
North												
1998	0	0	0	0	2	38	0	0	164	0	261	47,063
1999	0	0	0	0	0	15	4	9	17	0	59	47,449
2000	4	0	0	0	4	29	2	0	11	0	52	47,498
2001	19	0	0	0	1	128	1	0	37	0	202	37,108
2002	6	0	0	0	1	2	0	0	1	738	748	32,562
South												
1998	0	87	0	0	7	3	3	10	1	0	1,573	9,986
1999	0	62	0	0	2	1	1	3	17	0	1,459	8,404
2000	0	40	0	0	1	0	1	0	1	0	831	7,062
2001	0	0	0	0	0	0	0	0	0	0	947	6,043
2002	0	0	0	0	2	0	2	3	12	36	1,074	7,240

TABLE 6-5. Historical harvests of species groups by the Limited Entry Fixed Gear commercial fishery sectors North and South of Cape Mendocino (landed roundweight in mt and exvessel revenue in thousands of current dollars). (Page 1 of 2)

	Lingcod	Whiting, At Sea	Whiting, Shoreside	Flatfish	Sablefish	Rockfish	Other Groundfish	Total Groundfish	Pink Shrimp	Spot Prawn, Trawl	Spot Prawn, Pot	Ridgeback Prawn, Trawl	Pacific Halibut	California Halibut
Landed Roundweight (mt)														
North														
1998	47	0	0	3	1,594	1,057	34	2,734	0	0	0	0	73	0
1999	60	0	0	7	2,658	808	76	3,611	0	0	0	0	144	0
2000	35	0	0	6	2,657	278	363	3,338	0	0	0	0	80	0
2001	45	0	0	6	2,149	384	265	2,848	0	0	0	0	209	0
2002	36	0	0	9	1,599	256	475	2,375	0	0	0	0	309	0
South														
1998	40	0	0	10	409	1,333	320	2,111	0	0	0	0	3	36
1999	25	0	0	18	591	651	248	1,534	0	0	0	0	2	16
2000	11	0	0	4	674	400	167	1,255	0	0	0	0	0	17
2001	13	0	0	15	584	348	107	1,067	0	0	0	0	0	14
2002	12	0	0	8	473	247	117	857	0	0	0	0	0	22
Exvessel Revenue ($,000)														
North														
1998	100	0	0	2	4,453	1,509	92	6,157	0	0	0	0	219	0
1999	141	0	0	4	8,190	1,544	146	10,025	0	0	0	0	617	0
2000	110	0	0	4	10,142	756	428	11,440	0	0	0	0	386	0
2001	118	0	0	4	7,856	1,087	359	9,424	0	0	0	0	902	0
2002	117	0	0	4	6,111	765	595	7,592	0	0	0	0	1,330	0
South														
1998	90	0	0	10	1,028	3,966	1,080	6,175	0	0	0	0	10	186
1999	73	0	0	18	1,466	3,021	1,005	5,584	0	0	0	0	7	107
2000	37	0	0	7	2,166	2,254	707	5,171	0	0	0	0	0	102
2001	47	0	0	22	1,773	1,745	324	3,911	0	0	0	0	0	95
2002	34	0	0	10	1,366	1,365	224	2,998	0	0	0	0	1	128

TABLE 6-5. Historical harvests of species groups by the Limited Entry Fixed Gear commercial fishery sectors North and South of Cape Mendocino (landed roundweight in mt and exvessel revenue in thousands of current dollars). (Page 2 of 2)

	Salmon	Sea Cucumber	California Sheephead	Gillnet Complex	CPS Squid	CPS Wetfish	HMS	Dungeness Crab	Other Crustaceans	Other Species	Total Non-groundfish	Grand Total
Landed Roundweight (mt)												
North												
1998	0	0	0	0	0	0	0	0	0	70	2,141	4,875
1999	0	0	0	0	0	0	13	0	0	0	2,157	5,767
2000	0	0	0	0	0	0	0	0	0	0	2,080	5,419
2001	0	0	0	0	0	0	0	0	0	0	2,210	5,058
2002	0	0	0	0	0	0	0	0	0	439	2,750	5,126
South												
1998	0	84	44	0	0	0	0	0	0	2	2,165	4,277
1999	0	0	27	0	0	4	10	0	0	2	2,061	3,596
2000	0	0	20	42	0	4	0	0	0	0	2,083	3,339
2001	0	0	17	27	9	6	0	0	1	0	2,075	3,141
2002	0	0	11	0	0	0	0	0	0	127	2,163	3,021
Exvessel Revenue ($,000)												
North												
1998	0	0	0	0	0	0	0	0	1	70	221	6,378
1999	0	0	0	0	0	0	48	0	0	1	668	10,693
2000	0	0	0	0	0	0	0	0	3	1	391	11,831
2001	0	0	0	0	0	0	0	0	0	0	904	10,329
2002	0	0	0	0	0	0	0	0	0	275	1,606	9,198
1998	0	125	251	0	0	0	0	0	0	2	576	6,751
1999	0	0	175	0	0	9	41	0	0	2	344	5,928
2000	0	0	145	244	1	9	0	0	0	0	504	5,675
2001	0	0	123	183	2	13	0	2	3	0	423	4,334
2002	0	0	74	0	2	0	1	0	1	330	539	3,537

TABLE 6-6. Historical harvests of species groups by the Open Access commercial fishery sectors North and South of Cape Mendocino (landed roundweight in mt and exvessel revenue in thousands of current dollars). (Page 1 of 2)

	Lingcod	Whiting, At Sea	Whiting, Shoreside	Flatfish	Sablefish	Rockfish	Other Groundfish	Total Groundfish	Pink Shrimp	Spot Prawn, Trawl	Spot Prawn, Pot	Ridgeback Prawn, Trawl	Pacific Halibut	California Halibut
Landed Roundweight (mt)														
North														
1998	19	0	0	7	14	214	7	262	4,348	1	0	0	20	0
1999	19	0	0	4	4	116	16	159	12,416	1	0	0	20	0
2000	15	0	0	1	9	91	7	122	13,562	0	0	0	16	0
2001	17	0	0	1	22	125	16	180	17,611	1	0	0	12	0
2002	28	0	0	1	13	109	46	198	25,302	0	0	0	112	3
South														
1998	20	0	0	30	5	677	169	900	0	256	116	198	0	64
1999	15	0	0	19	3	276	169	482	0	185	93	632	0	95
2000	7	0	0	17	6	160	142	333	0	106	97	706	0	99
2001	12	0	0	23	6	155	108	304	0	91	95	161	0	68
2002	17	0	0	18	28	136	75	274	0	99	79	215	0	107
Exvessel Revenue ($,000)														
North														
1998	36	0	0	7	33	299	21	395	5,054	9	2	0	69	0
1999	42	0	0	3	12	216	54	327	12,825	8	0	0	83	0
2000	28	0	0	0	29	176	32	266	11,908	0	0	0	78	0
2001	50	0	0	1	75	312	99	537	10,293	27	0	0	51	0
2002	82	0	0	1	45	321	324	772	15,358	0	1	0	487	19
South														
1998	42	0	0	49	11	1,369	927	2,398	0	3,686	1,856	762	0	403
1999	46	0	0	49	10	1,272	835	2,212	0	2,675	1,577	1,546	0	586
2000	17	0	0	54	39	1,307	1,003	2,420	0	1,922	1,900	1,794	0	674
2001	38	0	1	69	34	1,249	628	2,018	0	1,676	1,905	532	2	489
2002	63	0	0	64	132	1,033	399	1,692	0	1,755	1,589	633	0	821

TABLE 6-6. Historical harvests of species groups by the Open Access commercial fishery sectors North and South of Cape Mendocino (landed roundweight in mt and exvessel revenue in thousands of current dollars). (Page 2 of 2)

	Salmon	Sea Cucumber	California Sheephead	Gillnet Complex	CPS Squid	CPS Wetfish	HMS	Dungeness Crab	Other Crustaceans	Other Species	Total Non-groundfish	Grand Total
Landed Roundweight (mt)												
North												
1998	716	0	0	1	4	1,279	11,375	10,272	173	141	30,327	30,588
1999	615	0	0	6	0	877	4,132	14,734	122	171	35,092	35,251
2000	625	0	0	0	23	14,504	7,536	12,245	1,311	559	52,382	52,504
2001	1,717	0	0	0	0	24,052	8,744	10,386	214	675	65,412	65,593
2002	2,039	0	0	1	0	39,363	8,427	11,086	179	908	89,423	89,621
South												
1998	1,092	204	76	255	2,898	67,095	18,272	1,484	1,456	4,800	100,263	101,164
1999	2,007	227	37	389	92,186	74,364	13,553	726	1,354	6,471	194,316	194,798
2000	2,924	264	59	255	118,060	88,661	7,009	780	1,297	6,650	228,968	229,300
2001	1,485	323	51	237	85,997	81,616	6,078	842	1,336	5,999	186,380	186,683
2002	1,974	426	41	352	72,942	67,378	4,480	4,418	1,254	9,768	165,535	165,809
Exvessel Revenue ($,000)												
North												
1998	2,155	0	0	4	2	145	15,843	38,531	1,248	144	63,206	63,601
1999	2,035	0	0	13	0	154	7,619	61,545	982	207	85,472	85,798
2000	2,350	1	0	0	0	1,863	14,175	57,307	2,677	843	91,202	91,468
2001	4,734	0	0	0	0	2,910	16,428	46,280	1,859	946	83,529	84,066
2002	5,391	0	0	0	0	4,857	11,994	39,914	1,690	774	80,486	81,257
South												
1998	3,472	244	441	887	1,620	6,675	24,413	7,738	7,163	7,973	67,333	69,731
1999	7,413	356	277	1,469	33,404	7,229	25,298	3,960	5,148	13,475	104,414	106,627
2000	11,192	564	448	820	27,069	10,033	18,761	4,336	6,491	14,451	100,456	102,876
2001	5,525	579	392	912	16,862	9,271	15,064	4,953	6,524	11,771	76,456	78,474
2002	5,811	792	317	1,503	18,257	7,086	10,034	17,931	6,462	12,866	85,858	87,549

TABLE 6-7. Number of marine anglers in West Coast states, 2000. (Page 1 of 1)

State	Total	Number of Marine Anglers (Thousands) Resident	Non-Resident	Percent Non-Resident
Washington	497	450	47	9%
Oregon	365	285	80	22%
N. California	439	388	51	12%
S. California	1,266	1,097	169	13%

Note: Estimates are not additive across states, since a participant may have fished in more than one state.
Source: Marine Angler Expenditures in the Pacific Coast Region, 2000 NMFS-F/SPO-49, Table 2, p. 7.

TABLE 6-8. Trends in effort for recreational ocean fisheries in thousands of angler trips. (Page 1 of 1)

	Charter							Private						
Area	1996	1997	1998	1999	2000	2001	2002	1996	1997	1998	1999	2000	2001	2002
Total Angler Trips														
Washington	51	50	44	49	49	59	201	52	55	37	52	52	88	407
Oregon	54	65	57	60	87	70	62	57	87	213	173	330	140	130
Northern CA	90	139	158	162	206	221	142	253	312	528	549	523	901	556
Southern CA	982	812	674	609	876	577	438	1,099	1,073	1,167	879	1,314	1,757	1,494
Total	1,177	1,066	933	880	1,218	927	843	1,461	1,527	1,945	1,653	2,219	2,886	2,587
Trips with Groundfish Target and Incidental														
Washington	24	19	23	21	25	12	9	24	21	54	25	30	10	10
Oregon	43	47	47	44	69	47	46	33	57	119	88	153	22	36
Northern CA	63	159	58	95	101	141	53	110	113	160	188	120	164	253
Southern CA	59	23	33	45	57	204	189	35	11	15	30	28	252	391
Total	189	248	161	205	252	404	297	202	202	348	331	331	448	690

Note: 2001 and 2002 estimates not directly comparable to previous years due to differences in estimation methodology.

TABLE 6-9. Estimated recreational groundfish effort by season and region for charter and private vessels in 2002 (in 1,000's of angler trips). (Page 1 of 1)

Region	Mode	Jan.-Feb.	March-April	May-June	July-Aug.	Sept.-Oct.	Nov.-Dec.	Total
Washington	Charter	0	0	8	1	0	0	9
	Private	0	0	8	2	0	0	10
	Total	0	0	16	3	0	0	20
Oregon	Charter	1	5	14	19	6	1	46
	Private	0	3	13	14	5	1	36
	Total	2	8	27	33	11	2	82
Oregon/California border to Cape Mendocino	Charter	0	0	1	2	0	0	3
	Private	0	0	12	16	2	0	29
	Total	0	0	13	17	2	0	32
Central California	Charter	0	0	8	26	15	1	50
	Private	38	10	42	63	60	10	224
	Total	38	10	51	89	75	10	274
Southern California	Charter	10	46	42	31	52	9	189
	Private	78	56	71	53	73	59	391
	Total	88	102	112	84	125	68	579
California Total	Charter	10	46	51	58	67	10	242
	Private	117	66	125	132	134	69	643
	Total	126	112	176	190	202	79	885
Grand Total	Charter	11	50	74	78	73	11	297
	Private	117	69	145	149	139	70	690
	Total	128	120	219	227	212	80	986

Source: Washington and Oregon estimates from state port sampling programs. California estimates from RecFIN.

TABLE 6-10. Charter vessels engaged in saltwater fishing outside of Puget Sound in 2001 by port area. (Page 1 of 1)

State	Port Area	Charter Boats
Washington	Neah Bay	1
	La Push	0
	Westport	13
	Ilwaco	6
	Unknown	86
	TOTAL	106
Oregon	Astoria	22
	Tillamook	51
	Newport	45
	Coos Bay	13
	Brookings	15
	Unknown	86
	TOTAL	232
California	Crescent City	1
	Eureka	4
	Fort Bragg	14
	San Francisco	67
	Monterey	33
	Conception (Northern portion)	129
	San Diego	95
	Unknown	72
	TOTAL	415
GRAND TOTAL		753

TABLE 6-11. Historical West Coast groundfish catch in ocean areas by tribal fleet: 1995 through 2002 (round weight-pounds). (Page 1 of 1)

Species	1995	1996	1997	1998	1999	2000	2001	2002
Arrowtooth Flounder	240	3		255	13,195	331	961	7,137
Dover Sole	1,764	2,441	1,268	4,509	11,594	2,030	4,619	35,417
English Sole		4	118	1,847	593	996	7,103	88,684
Petrale Sole		5	12	3,249	545	80	1,954	45,479
Rex Sole					26	151	1,358	6,632
Rock Sole				2,396	16		22	5,833
Unsp. Flatfish				38	775		437	8,406
Unspecified Sanddab							1,599	19,655
Sand Sole		12	40				269	2,748
Starry Flounder		22	54				3	301
Butter Sole								605
Flatfish Total	2,004	2,487	1,492	12,294	26,744	3,588	18,325	220,897
Bocaccio				2	38	145	449	
Nom. Canary Rockfish	59	171	26	609	1,033	539	4,064	13,285
Canary Rockfish				277	252	330	1,380	
Darkblotched Rockfish					36	76	226	3,074
Greenstriped Rockfish				1	51	16		
Pacific Ocean Perch					110	20	16	529
Redbanded Rockfish				1	128	492		
Redstripe Rockfish				1	63	131	1,510	
Rougheye Rockfish				1	80	76	1,529	
Rosethorn Rockfish								
Sharpchin Rockfish				1	9	10	85	
Silvergrey Rockfish					36	4	12	
Unsp. Pop Group		3			104			
Unsp. Rockfish	114,684	79,545	65,121	65,245	59,875	45,953		
Widow Rockfish				54	411	2,010	16,265	
Nom. Widow Rockfish					53	3	51	75,899
Yelloweye Rockfish					68	3	2	
Nom. Yellowtail Rockfish	519	1,297	2,471	10,448	28,671	9,585	7,598	1,037,741
Yellowtail Rockfish				3,263	6,498	68,463	210,006	
Unsp. Shelf Rockfish						3,099	20,503	19
Unsp. Near-shore Rockfish						10	58	116
Unsp. Slope Rockfish						19,891	54,920	4,121
Blackgill Rockfish							19	
Shortraker Rockfish							289	
Rockfish Total	115,262	81,016	67,618	79,903	97,516	150,856	318,982	1,140,036
Spiny Dogfish		5,521			881	6,251		2,607
Lingcod	2,873	2,732	1,648	5,247	7,051	6,817	9,429	24,854
Pacific Cod	2,814	1,540	2,166	4,873	2,677	4,573	8,712	128,530
Sablefish	1,696,098	1,881,702	1,775,108	980,719	1,566,260	1,555,808	1,451,522	959,982
Unspecified Skate	2,517	1,689	1,017	2,031	2,169	1,920	1,407	18,635
Nominal Shortspine Thornyhead	15,697	16,010	16,892	7,606	13,251	8,987	10,945	10,173
Shortspine Thornyhead				471	240		27	
Nominal Longspine Thornyhead	1,305	538	139	28				
Other Groundfish Total	1,721,304	1,909,732	1,796,970	1,000,975	1,592,529	1,584,356	1,482,042	1,145,107
Pacific Whiting		33,039,648	54,713,657	53,984,582	56,768,061	13,781,257	13,404,001	45,867,384
All Groundfish Species Total	1,838,570	35,032,883	56,579,737	55,077,754	58,484,850	15,520,057	15,223,350	47,901,855

TABLE 6-12. Historical West Coast groundfish catch in ocean areas by tribal fleet: 1995 through 2002 (exvessel revenue $). (Page 1 of 1)

Species	1995	1996	1997	1998	1999	2000	2001	2002
Arrowtooth Flounder	24	1		26	1,319	33	111	715
Dover Sole	570	768	393	1,478	3,817	663	1,498	11,335
English Sole		1	106	613	220	309	2,726	29,289
Petrale Sole		8	8	3,249	545	84	1,692	46,509
Rex Sole					8	51	471	2,316
Rock Sole				791	5		7	2,033
Unsp. Flatfish				13	271		145	2,773
Unspecified Sanddab							372	5,110
Sand Sole		9	30				204	2,084
Starry Flounder		7	16				1	98
Butter Sole								206
Flatfish Total	594	794	553	6,170	6,185	1,140	7,227	102,468
Bocaccio				1	13	64	207	0
Nom. Canary Rockfish	20	60	12	230	372	196	1,901	5,886
Canary Rockfish				97	89	145	655	0
Darkblotched Rockfish				0	12	33	104	1,139
Greenstriped Rockfish				0	18	7	0	
Pacific Ocean Perch				0	38	9	7	237
Redbanded Rockfish				0	44	216	0	
Redstripe Rockfish				0	22	58	689	
Rougheye Rockfish				0	27	33	705	
Rosethorn Rockfish				0	0		0	
Sharpchin Rockfish				0	3	4	39	
Silvergrey Rockfish				0	12	2	5	
Unsp. Pop Group		1			36			
Unsp. Rockfish	48,130	32,345	26,723	26,575	25,334	20,737		
Widow Rockfish				19	143	883	7,801	0
Nom. Widow Rockfish					19	1	16	36,431
Yelloweye Rockfish					24	2	0	2,327
Nom. Yellowtail Rockfish	189	438	864	3,542	10,256	3,429	3,379	489,530
Yellowtail Rockfish				1,142	2,275	30,124	99,901	
Unsp. Shelf Rockfish						1,758	13,068	8
Unsp. Near-shore Rockfish						4	25	14,434
Unsp. Slope Rockfish						8,238	22,558	7
Blackgill Rockfish							9	
Shortraker Rockfish							134	
Rockfish Total	61,977	48,699	42,552	39,366	49,703	73,143	159,637	549,999
Spiny Dogfish		544			177	830		405
Lingcod	1,404	1,255	731	3,007	4,169	4,065	6,075	18,176
Pacific Cod	1,086	587	818	1,924	1,096	1,987	3,792	63,961
Sablefish	3,046,910	3,003,716	3,162,376	1,280,233	2,045,434	2,544,542	2,411,517	1,512,595
Unspecified Skate	588	120	68	136	145	129	143	2,563
Nominal Shortspine Thornyhead	12,581	15,340	14,828	7,310	10,751	7,199	8,414	8,232
Shortspine Thornyhead				425	215		20	
Nominal Longspine Thornyhead	1,057	515	125	25				
Other Groundfish Total	3,049,988	3,006,222	3,163,993	1,285,300	2,051,021	2,551,553	2,421,527	1,605,932
Pacific Whiting		1,651,982	2,735,683	2,699,229	2,838,403	551,250	536,160	2,065,122
All Groundfish Species Total	3,112,559	4,707,697	5,942,781	4,030,065	4,945,312	3,177,086	3,124,551	4,323,521

TABLE 6-13. Bycatch rates of overfished species observed by sector and year in the whiting fishery, 1998-2003. (Page 1 of 2)

	1998		1999		2000		2001		2002		2003[a/]		Average 98-03	
Species	Catch	Bycatch Rate	Catch	Bycatch Rate	Catch	Bycatch Rate	Catch	Bycatch Rate	Catch	Bycatch Rate	Catch	Bycatch Rate	Catch	Bycatch Rate [b/]
Tribal														
Whiting	24,509		25,846		6,251		6,080		21,793		19,371		17,308	
Yellowtail	158.91	0.6484%	450.94	1.7447%	99.89	1.5980%	86.98	1.4306%	176.45	0.8097%	34.15	0.1763%	167.89	1.0679%
Widow	14.47	0.0590%	36.76	0.1422%	9.81	0.1569%	3.28	0.0539%	19.06	0.0875%	2.16	0.0111%	14.26	0.0851%
Canary	2.76	0.0113%	4.42	0.0171%	0.93	0.0149%	2.44	0.0401%	2.83	0.0130%	0.67	0.0035%	2.34	0.0166%
Darkblotched	0.01	0.0000%	0.00	0.0000%	0.00	0.0000%	0.00	0.0000%	0.07	0.0003%	0.02	0.0001%	0.02	0.0001%
POP	0.40	0.0016%	1.24	0.0048%	0.03	0.0005%	0.72	0.0118%	0.21	0.0010%	1.09	0.0056%	0.62	0.0042%
Lingcod	0.33	0.0013%	0.19	0.0007%	0.06	0.0010%	0.35	0.0058%	0.23	0.0011%	0.05	0.0003%	0.20	0.0017%
Motherships														
Whiting	50,087		47,580		46,840		35,823		26,593		26,021		38,824	
Yellowtail	313.26	0.6254%	253.26	0.5323%	285.54	0.6096%	91.82	0.2563%	1.42	0.0053%	0.57	0.0022%	157.65	0.3385%
Widow	171.84	0.3431%	47.70	0.1003%	150.65	0.3216%	29.19	0.0815%	20.50	0.0771%	0.69	0.0026%	70.09	0.1544%
Canary	2.46	0.0049%	0.19	0.0004%	0.56	0.0012%	0.95	0.0027%	0.81	0.0030%	0.08	0.0003%	0.84	0.0021%
Darkblotched	11.27	0.0225%	4.84	0.0102%	5.15	0.0110%	0.57	0.0016%	0.93	0.0035%	0.10	0.0004%	3.81	0.0082%
POP	6.50	0.0130%	4.44	0.0093%	3.03	0.0065%	0.05	0.0001%	2.17	0.0082%	0.10	0.0004%	2.71	0.0062%
Lingcod	0.11	0.0002%	0.39	0.0008%	0.25	0.0005%	0.48	0.0013%	0.11	0.0004%	0.09	0.0004%	0.24	0.0006%
Catcher-Processors														
Whiting	70,379		67,679		67,815		58,628		36,341		36,953		56,299	
Yellowtail	63.72	0.0905%	430.87	0.6366%	270.02	0.3982%	33.16	0.0566%	12.86	0.0354%	1.70	0.0046%	135.39	0.2037%
Widow	120.92	0.1718%	101.25	0.1496%	69.97	0.1032%	139.71	0.2383%	115.10	0.3167%	11.48	0.0311%	93.07	0.1684%
Canary	0.25	0.0004%	1.03	0.0015%	0.86	0.0013%	0.65	0.0011%	1.59	0.0044%	0.17	0.0005%	0.76	0.0015%
Darkblotched	6.94	0.0099%	6.94	0.0103%	3.81	0.0056%	11.50	0.0196%	2.19	0.0060%	4.14	0.0112%	5.92	0.0104%
POP	14.78	0.0210%	9.71	0.0143%	6.57	0.0097%	19.69	0.0336%	1.45	0.0040%	5.02	0.0136%	9.54	0.0160%
Lingcod	0.00	0.0000%	0.02	0.0000%	0.16	0.0002%	0.18	0.0003%	0.16	0.0004%	0.40	0.0011%	0.15	0.0003%

TABLE 6-13. Bycatch rates of overfished species observed by sector and year in the whiting fishery, 1998-2003. (Page 2 of 2)

	1998		1999		2000		2001		2002		2003[a/]		Average 98-03	
Species	Catch	Bycatch Rate	Catch	Bycatch Rate	Catch	Bycatch Rate	Catch	Bycatch Rate	Catch	Bycatch Rate	Catch	Bycatch Rate	Catch	Bycatch Rate [b/]
							Shoreside							
Whiting	87,626		83,272		85,652		73,326		45,276		50,965		71,019	
Yellowtail	501.06	0.5718%	481.39	0.5781%	189.81	0.2216%	95.86	0.1307%	41.37	0.0914%	48.60	0.0954%	226.35	0.2815%
Widow	366.00	0.4177%	192.00	0.2306%	76.00	0.0887%	42.00	0.0573%	5.32	0.0117%	8.97	0.0198%	115.05	0.1373%
Canary	0.38	0.0004%	0.61	0.0007%	0.52	0.0006%	0.45	0.0006%	0.21	0.0005%	0.11	0.0002%	0.38	0.0005%
Darkblotched	3.97	0.0045%	0.42	0.0005%	1.21	0.0014%	0.81	0.0011%	0.00	0.0000%	0.26	0.0005%	1.11	0.0013%
POP	27.26	0.0311%	7.47	0.0090%	0.22	0.0003%	0.04	0.0001%	0.22	0.0005%	0.30	0.0006%	5.92	0.0069%
Lingcod	0.44	0.0005%	0.61	0.0007%	0.83	0.0010%	0.76	0.0010%	0.22	0.0005%	0.40	0.0008%	0.54	0.0008%
Yelloweye	0.05	0.0001%	0.02	0.0000%	0.00	0.0000%	0.00	0.0000%	0.00	0.0000%	0.00	0.0000%	0.01	0.0000%
							Total All Sectors							
Whiting	232,601		224,377		206,558		173,857		130,004		133,310		183,451	
Yellowtail	1,036.95	0.4458%	1,616.46	0.7204%	845.26	0.4092%	307.82	0.1771%	232.10	0.1785%	85.02	0.0638%	687.27	0.3746%
Widow	673.23	0.2894%	377.71	0.1683%	306.43	0.1484%	214.18	0.1232%	159.98	0.1231%	23.30	0.0175%	292.47	0.1450%
Canary	5.85	0.0025%	6.25	0.0028%	2.87	0.0014%	4.49	0.0026%	5.44	0.0042%	1.03	0.0008%	4.32	0.0024%
Darkblotched	22.19	0.0095%	12.20	0.0054%	10.17	0.0049%	12.88	0.0074%	3.19	0.0025%	4.53	0.0034%	10.86	0.0055%
POP	48.94	0.0210%	22.86	0.0102%	9.85	0.0048%	20.50	0.0118%	4.05	0.0031%	6.51	0.0049%	18.78	0.0093%
Lingcod	0.88	0.0004%	1.21	0.0005%	1.30	0.0006%	1.77	0.0010%	0.72	0.0006%	0.95	0.0007%	1.14	0.0006%
Yelloweye	0.05	0.0000%	0.02	0.0000%	0.00	0.0000%	0.00	0.0000%	0.00	0.0000%	0.00	0.0000%	0.01	0.0000%

a/ Preliminary. Catch estimates for the at-sea sector through September 25, 2003. These data incomplete since all at-sea sectors still fishing after this date.

b/ Average bycatch rates calculated using average annual bycatch rates in 1998-2003.

TABLE 6-14. Coastwide annual and bi-monthly commercial landings of overfished species by fleet, metric tons, 1999-2001. (Page 1 of 2)

	1999	2000	2001	1999						2000						2001					
Species/Fleet	All	All	All	1.0	2.0	3.0	4.0	5.0	6.0	1.0	2.0	3.0	4.0	5.0	6.0	1.0	2.0	3.0	4.0	5.0	6.0
Bocaccio																					
LE Trawl	30.3	16.1	13.9	5.5	5.1	5.8	6.3	5.6	2.0	0.8	2.3	3.3	2.7	3.8	3.2	2.0	2.2	3.1	3.8	2.7	0.0
LE Fixed-gear	5.0	2.4	2.4	0.5	1.0	1.0	0.7	1.6	0.1	0.0	0.1	0.8	0.6	0.6	0.3	0.3	0.1	0.4	1.2	0.5	
LE Shrimp-trawl	0.3	0.1	0.0	0.3	0.0			0.0		0.0	0.1		0.0	0.0					0.0		
OA Non-shrimp	22.8	5.9	6.4	3.7	5.1	3.4	4.7	4.0	1.9	0.8	0.1	1.4	0.8	1.3	1.6	1.6	0.3	0.5	2.0	2.0	
OA Shrimp-trawl	0.2	0.0	0.1	0.0	0.0	0.1	0.1	0.0			0.0	0.0			0.0		0.0	0.1			
Total	58.5	24.6	22.8	10.0	11.2	10.2	11.8	11.4	4.0	1.6	2.6	5.4	4.1	5.8	5.2	3.9	2.7	4.1	6.9	5.2	0.0
Canary																					
LE Trawl	494.6	33.4	25.6	25.5	67.8	179.0	153.0	66.9	2.4	0.2	2.1	10.3	10.3	8.9	1.6	0.9	1.8	8.2	11.1	3.5	0.1
LE Fixed-gear	55.4	5.9	5.1	2.0	8.0	24.2	15.4	5.8	0.0	0.2	0.5	2.2	1.3	1.2	0.4	0.6	0.7	1.5	1.3	1.0	
LE Shrimp-trawl	14.2	4.3	0.7		0.9	5.3	4.8	3.3			0.0	0.9	2.7	0.7		0.0	0.0	0.5	0.2	0.0	
OA Non-shrimp	56.6	5.0	2.8	0.4	11.1	19.8	19.0	5.8	0.4	0.3	0.4	1.8	1.2	1.0	0.3	0.2	0.5	1.1	0.7	0.3	
OA Shrimp-trawl	21.3	7.2	2.0		1.2	9.2	7.0	4.0	0.0		0.0	1.6	3.9	1.6			0.1	0.8	1.0	0.0	
Total	642.2	55.8	36.2	28.0	88.9	237.5	199.2	85.8	2.8	0.6	3.0	16.9	19.5	13.5	2.3	1.7	3.1	12.2	14.3	4.8	0.1
Cowcod																					
LE Trawl	3.8	1.4	0.8	0.5	1.2	0.1	0.8	1.2	0.0	0.1	0.2	0.1	0.3	0.3	0.3	0.4	0.2	0.0	0.1	0.1	0.1
LE Fixed-gear	0.3	0.5		0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.3	0.1	0.0						
LE Shrimp-trawl		0.0									0.0	0.0	0.0	0.0							
OA Non-shrimp	2.2	0.4	0.0	0.4	0.8	0.3	0.4	0.0	0.2	0.0	0.0	0.1	0.1	0.1	0.1			0.0			
OA Shrimp-trawl	0.2	0.1		0.0	0.0	0.0	0.1	0.0			0.0	0.0	0.0								
Total	6.5	2.4	0.8	1.0	2.1	0.5	1.4	1.2	0.2	0.2	0.3	0.2	0.8	0.6	0.4	0.4	0.2	0.0	0.1	0.1	0.1
Darkblotched																					
LE Trawl	280.2	216.5	141.0	34.1	56.8	96.1	64.1	26.8	2.3	28.7	25.3	52.5	42.7	41.7	25.7	22.2	24.9	33.8	31.5	26.4	2.4
LE Fixed-gear		1.7	1.8							0.0	0.7	0.3	0.4	0.3	0.0	0.0	0.1	0.0	0.6	1.0	
LE Shrimp-trawl	2.0		0.0		0.0	0.0	1.5	0.4										0.0	0.0		
OA Non-shrimp	0.1	0.5	0.2		0.0		0.0	0.1		0.0	0.1	0.1	0.2	0.0	0.0	0.0	0.1	0.0	0.0		0.1
OA Shrimp-trawl	2.0	0.0	0.0		0.0	0.3	1.3	0.4				0.0						0.0	0.0	0.0	
Total	284.3	218.8	143.1	34.1	56.8	96.5	67.0	27.6	2.3	28.7	26.2	52.9	43.3	42.0	25.8	22.2	25.1	33.8	32.1	27.4	2.4
Lingcod																					
LE Trawl	204.3	61.8	58.5	12.1	30.9	59.2	59.8	32.4	9.9	0.0	0.1	18.3	24.8	18.1	0.5	0.2	0.0	21.1	18.8	18.3	0.1
LE Fixed-gear	33.1	17.2	18.8	2.1	4.4	7.3	12.2	6.6	0.5			4.8	6.4	5.8	0.1		0.0	5.1	7.8	5.8	0.1
LE Shrimp-trawl	14.9	6.4	1.6		1.0	5.8	5.9	2.2				3.6	2.5	0.3				0.9	0.4	0.2	
OA Non-shrimp	84.7	49.0	63.5	0.6	11.7	25.3	34.0	12.7	0.4	0.1	1.1	26.9	20.2	0.6	0.1	0.0	0.0	19.3	25.0	19.0	0.1
OA Shrimp-trawl	17.5	9.1	5.5		0.5	6.1	7.2	3.8				4.8	4.4				0.0	3.2	2.2	0.0	
Total	354.5	143.5	147.8	14.9	48.5	103.6	119.1	57.7	10.8	0.1	1.2	58.3	58.4	24.8	0.7	0.2	0.1	49.6	54.2	43.5	0.2

TABLE 6-14. Coastwide annual and bi-monthly commercial landings of overfished species by fleet, metric tons, 1999-2001. (Page 2 of 2)

	1999	2000	2001	1999						2000						2001					
Species/Fleet	All	All	All	1.0	2.0	3.0	4.0	5.0	6.0	1.0	2.0	3.0	4.0	5.0	6.0	1.0	2.0	3.0	4.0	5.0	6.0
Pacific Ocean Perch																					
LE Trawl	481.4	139.7	187.5	28.3	75.9	122.6	138.6	88.0	28.0	6.9	6.5	38.8	40.1	35.5	11.9	24.3	22.7	45.5	54.5	40.6	
LE Fixed-gear	0.1	0.7	0.0			0.1						0.5	0.1	0.0				0.0	0.0	0.0	0.0
LE Shrimp-trawl	0.0	0.2	0.0			0.0	0.0	0.0				0.2	0.0	0.0				0.0			
OA Non-shrimp	0.2	0.0	0.0		0.0	0.1	0.0	0.1			0.0		0.0	0.0					0.0		0.0
OA Shrimp-trawl	0.1	0.1	0.0		0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0			0.0	0.0			
Total	481.8	140.6	187.6	28.3	75.9	122.8	138.6	88.2	28.0	6.9	6.6	39.5	40.3	35.5	11.9	24.3	22.7	45.5	54.5	40.6	0.0
Widow																					
LE Trawl	3,836.3	3,761.8	1,750.4	882.0	843.6	309.0	345.6	694.7	761.5	374.0	487.1	404.6	601.1	1,069.0	826.1	387.9	456.1	189.6	53.6	15.5	647.7
LE Fixed-gear	16.1	5.3	0.5	1.7	1.9	2.4	3.9	5.7	0.4	0.1	0.7	1.8	0.9	1.5	0.3	0.1	0.1	0.0	0.1	0.2	
LE Shrimp-trawl	5.2	1.0	0.5		0.7	1.6	2.3	0.5			0.0	0.2	0.5	0.2			0.0	0.4	0.0	0.0	
OA Non-shrimp	41.4	17.7	13.0	4.5	4.9	2.8	8.4	14.9	5.8	2.0	0.1	1.6	2.7	6.4	4.9	5.1	1.2	1.9	3.1	1.6	0.1
OA Shrimp-trawl	4.6	1.7	0.6		0.5	1.6	1.5	0.9	0.0		0.1	0.7	0.7	0.2			0.2	0.3	0.0		
Total	3,903.5	3,787.5	1,765.0	888.2	851.6	317.6	361.6	716.7	767.7	376.2	487.9	408.9	605.9	1,077.4	831.3	393.2	457.7	192.2	56.8	17.3	647.8
Yelloweye																					
LE Trawl	20.5	1.0	2.2	0.4	1.6	4.3	9.7	4.5	0.0	0.0	0.0	0.2	0.5	0.2	0.0	0.0	0.1	0.5	1.2	0.5	
LE Fixed-gear	47.7	5.0	6.9	0.5	2.5	5.1	34.5	5.1		0.0	0.4	1.3	1.5	1.6	0.1	0.7	1.0	2.0	1.7	1.4	
OA Non-shrimp	15.4	2.9	2.9	0.1	0.6	1.8	10.1	2.6	0.1	0.2	0.1	0.6	1.1	0.6	0.2	0.2	0.5	0.7	1.1	0.5	0.0
Total	83.5	8.9	12.0	1.0	4.7	11.3	54.3	12.2	0.1	0.3	0.6	2.1	3.1	2.5	0.4	0.9	1.6	3.2	4.0	2.3	0.0

TABLE 6-15. Estimated recreational catch of selected overfished groundfish species in ocean waters by subregion for charter and private boats (mt). (Page 1 of 1)

		Southern California			Northern California			Oregon			Washington			Coast Wide		
Year	Species	Charter	Private	Total	Charter	Private	Total	Charter	Private	Total	Charter	Private	Total	Charter	Private	Total
1998	Bocaccio	12.9	15.3	28.2	20.0	2.7	22.7	0.2	0.1	0.3	0.1	0.1	0.2	33.2	18.1	51.4
	Canary Rockfish	1.1	0.3	1.5	12.7	11.4	24.1	25.3	17.9	43.3	9.6	1.5	11.1	48.7	31.2	80.0
	Cowcod	0.7	2.1	2.8	-	-	-	-	-	-	-	-	-	0.7	2.1	2.8
	Widow Rockfish	0.3	0.0	0.3	32.4	3.2	35.5	15.3	0.7	16.0	-	-	-	47.9	3.9	51.8
	Yelloweye Rockfish	-	-	-	3.2	2.3	5.5	8.3	10.5	18.8	9.9	4.5	14.4	21.4	17.3	38.7
	Lingcod	7.2	9.6	16.9	32.6	165.1	197.7	17.7	51.3	69.0	20.0	7.0	27.0	77.5	233.0	310.6
1999	Bocaccio	38.7	27.9	66.6	45.8	6.4	52.2	0.2	0.2	0.4	0.2	0.2	0.4	84.9	34.7	119.6
	Canary Rockfish	1.7	0.1	1.8	47.2	15.1	62.3	15.3	13.4	28.7	4.2	0.7	4.9	68.3	29.4	97.7
	Cowcod	2.2	1.5	3.8	1.8	-	1.8	-	-	-	-	-	-	4.0	1.5	5.6
	Widow Rockfish	0.1	-	0.1	27.6	2.6	30.3	0.9	1.1	2.0	-	-	-	28.7	3.7	32.4
	Yelloweye Rockfish	1.6	-	1.6	7.3	3.7	11.0	8.9	8.4	17.3	8.0	10.4	18.5	25.8	22.5	48.4
	Lingcod	19.6	10.6	30.2	93.2	195.3	288.6	30.5	49.5	80.0	21.6	12.4	34.0	164.9	267.8	432.7
2000	Bocaccio	32.1	11.1	43.2	53.6	5.3	58.9	0.7	-	0.7	0.3	0.1	0.3	86.7	16.5	103.2
	Canary Rockfish	0.4	-	0.4	62.1	14.2	76.3	10.3	4.2	14.5	1.8	0.9	2.8	74.7	19.3	94.0
	Cowcod	0.5	3.7	4.2	-	1.7	1.7	-	-	-	-	-	-	0.5	5.4	5.9
	Widow Rockfish	0.1	-	0.1	11.5	0.2	11.6	3.0	-	3.0	-	-	-	14.5	0.2	14.7
	Yelloweye Rockfish	-	-	-	3.8	3.7	7.5	9.0	0.5	9.5	4.4	6.3	10.7	17.2	10.5	27.7
	Lingcod	3.1	2.0	5.1	56.0	107.1	163.1	22.6	27.4	50.0	17.8	10.4	28.2	99.5	146.9	246.4
2001	Bocaccio	25.9	28.4	54.3	45.9	3.0	48.8	0.5	0.2	0.7	0.7	0.2	0.9	73.0	31.8	104.8
	Canary Rockfish	-	-	-	20.5	11.8	32.3	6.1	4.7	10.9	1.2	1.2	2.4	27.9	17.7	45.6
	Cowcod	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Pacific Ocean Perch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Widow Rockfish	-	0.3	0.3	9.1	0.1	9.2	4.1	-	4.1	-	-	-	13.2	0.4	13.6
	Yelloweye Rockfish	-	-	-	3.0	1.7	4.6	4.5	0.2	4.7	6.3	8.3	14.7	13.8	10.2	24.0
	Lingcod	3.1	19.2	22.3	39.7	76.6	116.3	28.6	31.4	60.0	17.5	14.7	32.2	88.9	141.9	230.8
2002[a/]	Bocaccio	53.4	20.0	73.3	7.7	0.5	8.2	0.4	0.4	0.8	-	-	-	61.5	20.9	82.3
	Canary Rockfish	0.0	0.2	0.2	2.5	3.2	5.7	3.8	4.6	8.4	0.1	3.5	3.6	6.4	11.5	17.9
	Cowcod	-	0.5	0.5	0.1	-	0.1	-	-	-	-	-	-	0.1	0.5	0.6
	Pacific Ocean Perch	0.0	-	0.0	0.2	0.2	0.4	-	-	-	-	-	-	0.2	0.2	0.4
	Widow Rockfish	0.7	-	0.7	0.9	0.0	0.9	1.0	-	1.0	-	-	-	2.5	0.0	2.6
	Yelloweye Rockfish	0.6	-	0.6	0.4	1.1	1.5	0.7	2.4	3.1	-	-	-	1.7	3.5	5.2
	Lingcod	28.7	35.0	63.7	187.6	216.7	404.3	10.7	64.3	75.0	4.0	23.0	27.1	231.0	339.1	570.1

a/ Preliminary estimate. Source: RecFIN (MRFSS and Oregon Recreational Ocean Boat Survey)

TABLE 6-16. Numbers of vessels most involved in West Coast fisheries and the groundfish (GF) fishery and total exvessel revenue for each group (November 2000 through October 2001). To produce this table, vessels were ranked from highest to lowest producer (by value), the first ranking (columns) was based on revenue from all species, and a second ranking (rows) was based on revenue from groundfish. (Page 1 of 1)

	Percent of Landings (All Species) by Vessels Ranked from Highest to Lowest Production (By Value)									
Percent of Groundfish Landings (All Species) by Vessels Ranked from Highest to Lowest Production (By Value)	Top 50% of Total Value	Next 20% of Total Value	Next 10% of Total Value	Next 10% of Total Value	Final 10% of Total Value	Total	Percent of All Vessels	Cumulative Percent	Percent of Groundfish Vessels	Cumulative Percent
	Number of Vessels Making The Indicated Amount of Landings									
Top 50% of GF Value	93	0	0	0	0	93	2%	2%	5%	5%
Next 20% of GF Value	50	30	0	0	0	80	2%	4%	5%	10%
Next 10% of GF Value	11	32	21	0	0	64	1%	5%	4%	14%
Next 10% of GF Value	12	16	27	64	4	123	3%	8%	7%	21%
Final 10% of GF Value	55	116	87	149	934	1,341	29%	37%	79%	100%
No Groundfish Landings	176	205	197	343	1,957	2,878	63%	100%		
Column Total	397	399	332	556	2895	4579				
Percent of All Vessels	9%	9%	7%	12%	63%					
Cumulative Percent of All Vessels	9%	17%	25%	37%	100%					
Total Groundfish Vessels in Column	221	194	135	213	938	1,701				
GF Vessels as % of Total for Col	56%	49%	41%	38%	32%					
GF Vessels in Column as % of Total Groundfish Vessels	13%	11%	8%	13%	55%					
Cumulative Total	13%	24%	32%	45%	100%					
	Exvessel Value of All Landings Made by the Vessels ($)									
Top 50% of GF Value	33,745,500	0	0	0	0	33,745,500	14%	14%	29%	29%
Next 20% of GF Value	10,988,899	4,078,778	0	0	0	15,067,678	6%	20%	13%	42%
Next 10% of GF Value	2,468,990	3,753,095	1,826,571	0	0	8,048,655	3%	23%	7%	49%
Next 10% of GF Value	2,507,196	1,756,437	1,823,832	2,800,173	124,397	9,012,036	4%	27%	8%	57%
Next 10% of GF Value	14,092,789	14,038,413	6,359,434	6,581,151	8,701,188	49,772,974	20%	47%	43%	100%
No Groundfish Landings	57,721,771	25,176,821	14,518,513	15,046,383	15,669,022	128,132,510	53%	100%		
Column Total	121,525,145	48,803,544	24,528,350	24,427,708	24,494,607	243,779,354				
Revenue of All Species Landed by Groundfish Vessels	63,803,374	23,626,723	10,009,837	9,381,325	8,825,585	115,646,844				
Revenue of Groundfish Vessels as Percent of Total for Column	53%	48%	41%	38%	36%					
Revenue of Groundfish Vessels as a Percent of Total Fishing Revenue	26%	10%	4%	4%	4%					
Cumulative Total	26%	36%	40%	44%	47%					

NOTE: Catch by catcher-processors and tribal vessels are not included in this table. Catcher vessels delivering to motherships are included, and all other landings for which landing receipts were filled out are included. Groundfish includes only the landings of groundfish species caught under the jurisdiction of the Council's groundfish FMP.

TABLE 6-17a. Number of vessels by fleet category, level of dependence and level of gross income (values for base period (November 2000 through October 2001). (Page 1 of 1)

	Category of Gross Income From West Coast Landings				
	<$5,000	$5,000-$50,000	$50,000-200,000	>$200,000	Total
Limited Entry Trawl	Number of Vessels				
>0% & <5%	0	0	4	1	5
>5% & <35%	0	0	11	6	17
>35% & <65%	0	0	18	27	45
>65% & <95%	0	4	26	40	70
>95% & <100%	2	7	53	37	99
No Groundfish Landing In Base Period	1	0	9	1	11
Total	3	11	121	112	247
Limited Entry Longline and Fishpot					
>0% & <5%	1	6	7	3	17
>5% & <35%	0	4	19	9	32
>35% & <65%	0	6	29	14	49
>65% & <95%	0	14	11	1	26
>95% & <100%	4	29	21	0	54
No Groundfish Landing In Base Period	1	10	7	1	19
Total	6	69	94	28	197
Open Access with >5% From					
>5% & <35%	52	101	44	0	197
>35% & <65%	47	50	8	0	105
>65% & <95%	63	55	6	0	124
>95% & <100%	200	138	7	0	345
Total	362	344	65	0	771
Open Access with <5% of Revenue					
>0% & <5%	45	268	169	34	516
No Groundfish Landing In Base Period	1,027	1,181	510	130	2,848
Total	1,072	1,449	679	164	3,364
Groundfish Vessel Total	416	692	449	174	1,731
Grand Total	1,443	1,873	959	304	4,579

Source: Derived from PacFIN monthly vessel summary files.

TABLE 6-17b. Exvessel revenue by fleet category, level of dependence, and level of gross income (values for base period November 2000 through October 2001). (Page 1 of 2)

	Category of Gross Income From West Coast Landings				
	<$5,000	$5,000-$50,000	$50,000-200,000	>$200,000	Total
Limited Entry Trawl	Total Exvessel Revenue ($)				
>0% & <5%	0	0	441,301	275,289	716,590
>5% & <35%	0	0	1,216,708	1,691,721	2,908,429
>35% & <65%	0	0	2,231,773	8,269,118	10,500,891
>65% & <95%	0	81,105	3,755,128	14,133,342	17,969,576
>95% & <100%	2,673	136,997	6,684,899	12,134,494	18,959,063
No Groundfish Landing In Base Period	2,273	0	756,161	210,743	969,177
Total	4,946	218,103	15,085,970	36,714,707	52,023,726
Limited Entry Longline and Fishpot					
>0% & <5%	3,311	126,194	644,914	1,163,527	1,937,946
>5% & <35%	0	110,820	1,997,638	3,286,281	5,394,739
>35% & <65%	0	196,026	3,159,960	4,498,529	7,854,515
>65% & <95%	0	407,988	1,017,071	201,429	1,626,488
>95% & <100%	9,741	797,807	1,611,208	0	2,418,756
No Groundfish Landing In Base Period	2,533	195,966	549,980	304,489	1,052,968
Total	15,585	1,834,801	8,980,771	9,454,255	20,285,412
Open Access with >5% From Groundfish					
>5% & <35%	111,738	2,148,676	3,999,350	0	6,259,764
>35% & <65%	75,358	956,712	546,317	0	1,578,387
>65% & <95%	108,372	996,853	486,934	0	1,592,159
>95% & <100%	261,318	2,589,685	508,585	0	3,359,588
Total	556,786	6,691,926	5,541,186	0	12,789,898
Open Access with <5% of Revenue from Groundfish					
>0% & <5%	112,103	6,003,259	17,085,952	9,368,639	32,569,953
No Groundfish Landing In Base Period	1,873,962	24,420,868	50,680,628	49,134,907	126,110,365
Total	1,986,065	30,424,127	67,766,580	58,503,546	158,680,318
Groundfish Vessel Total	689,420	14,748,089	46,693,879	55,537,601	117,668,989
Grand Total	2,563,382	39,168,957	97,374,507	104,672,508	243,779,354
Limited Entry Trawl	Total Groundfish Revenue ($)				
>0% & <5%	0	0	4,136	6,339	10,475
>5% & <35%	0	0	182,248	339,166	521,414
>35% & <65%	0	0	1,355,987	5,180,446	6,536,433
>65% & <95%	0	60,235	3,149,194	12,457,556	15,666,985
>95% & <100%	2,673	213,445	6,580,010	11,423,415	18,219,543
No Groundfish Landing In Base Period	0		0	0	0
Total	2,673	273,680	11,271,575	29,406,922	40,954,850
Limited Entry Longline and Fishpot					
>0% & <5%	50	1,933	7,738	20,066	29,787
>5% & <35%	0	17,374	419,268	807,674	1,244,316
>35% & <65%	0	96,624	1,631,259	2,257,878	3,985,761
>65% & <95%	0	352,893	858,841	161,731	1,373,465
>95% & <100%	9,741	789,014	1,579,821		2,378,576
No Groundfish Landing In Base Period	0	0	0	0	0
Total	9,791	1,257,838	4,496,927	3,247,349	9,011,905
Open Access with >5% From Groundfish					
>5% & <35%	16,965	358,000	423,529	0	798,494
>35% & <65%	40,741	516,414	267,690	0	824,845
>65% & <95%	91,691	851,945	407,877	0	1,351,513
>95% & <100%	259,602	2,563,176	503,827	0	3,326,605
Total	408,999	4,289,535	1,602,923	0	6,301,457

TABLE 6-17b. Exvessel revenue by fleet category, level of dependence, and level of gross income (values for base period November 2000 through October 2001). (Page 2 of 2)

	Category of Gross Income From West Coast Landings				
	<$5,000	$5,000-$50,000	$50,000-200,000	>$200,000	Total
Open Access with <5% of Revenue from Groundfish					
>0% & <5%	1,374	52,149	157,140	123,129	333,792
No Groundfish Landing In Base Period	0	0	0	0	0
Total	1,374	52,149	157,140	123,129	333,792
Groundfish Vessel Total	422,837	5,873,202	17,528,565	32,777,400	56,602,004
Grand Total	422,837	5,873,202	17,528,565	32,777,400	56,602,004

Source: Derived from PacFIN monthly vessel summary files.

TABLE 6-18a. Number of vessels by fleet category, level of dependence and vessel size category (values for base period November 2000 through October 2001). (Page 1 of 1)

	Vessel Size Category						
	<40'	40'-50'	50'-60'	60'-70'	70'-150'	Unspecified	Total
Limited Entry Trawl	Number of Vessels						
>0% & <5%	0	3	1	0	1	0	5
>5% & <35%	1	4	7	3	2	0	17
>35% & <65%	1	7	14	7	16	0	45
>65% & <95%	0	10	17	24	19	0	70
>95% & <100%	2	3	21	21	46	6	99
No Groundfish Landing In Base Period	1	4	4	2	0	0	11
Total	5	31	64	57	84	6	247
Limited Entry Longline and Fishpot							
>0% & <5%	7	8	2	0	0	0	17
>5% & <35%	8	15	5	2	2	0	32
>35% & <65%	15	19	7	7	1	0	49
>65% & <95%	14	10	2	0	0	0	26
>95% & <100%	31	14	6	1	1	1	54
No Groundfish Landing In Base Period	10	5	3	1	0	0	19
Total	85	71	25	11	4	1	197
Open Access with >5% From Groundfish							
>5% & <35%	154	32	6	4	1	0	197
>35% & <65%	96	8	1	0	0	0	105
>65% & <95%	115	5	0	0	1	3	124
>95% & <100%	310	21	5	2	0	7	345
Total	675	66	12	6	2	10	771
Open Access with <5% of Revenue from Groundfish							
>0% & <5%	324	109	29	28	25	1	516
No Groundfish Landing In Base Period	1967	432	254	80	101	14	2848
Total	2,291	541	283	108	126	15	3364
Groundfish Vessel Total	1,089	277	130	102	115	18	1,731
Grand Total	3,056	709	384	182	216	32	4,579

Source: Derived from PacFIN monthly vessel summary files.

TABLE 6-18b. Exvessel revenue by fleet category, level of dependence and vessel size category (values for base period November 2000 through October 2001). (Page 1 of 2)

	Vessel Size Category						
	<40'	40'-50'	50'-60'	60'-70'	<150'	No Length	Total
Limited Entry Trawl	Total Exvessel Revenue ($)						
>0% & <5%	0	325,964	275,289	0	115,337	0	716,590
>5% & <35%	181,153	430,674	953,215	825,043	518,344	0	2,908,429
>35% & <65%	27,962	871,383	2,490,768	1,888,811	5,221,968	0	10,500,891
>65% & <95%	0	1,165,761	3,136,028	6,765,312	6,902,474	0	17,969,576
>95% & <100%	106,771	242,804	3,151,177	4,266,877	10,613,452	577,982	18,959,063
No Groundfish Landing In Base Period	56,941	414,389	303,085	194,762	0	0	969,177
Total	372,827	3,450,975	10,309,561	13,940,805	23,371,575	577,982	52,023,726
Limited Entry Longline and Fishpot							
>0% & <5%	305,169	1,246,090	386,687	0	0	0	1,937,946
>5% & <35%	672,139	1,800,168	1,041,194	1,033,560	847,678	0	5,394,739
>35% & <65%	1,476,118	2,312,510	1,756,501	2,058,800	250,586	0	7,854,515
>65% & <95%	789,669	598,901	237,918	0	0	0	1,626,488
>95% & <100%	1,271,340	679,096	420,250	19,026	23,686	5,358	2,418,756
No Groundfish Landing In Base Period	215,379	266,313	488,684	82,592	0	0	1,052,968
Total	4,729,814	6,903,078	4,331,234	3,193,978	1,121,950	5,358	20,285,412
Open Access with >5% From Groundfish							
>5% & <35%	4,321,362	1,568,644	135,567	230,097	4,094	0	6,259,764
>35% & <65%	1,385,880	182,777	9,730	0	0	0	1,578,387
>65% & <95%	1,386,170	199,754	0	0	2,501	3,734	1,592,159
>95% & <100%	2,752,570	460,004	47,124	2,287	0	97,603	3,359,588
Total	9,845,982	2,411,179	192,421	232,384	6,595	101,337	12,789,898
Open Access with <5% of Revenue from Groundfish							
>0% & <5%	12,215,985	6,261,870	3,492,986	5,359,397	5,236,348	3,367	32,569,953
No Groundfish Landing In Base Period	38,231,406	22,436,667	26,343,670	12,444,865	26,130,590	523,167	126,110,365
Total	50,447,391	28,698,537	29,836,656	17,804,262	31,366,938	526,534	158,680,318
Groundfish Vessel Total	27,164,608	19,027,102	18,326,202	22,726,564	29,736,468	688,044	117,668,989
Grand Total	65,396,014	41,463,769	44,669,872	35,171,429	55,867,058	1,211,211	243,779,354

TABLE 6-18b. Exvessel revenue by fleet category, level of dependence and vessel size category (values for base period November 2000 through October 2001). (Page 2 of 2)

	Vessel Size Category						
	<40'	40'-50'	50'-60'	60'-70'	<150'	No Length	Total
Limited Entry Trawl	Total Groundfish Exvessel Revenue ($)						
>0% & <5%	0	2,711	6,339	0	1,425	0	10,475
>5% & <35%	19,428	43,784	157,768	253,150	47,284	0	521,414
>35% & <65%	29,954	455,343	1,150,602	728,615	2,391,219	0	4,755,733
>65% & <95%	0	977,218	3,240,980	6,428,795	6,800,692	0	17,447,685
>95% & <100%	106,787	273,082	3,097,003	4,278,678	9,886,011	577,982	18,219,543
No Groundfish Landing In Base Period	0	0	0	0	0	0	0
Total	156,169	1,752,138	7,652,692	11,689,238	19,126,631	577,982	40,954,850
Limited Entry Longline and Fishpot							
>0% & <5%	4,354	12,410	13,019	4	0	0	29,787
>5% & <35%	161,449	311,302	206,628	275,907	289,030	0	1,244,316
>35% & <65%	616,385	674,807	851,658	765,290	95,876	0	3,004,016
>65% & <95%	806,958	1,124,427	195,606	228,219	0	0	2,355,210
>95% & <100%	1,260,140	663,360	407,616	19,026	23,076	5,358	2,378,576
No Groundfish Landing In Base Period	0	0	0	0	0	0	0
Total	2,849,286	2,786,306	1,674,527	1,288,446	407,982	5,358	9,011,905
Open Access with >5% From Groundfish							
>5% & <35%	572,972	181,882	27,222	16,095	323	0	798,494
>35% & <65%	638,089	79,881	4,062	0	0	0	722,032
>65% & <95%	1,291,863	157,323	0	0	1,777	3,363	1,454,326
>95% & <100%	2,722,871	456,863	47,124	2,287	0	97,460	3,326,605
Total	5,225,795	875,949	78,408	18,382	2,100	100,823	6,301,457
Open Access with <5% of Revenue from Groundfish							
>0% & <5%	130,599	42,398	35,227	56,911	68,603	54	333,792
No Groundfish Landing In Base Period	0	0	0	0	0	0	0
Total	130,599	42,398	35,227	56,911	68,603	54	333,792
Groundfish Vessel Total	8,361,849	5,456,791	9,440,854	13,052,977	19,605,316	684,217	56,602,004
Grand Total	8,361,849	5,456,791	9,440,854	13,052,977	19,605,316	684,217	56,602

Source: Derived from PacFIN monthly vessel summary files.

TABLE 6-19. Number of vessels by length class, INPFC area, gear, and species groups for November 2000 through October 2001. (Page 1 of 3)

Gear and Species	<40'	40'-50'	50'-60'	60'-70'	70'-150'	>150'	Unspecified	Total
				Vessel Length Category				
Vancouver INPFC Area								
Limited Entry Trawl								
Whiting	0	0	1	3	13	0	0	17
Sablefish	1	10	17	22	31	0	0	81
Nearshore Species	1	6	10	9	9	0	0	35
Shelf Species	1	10	16	23	31	0	0	81
Slope Species	1	10	16	22	30	0	0	79
Limited Entry Fixed Gear								
Sablefish	9	17	6	1	3	0	0	36
Nearshore Species	1	2	1	0	0	0	0	4
Shelf Species	10	14	5	0	2	0	0	31
Slope Species	8	16	5	1	3	0	0	33
Open Access >5% Revenue from Groundfish								
Sablefish	13	3	1	0	0	0	1	18
Nearshore Species	7	0	0	0	0	0	0	7
Shelf Species	19	5	0	0	0	0	1	25
Slope Species	7	4	0	0	0	0	1	12
Open Access <5% Revenue from Groundfish								
Sablefish	0	1	2	1	1	0	0	5
Nearshore Species	2	11	3	1	1	0	0	18
Shelf Species	0	1	0	0	0	0	0	1
Slope Species	13	26	7	0	3	0	0	49
Nongroundfish Fisheries								
Shrimps and Prawns	0	0	2	3	3	0	0	8
Crabs	7	11	26	7	6	0	0	57
Salmon	13	20	2	1	4	0	0	40
HMS	2	3	2	3	5	0	0	15
CPS	0	2	6	1	15	0	0	24
Other	3	12	13	13	27	0	0	68
Columbia INPFC Area								
Limited Entry Trawl								
Whiting	-	2	1	8	35	0	6	52
Sablefish	3	10	21	38	51	0	4	127
Nearshore Species	1	10	17	19	15	0	0	62
Shelf Species	3	12	21	38	60	0	6	140
Slope Species	3	10	20	38	54	0	4	129
Limited Entry Fixed Gear								
Sablefish	12	27	14	6	2	0	1	62
Nearshore Species	3	3	2	0	0	0	0	8
Shelf Species	14	24	8	5	0	0	0	51
Slope Species	8	20	8	5	1	0	0	42
Open Access >5% Revenue from Groundfish								
Sablefish	25	12	4	2	1	0	2	46
Nearshore Species	55	5	1	0	0	0	0	61
Shelf Species	57	8	2	1	0	0	1	69
Slope Species	8	4	2	1	0	0	2	17
Open Access <5% Revenue from Groundfish								
Sablefish	19	16	10	17	17	0	0	79
Nearshore Species	35	7	2	4	3	0	0	51
Shelf Species	120	47	15	22	18	0	0	222
Slope Species	16	6	7	12	11	0	0	52
Nongroundfish Fisheries								
Halibut	104	73	24	8	12	0	1	222
Shrimps and Prawns	0	2	17	43	36	0	0	98
Crabs	167	135	90	42	32	0	0	466
Salmon	340	123	20	7	30	0	5	525
HMS	162	223	117	57	37	0	1	597
CPS	2	10	16	10	41	0	6	85
Other	51	32	40	42	58	0	7	230

TABLE 6-19. Number of vessels by length class, INPFC area, gear, and species groups for November 2000 through October 2001. (Page 2 of 3)

Gear and Species	<40'	40'-50'	50'-60'	Vessel Length Category 60'-70'	70'-150'	>150'	Unspecified	Total
Eureka INPFC Area								
Limited Entry Trawl								
Whiting	0	2	0	2	12	0	0	16
Sablefish	1	14	29	27	28	0	0	99
Nearshore Species	1	11	21	13	7	0	0	53
Shelf Species	2	14	29	25	30	0	0	100
Slope Species	2	14	31	28	29	0	0	104
Limited Entry Fixed Gear								
Sablefish	19	8	3	0	0	0	0	30
Nearshore Species	19	3	2	0	0	0	0	24
Shelf Species	22	6	2	0	0	0	0	30
Slope Species	20	4	1	0	0	0	0	25
Open Access >5% Revenue from Groundfish								
Sablefish	24	2	0	0	0	0	0	26
Nearshore Species	138	3	1	0	0	0	1	143
Shelf Species	133	3	1	0	0	0	0	137
Slope Species	76	1	0	0	0	0	0	77
Open Access <5% Revenue from Groundfish								
Sablefish	2	1	0	0	0	0	0	3
Nearshore Species	23	1	1	0	2	0	0	27
Shelf Species	20	4	1	5	3	0	0	33
Slope Species	5	0	0	2	1	0	0	8
Nongroundfish Fisheries								
Halibut	10	9	6	1	2	0	0	28
Shrimps and Prawns	1	6	10	12	8	0	0	37
Crabs	160	74	38	9	11	0	0	292
Salmon	74	23	1	0	3	0	0	101
HMS	39	33	27	9	7	1	0	116
CPS	1	0	1	2	11	0	0	15
Other	154	23	33	23	23	0	1	257
Monterey INPFC Area								
Limited Entry Trawl								
Whiting	0	0	0	1	1	0	0	2
Sablefish	1	5	22	17	11	0	0	56
Nearshore Species	1	7	12	8	5	0	0	33
Shelf Species	1	7	23	18	12	0	0	61
Slope Species	1	7	24	18	12	0	0	62
Limited Entry Fixed Gear								
Sablefish	15	12	3	1	0	0	0	31
Nearshore Species	12	4	1	0	0	0	0	17
Shelf Species	16	8	3	0	0	0	0	27
Slope Species	17	10	3	1	0	0	0	31
Open Access >5% Revenue from Groundfish								
Sablefish	62	20	3	0	0	0	0	85
Nearshore Species	218	12	5	1	0	0	7	243
Shelf Species	207	13	4	2	0	0	5	231
Slope Species	59	12	3	0	0	0	0	74
Open Access <5% Revenue from Groundfish								
Sablefish	8	3	0	0	0	0	1	12
Nearshore Species	31	3	0	0	0	0	0	34
Shelf Species	35	12	0	1	0	0	0	48
Slope Species	7	3	1	1	0	0	0	12
Nongroundfish Fisheries								
Halibut	152	16	11	3	3	0	0	185
Shrimps and Prawns	5	1	8	4	4	0	0	22
Crabs	138	65	22	8	4	0	0	237
Salmon	505	141	24	1	0	0	0	671
HMS	112	72	40	9	9	0	0	242
CPS	13	10	10	4	6	0	1	44
Other	361	35	22	16	11	0	4	449

TABLE 6-19. Number of vessels by length class, INPFC area, gear, and species groups for November 2000 through October 2001. (Page 3 of 3)

Gear and Species	<40'	40'-50'	50'-60'	60'-70'	70'-150'	>150'	Unspecified	Total
	Vessel Length Category							
Conception INPFC Area								
Limited Entry Trawl								
Whiting	0	0	0	0	1	0	0	1
Sablefish	0	0	5	6	2	0	0	13
Nearshore Species	0	0	4	1	0	0	0	5
Shelf Species	0	0	5	7	2	0	0	14
Slope Species	0	0	4	7	2	0	0	13
Limited Entry Fixed Gear								
Sablefish	15	4	0	0	0	0	0	19
Nearshore Species	10	3	1	0	0	0	0	14
Shelf Species	15	4	1	0	0	0	0	20
Slope Species	16	4	0	0	0	0	0	20
Open Access >5% Revenue from Groundfish								
Sablefish	6	4	0	0	0	0	0	10
Nearshore Species	208	22	1	2	0	0	1	234
Shelf Species	170	16	1	1	1	0	0	189
Slope Species	57	14	0	2	1	0	0	74
Open Access <5% Revenue from Groundfish								
Sablefish	4	2	1	0	0	0	0	7
Nearshore Species	95	26	4	0	0	0	0	125
Shelf Species	62	17	3	2	3	0	0	87
Slope Species	36	9	3	3	2	0	0	53
Halibut	157	33	5	6	0	0	0	201
Shrimps and Prawns	39	19	8	8	5	0	0	79
Crabs	238	36	7	2	1	0	0	284
HMS	221	78	34	17	50	0	0	400
CPS	69	37	41	12	20	0	0	179
Other	487	83	24	9	33	0	1	637
All Ocean Areas (Council Managed 0-200 Miles)								
Limited Entry Trawl								
Whiting	0	4	1	10	40	0	6	61
Sablefish	4	26	61	54	73	0	4	222
Nearshore Species	3	28	48	36	31	0	0	146
Shelf Species	4	30	61	54	80	0	6	235
Slope Species	4	27	60	54	76	0	4	225
Limited Entry Fixed Gear								
Sablefish	61	61	23	8	4	0	1	158
Nearshore Species	39	13	5	0	0	0	0	57
Shelf Species	65	50	16	5	2	0	0	138
Slope Species	63	48	15	7	3	0	0	136
Open Access >5% Revenue from Groundfish								
Sablefish	128	39	7	2	1	0	2	179
Nearshore Species	566	39	7	3	0	0	8	623
Shelf Species	542	41	7	4	1	0	6	601
Slope Species	207	34	5	3	1	0	2	252
Open Access <5% Revenue from Groundfish								
Sablefish	33	23	11	18	17	0	1	103
Nearshore Species	183	37	7	4	5	0	0	236
Shelf Species	234	84	20	28	22	0	0	388
Slope Species	64	19	11	17	14	0	0	125
Nongroundfish Fisheries								
Halibut	431	149	49	18	20	0	1	668
Shrimps and Prawns	44	28	38	58	45	0	0	213
Crabs	692	302	147	59	46	0	0	1,246
Salmon	855	252	43	8	31	0	5	1,194
HMS	511	324	160	75	94	1	1	1,666
CPS	85	51	60	23	63	0	7	289
Other	1,005	165	107	67	111	0	13	1,468

Source: Derived from PacFIN monthly vessel summary files.

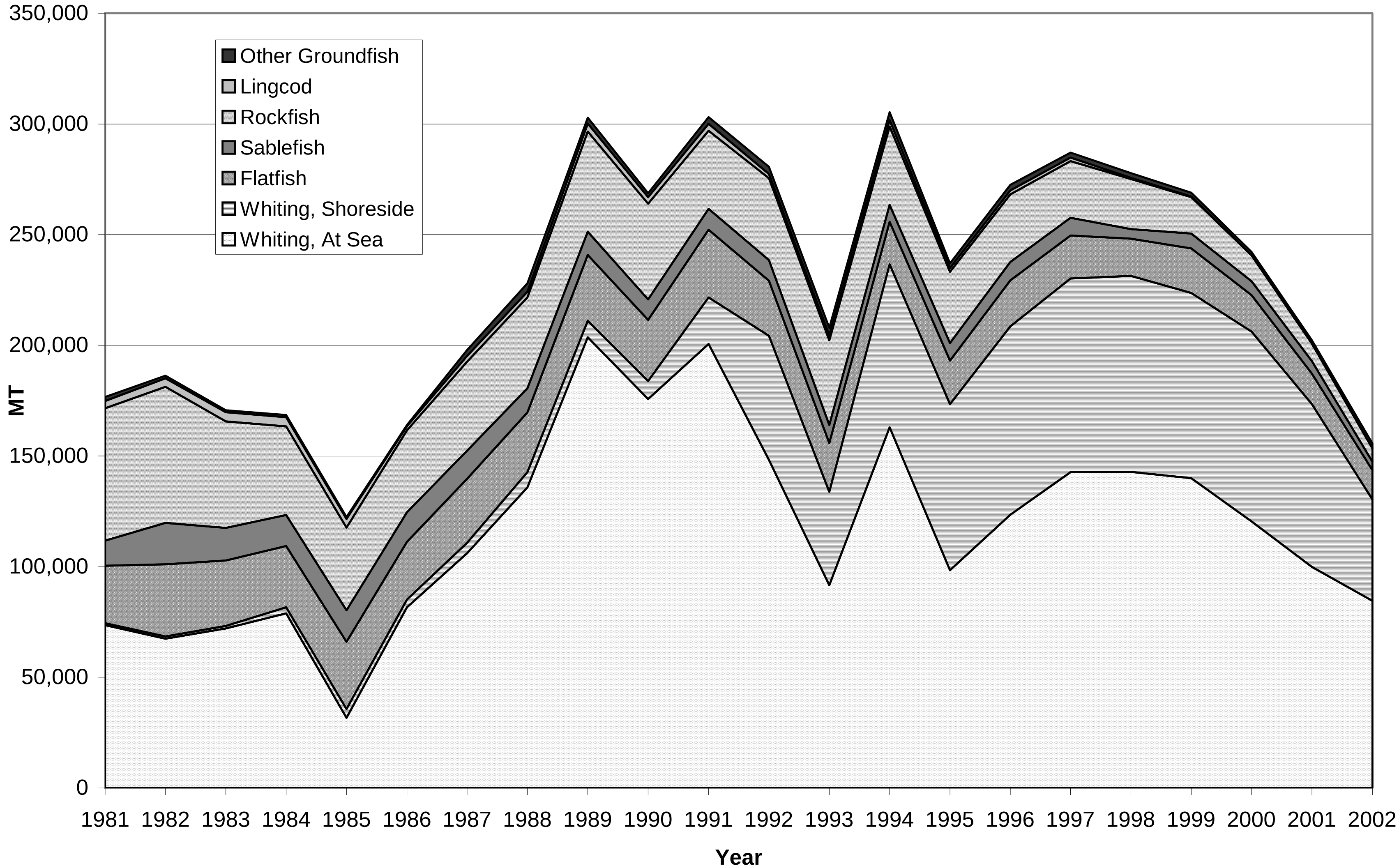

FIGURE 6-1. Groundfish landings by weight (mt), 1981-2002. (PacFIN landings data.)

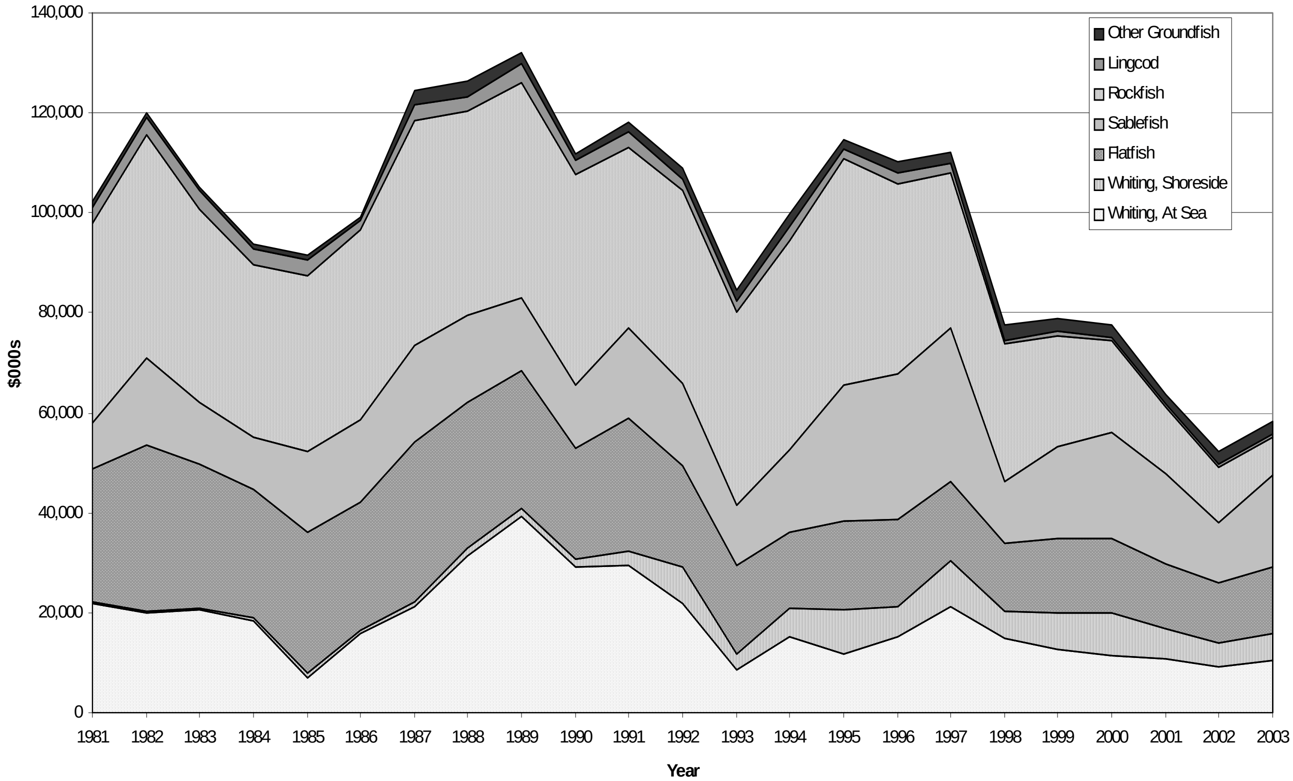

FIGURE 6-2. Groundfish landings in inflation adjusted dollars ($000), 1981-2002. (PacFIN landings data.)

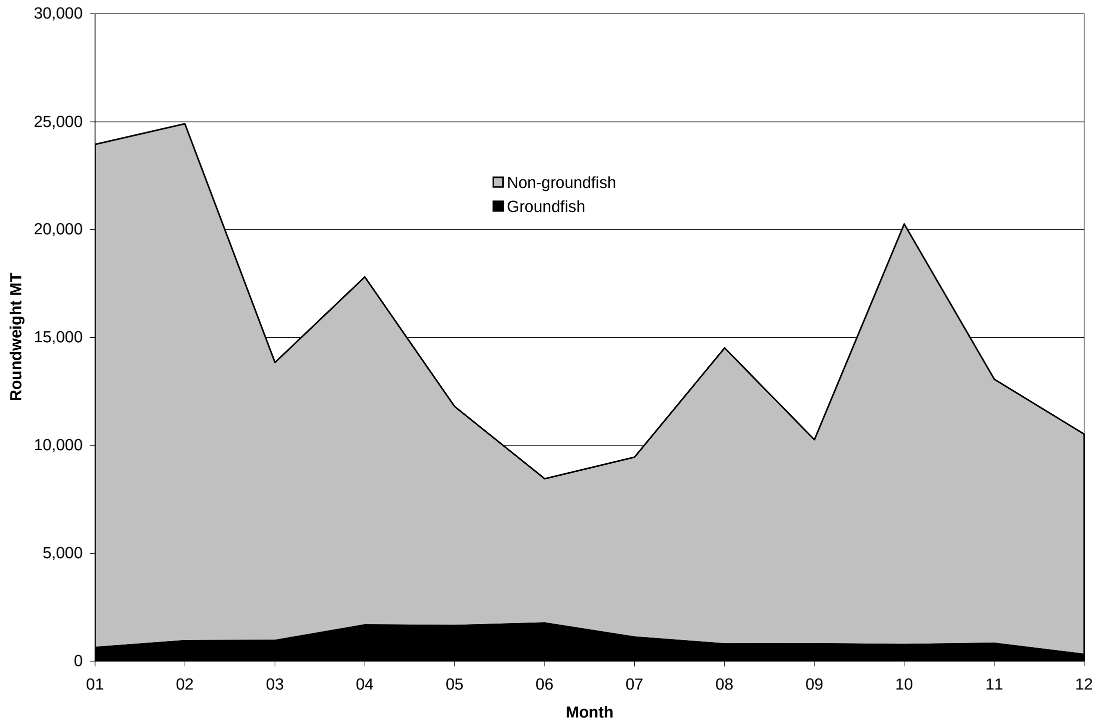

FIGURE 6-3. Total roundweight of all 2002 ocean fishery landings by month in **California**.

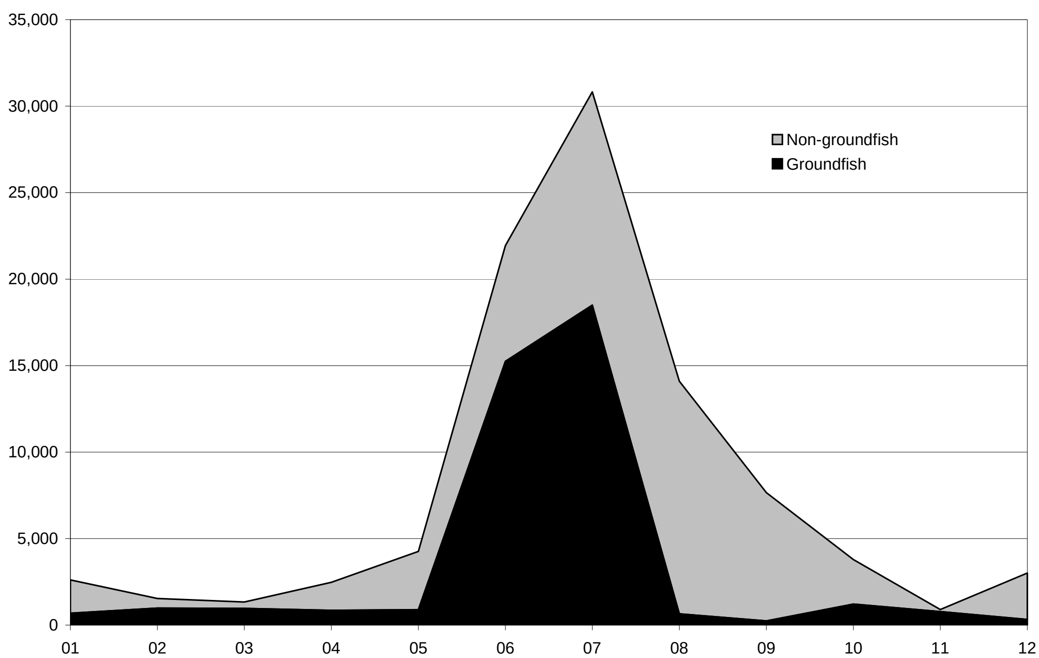

FIGURE 6-4. Total roundweight of all 2002 ocean fishery landings by month in **Oregon**.

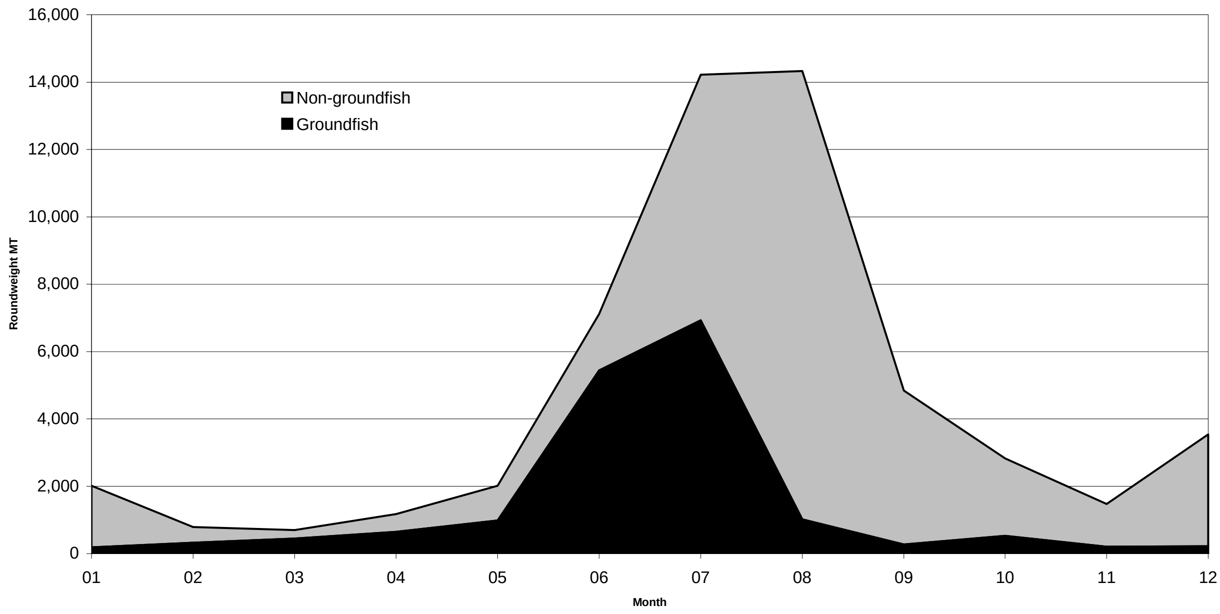

FIGURE 6-5. Total round weight of all 2002 ocean fishery landings by month in **Washington**.

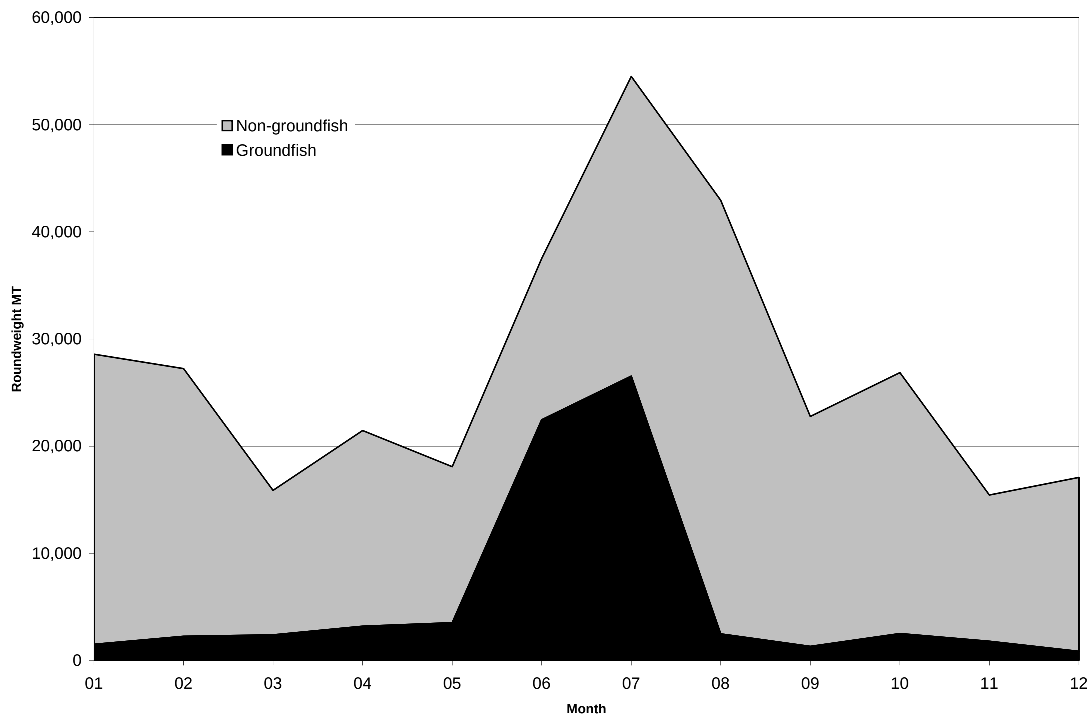

FIGURE 6-6. Total roundweight of all 2002 ocean fishery landings by month in **California, Oregon, and Washington**.

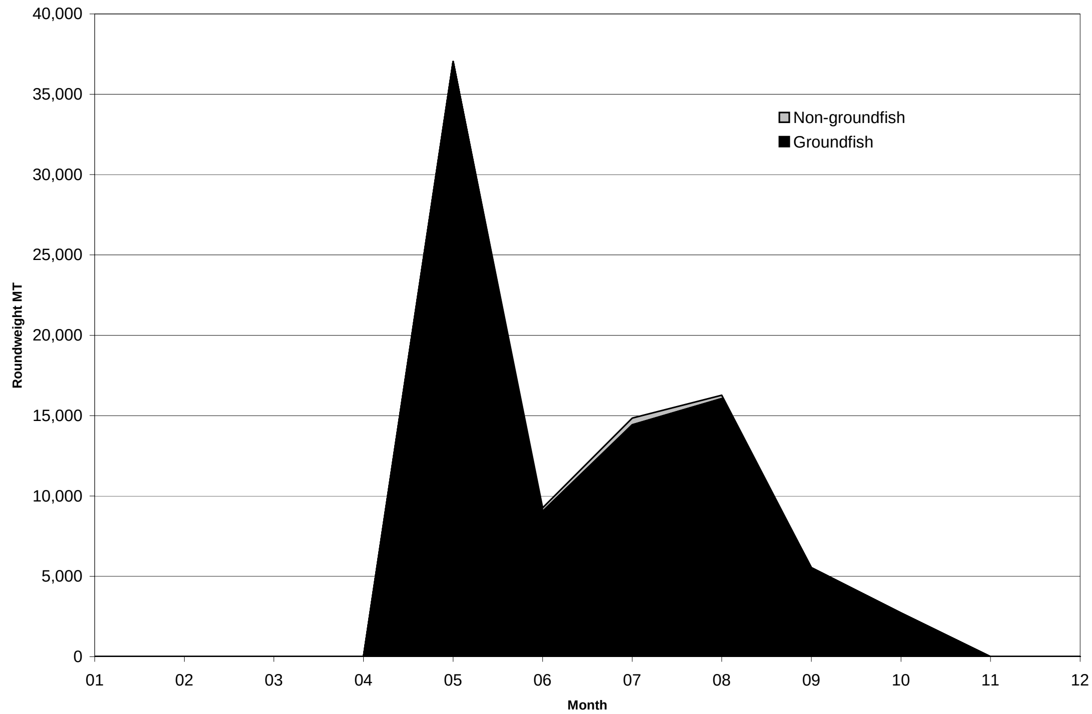

FIGURE 6-7. Total roundweight of all 2002 ocean fishery deliveries by month **At Sea**.

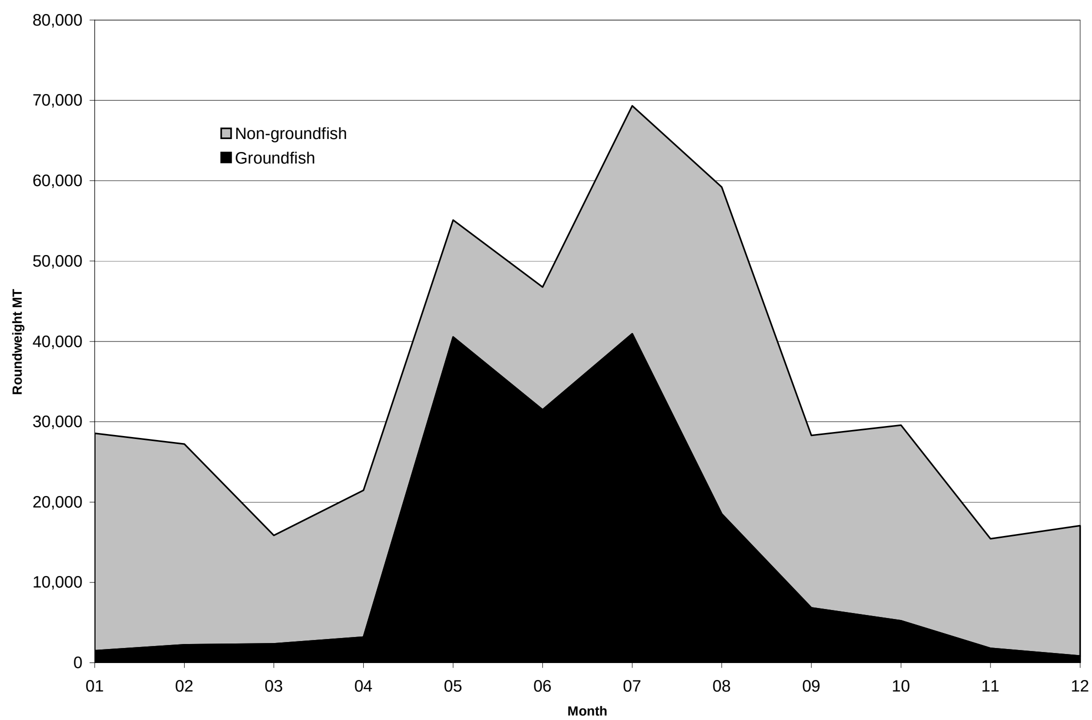

FIGURE 6-8. Total roundweight of all 2002 ocean fishery landings in **California, Oregon, and Washington** and deliveries **At Sea** by month.

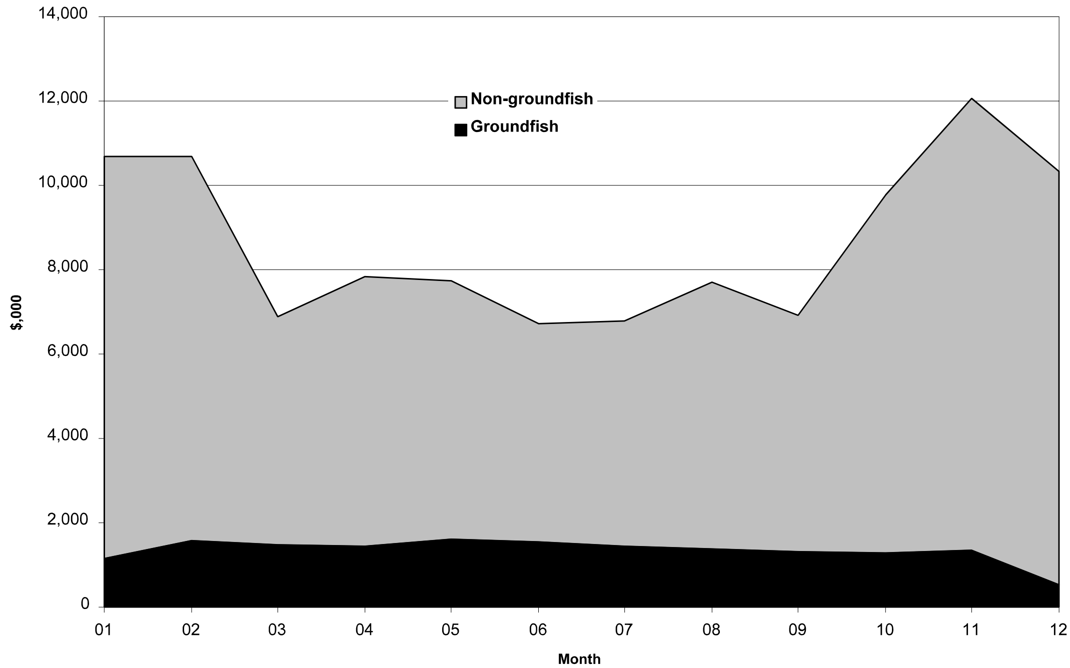

FIGURE 6-9. Exvessel value of all 2002 ocean fishery landings by month in **California**.

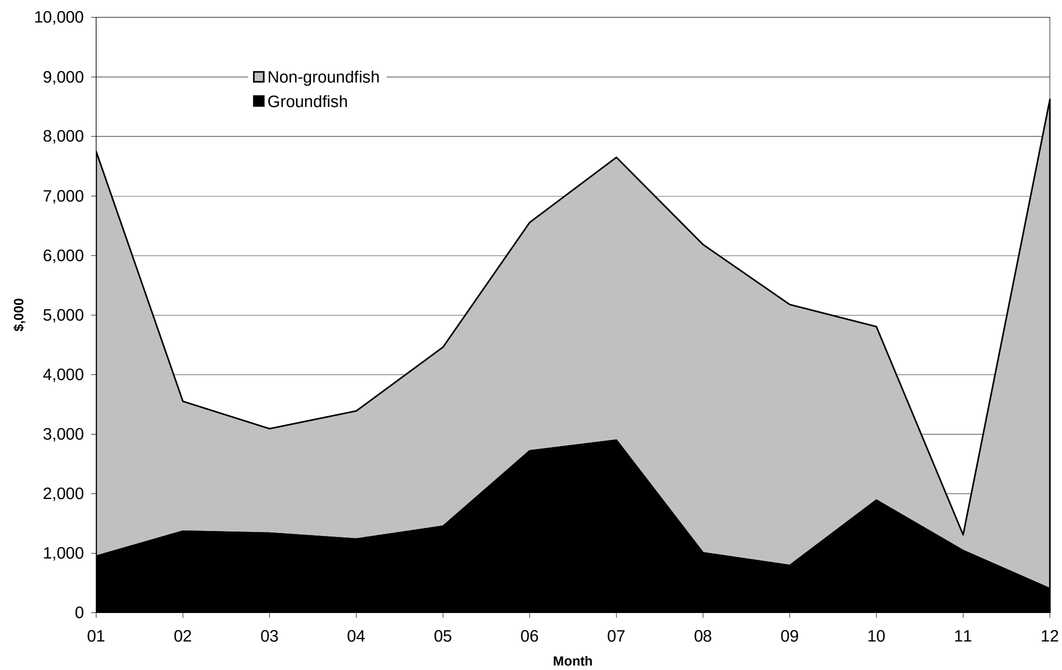

FIGURE 6-10. Exvessel value of all 2002 ocean fishery landings by month in **Oregon**.

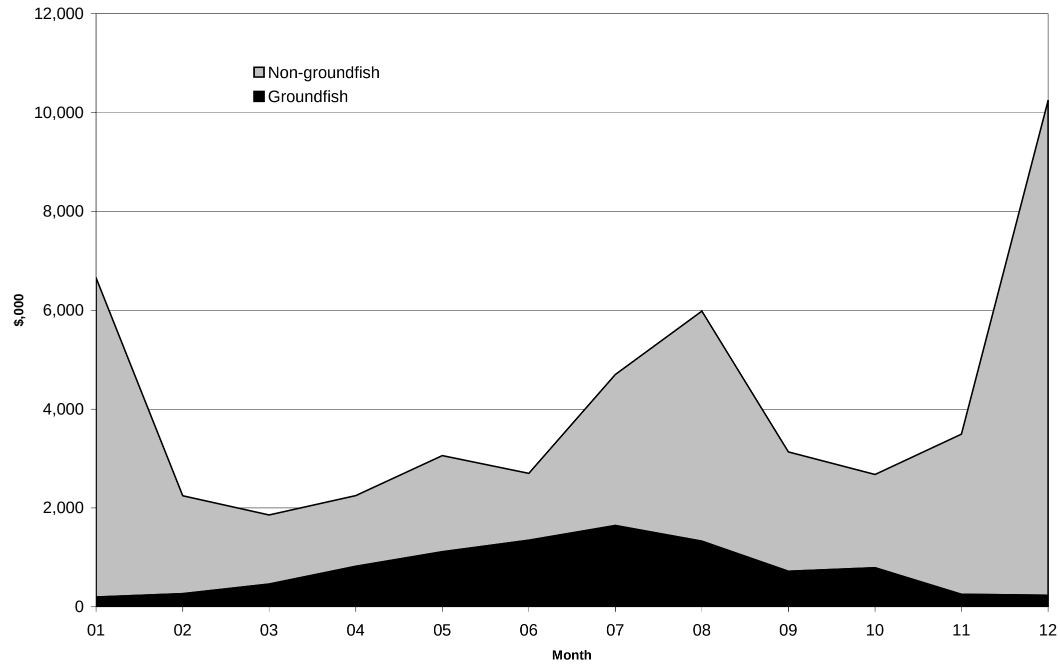

FIGURE 6-11. Exvessel value of all 2002 ocean fishery landings by month in **Washington**.

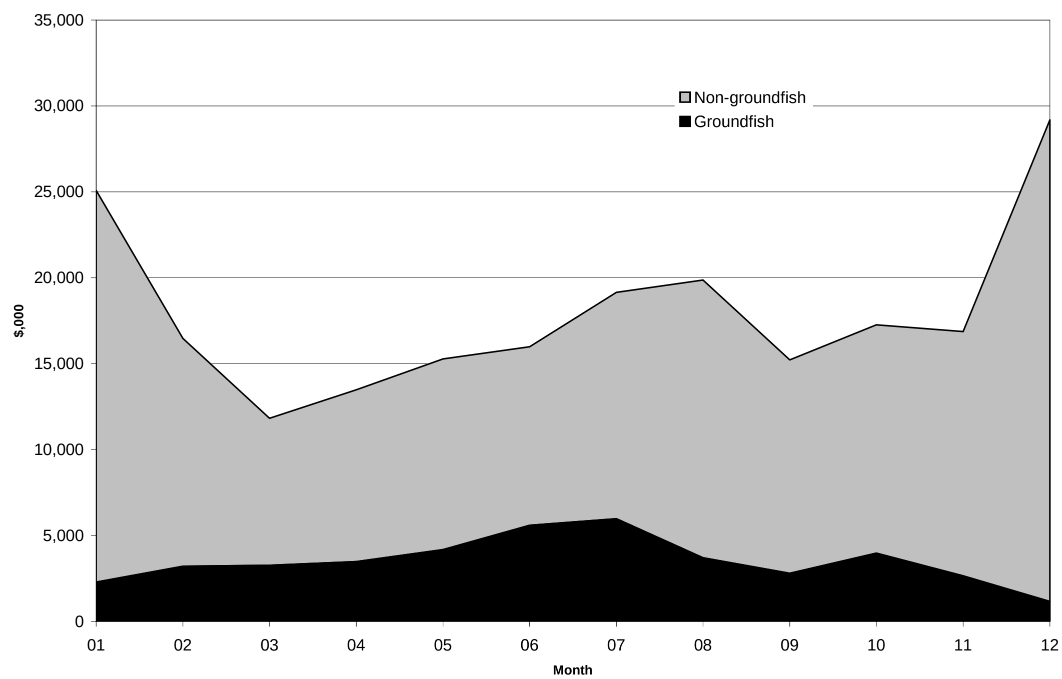

FIGURE 6-12. Exvessel value of all 2002 ocean fishery landings by month in **California, Oregon, and Washington**.

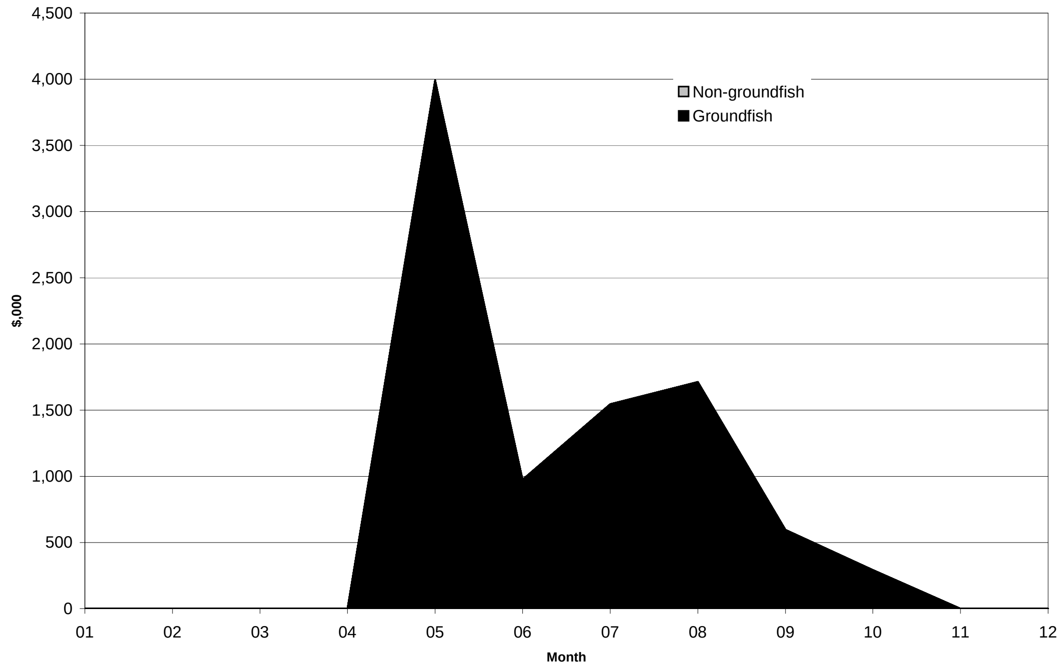

FIGURE 6-13. Exvessel value of all 2002 ocean fishery deliveries by month **At Sea**.

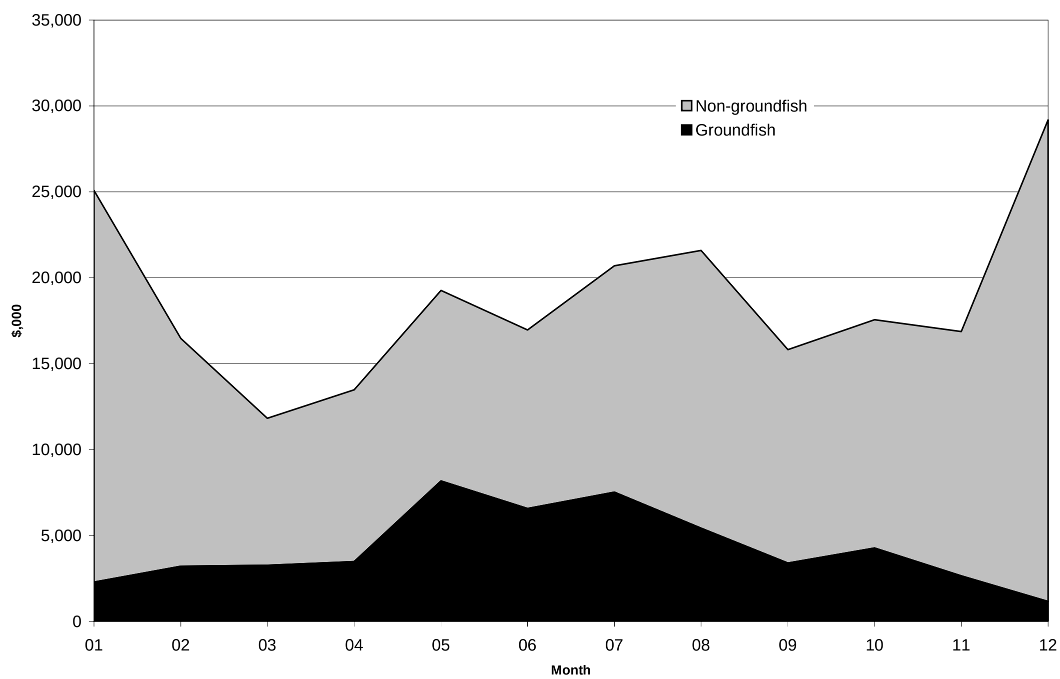

FIGURE 6-14. Exvessel value of all 2002 ocean fishery landings in **California, Oregon, and Washington** and deliveries **At Sea** by month.

7.0 Other Socioeconomic Sectors Involved in Groundfish Resources

Other sectors with a stake in the sound management of groundfish resources include secondary users, such as buyers and processors; non-consumptive users, such as tourists and wildlife watchers; and those who do not directly benefit from groundfish resources but may wish to preserve maximum flexibility for possible future uses (option value or bequethal values), or who simply value knowing that the resources exist and are well managed (existence value).

7.1 Buying, Processing, and Marketing Groundfish

The seafood distribution chain begins with deliveries by the harvesters (exvessel landings) to the shoreside networks of buyers and processors, and includes the linkage between buyers and processors and seafood markets. In addition to shoreside activities, processing of certain species (e.g. Pacific whiting and pollock) also occurs offshore on factory ships.

Several thousand entities have permits to buy fish on the West Coast. Of these 1,780 purchased fish caught in the ocean area and landed on Washington, Oregon, or California state fishtickets in the year 2000 (excluding tribal catch) and 732 purchased groundfish (Table 7-1).[18/]

Larger buyers tend to handle groundfish more than smaller buyers. Of the 546 buyers purchasing in excess of $20,000 of West Coast landings, 59% bought groundfish. These 546 buyers bought 99% of all Council-managed groundfish (Table 7-2). Of the 1,234 buyers purchasing less than $20,000 from West Coast vessels, only 33% bought groundfish.

The number of buyers handling groundfish from trawl vessels is a small proportion of all buyers handling groundfish: only 17% (125) of all groundfish buyers handled fish from trawl vessels or 7% of all buyers (Table 7-3). But buyers of trawl-caught groundfish are important to nontrawl vessels as well, handling 60% (by value) of the groundfish caught by nontrawl vessels.

The largest buyers tend to handle trawl vessels more than smaller buyers. Of the 38 largest buyers of groundfish (those with purchases in excess of $1 million), 28 (73%) bought from trawl vessels (Table 7-1). Seventy-eight percent of all groundfish purchases from trawl vessels go to these 28 buyers (Table 7-3). These 28 buyers also handle 39% of the exvessel value of the nontrawl purchases. Mid-size buyers tend to have greater importance for nontrawl vessels than for trawl vessels. Fifty percent of all nontrawl sales went to buyers with total purchases of between $20 thousand and $1 million, as compared to 22% for trawl vessels (Table 7-3).

Absent data on processor revenue and costs, gross exvessel value of purchases is used as a rough indicator of processor dependence on groundfish purchases. Large buyers of groundfish tend to have a lesser percentage of their overall purchases from groundfish than smaller buyers (Table 7-4). In the table, buyers are categorized by the proportion of purchases that are groundfish. By this measure, the distribution of large buyers has a single peak in the 5% to 35% range. The distribution of smaller buyers tends to be bimodal with peaks in the 0% to 5% range and the 95% to 100% range. For smaller buyers this may indicate that groundfish are purchased as part of the incidental catch from fisheries targeting other species (the buyers with

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18/ A "buyer" was defined here by a unique combination of Pacific Coast Fisheries Information Network (PacFIN) port code and state buyer code on the fishticket. For California, a single company may have several buying codes that vary only by the last two digits. In PacFIN, these last two digits are truncated, and so were treated as separate buying units only if they appear for different ports.

0% to 5% of their purchases from groundfish), or that the buyers are specialty buyers or handling their own catch (the small buyers with 95% to 100% of their purchases from groundfish).

7.1.1 Live Fish Fishery

An important and growing share of groundfish harvest is delivered live. These deliveries help feed the growing trade in live seafood consumed in restaurants. Groundfish delivered live were primarily nearshore rockfish and perch, but also included thornyheads, sablefish and lingcod. About 86% of live fish landings were in California with the remainder in Oregon (PFMC 2004). There were no recorded live fish landings in Washington. Significantly higher exvessel price was paid for live product. The coastwide average price for live product was nearly four dollars per pound, compared with under one dollar for other deliveries of the same species.

7.1.2 Seasonality

Groundfish buyers (particularly larger buyers) tend to have more of a year-round presence in the fishery than nongroundfish buyers. Eighty percent of the groundfish buyers with over $1 million in purchases made purchases in every month in the year 2000, while only 31% of the nongroundfish buyers made purchases in every month (Table 7-5). For the 75 processors active 10 or 11 months of the year, the most common months to be inactive are November (22 buyers inactive), followed by February, January, March, and December (with between 10 and 14 buyers inactive in each month) (Table 7-6).

7.1.3 Processing Costs and Capacity

The main processing costs are payments for raw materials and processing labor. Information on processing costs is being collected by the Pacific States Marine Fisheries Commission Economic Fishery Information Network project. It is hoped some of this information will be available soon for economic analysis. In 2002 port biologists were asked to report their observations on the number of fillet and cutting stations in the plants from which they sampled. While the partial data collected in this initial effort is not sufficient for analysis, it does provide something of a baseline for certain areas of the coast. The survey found that in 2001 there were 44 fillet stations and two cutting tables in the Puget Sound region, 27 fillet stations (and an additional 26 in storage) on the Southern and Central Washington Coast, and 130 fillet stations between Crescent City and Fort Bragg in Northern California.

7.1.4 West Coast Groundfish and the World Market

West Coast groundfish compete in a global market, not only with similar species produced in other regions of the world, but also with other fish species such as salmon and tuna. In addition, fish compete with other sources of protein in consumers' budgets. More than 4.7 million mt of fish and other seafood were landed in the U.S. in 2000, approximately the same amount landed in each of the prior two years (DOC 2001). West Coast groundfish contributed about 0.14 million mt, 0.13 million mt, and 0.12 million mt to this total in 1998, 1999 and 2000, respectively. Pacific whiting, a relatively abundant but low-value species, comprises about two-thirds of West Coast groundfish landings by weight, but only around 10% of groundfish exvessel revenue.

Production of farm-raised fish has increased rapidly in recent years. In 2000, more than 0.4 million mt of cultured fishery products were produced in the U.S., and more than 45 million mt were raised worldwide. Salmon aquaculture demonstrates the emerging importance of farmed species. While commercial salmon harvest is still near the 1980 to 1997 annual average, world salmon supply has tripled since 1980 due to a ninefold increase in farmed salmon to 1.5 million mt in 2000.

An objective of groundfish management has been to spread harvest of the annual OY over as much of the year as possible. Consequently, groundfish harvesting occurs in every month, although in the late 1990s through 2000, it took on increased importance during the summer months when sablefish harvest peaked during the primary limited entry fixed gear fishery. (Table 7-7).

Groundfish have historically provided West Coast commercial fisheries participants with a relatively steady source of income over the year, supplementing the other more seasonal fisheries. Although groundfish contributed only about 17% of total annual exvessel revenue during 2000, seasonally groundfish played a more significant role, providing one-fifth to one-third of monthly exvessel revenue coastwide during April and the three summer months. The peak contribution by the groundfish fishery in 2000 was sablefish during August (20% of exvessel revenue). Flatfish harvest supplied between 3% and 9% of monthly exvessel revenue throughout the year, and rockfish contributed an additional 2.5% to 6.8% to monthly exvessel revenue. For northern parts of the coast, groundfish is particularly important just before the start of the December crab fishery.

7.1.4.1 Exvessel Prices

Table 7-8 shows average annual West Coast commercial exvessel prices for major species groups from 1981 to 2002. In 2002, exvessel prices for groundfish species groups were generally above their five-year (1998-2002) averages, with the exception of "other groundfish." This was due in part to the expansion of the high-value livefish fishery in recent years. Several species were substantially below their five-year averages, especially salmon and Dungeness crab. Species at or below their five year lows in 2002 included other groundfish, salmon, and Dungeness crab.

7.1.4.2 Exprocessor and Wholesale Prices

While producer prices for groundfish products have not fared quite as badly as for other frozen fish (including salmon), they still are significantly below recent highs. The trend may be flat or still lower in the future (Table7-9). Increasing production of farmed salmon is partly responsible for a continuing slump in salmon commodity prices. Producer prices for meat products in general have been relatively weak, thereby helping to hold down prices for competitive fish protein. Preliminary 2003 estimates of producer price indices for fish and meat products were higher than seen in recent years, possibly due to the continuing improvement in the world economic outlook.

7.1.4.3 Trade

In 2000 the U.S. imported 1.8 million mt of edible fishery products (17% from Canada and 14% from Thailand), and exported about one million mt of edible fishery products, one third of this to Japan (DOC 2001). Japan is the world's largest importer of fish, and Japanese demand drives much of the trade in world markets (Wessells 1992). Altogether Japan imported more than $14 billion of fishery products from the rest of the world in 1999. The U.S. was the second largest importer of fishery products in 1999 at $9.4 billion. While the current dollar value of U.S. edible fishery product exports remained fairly flat from 1995 to 1999 at approximately $3 billion, the current dollar cost of imports increased by one third over the same period to $9 billion. In 1999 the U.S. was the fourth largest exporter by value of fishery products after Thailand, Norway, and China (DOC 2001).

Imports

Most West Coast groundfish compete in the fresh and frozen fish product markets. In 2000 the U.S. imported 1.5 million mt of edible fresh and frozen fish products (DOC 2001). One hundred seventy one thousand mt

(11%) consisted of flatfish and groundfish. An additional 283 thousand mt of canned and cured edible fishery products were also imported. Fresh and frozen shrimp were by far the largest edible fishery import item in 2000, both in terms of tonnage (343 thousand mt) and value ($3.7 billion). Thailand supplied one half of this tonnage, earning $1.5 billion. In terms of value, U.S. imports of non-edible fishery products are almost as important as edible products. In 2000, nearly $9 billion of non-edible fishery products were imported along with $10 billion in edible products.

Exports

In 2000 the U.S. exported 190,000 mt of edible, fresh or frozen flatfish and groundfish products, about 22% of total edible fresh or frozen fishery exports by weight, or 19% by value (DOC 2001). Surimi was the single largest component of total fresh and frozen imports by weight, accounting for another 150 thousand mt. However, salmon was the most valuable export, generating $353 million on the 100 thousand mt of fresh and frozen product shipped, and another $146 million from exports of canned product. Asia was the largest export region, absorbing 61% of U.S. fishery exports by volume. Japan alone bought 34% of total fishery exports, and South Korea and China took 11% and 10%, respectively.

Domestic Demand

From 1910 through the early 1970s, annual per-capita fish consumption in the U.S. generally ran between 10 pounds and 12 pounds edible weight (DOC 2001). Beginning in the early 1970s, per-capita consumption increased to between 12 pounds and 13 pounds. In the mid 1980s, it began shifting upward again to the 15-pound to 16-pound range where it has generally remained since 1985. In 2000 annual per-capita U.S. fish consumption was estimated to be 15.6 pounds. Internationally the U.S. ranks just above average in terms of per-capita fish consumption along with countries like the United Kingdom, Italy, Russia, and Canada, and not far below China, but less than half the level of Japan and South Korea.

7.2 Market and Nonmarket Benefits

7.2.1 Market Consumer Goods

For goods sold in markets where a consumer price can be determined, for example the market for seafood, price and quantity information can be used to estimate the maximum benefits consumers derive from consumption activities. A given regulatory action may have little or no impact on consumers if changes in the quantity of fish available are not expected to change prices. This would be especially the case if imports or other protein substitutes are readily available. In the market for recreational experiences, individuals pay fees to participate in recreational fishing trips on charterboats. Price and quantity information from these trips might allow estimation of the maximum benefits participants derive from this type recreational fishing. However, charter trips may often be purchased as part of a bundle of goods and services that include nonfishing recreational activities. Therefore, the estimation of benefits from recreational charter activities is less straightforward than for marketed consumer goods.

7.2.2 Non-Market Consumer Goods

For other consumer goods, especially bundles of goods and services like a recreational fishing trip taken on a private vessel, the prices and quantities associated with each transaction are much more difficult to determine. For the private recreationalist, the amount spent on fishing gear, licenses, and other goods necessary to carry out a particular fishing trip is difficult to isolate. The term “private” is used here to designate a recreational fisher fishing from a private vessel, the shore, bank or a public pier, as opposed to fishing on a charter vessel. Depending on the value a particular individual places on alternatives to fishing, the maximum benefit associated with a fishing trip may far exceed actual trip expenditures.

7.3 Non-consumptive Activities

This section discusses nonmarket values, other than the recreational fishing experience, that members of the general public may have. The sectors benefitting from a resource can generally be placed into one of three groups: consumptive users (e.g., recreational fishers, commercial harvesters, and processors), nonconsumptive users (e.g., wildlife viewers), and nonconsumptive nonusers (e.g., members of the general public who derive value from knowing that fish species are being maintained at healthy biomass levels). The following table displays the general relationship between use/non-use and consumptive/nonconsumptive types of activities.

Relationship between Use/Non-use and Consumptive/Non-consumptive Activities

	Consumptive	Non-Consumptive
Use	Commercial and Recreational Fishing, Processing.	Wildlife Viewing
Non-use	N/A	Existence Value, Options Value, Bequethal Value

In economic terms, renewable resource management entails a fundamental tradeoff between current and future costs and benefits. When management needs call for a substantial reduction in allowable harvests, from the perspective of consumptive users of the resource, additional costs are born by the direct consumptive users, who may be left with much smaller harvests than they have been accustomed to. While this near-term sacrifice may create much greater harvest opportunities in the future once the stock has been replenished—depending on the duration of the rebuilding period—many fishers and processors may be unable to weather a long down period, opting instead to go out of business. Therefore, many of the consumptive users using the resource after a stock has been rebuilt may be different from those who left the fishery during the rebuilding period.

For a nonconsumptive user, benefit may derive from maximizing the unexploited biomass, so the faster a stock is rebuilt the better.

7.3.1 Nonconsumptive Use

Nonconsumptive users may benefit from the use and nonuse values provided by the resource. Wildlife viewing or the derivation of secondary benefits from ecosystem services are examples of nonconsumptive use values. One or more of the following non-use benefits may accrue from the preservation of fish stocks at higher levels of abundance, (1) existence value derived from knowing a fish population or ecosystem is protected without intent to harvest the resource; (2) option value placed on knowing a fish population, habitat, or ecosystem has been protected and is available for use, regardless of whether the resources are actually used; and (3) bequethal value placed on knowing a fish population, habitat, or ecosystem is protected for the benefit of future generations. These values may be closely related and overlap with values the general public places on wildlife and natural parks. Offsite nonconsumptive uses of resources are public in nature in that no one is excluded from deriving the identified benefits, and one person's enjoyment does not affect another's potential benefit.

The existence of coastal fishing communities in themselves may have intrinsic social value. For example, the Newport Beach dory fishing fleet, founded in 1891, is a historical landmark designated by the Newport Beach

Historical Society. The city grants the dory fleet use of the public beach in return for the business and tourism this unique fishery generates.

Value may also be placed on biological diversity. The value of biological diversity may be part of the total value placed on a site by nonconsumptive users (onsite or offsite). Three levels of biological diversity have been identified, (1) genetic diversity within a species, (2) species diversity (richness, abundance, and taxonomic diversity), and (3) ecosystem diversity. Ecosystem diversity encompasses the variety of habitats, biotic communities, and ecological processes (Caribbean Fishery Management Council 1998).

The total societal value placed on offsite nonconsumptive use of a stock or component of the ecosystem will also depend on: (1) the size of the human population, (2) the level of income, (3) education levels, and (4) environmental perceptions and preferences. (After Spurgeon, 1992, as cited in Caribbean Fishery Management Council, 1998).

The above relationships imply that as human populations and the affluence of those populations increase, and as fish stocks and their ecosystems are depleted, nonconsumptive values associated with maintaining ocean resources are likely to increase. Another implication of these relationships is that once the basic integrity of ecosystem processes and marine fisheries components are preserved, the likely additional benefit from incremental increases biomass will decrease.

TABLE 7-1. Number of buyers on the West Coast in the year 2000 (excluding at-sea whiting deliveries). (Page 1 of 1)

Buyers' Total Expenditures on West Coast Harvest (Groundfish and Nongroundfish)	All Buyers	Nongroundfish Buyers	Groundfish Buyers	Groundfish Buyers as % of Category	Trawl-Caught Groundfish Buyers	Nontrawl-Only Groundfish Buyers
>$2 Million	21	2	19	90%	17	2
$1-$2 Million	33	14	19	58%	11	8
$300 Thousand - $1 Million	98	36	62	63%	33	29
$100-$300 Thousand	121	49	72	60%	23	49
$20-$100 Thousand	273	123	150	55%	19	131
$5 Thousand-$20 Thousand	372	224	148	40%	11	137
<$5 Thousand	862	600	262	30%	11	251
Total	1,780	1,048	732	41%	125	607

Source: Data for West Coast ocean area landings made to West Coast ports derived from PacFIN monthly vessel summary files.

TABLE 7-2. Value of purchases ($1,000) by West Coast buyers (groundfish and nongroundfish) in the year 2000. (Page 1 of 1)

	All Buyers	Groundfish Buyers					
		All Species (All West Coast Purchases by All Groundfish Buyers)			Groundfish (All West Coast Purchases)		
	Total Purchases	Total Purchases	As % of All West Coast Purchases	Cumulative Percent of All West Coast Purchases	Groundfish Purchases	Percent of Total Groundfish	Cumulative Percent of Total Groundfish
>$2 Million	95,742	90,762	38%	38%	28,680	53%	53%
$1-$2 Million	45,343	25,851	11%	49%	8,585	16%	68%
$300 Thousand-$1 Million	56,115	36,527	15%	65%	11,278	21%	89%
$100-$300 Thousand	21,427	12,543	5%	70%	3,269	6%	95%
$20-$100 Thousand	12,881	7,297	3%	73%	2,023	4%	99%
$5 Thousand-$ 20 Thousand	3,989	1,519	1%	74%	501	1%	100%
<$5 Thousand	1,278	426	0%	74%	218	0%	100%
Total	236,775	174,926			54,554		

Source: Derived from PacFIN monthly vessel summary files.

TABLE 7-3. Groundfish buyers' expenditures on all species and groundfish in the year 2000 (excludes at-sea whiting). (Page 1 of 1)

	Buying Groundfish from Limited Entry Trawl Vessels						Buying Groundfish from Nontrawl Only				All Buyers
			Trawl Expenditure		Nontrawl Expenditures						
	Number	Total Expenditures All Species ($,000)	($,000)	As a % of Grand Total Trawl Expenditures	($,000)	As a % of Grand Total Nontrawl Expenditures	Number	Total Expenditures ($,000)	Nontrawl Expenditures ($,000)	As a % of Grand Total Nontrawl Expenditures	Grand Total Nontrawl Expenditures ($,000)
>$2 Million	17	80,726	22,904	60%	5,773	35%	2	10,036	3	0%	5,776
$1-2 Million	11	15,874	6,898	18%	699	4%	8	9,976	988	6%	1,686
$300 Thousand-$1 Million	33	20,226	6,419	17%	2,957	18%	29	16,301	1,902	12%	4,859
$100-$300 Thousand	23	3,765	1,515	4%	235	1%	49	8,778	1,519	9%	1,754
$20-$100 Thousand	19	990	234	1%	249	2%	131	6,307	1,540	9%	1,789
$5 Thousand-$20 Thousand	11	132	80	0%	16	0%	137	1,386	405	2%	421
<$5 Thousand	11	24	20	0%	0	0%	251	402	197	1%	197
Total	125	121,739	38,071	100%	9,929	60%	607	53,187	6,554	40%	16,483

Source: Derived from PacFIN monthly vessel summary files.

TABLE 7-4. Number of buyers by amount and proportion of total purchases that are groundfish from trawl vessels and nontrawl vessels in the year 2000 (excludes at-sea whiting). (Page 1 of 1)

Buyers Total Expenditures on West Coast Harvest (Groundfish and Nongroundfish)	Number of		Percent of Purchases That Are:																	
			Groundfish						Groundfish Caught with LE Trawl Gear						Groundfish Caught With Other Gear					
	All Buyers	Groundfish Buyers	None	<5%	5%-35%	35%-65%	65%-95%	>95%	None	<5%	5%-35%	35%-65%	65%-95%	>95%	None	<5%	5%-35%	35%-65%	65%-95%	>95%
Number of Buyers (All)																				
>$2 Million	21	19	2	4	8	5	2	0	Same as below						2	9	10	0	0	0
$1-$2 Million	33	19	14	4	9	3	3	0							15	12	5	1	0	0
$300 Thousand-$1 Million	98	62	36	26	15	6	10	5							44	34	12	3	3	2
$100-$300 Thousand	121	72	49	37	12	10	6	7							56	41	12	6	3	3
$33-$100 Thousand	183	100	83	56	19	5	5	15							86	56	19	4	4	14
$5-$33 Thousand	462	198	264	80	43	16	21	38							274	81	43	16	18	30
<$5 Thousand	862	262	600	50	42	29	24	117							610	51	42	26	24	109
Total	1,780	732	1,048	257	148	74	71	182							1,087	284	143	56	52	158
Buyers Buying from Trawl Vessels																				
>$2 Million	17	17	0	2	8	5	2	0	-	3	10	4	0	0	0	7	10	0	0	0
$1-$2 Million	11	11	0	0	6	2	3	0	-	1	5	2	3	0	1	8	2	0	0	0
$300 Thousand-$1 Million	33	33	0	6	9	5	10	3	-	11	9	5	7	1	8	14	6	2	3	0
$100-$300 Thousand	23	23	0	6	4	5	4	4	-	10	2	4	3	4	7	10	4	1	1	0
$33-$100 Thousand	13	13	0	2	4	2	3	2	-	6	5	0	1	1	3	2	4	1	2	1
$5-$33 Thousand	17	17	0	1	4	1	3	8	-	2	4	1	4	6	10	2	4	1	0	0
<$5 Thousand	11	11	0	0	0	3	0	8	-	0	0	3	0	8	10	1	0	0	0	0
Buyers NOT Buying from Trawl Vessels																				
>$2 Million	4	2	2	2	0	0	0	0	4	-	-	-	-	-	Same as to far left					
$1-$2 Million	22	8	14	4	3	1	0	0	22	-	-	-	-	-						
$300 Thousand-$1 Million	65	29	36	20	6	1	0	2	65	-	-	-	-	-						
$100-$300 Thousand	98	49	49	31	8	5	2	3	98	-	-	-	-	-						
$33-$100 Thousand	170	87	83	54	15	3	2	13	170	-	-	-	-	-						
$5-$33 Thousand	445	181	264	79	39	15	18	30	445	-	-	-	-	-						
<$5 Thousand	851	251	600	50	42	26	24	109	851	-	-	-	-	-						

Note: Each unique combination of buyer license and PacFIN port is counted as a separate buyer. In some cases, a particular buyer may have a presence in a port (be buying through a port), but have no facilities at that port. Source: Derived from PacFIN monthly vessel summary files.

TABLE 7-5. Number of buyers (groundfish and nongroundfish) by number of months buying and exvessel value of purchases in the year 2000 (excluding at-sea whiting). (Page 1 of 1)

	Number of Months During Which Purchases Were Made												
	1	2	3	4	5	6	7	8	9	10	11	12	Total
	Number of Buyers **NOT Buying Groundfish**												
>$2 Million	0	0	0	0	0	0	0	0	0	0	0	2	2
$1-$2 Million	0	0	0	0	0	0	1	0	1	3	6	3	14
$300 Thousand-$1 Million	0	0	3	3	2	3	3	4	3	3	5	7	36
$100-$300 Thousand	1	4	6	4	3	4	2	4	7	4	4	6	49
$20-$100 Thousand	15	23	21	10	11	14	3	2	7	8	4	5	123
$5 Thousand-$20 Thousand	54	45	36	25	19	11	5	7	7	5	4	6	224
<$5 Thousand	388	113	59	16	9	7	2	2	0	1	1	2	600
Total	458	185	125	58	44	39	16	19	25	24	24	31	1,048
	Groundfish Buyers that Buy from Groundfish Limited Entry Trawl Vessels												
>$2 Million	0	0	0	0	0	0	0	0	0	0	1	16	17
$1-$2 Million	0	0	0	0	0	0	0	0	0	1	2	8	11
$300 Thousand-$1 Million	0	0	0	2	0	3	1	4	1	0	7	15	33
$100-$300 Thousand	0	0	1	6	2	1	0	5	0	1	5	2	23
$20-$100 Thousand	0	4	4	2	0	1	0	1	0	1	2	4	19
$5 Thousand-$20 Thousand	2	3	0	1	1	2	0	0	0	0	0	2	11
<$5 Thousand	7	2	2	0	0	0	0	0	0	0	0	0	11
Total	9	9	7	11	3	7	1	10	1	3	17	47	125
	Groundfish Buyers that Do Not Buy from Groundfish Limited Entry Trawl Vessels												
>$2 Million	0	0	0	0	0	0	0	0	0	0	0	2	2
$1-$2 Million	0	0	0	0	0	0	0	0	0	2	2	4	8
$300 Thousand-$1 Million	0	2	0	0	2	0	3	1	2	1	5	13	29
$100-$300 Thousand	0	0	0	0	1	3	4	0	6	5	7	23	49
$20-$100 Thousand	3	6	10	7	9	18	12	9	10	7	12	28	131
$5 Thousand-$20 Thousand	8	21	22	14	13	11	15	12	6	4	8	3	137
<$5 Thousand	118	54	28	17	10	8	8	6	0	1	1	0	251
Total	129	83	60	38	35	40	42	28	24	20	35	73	607
Grand Total	596	277	192	107	82	86	59	57	50	47	76	151	1,780

Note: Each unique combination of buyer license and PacFIN port is counted as a separate buyer. In some cases, a particular buyer may have a presence in a port (be buying through a port), but have no facilities at that port. Source: Derived from PacFIN monthly vessel summary files.

TABLE 7-6. Number of groundfish buyers by seasonality of activity and amounts of purchases (exvessel value) for the year 2000 (excludes at-sea deliveries). (Page 1 of 2)

Month During Which Any Species Was Purchased (Groundfish and Nongroundfish)	Groundfish Buyers Total Expenditures on West Coast Landings							
	>$2 Million	$1-$2 Million	$300 Thousand - $1 Million	$100-$300 Thousand	$33-$100 Thousand	$5-$33 Thousand	<$5 Thousand	Totals
				Number of Processors				
Year Round	18	12	28	25	32	5	0	120
11 Month	1	4	12	12	14	8	1	52
10 Month	-	3	1	6	8	4	1	23
9 Month	-	-	3	6	10	6	0	25
7-8 Month	-	-	9	9	22	27	14	81
4-6 Month	-	-	7	13	37	42	35	134
1-3 Month	-	-	2	1	27	56	211	297
Total	19	19	62	72	150	148	262	732
Percent processing 10 or	100%	100%	66%	60%	36%	11%	1%	27%
				Number of 11 Month Buyers by Month Not Buying				
January			1	2	2			5
February				3	2	3		8
March		1		1	2			4
April			3	1				4
May								0
June						1		1
July				1	1			2
August						1		1
September			2		1	1		4
October		1			1	2		4
November	1	2	6	1	4			14
December				3	1		1	5
				Number of 10 Month Buyers by Months Not Buying				
January-February				1	1			2
January, March					2	1		3
January, November					1			1
January, July							1	1
January, October						1		1
February-March		1			1			2
February, December		1						1
February, September						1		1
March-April					1			1
March, May					1			1
August-September				1				1
October-November		1	1	1	1			4
November-December				3		1		4

TABLE 7-6. Number of groundfish buyers by seasonality of activity and amounts of purchases (exvessel value) for the year 2000 (excludes at-sea deliveries). (Page 2 of 2)

Month During Which Any Species Was Purchased (Groundfish and Nongroundfish)	Groundfish Buyers Total Expenditures on West Coast Landings							
	>$2 Million	$1-$2 Million	$300 Thousand - $1 Million	$100-$300 Thousand	$33-$100 Thousand	$5-$33 Thousand	<$5 Thousand	Totals
	Number of 10 and 11 Month Buyers Not Buying in Each Month							
January			1	3	6	2	1	13
February		2		4	4	4		14
March		2		1	7	2		12
April			3	1	1			5
May					1			1
June						1		1
July				1	1		1	3
August				1		1		2
September			2	1	1	2		6
October		2	1	1	2	3		9
November	1	3	7	5	6	1		22
December		1		6	1	1	1	10

Note: Each unique combination of buyer license and PacFIN port is counted as a separate buyer. In some cases, a particular buyer may have a presence in a port (be buying through a port), but have no facilities at that port. Source: Derived from PacFIN monthly vessel summary files.

TABLE 7-7 Percent of monthly exvessel value of all 2000 West Coast commercial fishery landings by month. (Page 1 of 1)

Species Group	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Sablefish	0.8	1.3	3.6	6.0	3.7	3.4	6.3	20.3	5.7	4.4	4.3	2.2	5.8
Whiting	0.0	0.0	0.0	0.2	1.9	3.5	7.6	6.7	4.4	0.0	0.0	0.0	2.3
Flatfish	8.9	5.5	5.4	7.1	4.1	3.2	3.2	2.7	2.7	3.0	3.2	3.0	4.2
Rockfish	2.5	3.3	5.6	6.5	5.6	4.7	5.6	3.3	5.9	5.0	6.8	3.2	4.6
Other GF	0.2	0.7	0.3	0.7	1.1	1.4	1.3	0.8	0.8	0.5	0.4	0.3	0.7
Shrimp/Prawns	1.6	2.7	3.8	6.8	7.1	16.2	14.3	8.2	8.3	5.0	1.6	1.3	6.2
Crab/Lobster	51.0	41.6	29.6	19.6	15.9	13.0	7.2	4.3	8.3	18.3	18.4	50.3	23.5
Salmon	0.2	0.3	0.2	0.7	17.1	13.7	10.0	13.6	13.3	8.2	2.0	0.4	6.9
HMS	1.2	6.5	2.6	4.7	1.1	1.4	7.3	16.3	19.8	19.6	8.6	6.7	8.9
CPS	13.5	13.3	11.3	10.6	8.1	6.1	7.8	4.9	6.5	11.6	25.0	15.4	11.0
Other	20.2	24.9	37.5	37.2	34.3	33.4	29.3	18.9	24.2	24.4	29.7	17.3	25.9
GF Total	12.3	10.9	14.9	20.4	16.5	16.1	24.0	33.8	19.5	12.8	14.7	8.7	17.5
Non GF Total	87.7	89.1	85.1	79.6	83.5	83.9	76.0	66.2	80.5	87.2	85.3	91.3	82.5
Region Total	100	100	100	100	100	100	100	100	100	100	100	100	100

Source: PacFIN

TABLE 7-8. Average coastwide exvessel prices for deliveries of West Coast species groups ($ per lb). (Page 1 of 2)

Year	Lingcod	Whiting, At Sea	Whiting, Shoreside	Flatfish	Sablefish	Rockfish	Other Groundfis h	Total Groundfis h	Total Groundfis h - Less Whiting	Total Groundfis h - Less At Sea Whiting	Pink Shrimp	Spot Prawn, Trawl	Spot Prawn, Pot	Ridgeback Prawn, Trawl	Pacific Halibut
1981	0.23	0.08	0.08	0.26	0.21	0.17	0.20	0.15	0.20	0.20	0.50	2.03	4.29	0.86	1.17
1982	0.25	0.08	0.08	0.27	0.25	0.20	0.25	0.17	0.23	0.23	0.51	2.27	4.96	1.17	1.20
1983	0.25	0.08	0.08	0.27	0.24	0.22	0.27	0.17	0.24	0.24	0.73	2.89	6.03	0.91	1.13
1984	0.24	0.07	0.07	0.27	0.22	0.25	0.27	0.16	0.25	0.24	0.46	3.40	0.00	0.57	0.84
1985	0.26	0.07	0.07	0.28	0.34	0.28	0.27	0.22	0.29	0.28	0.35	4.27	5.30	0.61	1.04
1986	0.32	0.06	0.06	0.30	0.38	0.31	0.33	0.19	0.32	0.31	0.53	4.47	4.10	0.82	1.51
1987	0.38	0.06	0.06	0.35	0.48	0.35	0.33	0.20	0.37	0.35	0.68	4.39	5.72	1.12	1.85
1988	0.37	0.08	0.08	0.35	0.52	0.32	0.27	0.18	0.36	0.34	0.41	4.74	4.92	1.27	1.93
1989	0.35	0.07	0.07	0.31	0.47	0.32	0.26	0.15	0.33	0.31	0.37	3.26	4.76	1.31	1.85
1990	0.35	0.06	0.06	0.28	0.48	0.34	0.25	0.15	0.34	0.31	0.49	3.79	4.95	1.36	2.68
1991	0.35	0.05	0.05	0.32	0.69	0.37	0.25	0.14	0.38	0.31	0.56	4.80	5.24	1.29	2.89
1992	0.39	0.06	0.05	0.30	0.66	0.39	0.26	0.14	0.39	0.24	0.35	5.61	6.13	2.20	2.17
1993	0.38	0.04	0.03	0.30	0.56	0.39	0.23	0.15	0.37	0.25	0.33	5.43	6.68	1.93	1.75
1994	0.39	0.04	0.03	0.31	0.83	0.46	0.25	0.13	0.44	0.23	0.59	5.85	6.88	1.35	2.30
1995	0.45	0.05	0.05	0.35	1.35	0.56	0.37	0.19	0.58	0.29	0.72	6.34	7.24	1.16	2.16
1996	0.46	0.05	0.03	0.34	1.41	0.50	0.34	0.16	0.56	0.26	0.60	6.57	7.09	1.34	2.31
1997	0.48	0.06	0.04	0.33	1.59	0.49	0.41	0.16	0.59	0.26	0.40	6.42	7.10	1.77	2.01
1998	0.64	0.04	0.02	0.34	1.17	0.50	0.61	0.12	0.51	0.19	0.53	6.53	7.21	1.76	1.62
1999	0.74	0.04	0.04	0.31	1.17	0.57	0.71	0.12	0.55	0.22	0.47	6.58	7.70	1.11	1.99
2000	1.08	0.04	0.04	0.39	1.47	0.68	0.80	0.14	0.69	0.23	0.40	8.19	9.16	1.15	2.46
2001	1.13	0.05	0.04	0.41	1.41	0.75	0.62	0.14	0.71	0.23	0.27	8.40	9.10	1.50	2.02
2002	1.12	0.05	0.05	0.41	1.40	0.84	0.56	0.15	0.68	0.27	0.28	8.03	9.15	1.34	1.96
1981-2001	0.34	0.06	0.04	0.31	0.64	0.35	0.35	0.15	0.38	0.26	0.46	5.67	6.91	1.16	1.70
1991-2002	0.44	0.05	0.04	0.34	1.10	0.48	0.40	0.14	0.50	0.25	0.42	6.70	7.39	1.31	2.09
1998-2002	0.83	0.04	0.04	0.37	1.32	0.61	0.65	0.13	0.61	0.22	0.35	7.24	8.37	1.25	2.00

NOTE: For 1981-1990, at-sea whiting catch estimates are from Council 1997.

TABLE 7-8. Average coastwide ex-vessel prices for deliveries of West Coast species groups ($ per lb). (Page 2 of 2)

Year	California Halibut	Salmon	Sea Cucumber	California Sheephead	Gillnet Complex	CPS Squid	CPS Wetfish	HMS	Dungeness Crab	Other Crus-taceans	Other Species	Total Non-groundfish	Total
1981	1.35	1.81	0.00	0.00	0.75	0.10	0.06	0.59	0.92	1.04	0.34	0.41	0.32
1982	1.39	1.92	0.18	0.00	0.73	0.10	0.06	0.53	1.08	1.45	0.27	0.40	0.31
1983	1.46	1.41	0.16	0.00	0.78	0.19	0.08	0.47	1.48	1.24	0.27	0.43	0.31
1984	1.70	2.24	0.19	0.00	0.77	0.23	0.08	0.51	1.59	1.65	0.21	0.43	0.30
1985	1.80	1.88	0.00	0.00	0.62	0.17	0.08	0.56	1.45	1.08	0.24	0.43	0.34
1986	1.99	1.55	0.21	0.00	0.63	0.10	0.08	0.55	1.39	1.54	0.21	0.42	0.31
1987	2.16	2.22	0.22	0.00	0.76	0.09	0.07	0.62	1.38	1.62	0.23	0.49	0.34
1988	2.27	2.47	0.20	0.00	0.81	0.10	0.08	0.73	1.18	1.83	0.26	0.50	0.34
1989	2.23	1.77	0.00	0.00	1.00	0.08	0.08	0.66	1.13	1.59	0.28	0.39	0.25
1990	2.35	2.13	0.25	0.00	0.97	0.08	0.06	0.70	1.53	1.47	0.44	0.48	0.28
1991	2.41	1.73	0.32	0.00	0.94	0.07	0.07	0.70	1.57	1.53	0.74	0.44	0.24
1992	2.41	2.05	0.00	0.00	1.13	0.09	0.07	0.86	1.17	1.90	0.81	0.52	0.27
1993	2.39	1.83	0.54	0.00	1.33	0.11	0.06	0.82	1.11	1.53	0.85	0.47	0.29
1994	2.70	1.83	0.65	2.88	1.18	0.12	0.07	0.84	1.35	2.13	0.94	0.53	0.26
1995	2.71	1.47	0.70	2.77	1.31	0.14	0.05	0.66	1.70	2.35	0.99	0.48	0.32
1996	2.58	1.28	0.65	2.74	1.29	0.12	0.05	0.70	1.37	2.45	0.94	0.47	0.30
1997	2.38	1.24	0.50	2.77	1.76	0.13	0.05	0.70	1.91	2.38	0.70	0.41	0.27
1998	2.31	1.40	0.59	2.64	1.59	0.25	0.05	0.62	1.79	2.29	0.49	0.47	0.23
1999	2.45	1.62	0.70	3.26	1.71	0.16	0.04	0.85	1.93	1.89	0.68	0.39	0.25
2000	2.81	1.71	0.94	3.41	1.75	0.10	0.05	1.03	2.15	2.30	0.68	0.32	0.24
2001	2.86	1.43	0.82	3.44	1.88	0.09	0.05	0.97	2.07	2.35	0.65	0.30	0.23
2002	2.92	1.27	0.84	3.40	1.94	0.11	0.05	0.77	1.69	2.56	0.41	0.30	0.25
1981-2001	2.29	1.83	0.63	2.95	0.93	0.11	0.06	0.61	1.49	1.82	0.42	0.42	0.28
1991-2002	2.55	1.53	0.67	2.95	1.42	0.12	0.05	0.77	1.61	2.12	0.76	0.41	0.26
1998-2002	2.62	1.48	0.78	3.15	1.78	0.12	0.05	0.81	1.92	2.28	0.57	0.34	0.24

NOTE: For 1981-1990, at-sea whiting catch estimates are from Council 1997.

TABLE 7-9. Producer Price Indices: Groundfish vs. Substitutes. (Page 1 of 1)

Year	Groundfish, fillets and steaks	Groundfish (cod, cusk, haddock, hake, perch, pollock, whiting)	Other frozen fish (salmon, flounder, halibut, etc.)	Meat products
1992	166.5	127.5	96.4	110.0
1993	161.3	122.9	94.2	113.6
1994	157.0	121.4	97.0	110.7
1995	164.8	126.1	95.3	109.3
1996	164.0	126.5	92.6	114.6
1997	177.8	131.2	96.6	116.1
1998	190.1	137.4	98.8	109.2
1999	216.7	153.0	99.3	108.9
2000	205.1	153.4	101.9	115.0
2001	190.5	145.5	94.9	120.3
2002	195.9	145.9	88.3	114.0
2003 (preliminary)	197.6	149.5	90.7	125.9

Source: U.S. Department of Labor, Bureau of Labor Statistics website (http://146.142.4.24/cgi-bin/srgate)

8.0 Fishing Communities

Fishing communities, as defined in the Magnuson-Stevens Act, include not only the people who actually catch the fish, but also those who share a common dependency on directly related fisheries-dependent services and industries. In commercial fishing this may include boatyards, fish handlers, processors, and ice suppliers. Similarly, entities that depend on recreational fishing may include tackle shops, small marinas, lodging facilities catering to out-of-town anglers, and tourism bureaus advertising charter fishing opportunities. People employed in fishery management and enforcement make up another component of fishing communities.

Fishing communities on the West Coast depend on commercial and/or recreational fisheries for many species. Participants in these fisheries employ a variety of fishing gears and combinations of gears. Naturally, community patterns of fishery participation vary coastwide and seasonally, based on species availability, the regulatory environment, and oceanographic and weather conditions. Communities are characterized by the mix of fishery operations, fishing areas, habitat types, seasonal patterns, and target species. While each community is unique, there are many similarities. For example, all face danger, safety issues, dwindling resources, and a multitude of state and federal regulations.

Individuals make up unique communities with differing cultural heritages and economic characteristics. Examples include a Vietnamese fishing community of San Francisco Bay and an Italian fishing community in Southern California. Native American communities with an interest in the groundfish fisheries are also considered. In most areas, fishers with a variety of ethnic backgrounds come together to form the fishing communities within local areas, drawn together by their common interests in economic and physical survival in an uncertain and changing ocean and regulatory environment.

This section provides an overview of West Coast fishing communities organized around regions comprising port groups and ports consistent with the organization of fish landings data in the PacFIN database. Ports are coded in PacFIN using a two- or three-letter code, or PCID; landings data from several sites may be combined under one of these ports.[19/] The ports have been further aggregated into 18 port groups. These port groups are designed to reduce issues surrounding the disclosure of confidential information (which could be a problem with very disaggregated data). Because ports and port groups are also units of analysis when evaluating socioeconomic and demographic characteristics, their boundaries are consistent with major civil boundaries, such as county and state lines. Figure 8-1 maps the ports and port groups (although the port group boundaries in this map are illustrative only). Table 8-1 lists the ports by state, port group, and county, and gives the PCID for each port.

The discussion here further aggregates these geographic entities into seven larger regions, each comprising one or more port groups: Puget Sound, the Washington coast, the northern Oregon coast, the southern Oregon coast, Northern California, Central California, and Southern California. Each subsection first describes the constituent port groups and ports and associated fleet characteristics. Socioeconomic and demographic characteristics are then summarized. The following tables provide the detailed source information for the description of fleet characteristics:

Table 8-2a: Landings at each port by species group in 1998.
Table 8-2b:Landings at each port by species group in 2002.
Table 8-3a: Exvessel revenue at each port by species group in 1998.
Table 8-3b: Exvessel revenue at each port by species group in 2002.
Table 8-4: Number of vessels by primary port and species group in 2001.

19/ Additional codes account for fish landed in unspecified locations.

Table 8-5: Number of vessels by primary port and vessel length class in 2001.
Table 8-6: Number of processors/buyers by primary port in 2001.
Table 8-7: Number of processors/buyers by purchase value of raw product by port group.

The socioeconomic and demographic descriptions are drawn from the following detailed tables:

Table 8-8: Income and employment from commercial fishing activities in 2001.
Table 8-9: Effort, personal income, and jobs related to recreational fishing on the West Coast in 2001.
Table 8-10: Urban and rural population at state, regional, and port levels in 2000.
Table 8-11: Racial composition at state, regional, and port levels in 2000.
Table 8-12: Hispanic population at state, regional, and port levels in 2000.
Table 8-13: Age distribution of the population at state, regional, and port levels in 2000.
Table 8-14: Educational attainment of the population at state, regional, and port levels in 2000.
Table 8-15: Unemployment and employment in natural-resource-related resource occupations at state, regional, and port levels in 2000.
Table 8-16: Median income, average income and poverty rate at state, regional, and port levels in 2000
Table 8-17a: and 8-17b: County-level economic profile.
Table 8-18: County unemployment rates, 2002.

Table 8-10 through 8-16 are derived from 2000 U.S. census data. This series of tables shows demographic characteristics at the state, port group, county, and port levels. Port- and port group-level data are derived in two ways. First, census places are used. The U.S. Census Bureau defines these entities as census designated places (CDPs), consolidated cities, and incorporated places.[20/] However, the following ports are not identified as census places: La Push, Grays Harbor, and Willapa Bay in Washington; Salmon River in Oregon; and Albion, Princeton, Avila Beach, Ventura, San Pedro, Wilmington, and Terminal Island in California. Furthermore, in rural areas population may be more dispersed so that the census places are less representative of population involved in the local economy. For these two reasons, ports have also been characterized by deriving data at the census block group level. Census block groups comprise several census blocks and contains between 600 and 3,000 people, with an optimum of 1,500.[21/] Block groups never cross county or state lines. A geographic information system (GIS) was used to select block groups covering an area coincident with the corresponding census place in urban areas and a somewhat larger area in rural areas.[22/] For the ports without corresponding census places, Zip Code Tabulation Areas were used in all cases except Salmon River, Oregon, were a point designating the location of a boat landing was used. Demographic data are only reported for the "block group equivalent area" in these cases. The block groups comprising the block group equivalent areas were further filtered by choosing only those within 10 miles of the coast. Block group equivalent areas have a larger population for ports in rural areas. In urban areas there is typically little or no population difference between the block group area and the census place. In a few cases, such as San Diego, the population of the block group equivalent area may actually be smaller because part of the census place lies further than 10 miles from the coast. Figures 8-2 through 8-5 show the

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20/ In some cases more than one census place corresponds to a port. These are: Port Angeles and Port Angeles East; Crescent City, Bertsch Oceanview, and Crescent City North; and Newport Beach and Newport Coast CDP. Demographics are reported separately for these places in the tables.

21/ Because block groups are delineated to limit the variation in population size between block groups, the geographic size of block groups can vary substantially. In urban areas, with high population density, block groups are smaller than in rural areas where population density is lower. This explains why block groups representing ports in rural areas cover large geographic areas in comparison to the census place.

22/ The basic query rule for selecting block groups in rural areas was to choose block groups whose boundaries fell within a half-mile of the boundary of the census place.

correspondence between census places and the block group equivalents for West Coast ports. (In the figures darker shading indicates census places, lighter shading block group equivalents.)

8.1 Washington State

8.1.1 Puget Sound

8.1.1.1 Port Infrastructure and Fleet Characteristics

Puget Sound is dominated by the Seattle metropolitan area; the city is a regional population center and economically important regionally and nationally. Seattle has traditionally been an important entrepôt for Alaska, and many of the large catcher-processors participating in Alaskan fisheries are based there. Blaine and Bellingham, both north of Seattle, are important ports for groundfish vessels.

In 2002, 3,794 mt of groundfish were landed in the Puget Sound port group (Table 8-2b), a smaller amount than most other port groups in Washington and Oregon. Exvessel revenue from Puget Sound landings in 2002 was relatively high at $3.3 million, comparable to other port groups in Washington (Table 8-3b). This is partly explained by the large amounts of high-value sablefish landed in this region; flatfish are also a large component of landings than in other port groups.

As shown in Table 8-4, about one-third of the port group's fishing vessels home port in Bellingham in 2001.[23/] As described in Section 1.2.4, a vessel buyback program permanently retired 91 groundfish limited entry trawl vessels and associated permits. Thus the current number of limited entry trawl vessels is less than what is reported in Table 8-4. A recent report (NMFS 2004a) provides information on the home ports of retired vessels. Where appropriate, changes in vessel numbers are noted. Bellingham and Blaine—on Puget Sound near the Canadian border—hosted all nine of the region's groundfish limited entry trawl vessels and almost all the limited entry fixed gear vessels. However, the aforementioned report shows that four vessels were retired in Bellingham and one in Blaine. Seattle is a distant second in terms of the number of vessels participating in West Coast fisheries, with 93, and only two limited entry fixed gear vessels port there. But many of the vessels listed as at-sea only—which participate in the Pacific whiting fishery—are likely part of the fleet based in Seattle and also fishing in Alaska. Otherwise, Puget Sound is less important as a center for West Coast groundfish vessels; with 36 vessels listed under this total in Table 8-4 it ranks near the bottom among the port groups. In terms of the distribution of different sized vessels, Puget Sound is consistent with the West Coast as a whole, with about two-thirds of the vessels under 40 feet; one of the two vessels over 150 feet participating in West Coast fisheries is based in Seattle, however (Table 8-5).

23/ Table 8-4 actually counts vessels based on fish landings. In some cases, a vessel's primary port for landings may not be its home port. To simplify the description, however, these primary ports are also referred to as the home port.

8.1.1.2 Community Demographics

Puget Sound demographics at a glance:

	Value	Rank
Total population:	749,916	3
Urban population	97.2%	5
Non-white population:	25%	5
Hispanic population:	5.5%	11
Working age population (17-64):	69.4%	4
High school graduate and higher*:	88.1%	4
Natural resource-related employment**:	0.4%	15
Average household income:	$58,327	7
Poverty rate:	11.6%	12

(Values from Tables 8-10 through 8-16 for block group equivalent areas. Census data, 2000. *Some college, bachelor and graduate degrees. **Population employed in private sector natural resource-related occupation.)

As noted above, the Puget Sound is a major population center on the West Coast and is largely urban. Washington and Oregon, and the more rural coastal areas in particular, are less racially and ethnically diverse than coastal California, especially Southern California. The Puget Sound region has the fifth-largest percent non-white population of the port groups, or about a quarter of the population. All the other port groups with larger percent non-white populations are in Central and Southern California. Hawaiian and Pacific Islanders represent largest non-white racial group with 10% of the population for the port group and 13% of Seattle's population. (As might be expected, Seattle and Tacoma are the most ethnically diverse census places in this port group.) Puget Sound ranks eleventh among the port groups for the percentage of the population that is Hispanic (Table 8-12), fourteenth if looking at census places, suggesting that the Hispanic population is more rural. Comparing communities within the Puget Sound port group, Skagit County, and the La Conner environs in particular, and also Shelton have a proportionately large Hispanic population, although the absolute numbers in these more rural communities are small.

Employment- and income-related statistics reflect the area's urbanism and economic activity. A large proportion of the population is of working age (defined as between 17 to 64 year olds) and incomes are relatively high, although these data, from the 2000 census and representing income in 1999, do not reflect the subsequent economic down-turn. As has been widely reported, Washington and Oregon unemployment rates were the highest in the nation in subsequent years; employment in Oregon especially has been slow to rebound. Median income values, which are reported in the census, cannot be aggregated and are thus not available for the port area, although Table 8-16 shows this statistic for states, counties and census places. (Median income is a better measure of economic well being of the population at large since it is not skewed by a relative few "outlier" high income earners.) Of census places, Seattle has the highest median income in this port group, $45,736, which is very close to the value for Washington state as a whole. The counties impinging on the port areas (which, as defined by census place or block group equivalent generally exclude inland areas of counties) generally show higher median and average incomes, probably reflecting greater wealth in surrounding suburbs.

Table 8-8 shows economic modeling estimates of income and employment derived from fisheries (for November 2002 to October 2001.)[24/] Puget Sound ranks at the bottom in terms of the share of personal

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24/ Table 8-8 displays estimated income and employment resulting from all commercial fishing activities for each port area group. (Note that the time period differs from that for the data in Tables 8-2 and 8-3, showing landings by weight and revenue.) Indices were calculated as the percentage of total area personal income or total employment that is generated by commercial fishing and processing activities via local economic linkages. Note that income and employment rankings for all commercial fishery (continued...)

income and employment derived from all commercial fishing activities. The relative unimportance of fisheries as a share of total income and employment in the region reflects its economic dynamism, with many industries—notably computer software and commercial aircraft manufacture—providing substantial income and employment. However, looking at fishery-related income alone, at 61%, more of it is derived from groundfish-fishery-related activities than in any of the other port areas. Thus, groundfish fisheries play an important role in what is a relatively small sector of the total regional economy.

8.1.2 Washington Coast (North Washington Coast and Central and South Washington Coast)

8.1.2.1 Port Infrastructure and Fleet Characteristics

Ports in the Straits of Juan de Fuca, along the north coast of the Olympic Peninsula, and Pacific coast of the peninsula are part of the North Washington Coast port group. The Central and South Washington Coast port group continues south to the Columbia River border with Oregon. The South and Central Washington Coast shows the largest groundfish landings of the three Washington port groups in 2002, with 13,247 mt (Table 8-2b). However, most of this is relatively low-value Pacific whiting delivered to shore-based processing plants. As a result, the North Washington Coast, with greater landings of higher value species such as sablefish shows more ex-vessel revenue in 2002—$3.4 million versus $2.6 million (Table 8-3b). It is important to note, however, that the treaty Indian tribes participating in West Coast groundfish fisheries are located in these two port groups and landings from their fisheries are not reflected in Tables 8-2 and 8-3. Because of the Pacific whiting landings, the Central and South Washington Coast ranks third among the port groups for total groundfish landings in 2002. In terms of landings value, however, these two port areas are similar to other port groups in southern Oregon and Washington—northern Oregon ports have notably higher exvessel revenue while Southern California ports have significantly less. The South Washington Coast is also a major center for several nongroundfish fisheries, and measured by its $34.4 million in exvessel revenue from all fisheries in 2002, is the largest port area on the West Coast. High-value Dungeness crab is the big contributor to this total.

The South Coast has almost twice as many vessels involved in the groundfish fishery as the North Coast port group—97 versus and 52. (Note that in Table 8-4 Central and South Washington are listed separately.) Port Angeles, Neah Bay, and La Push are the only ports in the North Coast region hosting groundfish vessels, with no limited entry trawl vessels listed for La Push. Neah Bay is home to the Makah Tribe, while La Push is near the Quileute Indian reservation and it is likely that some of the five vessels ported there are involved in the tribal fishery sector. However, Port Angeles is the delivery port for the bulk of limited entry fixed gear and open access groundfish vessels in the North Coast region. Westport and Ilwaco are the dominant ports for groundfish in the Central and South Coast port group. Ilwaco has relatively few groundfish limited entry vessels, but comparable numbers of groundfish open access vessels, so that its total of 42 groundfish vessels is only nine less than the 51 in Westport. According to Table 8-5, most of the larger vessels, in excess of 60 feet, are ported in Westport and Ilwaco. Some of these are likely participants in groundfish fisheries, particularly the industrial fishery for Pacific whiting.

24/ (...continued)
activity are broadly consistent, but show slight discrepancies due to differing shares of wage and non-wage income in each area's total personal income. Also displayed in the table are estimated income and employment derived from the groundfish fishery, split between limited entry trawl and other groundfish gear.

8.1.2.2 Community Demographics

Washington Coast demographics at a glance:

	North Coast		Central/South Coast	
	Value	Rank	Value	Rank
Total population:	58,855	7	39,574	11
Urban population	63.1%	12	60.5%	13
Non-white population:	9.8%	13	9.6%	14
Hispanic population:	2.3%	18	5.0%	14
Working age population (17-64):	58.1%	16	58.5	15
High school graduate and higher*:	87.7%	5	78.8%	15
Natural resource-related employment**:	1.92%	13	3.72%	3
Average household income:	$45,252	11	$40,188	15
Poverty rate:	12.6%	7	15.0%	4

(Values from Tables 8-10 through 8-16 for block group equivalent areas. Census data, 2000. *Some college, bachelor and graduate degrees. **Population employed in private sector natural resource-related occupation.)

These two port groups are sparsely populated, more rural areas. Both are less ethnically diverse than most of the other port groups; lower ranked port groups for this statistic are on the Oregon coast. However, these regions have large Native American populations, at least proportionately, and rank third and seventh for this statistic (Table 8-11). Both port groups also have a comparatively lower proportion of working age population. The North Coast port group includes some communities with a large number of retirees. Forty-six percent of the population in Sequim, for example, is 65 and older. The Central and South Coast port group is noticeably worse off in terms of other socioeconomic indicators of education and income. But Neah Bay, in the North Coast group, has the lowest median income, at $21,635 in 1999, of any of the ports that are also census places.

Earnings from and employment in fishing-related activities is important in the Washington Coast port groups. The South Coast ranked first for the proportion of total personal income that is derived from fishing activities at 4.8%, with the Central and North Coast regions ranking fifth and ninth (Table 8-8) in 2001. This is consistent with the employment-related census data discussed above. Groundfish-related revenues are a less important component of fisheries-related income and employment on the South Coast, however, in comparison to the Central and North Coast regions. Fifty-nine percent of fisheries income was derived from groundfish-related activities on the North Coast, for example, as compared to only 7.4% on the South Coast in 2001. (Note that the Central and South Coasts are split out in Table 8-8.)

8.2 Oregon

8.2.1 North Oregon Coast (Astoria, Tillamook, and Newport)

8.2.1.1 Port Infrastructure and Fleet Characteristics

The north Oregon coast is the most important groundfish region on the West Coast in terms of total groundfish landings and revenue. These port groups accounted for $12.3 million in exvessel groundfish revenue in 2002, almost a quarter of the $51.5 million coastwide total, including at-sea deliveries (Table 8-3b). (Note that the bulk of the at-sea deliveries—which are Pacific whiting delivered to floating processors—are attributable to these port groups.) Astoria-Tillamook, grouped as one port area in the fishery-related tables (but split out in the demographic tables), and Newport are at or near the top of all the groundfish species categories shown in Tables 8-2 and 8-3, indicating that although the high-volume whiting fishery is centered in this region, other groundfish are equally important, surpassing whiting in terms of exvessel revenue. For example, these two port areas rank second and third behind the North Washington Coast for sablefish landings.

Table 8-4 shows that Astoria and Newport are home to a large fraction of the limited entry groundfish trawl fleet with 57 of the 243 total vessels in the fleet in 2002. The vessel buyback program retired 13 limited entry trawl vessels in Astoria and six trawlers in Newport in 2003 (NMFS 2004a). Table 8-5 shows that these port areas have a relatively large number of vessels in the 60 foot and above length classes, also reflecting the larger limited entry trawlers fishing out of these ports.

8.2.1.2 Community Demographics

North Oregon coast demographics at a glance:

	Astoria		Tillamook		Newport	
	Value	Rank	Value	Rank	Value	Rank
Total population:	39,957	12	19,876	17	24,335	14
Urban population	71.51%	11	28.51%	18	61.21%	13
Non-white population:	7.4%	16	5.47%	18	10.4	11
Hispanic population:	5.1%	13	5.1%	12	4.8%	15
Working age population (17-64):	62.9%	11	59.8%	14	60.87	13
High school graduate and higher*:	85.0%	7	85.0%	8	85.3%	6
Natural resource-related employment**:	2.07%	11	7.31%	1	2.5%	9
Average household income:	$45,399	10	$42,730	13	$44,715	12
Poverty rate:	12.3%	10	11.4%	13	10.9%	14

(Values from Tables 8-10 through 8-16 for block group equivalent areas. Census data, 2000. *Some college, bachelor and graduate degrees. **Population employed in private sector natural resource-related occupation.)

These port groups are demographically quite similar. Tillamook is much more rural, ranking lowest for urban population of all the port groups. (Even looking at the value for census places, Tillamook ranks fourteenth in terms of urban population, with 70%.) It is also the least racially diverse port group and has the highest proportion of the population involved in natural resource-related occupations (farming, forestry, fishing, and hunting). Of these three areas, Newport has the highest percent nonwhite population, and Native Americans represent the largest share of this population with 3.2% of the total population. These port groups rank in the middle in terms of educational attainment. Although average income is comparatively modest, poverty rates also rank lower, which could suggest less wealth disparity in these areas. However, looking at rates for individual census places suggests pockets of poverty in some areas. The rate for Astoria is 15.2% while Siletz Bay in the Newport port group has a 15.7% poverty rate. Siletz Bay also has a large percentage of Native Americans: they make up 19.3% of the population. Median incomes range from a low of $31,074 for Seaside in the Astoria port group to a high of $40,250 in Nehalem Bay in the Tillamook port group, which has the lowest average income of the three.

Fishery-related income and employment are important in these port groups as evidenced by Table 8-8. Newport ranked second while Astoria-Tillamook ranked fourth in terms of contribution fisheries activities made to these economic indicators in 2001. About half of all fisheries income in these port groups was derived from groundfish-fishery-related activities in that year, reflecting the significance of these ports to the West Coast groundfish fishery, discussed above.

8.2.2 South Oregon Coast (Coos Bay and Brookings)

8.2.2.1 Port Infrastructure and Fleet Characteristics

The Pacific whiting fishery diminishes in importance, measured by landings and exvessel revenue in southern Oregon. Although still a component of the Coos Bay port group landings, no whiting landings are shown in the Brookings region. Table 8-2b shows that groundfish landings in the Brooking port group for 2002, at 881 mt, were less than any other port group north of San Francisco. However, with $2.3 million in exvessel revenue from groundfish in 2002, the Brookings port group is not substantially smaller than most of the other port groups. The rockfish category contributes most to revenues in Brookings. Because many of these are sold as live fish, which command higher prices, Brookings ports earned more revenue from fewer landed fish in comparison to the neighboring Coos Bay port group. As noted in Section 6.1.3, live fish deliveries are an important component of California groundfish fisheries, and increasingly in southern Oregon as well. Also, as a proportion of revenue from all fisheries, groundfish are especially important in the Brooking region: the $2.3 million value amounts to just over half the $4.3 million in landings from all fisheries shown in Table 8-3b for 2002.

Looking at Table 8-4, there are some notable differences in fleet characteristics between these two port groups. Coos Bay had 29 limited entry groundfish trawlers in 2001 versus only four in Brookings. The vessel buyback program retired eight limited entry trawl vessels in Coos Bay. Five retired vessels are reported for Brookings out of a total of nine (NMFS 2004a), more than the 2001 count shown in Table 8-4. This discrepancy is likely due to differences in the way vessel home ports are determined. Port Orford in the Brookings port group had a fleet of limited entry fixed vessels numbering 14 in 2001. The table also shows a large number of vessels in the open access category of more than 5% of revenue from groundfish in the Brookings port group. Some of these vessels are likely participating in the live fish fishery and contributing to high-value rockfish landings.

8.2.2.2 Community Demographics

South Oregon coast demographics at a glance:

	Coos Bay		Brookings	
	Value	Rank	Value	Rank
Total population:	59,901	8	20,137	16
Urban population	80.44%	9	49.2%	15
Non-white population:	7.8%	15	6.7%	17
Hispanic population:	3.1%	17	3.4%	16
Working age population (17-64):	57.6%	17	55.5%	18
High school graduate and higher*:	83.0%	11	81.3%	13
Natural resource-related employment**:	2.52%	8	3.0%	5
Average household income:	$39,553	18	$39,563	17
Poverty rate:	14.8%	5	13.3%	6

(Values from Tables 8-10 through 8-16 for block group equivalent areas. Census data, 2000. *Some college, bachelor and graduate degrees. **Population employed in private sector natural resource-related occupation.)

These two fairly rural port groups are generally similar to northern Oregon ports in terms of race and ethnicity, or the comparatively small percentage of the population that is non-white and Hispanic. Native Americans are the largest minority group at a little over two percent in both port groups. These two port groups rank at the bottom for the percent of the population between 17 and 64; Coos Bay ranks first for population 65 years old and up, Brookings third. This reflects the popularity of this part of the Oregon coast as a retirement destination. They also rank at the bottom in terms of average household income and have fairly high poverty rates. Median incomes in constituent census places, however, are higher than in some Northern California communities (see below), ranging from $31,656 in Brookings to $29,492 in Bandon. These values are about two-thirds the statewide value of $40,916. Table 8-8 shows that fisheries made a modest contribution to income and employment in 2001, with Brookings ranking somewhat higher than Coos Bay for the percent share coming from fisheries.

8.3 California

8.3.1 Northern California (Crescent City, Eureka, and Fort Bragg)

8.3.1.1 Port Infrastructure and Fleet Characteristics

Groundfish are an important component of landings, measured by value, in Northern California even if the total amount of groundfish landed in these three port groups is less than for most port groups in Washington and Oregon. Referring to Table 8-3b, in 2002 groundfish landings accounted for 29% of total exvessel revenues in these three port groups compared to 34% in Oregon and 18% in Washington. During this year these port groups also accounted for a little over half of the value of all groundfish landed in California but only about a quarter of all fishery landings in California (Table 8-3b). Yet the amount of groundfish landed in these three port groups, 8,303 mt in 2002, is less than that landed in any one of three port groups in Washington and Oregon (South and Central Washington, Astoria-Tillamook, and Newport) and less than the sum of any three port groups in those two states. As in southern Oregon, rockfish and lingcod are an important component of landings, measured by exvessel revenue. In Fort Bragg rockfish were the largest component of groundfish landings, as shown in Table 8-3b. As mentioned above, this likely reflects the importance of high-value live fish deliveries. Eureka represents the southern terminus of the Pacific whiting fishery in terms of landings ports with 2,775 mt landed there in 2002, a small amount in comparison to landings in southern Washington and northern Oregon.

The total number of groundfish vessels in each of these three port groups is less than in Oregon port groups, although greater than port groups in Washington (Table 8-4). However, the largest number of limited entry trawl vessels were retired by the vessel buyback program in this region. According to the report (NMFS 2004a), 14 vessels each were retired in Crescent City and Eureka. Another four vessels in Fort Bragg were retired. The open access sector also plays a larger role in these ports. In Eureka, for example, of the 98 vessels making groundfish landings in 2001, 68 were in the open access sector with groundfish accounting for more than 5% of their revenue for the year. Smaller vessels are more prevalent in the fishing fleets in these port groups; only 7% of the vessels are in the 60 feet and above size groups, half or less of the comparable percentage in Oregon port groups such as Astoria-Tillamook and Newport.

8.3.1.2 Community Demographics

Northern California coast demographics at a glance:

	Crescent City		Eureka		Fort Bragg	
	Value	Rank	Value	Rank	Value	Rank
Total population:	24,472	13	52,460	9	21,237	15
Urban population	76.3%	10	82.5%	8	43.9%	17
Non-white population:	20.9	6	14.5	9	14.7	8
Hispanic population:	13.0%	7	6.2%	9	14.1%	6
Working age population (17-64):	64.8%	6	64.6%	7	73.9%	8
High school graduate and higher*:	71.4%	18	84.8	9	84.0	10
Natural resource-related employment**:	2.6%	12	2.0%	12	5.1%	2
Average household income:	$39,654	16	$41,482	14	$49,781	9
Poverty rate:	18.5%	1	17.3%	2	12.5%	8

(Values from Tables 8-10 through 8-16 for block group equivalent areas. Census data, 2000. *Some college, bachelor and graduate degrees. **Population employed in private sector natural resource-related occupation.)

Hispanics are the largest minority group in these three port groups, although their share of the population is less than in most of the other port groups in California. The next largest minority groups after Hispanics is Native Americans, which make up 5.4% of the population in the Crescent City area, 4.0% in Eureka, and 2.9% in Fort Bragg, ranking them first, third, and fifth among the port groups, respectively, for this statistic.

Crescent City and Eureka rank low in terms of average household income and have the highest poverty rates among all the port groups. Median incomes in constituent census places are also comparatively low; in fact the median income for Crescent City—$20,133—is less than half the value for California as a whole. Fort Bragg is notable in terms of the comparatively high percentage of the population employed in natural resource related jobs. As shown in Table 8-8, estimated employment in fisheries in 2001 was relatively high in Crescent City but more modest in the other two port groups. Groundfish fisheries played a more prominent role in Eureka than the other two port groups in this region, likely because of the shore-based processing of Pacific whiting at this port.

8.3.2 Central California (Bodega Bay, San Francisco, Monterey, and Morro Bay)

8.3.2.1 Port Infrastructure and Fleet Characteristics

In Central California, and Southern California especially (see below), groundfish diminish as a significant component of commercial landings. In 2002 San Francisco ranked below Eureka and Fort Bragg port groups in terms of the amount of groundfish landings, but second only to Eureka in California measured by exvessel value. (Note that in the fishery-related tables, as opposed to the demographic tables, Bodega Bay ports are included in the San Francisco port group.) Rockfish were an important component of landings in all three port groups in 2002, but in Morro Bay especially they provided a large portion of exvessel revenue. As noted above, this reflects the importance of the live fish fishery. Flatfish are also an important contributor to landings in all three port groups, while sablefish are significant in the Monterey port group.

As in Northern California, open access vessels were an important part of the fleet in these port groups, based on landings at member ports, as shown in Table 8-4. The limited entry trawl vessel buyback program retired 11 vessels in this region (NMFS 2004a), further reducing the importance of that sector. Taking the three port groups together, 86% of vessels making groundfish landings were in the open access sector, and the great majority of these likely targeted groundfish on some trips, given the number for which groundfish account for more than 5% of total landings value. In Morro Bay almost all of these vessels made landings of nearshore species, again suggesting the importance of the live fish fishery—which targets fish in relatively shallow water—in this port group. Table 8-5 shows that these port groups have more smaller vessels—97.5% are less than 60 feet in comparison to the coastwide value of 92%.

8.3.2.2 Community Demographics

Central California coast demographics at a glance:

	Bodega Bay		San Francisco		Monterey		Morro Bay	
	Value	Rank	Value	Rank	Value	Rank	Value	Rank
Total population:	15,592	18	1,484,046	1	112,344	6	40,812	10
Urban population	49.1%	16	99.7%	2	92.5%	6	87.7%	7
Non-white population:	11.0%	10	55.0%	1	20.1%	7	10.3%	12
Hispanic population:	9.2%	9	16.7%	4	16.0%	5	10.9%	8
Working age population (17-64):	73.9%	1	70.0%	3	72.2%	2	61.6%	12
High school graduate and higher*:	93.9%	1	80.1%	14	89.3%	3	91.2%	2
Natural resource-related employment**:	2.8%	6	0.1%	18	1.0%	14	2.4%	10
Average household income:	$108,183	1	$72,203	2	$67,623	3	$56,804	8
Poverty rate:	6.3%	18	12.3%	9	10.3%	15	9.9%	17

(Values from Tables 8-10 through 8-16 for block group equivalent areas. Census data, 2000. *Some college, bachelor and graduate degrees. **Population employed in private sector natural resource-related occupation.)

This region is more ethnically diverse, better educated and wealthier than port groups to the north. Like Seattle in Puget Sound, San Francisco and the Bay Area conurbation dominate this region in terms of population and economic activity. The sparsely populated Bodega Bay port group includes affluent Sausalito, just across the Golden Gate Bridge from San Francisco. Its median income of $87,469 places it above all other communities except for the Newport Coast CDP in Southern California. Yet all of these port groups compare positively in terms of the statistics measuring income and education, with Morro Bay somewhat of a laggard in comparison to the other three port groups. As might be expected, natural resource related employment is insignificant in the San Francisco port group and modest in the other three. Table 8-8 further underscores the relatively unimportant role that fisheries play in large regional economy of Central California. These ports rank near the bottom of the West Coast port groups in estimates of 2001 income and employment from fisheries. Groundfish-related activities were also a less important share of fisheries income and employment in the Central California port groups, outranking only Southern California.

8.3.3 Southern California (Santa Barbara, Los Angeles, and San Diego)

8.3.3.1 Port Infrastructure and Fleet Characteristics

Commercial groundfish fisheries are relatively unimportant in Southern California; these port groups show groundfish exvessel revenue in 2002 somewhat greater than a half a million dollars in each group (Table 8-3b). Half of that revenue, or better, came from rockfish. In contrast, Los Angeles ranked second (behind the South Washington Coast) for exvessel revenue from all fisheries on the West Coast, and Santa Barbara ranked fourth in 2002. Table 8-9 shows the importance of recreational fisheries for groundfish in this region: an estimated $37.2 million in income was generated in 2001. (This statistic cannot be directly compared to the exvessel revenue figures in Tables 8-3a and 8-3b because income includes a wider range of economic activity than what is reflected in exvessel revenue. Nonetheless, it suggests that recreational groundfish fisheries play a greater role in the regional economy than commercial groundfish fisheries.)

Table 8-4 shows that this region is dominated by open access groundfish fisheries. No groundfish limited entry trawlers operate out of these ports and only a modest number of limited entry fixed gear vessels do. Of the 258 vessels making groundfish landings at these ports in 2001, 236 were in the open access sector.

8.3.3.2 Community Demographics

Southern California coast demographics at a glance:

	Santa Barbara		Los Angeles		San Diego	
	Value	Rank	Value	Rank	Value	Rank
Total population:	400,353	5	703,511	4	1,336,350	2
Urban population	99.2%	3	100.0%	1	99.6%	3
Non-white population:	39.2%	3	46.9%	2	38.8%	4
Hispanic population:	45.8%	1	35.8%	2	26.0%	3
Working age population (17-64):	63.8%	10	63.8%	9	66.2%	5
High school graduate and higher*:	73.8%	17	75.1%	16	82.5%	12
Natural resource-related employment**:	3.4%	4	0.1%	17	0.2%	16
Average household income:	$63,423	5	$64,901	4	$61,947	6
Poverty rate:	9.9%	16	15.6%	3	11.9%	11

(Values from Tables 8-10 through 8-16 for block group equivalent areas. Census data, 2000. *Some college, bachelor and graduate degrees. **Population employed in private sector natural resource-related occupation.)

Coastal Southern California is overwhelmingly urban and the most racially and ethnically diverse region on the West Coast. Los Angeles is the preeminent urban center on the West Coast. As might be expected, these port groups rank at the top for the percent of the population that is Hispanic. The population value for the Los Angeles port group is somewhat misleading because it includes a small subset of the cities and communities in the Los Angeles area. In comparison, the combined population of Los Angeles and Orange counties is 7.7 million. The Los Angeles ports in particular show significant disparities in economic well-being. The Newport Coast CDP, for example, has the highest median income of the West Coast port areas—$164,653—and an average income of $264,648. This is more than four times the average income for the port group as a whole. To a lesser degree, there are these types of disparities in the Santa Barbara port group. Santa Barbara itself is a quite affluent city while the coastal areas in Ventura county to the south, also part of the port group, have fewer wealthy residents. Comparison of the median and average income values for Santa Barbara and the other ports in the port group reflect the differences in income distribution. There is a much greater difference between median income and average income in Santa Barbara compared to the other ports. For example, median household income in Santa Barbara is less than in Oxnard while average household income is greater.

The estimates of income and employment derived from fisheries are comparatively small for these port groups; Santa Barbara ranks higher than the other two but still in the bottom half of all West Coast port groups. These port groups rank at the bottom of the port roups in terms of the share groundfish contributes to fishery-related income.

8.4 Coastwide Summary

8.4.1 Dependence on and Engagement in Fishing and Fishing-Related Activities

By examining the rankings in the first block of Table 8-8 we get an idea of how engaged each port area is in commercial fishing relative to other opportunities in the regional economy. Both the income and employment measures show that the south Washington coast is the area most heavily invested in commercial fishing relative to its economy. Newport and Astoria-Tillamook in Oregon, and Crescent City, California, are the next most engaged. Brookings and Central Washington coast alternate for fifth and sixth place, depending on whether the income or employment measure is used. By this measure the least engaged port areas are the large, relatively urbanized centers of Puget Sound, San Diego, San Francisco, and Los Angeles. While these areas certainly include local pockets that are heavily engaged in fishing activities, the size and diversity of the surrounding economies tend to mask the significance of locally important factors.

The second block on the first page of Table 8-8 shows how much of the total fishery-related income and employment in each region is generated by groundfish activity. This measure shows Puget Sound, North Washington Coast, Astoria-Tillamook, and Eureka all depend on groundfish for at least 50% of fishery-related income and employment. All but four of the port groups generate at least 14% of fishery-related income from groundfish.

The second page of Table 8-8 splits the groundfish totals into limited entry trawl and other gear components. From this information we see that of the regions highly involved in groundfish, Astoria-Tillamook, Puget Sound, Newport, and Eureka-derive more than 40% of groundfish income from the limited entry trawl fishery. Only the North Washington coast derives more than one-third of groundfish income from nontrawl sources.

Table 8-9 shows estimated personal income generated in 2001 by the West Coast ocean recreational fishery. These estimates were also generated using the Fisheries Economic Assessment Model (or FEAM, see Jensen 1996). The ocean recreational fishery accounted for $254 million in personal income and almost 10,000 jobs in 2001. Of this, groundfish trips accounted for $71 million and 2,800 jobs, respectively, or about 28% of the total. The proportion of income associated with groundfish trips ranged from 17% in Washington to 45% in Oregon. The ratio of charter angler trips to private vessel participation was much greater in Northern and Southern California than in Washington and Oregon, probably reflecting differences in species opportunities, season length and weather along the coast.

8.4.2 County Economic Indicators

Tables 8-17a and 8-17b display the most recent (2001) information on the components of total personal income in counties along the West Coast, Puget Sound, and Lower Columbia River by county. The counties are ranked on the basis of several different average or per capita income measures. In terms of total per capita personal income, the urban Northern California counties are on top, with Marin county ranked number one, followed by two other Bay Area counties: San Mateo and San Francisco. San Mateo and San Francisco also rank first and second in terms of average annual wage, a measure of the strength of these economies as centers of high wage employment, with King county Washington at number three. Marin, San Mateo, and San Francisco counties are ranked first, second, and third in terms of per capita non-labor income (dividends, interest and rent). The status of Marin county as a top bedroom community for San Francisco-bound commuters is betrayed by its ranking as number one in terms of residence adjustment, a net measure of income brought home by resident commuters minus the income carried out by non-residents. The number two and three spots in this category are held by Contra Costa, California, and Columbia County, Oregon, respectively. The four poorest counties in the region, measured by per capita income, are Del Norte County in California, and Klickitat, Pacific, and Grays Harbor counties in Washington.

Transfer payments include welfare and Social Security benefits received from federal, state, and local governments. As such, it can be both a measure of how dependent an area is on public assistance or an indicator of how attractive an area is as a retirement destination. By this measure, Pacific County, Washington, is number one, followed by Curry County, Oregon and Clallam County in Washington. Looking at dividends, interest, and rent (a measure of wealth) expands this picture. By this measure, Curry and Clallam counties rank relatively high (7th and 11th respectively), but Pacific County is well down the list at thirty-third, indicating that Pacific is probably the poorer of the three counties.

Table 8-18 shows 2002 unemployment rates in coastal counties, the latest available county-level data. Counties with relatively high unemployment rates are arrayed along the lower Washington coast, Columbia River, and southern Oregon coast. Monterey and Del Norte were the only counties in California with unemployment rates among the highest ten. Three of the four counties with highest unemployment rates in 2002 were located in southwestern Washington.

Table 8-18 also displays the national average unemployment rate and the state averages for the three coastal states. Unemployment rates for all three states were significantly above the national average in 2002. In Washington, 11 of the 15 counties displayed had higher unemployment rates than the state average. In Oregon, 7 of 11 counties displayed had higher than state-average unemployment. In California, 7 of 19 counties displayed had unemployment rates higher than the state average.

8.4.3 Social Structure: Networks, Values, Identity

The fishing community on the West Coast is composed of many separate communities based on fishery, gear type, targeted species, geography and, to some degree, cultural background and ethnicity. For example, Astoria, Oregon, has Finnish roots that are celebrated in community festivals, and Native American communities have ties to the fishery that date back thousands of years.

Commercial fishing enterprises in Washington, Oregon, and California are socially and culturally diverse. However, most tend to be family-run businesses. While most fishers are male, women are often involved in the shoreside aspects of the fishing business and provide an important support and communications network for the fishing community. Few fishing families own multiple boats, and few boats are owned by large corporations. In many communities, families can trace several generations of involvement in the fishing industry.

Recreational fishing is also an important part of many communities' identities. The recreational fishing industry includes charter boats, guides, marinas; and gear, bait, and other suppliers. Many of these businesses are also family-owned and operated. In addition to their direct impact on the local community, the recreational fishing industry supports a broad-based community of thousands of individual boat owners and shore fishers participating in ocean and inland recreational fisheries.

The commercial fishing industry generally places a high value on independence. Fishing necessarily occurs at sea, and frequently attracts people who enjoy solitude and self-direction. This sense of independence and self-reliance contrasts sharply with the increasingly stringent controls being placed on the industry.

Fishing is also known for its high level of danger; it is consistently rated among the most dangerous professions in the United States. Despite this danger, there are few safety nets for people in the industry. Crew members are not technically "employees" and are not eligible for unemployment insurance, workers' compensation, and other benefits normally associated with workers in other demanding and dangerous occupations. Vagaries of weather, market conditions and regulations demand high levels of flexibility. Many crew members are itinerant, moving from port to port and job to job (Gilden 1999).

The challenges of pursuing and maintaining fishing-based livelihoods have caused fishers to form organizations to represent common interests. Examples include the Coos Bay Trawlers Association, the Newport Fishermen's Wives Association, the Pacific City Dorymen's Association, the Fishermen's Marketing Association, the Pacific Marine Conservation Council, the West Coast Fishermen's Alliance, the Western Fishboat Owner's Association, and the Women's Coalition for Pacific Fisheries (Gilden 1999). These organizations help the multiple facets of the fishing community represent their interests to policy makers and the general public.

8.4.4 Impact on the Built Environment in Fishing Communities

While few coastal communities depend exclusively on fishing; harvesting, processing and related support industries (fuel, docks, ice, gear repair, etc.) are part of a complex web of interaction with other economic activities such as sport fishing, whale watching, tourism, and other recreational activities. Commercial and recreational fishers coexist, and both contribute financially to the businesses and infrastructure that serve and support them. Communities such as Newport, Oregon, celebrate their fishing industry, having turned the port waterfront into a major tourist attraction. This is also true for many other historic ports in Washington, Oregon, and California. Maintenance of port facilities for the fishing fleet provides access for other user groups, such as recreational fishers and boaters, and draws tourists who are attracted to the sights and smells of a working fishing port.

The presence of a viable commercial fleet helps provide the funding and incentive to dredge harbor entrances and to maintain jetties and port facilities. These in turn assist the recreational industry and private users to operate safely and efficiently from coastal ports. Seafood processors and shoreside support businesses pay property taxes and license fees to the port cities and surrounding jurisdictions, thereby contributing to the maintenance of the local infrastructure for all area residents.

The following are examples of fishery-related effects on port infrastructure. In ports such as Brookings and Garibaldi in Oregon, reduction in fishing fleets has coincided with the silting of harbor entrances due to reduced dredging. This has restricted access for larger vessels, including trawlers, and made it more difficult for a fleet to become established in the future (Gilden 1999). In another example, the Port of Astoria recently added a new breakwater to provide additional moorage for larger vessels involved in the new sardine fishery (Oregon Coastal Zone Management Association 2002).

8.5 *Identification of Minority and Low Income Communities and Addressing Environmental Justice*

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, requires federal agencies to identify and address "disproportionately high adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations in the United States." Fishery management actions promulgated by the Pacific Council and implemented by NMFS can have environmental and socioeconomic impacts over a very wide area; the affected area of many actions covers all West Coast waters and adjacent coastal communities involved in fishing. This makes it difficult to identify minority and low-income populations that may be disproportionately affected.

The same population units described above and used to characterize the demographics of ports and port groups were used to evaluate what ports might qualify as low income and minority. These are census places and block group equivalent areas. Five criteria were used from SF3 population tables: percent non-white population, percent Native American population, percent Hispanic population, average income, and poverty rate.[25/] Statistics for the ports need to be compared to a reference community in order to determine if they are sufficiently different from a more general, but comparable, population to be considered a minority or low-income community. Three reference communities were identified: north, central, and south. (A single coastwide reference community was not used because of the substantial variation in population characteristics along the coast.) To begin developing the reference communities census block groups within 10 miles of the coast were selected and coded using GIS. (Some manual editing was necessary to include smaller census blocks, which, although more than 10 miles from the coast, were surrounded by large block groups that qualified. This is because the selection rule was based on the boundary of the block group, not its centroid. A small number of block groups qualifying, but not in coastal counties, were also manually excluded.) The three regions are based on port groups; "coastal" block groups were further coded according to these regions. The northern region includes port groups in Washington, Oregon, and the Crescent City, Eureka, and Fort Bragg port groups in California. The central region includes the Bodega Bay, San Francisco, Monterey, and Morro Bay port groups. The southern region includes the Santa Barbara, Los Angeles, and San Diego port groups. (See Figure 8-1 for a map of ports and port groups.)

Once reference communities were identified, a threshold value for each of the five statistics used in the evaluation was determined. The block groups in each reference community were ranked and the value constituting the minimum of the highest quintile (twentieth percentile) was identified for percent nonwhite, percent Native American, percent Hispanic, and percent households below the poverty line, and the value constituting the maximum of the bottom quintile for average household income. Table 8-19 shows the number of block groups, total population, and threshold values for these five statistics for each of the three reference communties.

Using the quintile value, the ports were evaluated to see if they met the threshold for each of these statistics. Table 8-20 summarizes the results; for each port the appropriate cell is shaded if that statistic is above (or below for average household income) the quintile threshold for the block group equivalent (the column headed "B") or census place (the column headed "P"). Providing results for both block group equivalents and census places allows comparison to note how they differ.

25/ Percent nonwhite was calculated from Table P6 by subtracting the white population from the total population. Sources for the other statistics are given in the notes for Table 8-10 to 8-16.

TABLE 8-1. Location and composition of port groups. (Page 1 of 2)

State	Port Group Area	County	PCID	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
		Unknown	OSP	Other South Puget Sound Ports
	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
	Unidentified WA	Pacific	OWC	Other Washington Coastal Ports
		Unknown	OWA	Unknown WA Ports
Oregon	Astoria	Multnomah	CRV	Psuedo Port Code for Columbia R.
		Clatsop	AST	Astoria
		Clatsop	GSS	Gearhart - Seaside
		Clatsop	CNB	Cannon Beach
		Unknown	WAL	Landed in WA; Transp. to OR
	Tillamook	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
		Marin	TML	Tomales Bay
		Marin	RYS	Point Reyes
		Marin	OSM	Other Son. and Mar. Co. Outer Coast Ports
		Marin	SLT	Sausalito
	San Francisco	Alameda	OAK	Oakland
		Alameda	ALM	Alameda
		Alameda	BKL	Berkely
		Contra Costa	RCH	Richmond

TABLE 8-1.   Location and composition of port groups. (Page 2 of 2)

State	Port Group Area	County	PCID	Name
		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
	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
	Unidentified CA	Unknown	OCA	Unknown CA Ports

TABLE 8-2a. Total Commercial Deliveries (including Tribal fisheries) of Council-Managed Species to West Coast Port Areas in 1998 (mt). (Page 1 of 2)

	Washington					Oregon				
Species Group	Puget Sound	North WA Coast	South and Central WA Coast	Unsp. WA	WA TOTAL	Astoria-Tillamook	Newport	Coos Bay	Brookings	OR TOTAL
Lingcod	156	21	14	0	191	64	49	54	85	252
Whiting (at sea)	0	0	0	0	0	816	1,055	0	0	1,872
Whiting (shoreside)	34	0	662	0	696	1,608	2,144	4	0	3,756
Flatfish	1,216	420	591	0	2,227	2,136	838	2,018	416	5,407
Sablefish	931	1,239	698	516	3,384	1,483	1,427	1,153	538	4,602
Rockfish	2,314	392	1,114	8	3,829	3,607	1,937	1,866	1,211	8,621
Other Groundfish	248	201	57	0	507	117	10	67	71	265
Total Groundfish	4,899	2,274	3,136	524	10,833	9,832	7,461	5,162	2,320	24,775
Pink Shrimp Trawl	0	5	875	0	880	1,020	1,210	586	373	3,189
Spot Prawn Trawl	0	0	0	0	0	0	0	0	0	0
Spot Prawn Pot	0	0	0	0	0	0	0	0	0	0
Ridgeback Prawn Trawl	0	0	0	0	0	0	0	0	0	0
Pacific Halibut	1	444	33	53	530	73	107	68	4	253
California Halibut[a/]	0	0	0	0	0	0	0	0	0	0
Salmon	1	137	212	7	356	1,778	24	23	1	1,825
Sea Cucumber	0	0	0	0	0	0	0	0	0	0
California Sheephead	0	0	0	0	0	0	0	0	0	0
Gillnet Complex[b/]	0	0	0	0	0	0	0	0	0	0
Squid	0	0	0	0	0	0	2	1	1	4
Other CPS	0	0	64	0	64	12	58	4	0	74
HMS	484	1	8,291	22	8,798	4,467	1,385	851	119	6,823
Dungeness Crab	1,250	1,148	10,875	555	13,828	3,664	3,604	2,176	3,076	12,519
Other Crustaceans	1	7	388	98	494	521	76	40	9	646
Other Species	0	0	7	0	7	51	18	21	116	207
Total Council-Managed	6,636	4,015	23,881	1,258	35,791	21,418	13,944	8,933	6,020	50,314

TABLE 8-2a. Total Commercial Deliveries (including Tribal fisheries) of Council-Managed Species to West Coast Port Areas in 1998 (mt). (Page 2 of 2)

	California												
Species Group	Crescent City	Eureka	Fort Bragg	San Francisco	Monterey	Morro Bay	Santa Barbara	Los Angeles	San Diego	Unsp. CA	CA TOTAL	At Sea TOTAL	Grand TOTAL
Lingcod	50	36	47	77	23	26	12	4	0	0	275	0	718
Whiting (at sea)	155	0	0	0	0	0	0	0	0	0	155	11,512	13,538
Whiting (shoreside)	341	50	0	0	0	0	1	1	0	0	394	0	4,846
Flatfish	885	1,171	637	801	730	599	19	37	1	0	4,879	0	12,514
Sablefish	539	930	542	323	508	203	74	148	112	0	3,380	14	11,380
Rockfish	1,050	1,608	1,639	2,572	1,853	2,210	740	614	229	0	12,515	32	24,996
Other Groundfish	46	25	246	174	281	1,182	175	25	20	0	2,174	0	2,946
Total Groundfish	3,066	3,821	3,111	3,946	3,396	4,220	1,020	829	363	0	23,771	11,558	70,937
Pink Shrimp Trawl	985	0	0	0	0	0	0	0	0	0	985	0	5,054
Spot Prawn Trawl	8	1	10	730	302	1,385	1,246	13	0	3	3,697	0	3,697
Spot Prawn Pot	0	2	0	2	544	13	389	738	170	0	1,858	0	1,858
Ridgeback Prawn Trawl	0	0	0	0	0	3	747	12	0	0	762	0	762
Pacific Halibut	0	0	10	0	0	0	0	0	0	0	11	0	794
California Halibut a/	31	25	0	1,228	60	248	238	267	11	0	2,108	0	2,108
Salmon	0	58	62	2,355	0	1,056	0	0	0	0	3,530	0	5,712
Sea Cucumber	0	0	0	0	0	0	309	141	6	0	456	0	456
California Sheephead	0	0	0	0	0	6	349	221	116	0	692	0	692
Gillnet Complex b/	0	0	0	5	127	18	384	280	76	0	891	0	891
Squid	0	0	0	15	0	0	1,476	133	3	0	1,626	0	1,630
Other CPS	8	5	0	35	833	0	239	5,519	51	0	6,690	33	6,861
HMS	531	233	55	1,187	1,311	463	723	16,763	3,386	0	24,653	0	40,274
Dungeness Crab	6,550	5,634	1,100	6,451	135	60	1	1	0	2	19,935	0	46,282
Other Crustaceans	258	15	0	956	26	248	2,557	2,199	1,177	79	7,516	0	8,655
Other Species	1	0	1,784	350	0	1	4,648	806	385	0	7,975	0	8,188
Total Council-Managed	11,439	9,795	6,131	17,261	6,734	7,721	14,323	27,924	5,743	85	107,156	11,591	204,852

a/ Excluding California halibut caught in Gillet Complex.

b/ Includes California halibut, white sea bass, sharks and white croaker.

TABLE 8-2b. Total exvessel revenue from commercial deliveries (including tribal fisheries) of Council-managed species to West Coast port areas in 2002 ($,000). (Page 1 of 2)

	Washington					Oregon					
Species Group	Puget Sound	North WA Coast	South and Central WA Coast	Unsp. WA	WA TOTAL	Astoria-Tillamook	Newport	Coos Bay	Brookings	Unsp. OR	OR TOTAL
Lingcod	14	41	11	0	65	52	37	27	93	0	209
Whiting (at sea)	0	0	211	0	211	226	699	0	0	0	925
Whiting (shoreside)	6	0	1,055	0	1,060	1,208	1,841	157	0	0	3,205
Flatfish	1,150	575	264	0	1,989	2,425	1,015	1,399	316	0	5,155
Sablefish	1,231	1,736	574	417	3,958	1,425	1,374	1,081	449	0	4,330
Rockfish	343	501	123	3	969	1,277	650	748	759	0	3,435
Other Groundfish	589	535	21	0	1,144	84	12	20	646	0	761
Total Groundfish	3,332	3,387	2,259	420	9,398	6,697	5,627	3,432	2,264	0	18,020
Pink Shrimp Trawl	0	0	2,737	0	2,737	3,953	3,089	3,631	667	0	11,340
Spot Prawn Trawl	0	0	0	0	0	0	0	0	0	0	0
Spot Prawn Pot	0	0	0	0	0	0	0	0	0	0	0
Ridgeback Prawn Trawl	0	0	0	0	0	0	0	0	0	0	0
Pacific Halibut	122	821	63	203	1,209	63	424	79	36	6	608
California Halibut[a/]	0	0	0	0	0	0	0	0	0	0	0
Salmon	472	2,428	552	8	3,460	2,757	90	635	0	2	3,484
Sea Cucumber	0	0	0	0	0	0	0	0	0	0	0
California Sheephead	0	0	0	0	0	0	0	0	0	0	0
Gillnet Complex[b/]	0	0	0	0	0	0	0	0	0	0	0
Squid	0	0	0	0	0	0	0	1	0	0	1
Other CPS	0	0	2,009	0	2,009	2,846	1	1	0	0	2,849
HMS	770	23	6,429	196	7,419	979	1,282	652	37	0	2,950
Dungeness Crab	1,145	470	19,030	3,090	23,735	1,276	5,682	3,902	998	0	11,858
Other Crustaceans	79	1	673	0	753	589	27	7	36	0	659
Other Species	21	47	623	0	691	264	175	171	297	0	907
Total Council-Managed	5,941	7,177	34,375	3,918	51,411	19,423	16,398	12,512	4,336	8	52,675

TABLE 8-2b. Total Commercial Deliveries (including Tribal fisheries) of Council-Managed Species to West Coast Port Areas in 2002 (mt). (Page 2 of 2)

	California												
Species Group	Crescent City	Eureka	Fort Bragg	San Francisco	Monterey	Morro Bay	Santa Barbara	Los Angeles	San Diego	Unsp. CA	CA TOTAL	At Sea TOTAL	Grand TOTAL
Lingcod	22.6	14.5	13.8	10.2	9.5	8.4	1.4	0.3	0.3	0.0	80.9	0.1	205.2
Whiting (at sea)	0.0	0.0	0.0	3,016.2	0.0	0.0	0.0	0.0	0.0	0.0	3,016.2	70,952.7	84,494.3
Whiting (shoreside)	0.0	2,775.3	0.0	0.1	0.0	0.0	0.0	0.3	0.0	0.0	2,775.8	0.0	45,807.5
Flatfish	907.1	1,202.2	1,110.6	835.8	569.9	326.9	11.3	11.0	0.2	0.0	4,975.0	4.4	13,220.1
Sablefish	162.3	259.4	319.8	149.8	238.8	56.1	15.6	45.0	72.8	0.0	1,319.5	18.7	3,829.8
Rockfish	285.4	424.2	713.7	322.0	320.7	488.4	56.6	63.1	64.9	0.0	2,738.9	287.0	5,974.1
Other Groundfish	7.7	35.6	49.4	20.3	126.7	30.6	20.2	15.8	7.7	0.0	313.9	1.2	2,114.5
Total Groundfish	1,385.0	4,711.1	2,207.3	4,354.4	1,265.6	910.4	105.1	135.4	145.9	0.0	15,220.3	71,264.1	155,645.5
Pink Shrimp Trawl	1,869.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1,869.5	0.0	25,302.4
Spot Prawn Trawl	0.0	0.0	2.8	23.6	11.4	39.9	21.4	0.2	0.0	0.0	99.2	0.0	99.2
Spot Prawn Pot	0.0	0.2	0.0	0.1	26.1	4.6	14.9	18.8	14.3	0.1	79.0	0.0	79.0
Ridgeback Prawn Trawl	0.0	0.0	0.0	0.0	0.0	0.8	212.6	1.7	0.0	0.0	215.2	0.0	215.2
Pacific Halibut	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	421.6
California Halibut[a/]	0.1	3.5	0.0	157.1	32.6	6.9	86.5	21.1	1.4	0.0	309.1	0.0	309.1
Salmon	0.0	76.4	0.0	1,891.5	0.0	81.9	0.0	0.0	0.0	0.0	2,049.8	0.0	4,660.4
Sea Cucumber	0.0	0.0	0.2	0.4	0.0	0.5	350.8	67.9	5.9	0.1	425.7	0.0	425.7
California Sheephead	0.0	0.0	0.0	0.3	0.0	0.3	23.0	17.0	11.7	0.0	52.2	0.0	52.2
Gillnet Complex[b/]	0.0	0.0	0.0	0.0	6.8	10.5	148.8	170.5	15.2	0.0	352.0	0.0	352.5
Squid	0.0	0.0	3.9	866.2	25,089.6	356.5	18,441.4	28,185.6	1.0	0.0	72,944.2	10.4	72,957.7
Other CPS	0.0	0.1	0.0	189.2	16,313.1	102.0	5,811.1	44,866.9	95.8	0.0	67,378.2	5.8	106,754.3
HMS	136.3	1,121.5	21.2	72.8	420.1	290.3	293.6	2,589.5	638.5	0.0	5,583.8	0.0	12,908.5
Dungeness Crab	742.3	537.7	2,496.0	1,859.2	48.8	14.5	0.1	0.0	0.0	0.0	5,698.6	0.0	15,504.6
Other Crustaceans	36.0	6.3	0.8	377.1	0.5	54.1	506.7	153.2	164.4	4.4	1,303.5	0.0	1,464.9
Other Species	51.8	207.6	1,962.0	3,839.7	85.4	19.9	2,145.2	1,366.9	509.8	25.6	10,213.8	851.9	16,638.6
Total Council-Managed	4,221.0	6,664.4	6,694.4	13,631.5	43,299.9	1,893.0	28,161.2	77,594.8	1,603.8	30.2	183,794.1	72,132.2	413,791.4

a/ Excluding California halibut caught in Gillet Complex.

b/ Includes California halibut, white sea bass, sharks, and white croaker.

TABLE 8-3a. Total exvessel revenue from commercial deliveries (including Tribal fisheries) of Council-managed species to West Coast port areas in 1998 ($,000). (Page 1 of 2)

	Washington					Oregon				
Species Group	Puget Sound	North WA Coast	South and Central WA Coast	Unsp. WA	WA TOTAL	Astoria-Tillamook	Newport	Coos Bay	Brookings	OR TOTAL
Lingcod	156	21	14	0	191	64	49	54	85	252
Whiting (at sea)	0	0	0	0	0	816	1,055	0	0	1,872
Whiting (shoreside)	34	0	662	0	696	1,608	2,144	4	0	3,756
Flatfish	1,216	420	591	0	2,227	2,136	838	2,018	416	5,407
Sablefish	931	1,239	698	516	3,384	1,483	1,427	1,153	538	4,602
Rockfish	2,314	392	1,114	8	3,829	3,607	1,937	1,866	1,211	8,621
Other Groundfish	248	201	57	0	507	117	10	67	71	265
Total Groundfish	4,899	2,274	3,136	524	10,833	9,832	7,461	5,162	2,320	24,775
Pink Shrimp Trawl	0	5	875	0	880	1,020	1,210	586	373	3,189
Spot Prawn Trawl	0	0	0	0	0	0	0	0	0	0
Spot Prawn Pot	0	0	0	0	0	0	0	0	0	0
Ridgeback Prawn Trawl	0	0	0	0	0	0	0	0	0	0
Pacific Halibut	1	444	33	53	530	73	107	68	4	253
California Halibut[a/]	0	0	0	0	0	0	0	0	0	0
Salmon	1	137	212	7	356	1,778	24	23	1	1,825
Sea Cucumber	0	0	0	0	0	0	0	0	0	0
California Sheephead	0	0	0	0	0	0	0	0	0	0
Gillnet Complex[b/]	0	0	0	0	0	0	0	0	0	0
Squid	0	0	0	0	0	0	2	1	1	4
Other CPS	0	0	64	0	64	12	58	4	0	74
HMS	484	1	8,291	22	8,798	4,467	1,385	851	119	6,823
Dungeness Crab	1,250	1,148	10,875	555	13,828	3,664	3,604	2,176	3,076	12,519
Other Crustaceans	1	7	388	98	494	521	76	40	9	646
Other Species	0	0	7	0	7	51	18	21	116	207
Total Council-Managed	6,636	4,015	23,881	1,258	35,791	21,418	13,944	8,933	6,020	50,314

TABLE 8-3a. Total exvessel revenue from commercial deliveries (including tribal fisheries) of Council-managed species to West Coast port areas in 1998 ($,000). (Page 2 of 2)

	California												
Species Group	Crescent City	Eureka	Fort Bragg	San Francisco	Monterey	Morro Bay	Santa Barbara	Los Angeles	San Diego	Unsp. CA	CA TOTAL	At Sea TOTAL	Grand TOTAL
Lingcod	50	36	47	77	23	26	12	4	0	0	275	0	718
Whiting (at sea)	155	0	0	0	0	0	0	0	0	0	155	11,512	13,538
Whiting (shoreside)	341	50	0	0	0	0	1	1	0	0	394	0	4,846
Flatfish	885	1,171	637	801	730	599	19	37	1	0	4,879	0	12,514
Sablefish	539	930	542	323	508	203	74	148	112	0	3,380	14	11,380
Rockfish	1,050	1,608	1,639	2,572	1,853	2,210	740	614	229	0	12,515	32	24,996
Other Groundfish	46	25	246	174	281	1,182	175	25	20	0	2,174	0	2,946
Total Groundfish	3,066	3,821	3,111	3,946	3,396	4,220	1,020	829	363	0	23,771	11,558	70,937
Pink Shrimp Trawl	985	0	0	0	0	0	0	0	0	0	985	0	5,054
Spot Prawn Trawl	8	1	10	730	302	1,385	1,246	13	0	3	3,697	0	3,697
Spot Prawn Pot	0	2	0	2	544	13	389	738	170	0	1,858	0	1,858
Ridgeback Prawn Trawl	0	0	0	0	0	3	747	12	0	0	762	0	762
Pacific Halibut	0	0	10	0	0	0	0	0	0	0	11	0	794
California Halibut[a/]	31	25	0	1,228	60	248	238	267	11	0	2,108	0	2,108
Salmon	0	58	62	2,355	0	1,056	0	0	0	0	3,530	0	5,712
Sea Cucumber	0	0	0	0	0	0	309	141	6	0	456	0	456
California Sheephead	0	0	0	0	0	6	349	221	116	0	692	0	692
Gillnet Complex[b/]	0	0	0	5	127	18	384	280	76	0	891	0	891
Squid	0	0	0	15	0	0	1,476	133	3	0	1,626	0	1,630
Other CPS	8	5	0	35	833	0	239	5,519	51	0	6,690	33	6,861
HMS	531	233	55	1,187	1,311	463	723	16,763	3,386	0	24,653	0	40,274
Dungeness Crab	6,550	5,634	1,100	6,451	135	60	1	1	0	2	19,935	0	46,282
Other Crustaceans	258	15	0	956	26	248	2,557	2,199	1,177	79	7,516	0	8,655
Other Species	1	0	1,784	350	0	1	4,648	806	385	0	7,975	0	8,188
Total Council-Managed	11,439	9,795	6,131	17,261	6,734	7,721	14,323	27,924	5,743	85	107,156	11,591	204,852

a/ Excluding California halibut caught in Gillet Complex.

b/ Includes California halibut, white sea bass, sharks, and white croaker.

TABLE 8-3b. Total exvessel revenue from commercial deliveries (including tribal fisheries) of Council-managed species to West Coast port areas in 2002 ($,000). (Page 1 of 2)

	Washington					Oregon					
Species Group	Puget Sound	North WA Coast	South and Central WA Coast	Unsp. WA	WA TOTAL	Astoria-Tillamook	Newport	Coos Bay	Brookings	Unsp. OR	OR TOTAL
Lingcod	14	41	11	0	65	52	37	27	93	0	209
Whiting (at sea)	0	0	211	0	211	226	699	0	0	0	925
Whiting (shoreside)	6	0	1,055	0	1,060	1,208	1,841	157	0	0	3,205
Flatfish	1,150	575	264	0	1,989	2,425	1,015	1,399	316	0	5,155
Sablefish	1,231	1,736	574	417	3,958	1,425	1,374	1,081	449	0	4,330
Rockfish	343	501	123	3	969	1,277	650	748	759	0	3,435
Other Groundfish	589	535	21	0	1,144	84	12	20	646	0	761
Total Groundfish	3,332	3,387	2,259	420	9,398	6,697	5,627	3,432	2,264	0	18,020
Pink Shrimp Trawl	0	0	2,737	0	2,737	3,953	3,089	3,631	667	0	11,340
Spot Prawn Trawl	0	0	0	0	0	0	0	0	0	0	0
Spot Prawn Pot	0	0	0	0	0	0	0	0	0	0	0
Ridgeback Prawn Trawl	0	0	0	0	0	0	0	0	0	0	0
Pacific Halibut	122	821	63	203	1,209	63	424	79	36	6	608
California Halibut[a/]	0	0	0	0	0	0	0	0	0	0	0
Salmon	472	2,428	552	8	3,460	2,757	90	635	0	2	3,484
Sea Cucumber	0	0	0	0	0	0	0	0	0	0	0
California Sheephead	0	0	0	0	0	0	0	0	0	0	0
Gillnet Complex[b/]	0	0	0	0	0	0	0	0	0	0	0
Squid	0	0	0	0	0	0	0	1	0	0	1
Other CPS	0	0	2,009	0	2,009	2,846	1	1	0	0	2,849
HMS	770	23	6,429	196	7,419	979	1,282	652	37	0	2,950
Dungeness Crab	1,145	470	19,030	3,090	23,735	1,276	5,682	3,902	998	0	11,858
Other Crustaceans	79	1	673	0	753	589	27	7	36	0	659
Other Species	21	47	623	0	691	264	175	171	297	0	907
Total Council-Managed	5,941	7,177	34,375	3,918	51,411	19,423	16,398	12,512	4,336	8	52,675

TABLE 8-3b. Total exvessel revenue from commercial deliveries (including tribal fisheries) of Council-managed species to West Coast port areas in 2002 ($,000). (Page 2 of 2)

	California												
Species Group	Crescent City	Eureka	Fort Bragg	San Francisco	Monterey	Morro Bay	Santa Barbara	Los Angeles	San Diego	Unsp. CA	CA TOTAL	At Sea TOTAL	Grand TOTAL
Lingcod	71	39	31	32	18	30	8	2	2	0	232	0	506
Whiting (at sea)	0	0	0	326	0	0	0	0	0	0	326	7,658	9,119
Whiting (shoreside)	0	275	0	0	0	0	0	0	0	0	275	0	4,540
Flatfish	828	1,131	1,017	860	473	306	15	53	0	0	4,683	0	11,828
Sablefish	410	741	802	351	601	127	43	156	291	0	3,522	0	11,810
Rockfish	739	985	1,236	623	834	1,216	355	330	343	0	6,662	0	11,066
Other Groundfish	31	30	106	26	105	290	90	19	12	0	710	0	2,615
Total Groundfish	2,080	3,201	3,192	2,218	2,031	1,969	511	560	648	0	16,410	7,658	51,485
Pink Shrimp Trawl	1,281	0	0	0	0	0	0	0	0	0	1,281	0	15,358
Spot Prawn Trawl	0	0	52	397	198	725	381	3	0	0	1,755	0	1,755
Spot Prawn Pot	0	1	0	1	571	97	307	361	251	2	1,592	0	1,592
Ridgeback Prawn Trawl	0	0	0	0	0	3	625	6	0	0	633	0	633
Pacific Halibut	0	0	1	0	0	0	0	0	0	0	1	0	1,818
California Halibut[a/]	0	20	0	873	171	41	659	216	8	0	1,988	0	1,988
Salmon	0	261	0	5,492	0	318	0	0	0	0	6,071	0	13,015
Sea Cucumber	0	0	1	1	0	1	618	156	16	0	792	0	792
California Sheephead	0	0	0	2	0	2	152	137	98	0	391	0	391
Gillnet Complex[b/]	0	0	0	0	40	49	636	695	84	0	1,503	0	1,504
Squid	0	0	1	215	6,793	76	4,742	6,432	1	0	18,260	0	18,261
Other CPS	0	0	0	41	1,553	7	806	4,615	63	0	7,086	0	11,944
HMS	233	1,612	50	180	622	578	644	6,005	1,739	0	11,663	0	22,032
Dungeness Crab	2,467	1,854	9,257	8,285	262	131	0	0	0	0	22,255	0	57,848
Other Crustaceans	284	22	4	317	1	150	3,042	1,533	1,427	63	6,845	0	8,257
Other Species	33	157	2,774	3,187	119	45	3,710	2,353	1,045	62	13,484	0	15,082
Total Council-Managed	6,378	7,129	15,330	21,210	12,361	4,193	16,832	23,071	5,380	127	112,011	7,658	223,755

a/ Excluding California halibut caught in Gillet Complex.

b/ Includes California halibut, white sea bass, sharks, and white croaker.

TABLE 8-4. Number of vessels by vessel primary port and species group in 2001.[a/] (Page 1 of 4)

	Vessels with Limited Entry Trawl Permits						Vessels with Fixed Gear Limited Entry Permits (No Trawl Permit)					Open Access Vessels with More than 5% Revenue from Groundfish					Open Access Vessels with Less than 5% Revenue from Groundfish						Vessels Participating in Other Fisheries							
	Whit-ing	Sable-fish	Near-shore spp	Shelf spp	Slope spp	Total	Sable-fish	Near-shore spp	Shelf spp	Slope spp	Total	Sable-fish	Near-shore spp	Shelf spp	Slope spp	Total	Sable-fish	Near-shore spp	Shelf spp	Slope spp	Total	Total GF	Hal. (Pac. & CA)	Shrimp / Prawns	Crabs	Sal-mon	HMS	CPS	Other	Total
Blaine	2	4	4	4	4	4	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	5	-	-	11	-	-	-	117	119
Bellingham	1	5	5	5	5	5	19	2	14	17	19	-	-	1	-	1	-	-	-	-	-	25	13	-	14	-	5	2	203	210
Point Roberts	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	6	6
Friday Harbor	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	3
Anacortes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	74	74
LaConner	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	1	-	1	1	1	2	2	-	3	-	-	-	25	25
Everett	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	51	51
Seattle	-	-	-	-	-	-	2	-	-	2	2	-	-	-	-	-	-	-	1	-	1	3	3	-	12	1	7	1	75	93
Tacoma	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	2	-	26	27
Shelton	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	4
Centralia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14	14
Puget Sound Total	**3**	**9**	**9**	**9**	**9**	**9**	**21**	**2**	**14**	**19**	**21**	**1**	**0**	**1**	**0**	**2**	**3**	**1**	**3**	**2**	**4**	**36**	**19**	**1**	**42**	**3**	**14**	**3**	**598**	**626**
Port Townsend	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	23	23
Quilcene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2
Sequim	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	10
Port Angeles	-	3	3	3	3	3	14	1	13	14	15	12	6	17	8	20	-	-	4	1	4	42	19	-	1	11	2	-	25	58
Neah Bay	-	3	3	3	3	3	-	-	-	-	-	-	-	2	-	2	-	-	-	-	-	5	2	-	-	-	-	-	3	5
La Push	-	-	-	-	-	-	2	1	2	2	2	3	1	2	2	3	-	-	-	-	-	5	1	-	6	-	2	-	4	10
North WA Coast Total	**0**	**6**	**6**	**6**	**6**	**6**	**16**	**2**	**15**	**16**	**17**	**15**	**7**	**21**	**10**	**25**	**0**	**0**	**4**	**1**	**4**	**52**	**22**	**0**	**7**	**11**	**5**	**0**	**67**	**108**
Copalis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	10
Aberdeen	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	2
Westport (WA)	5	11	5	12	11	12	11	-	9	11	11	6	-	4	4	6	7	1	21	3	22	51	16	13	100	40	58	9	44	178
Central WA Coast Total	**5**	**11**	**5**	**12**	**11**	**12**	**11**	**0**	**9**	**11**	**11**	**6**	**0**	**4**	**4**	**6**	**7**	**1**	**21**	**3**	**22**	**51**	**16**	**13**	**101**	**41**	**58**	**9**	**54**	**190**
Tokeland	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	4	2	4	4	-	4	20	-	2	-	35	57
Ilwaco	1	4	2	4	4	4	3	3	4	3	4	5	-	2	2	5	15	2	22	8	29	42	25	7	51	35	96	7	61	163
Pacific County	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	46	47
Columbia River	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	173	173
South WA Coast Total	**1**	**4**	**2**	**4**	**4**	**4**	**3**	**3**	**4**	**3**	**4**	**5**	**0**	**2**	**2**	**5**	**18**	**2**	**26**	**10**	**33**	**46**	**25**	**11**	**72**	**36**	**98**	**8**	**315**	**440**

TABLE 8-4. Number of vessels by vessel primary port and species group in 2001.[a/] (Page 2 of 4)

	Vessels with Limited Entry Trawl Permits						Vessels with Fixed Gear Limited Entry Permits (No Trawl Permit)					Open Access Vessels with More than 5% Revenue from Groundfish					Open Access Vessels with Less than 5% Revenue from Groundfish						Vessels Participating in Other Fisheries							
	Whit-ing	Sabl e-fish	Near-shore spp	Shelf spp	Slop e spp	Total	Sabl e-fish	Near-shore spp	Shelf spp	Slop e spp	Total	Sabl e-fish	Nea r-shor e spp	Shelf spp	Slop e spp	Total	Sabl e-fish	Near-shore spp	Shelf spp	Slop e spp	Total	Total GF	Hal. (Pac. & CA)	Shrimp / Prawns	Crabs	Sal-mon	HMS	CPS	Other	Total
Astoria	4	31	18	31	30	31	11	-	9	7	11	11	3	9	7	12	17	4	16	9	19	73	21	23	66	27	68	19	43	164
Gearhart-Seaside	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	2
Cannon Beach	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	2
Nehalem Bay	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	2
Garibaldi (Tillamook)	-	3	3	3	3	3	-	-	-	-	-	-	7	5	-	7	2	12	21	2	27	37	18	-	18	47	26	1	14	71
Pacific City	-	-	-	-	-	-	-	-	-	-	-	-	17	13	-	17	-	-	-	-	-	17	-	-	2	8	5	-	2	21
Astoria-Tillamook Total	**4**	**34**	**21**	**34**	**33**	**34**	**11**	**0**	**9**	**7**	**11**	**11**	**27**	**27**	**7**	**36**	**19**	**16**	**37**	**11**	**46**	**127**	**39**	**23**	**88**	**86**	**99**	**20**	**59**	**262**
Depoe Bay	-	-	-	-	-	-	-	-	-	-	-	-	3	3	-	3	1	1	1	1	2	5	2	-	5	4	3	-	8	12
Newport	15	26	12	25	25	26	13	3	11	10	14	7	5	8	2	9	24	10	87	24	90	139	94	21	89	157	157	13	50	267
Waldport	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-	-	6
Newport Total	**15**	**26**	**12**	**25**	**25**	**26**	**13**	**3**	**11**	**10**	**14**	**7**	**8**	**11**	**2**	**12**	**25**	**11**	**88**	**25**	**92**	**144**	**96**	**21**	**100**	**161**	**160**	**13**	**58**	**285**
Florence	-	-	-	-	-	-	3	-	1	1	3	-	1	1	1	1	1	1	8	-	8	12	7	-	10	27	15	1	3	30
Winchester	-	-	-	-	-	-	3	-	3	-	3	1	-	-	-	1	-	3	9	-	10	14	6	1	12	25	14	-	4	35
Charleston (Coos Bay)	4	26	17	29	27	29	8	-	7	3	9	12	15	16	7	21	5	14	30	3	34	93	18	25	59	84	77	3	47	146
Bandon	-	-	-	-	-	-	-	-	-	-	-	-	2	1	-	2	-	1	2	-	2	4	-	-	2	4	2	-	-	8
Coos Bay Total	**4**	**26**	**17**	**29**	**27**	**29**	**14**	**0**	**11**	**4**	**15**	**13**	**18**	**18**	**8**	**25**	**6**	**19**	**49**	**3**	**54**	**123**	**31**	**26**	**83**	**140**	**108**	**4**	**54**	**219**
Port Orford	-	-	-	-	-	-	11	14	14	14	14	8	35	36	33	37	-	7	5	2	7	58	12	-	30	27	11	-	53	67
Gold Beach	-	-	-	-	-	-	-	-	-	-	-	-	20	19	17	20	-	2	2	2	2	22	-	-	1	3	1	-	23	23
Brookings	-	4	3	4	4	4	3	1	2	1	3	1	25	25	9	28	1	9	9	-	12	47	3	3	33	28	20	-	34	71
Brookings Total	**0**	**4**	**3**	**4**	**4**	**4**	**14**	**15**	**16**	**15**	**17**	**9**	**80**	**80**	**59**	**85**	**1**	**18**	**16**	**4**	**21**	**127**	**15**	**3**	**64**	**58**	**32**	**0**	**110**	**161**
Crescent City	**2**	**20**	**14**	**20**	**20**	**20**	**8**	**4**	**5**	**2**	**9**	**7**	**35**	**35**	**7**	**37**	**4**	**8**	**15**	**3**	**19**	**85**	**11**	**21**	**118**	**31**	**45**	**4**	**44**	**141**
Orick	-	-	-	-	-	-	-	-	-	-	-	1	8	8	1	8	-	-	1	-	1	9	1	-	4	7	2	-	-	12
Trinidad	-	-	-	-	-	-	-	-	-	-	-	-	5	6	-	6	-	1	1	-	1	7	-	-	23	2	1	-	3	27
Eureka Area	1	16	15	16	16	16	4	2	4	4	4	13	13	12	8	17	2	1	1	-	2	39	7	5	51	33	17	1	36	78
Fields Landing	3	10	7	10	10	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	2	1	7	2	-	1	8	14
Eureka Total	**4**	**26**	**22**	**26**	**26**	**26**	**4**	**2**	**4**	**4**	**4**	**14**	**26**	**26**	**9**	**31**	**2**	**2**	**3**	**0**	**4**	**65**	**10**	**6**	**85**	**44**	**20**	**2**	**47**	**131**

TABLE 8-4. Number of vessels by vessel primary port and species group in 2001.[a/] (Page 3 of 4)

	Vessels with Limited Entry Trawl Permits						Vessels with Fixed Gear Limited Entry Permits (No Trawl Permit)					Open Access Vessels with More than 5% Revenue from Groundfish					Open Access Vessels with Less than 5% Revenue from Groundfish						Vessels Participating in Other Fisheries							
	Whit-ing	Sable-fish	Near-shore spp	Shelf spp	Slope spp	Total	Sable-fish	Near-shore spp	Shelf spp	Slope spp	Total	Sable-fish	Near-shore spp	Shelf spp	Slope spp	Total	Sable-fish	Near-shore spp	Shelf spp	Slope spp	Total	Total GF	Hal. (Pac. & CA)	Shrimp / Prawns	Crabs	Sal-mon	HMS	CPS	Other	Total
Fort Bragg	-	12	5	12	12	12	3	1	3	3	4	27	36	34	6	57	4	5	3	1	8	81	3	3	26	49	19	1	56	130
Albion	-	-	-	-	-	-	-	-	-	-	-	2	6	5	-	7	-	1	1	-	2	9	-	-	2	2	1	-	12	17
Point Arena	-	-	-	-	-	-	-	-	-	-	-	-	4	3	1	4	-	3	2	1	4	8	-	-	5	3	1	-	11	19
Fort Bragg Total	**0**	**12**	**5**	**12**	**12**	**12**	**3**	**1**	**3**	**3**	**4**	**29**	**46**	**42**	**7**	**68**	**4**	**9**	**6**	**2**	**14**	**98**	**3**	**3**	**33**	**54**	**21**	**1**	**79**	**166**
Bodega Bay	-	-	-	-	-	-	2	2	2	1	2	1	21	23	7	26	1	1	11	1	11	39	14	-	44	125	28	1	24	171
Cloverdale	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	2	-	3	3	4	-	6	4	1	-	17	24
Yountville	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	1	1	-	-	-	1	2	1	-	10	2	-	-	9	15
Tomales Bay	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	1
Point Reyes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	6	8	1	-	-	10
Sausilito	-	-	-	-	-	-	-	-	-	-	-	1	-	1	1	1	-	4	5	-	5	6	7	-	4	21	6	1	39	53
Bodega Bay Total	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**2**	**1**	**2**	**2**	**22**	**25**	**8**	**28**	**2**	**8**	**18**	**1**	**20**	**50**	**33**	**-**	**70**	**161**	**36**	**2**	**89**	**274**
Oakland	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1
Alameda	-	-	-	-	-	-	-	-	-	-	-	-	2	1	1	2	-	-	-	-	-	2	-	-	-	1	-	-	2	3
Berkeley	-	-	-	-	-	-	-	-	-	-	-	1	8	9	3	10	-	-	-	-	-	10	5	-	-	4	2	-	8	15
Richmond	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	2	-	-	1	-	1	3	3	1	-	5	-	-	1	10
San Francisco	-	6	6	6	6	6	6	6	8	7	9	9	22	21	12	27	1	5	7	1	9	51	33	3	29	59	17	2	86	155
Princeton	1	6	8	8	7	8	3	2	2	3	3	8	39	36	8	44	1	6	6	3	11	66	34	2	56	74	30	10	43	135
San Francisco Total	**1**	**12**	**14**	**14**	**13**	**14**	**9**	**8**	**10**	**10**	**12**	**18**	**71**	**68**	**25**	**85**	**2**	**11**	**14**	**4**	**21**	**132**	**75**	**6**	**85**	**143**	**49**	**12**	**141**	**319**
Gilroy	-	-	-	-	-	-	-	-	-	-	-	-	10	8	2	10	-	-	-	-	-	10	-	-	1	-	1	-	8	10
Santa Cruz	-	2	2	2	2	2	-	-	-	-	-	9	11	11	10	18	1	5	4	1	6	26	18	-	7	31	19	3	19	46
Moss Landing	-	8	6	8	8	8	11	2	6	11	11	19	24	23	13	38	1	2	2	1	6	63	27	2	6	71	42	7	38	132
Monterey	-	2	2	2	2	2	-	1	-	1	1	1	25	23	6	26	2	3	1	3	6	35	23	5	1	50	10	5	42	81
Monterey Total	**0**	**12**	**10**	**12**	**12**	**12**	**11**	**3**	**6**	**12**	**12**	**29**	**70**	**65**	**31**	**92**	**4**	**10**	**7**	**5**	**18**	**134**	**68**	**7**	**15**	**152**	**72**	**15**	**107**	**269**
San Simeon	-	-	-	-	-	-	-	-	-	-	-	-	6	6	-	6	-	-	-	-	-	6	-	-	-	-	-	-	3	6
Morro Bay	-	2	2	2	2	2	-	1	2	-	2	2	56	49	10	57	2	16	13	7	20	81	26	9	19	36	68	6	55	122
Avila	1	5	2	5	5	5	-	-	1	1	1	-	50	47	2	50	-	10	8	1	10	66	32	5	17	9	31	3	46	78
Morro Bay Total	**1**	**7**	**4**	**7**	**7**	**7**	**0**	**1**	**3**	**1**	**3**	**2**	**112**	**102**	**12**	**113**	**2**	**26**	**21**	**8**	**30**	**153**	**58**	**14**	**36**	**45**	**99**	**9**	**104**	**206**

TABLE 8-4. Number of vessels by vessel primary port and species group in 2001.[a/] (Page 4 of 4)

	Vessels with Limited Entry Trawl Permits						Vessels with Fixed Gear Limited Entry Permits (No Trawl Permit)					Open Access Vessels with More than 5% Revenue from Groundfish					Open Access Vessels with Less than 5% Revenue from Groundfish						Vessels Participating in Other Fisheries							
	Whit-ing	Sabl e-fish	Near-shore spp	Shelf spp	Slop e spp	Total	Sabl e-fish	Near-shore spp	Shelf spp	Slop e spp	Total	Sabl e-fish	Nea r-shor e spp	Shelf spp	Slop e spp	Total	Sabl e-fish	Near-shore spp	Shelf spp	Slop e spp	Total	Total GF	Hal. (Pac. & CA)	Shrimp / Prawns	Crabs	Sal-mon	HMS	CPS	Other	Total
Santa Barbara	-	-	-	-	-	-	-	-	-	-	-	-	31	16	11	31	-	25	13	10	29	60	32	15	46	4	20	10	111	136
Santa Cruz Island	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	1
Ventura	-	-	-	-	-	-	1	-	1	1	1	2	9	8	9	12	1	9	8	7	10	23	15	8	17	1	16	8	29	43
Oxnard	-	-	-	-	-	-	6	4	6	6	6	2	14	8	9	14	-	14	5	10	17	37	13	8	19	-	14	3	58	64
Port Hueneme	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	2	3	31	9	31
Santa Barbara Total	**0**	**0**	**0**	**0**	**0**	**0**	**7**	**4**	**8**	**7**	**8**	**4**	**54**	**32**	**29**	**57**	**1**	**48**	**26**	**27**	**56**	**121**	**61**	**31**	**82**	**7**	**54**	**52**	**207**	**275**
Terminal Island	-	-	-	-	-	-	1	1	1	1	1	2	19	9	10	19	1	9	6	2	12	32	35	7	28	2	47	26	100	126
San Pedro	-	-	-	-	-	-	-	-	-	-	-	-	7	8	3	10	-	17	12	5	18	28	16	2	18	1	51	53	59	112
Willmington	-	-	-	-	-	-	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	1	1	-	1	-	1	1	1	2
Catalina Island	-	-	-	-	-	-	-	-	-	-	-	2	6	2	4	8	-	3	2	1	4	12	10	3	15	-	12	9	26	41
Long Beach	-	-	-	-	-	-	-	-	-	-	-	-	2	3	1	3	-	-	-	-	-	3	4	-	1	-	4	1	4	6
Newport Beach	-	-	-	-	-	-	4	2	3	4	5	1	1	2	2	2	1	1	-	-	2	9	3	3	8	-	4	5	11	18
Dana Point	-	-	-	-	-	-	-	1	-	-	1	-	1	1	-	1	-	2	-	-	2	4	-	3	26	-	4	-	18	33
Los Angeles Total	**0**	**0**	**0**	**0**	**0**	**0**	**6**	**5**	**5**	**6**	**8**	**5**	**36**	**25**	**20**	**43**	**2**	**32**	**20**	**8**	**38**	**89**	**69**	**18**	**97**	**3**	**123**	**95**	**219**	**338**
North Shore	-	-	-	-	-	-	-	-	-	-	-	1	3	8	5	8	1	6	9	6	10	18	5	5	26	-	18	7	30	49
San Diego	-	-	-	-	-	-	-	1	1	-	1	1	7	6	5	10	1	5	4	1	7	18	6	2	30	-	37	11	41	65
Oceanside	-	-	-	-	-	-	5	1	2	5	5	-	1	3	2	3	-	4	2	2	4	12	2	3	9	-	15	2	14	26
San Diego Total	**0**	**0**	**0**	**0**	**0**	**0**	**5**	**2**	**3**	**5**	**6**	**2**	**11**	**17**	**12**	**21**	**2**	**15**	**15**	**9**	**21**	**48**	**13**	**10**	**65**	**0**	**70**	**20**	**85**	**140**
Other California	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	8	10
At-Sea Only	**28**	**20**	**2**	**28**	**23**	**28**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**28**	**11**	**-**	**2**	**26**	**9**	**28**	**25**	**28**
Grand Total	**68**	**229**	**146**	**242**	**232**	**243**	**158**	**57**	**138**	**136**	**178**	**179**	**623**	**601**	**252**	**771**	**104**	**237**	**389**	**126**	**517**	**1,709**	**675**	**214**	**1,247**	**1,202**	**1,172**	**297**	**2,470**	**4,588**

NOTE: The primary port is the port at which the vessel made more landings than any other port, as measured in terms of exvessel value. Vessels in the "at-sea only" row are those that made no shoreside landings. Vessels delivering at-sea that had some shoreside landings were assigned to a primary port based on their shoreside landings. Source: Derived from PacFIN monthly vessel summary files.

a/ Actual period is November 2000 through October 2001.

TABLE 8-5. Number of vessels by port by length class in 2001.[a/] (Page 1 of 2)

	Vessel Length Category							
	<40'	40'-50'	50'-60'	60'-70'	70'-150'	>150'	Unspecified	Total
Blaine	75	18	17	3	4	-	2	119
Bellingham	109	33	39	16	9	1	3	210
Point Roberts	6	-	-	-	-	-	-	6
Friday Harbor	3	-	-	-	-	-	-	3
Anacortes	70	1	2	-	-	-	1	74
LaConner	24	1	-	-	-	-	-	25
Everett	34	8	4	3	-	-	2	51
Seattle	48	19	15	5	6	-	-	93
Tacoma	17	4	4	1	-	-	-	26
Shelton	4	-	-	-	-	-	-	4
Centralia	13	1	-	-	-	-	-	14
Puget Sound Total	**403**	**85**	**81**	**28**	**19**	**1**	**8**	**625**
Port Townsend	18	1	2	1	1	-	-	23
Quilcene	2	-	-	-	-	-	-	2
Sequim	10	-	-	-	-	-	-	10
Port Angeles	36	17	4	-	1	-	-	58
Neah Bay	2	2	1	-	-	-	-	5
La Push	4	4	2	-	-	-	-	10
North WA Coast Total	**72**	**24**	**9**	**1**	**2**	**0**	**0**	**108**
Copalis	-	4	6	-	-	-	-	10
Aberdeen	2	-	-	-	-	-	-	2
Westport (WA)	56	53	41	16	12	-	-	178
Central WA Coast Total	**58**	**57**	**47**	**16**	**12**	**0**	**0**	**190**
Tokeland	50	2	2	1	2	-	-	57
Ilwaco	69	36	27	16	15	-	-	163
Pacific County	45	-	1	-	-	-	1	47
Columbia River	173	-	-	-	-	-	-	173
South WA Coast Total	**337**	**38**	**30**	**17**	**17**	**0**	**1**	**440**
Astoria	37	55	20	25	24	-	3	164
Gearhart-Seaside	2	-	-	-	-	-	-	2
Cannon Beach	2	-	-	-	-	-	-	2
Nehalem Bay	2	-	-	-	-	-	-	2
Garibaldi (Tillamook)	57	11	3	-	-	-	-	71
Pacific City	21	-	-	-	-	-	-	21
Astoria-Tillamook Total	**121**	**66**	**23**	**25**	**24**	**0**	**3**	**262**
Depoe Bay	9	3	-	-	-	-	-	12
Newport	103	89	36	20	19	-	-	267
Waldport	6	-	-	-	-	-	-	6
Newport Total	**118**	**92**	**36**	**20**	**19**	**0**	**0**	**285**
Florence	22	5	3	-	-	-	-	30
Winchester	28	1	4	1	1	-	-	35
Charleston (Coos Bay)	72	36	11	14	12	-	1	146
Bandon	7	-	1	-	-	-	-	8
Coos Bay Total								
Port Orford	67	-	-	-	-	-	-	67
Gold Beach	23	-	-	-	-	-	-	23
Brookings	56	10	3	1	1	-	-	71
Brookings Total								
Crescent City	**70**	**35**	**22**	**6**	**8**	**-**	**-**	**141**
Orick	12	-	-	-	-	-	-	12
Trinidad	26	-	-	-	-	-	1	27
Eureka Area	36	24	11	5	1	1	-	78
Fields Landing	4	1	2	1	6	-	-	14
Eureka Total	**78**	**25**	**13**	**6**	**7**	**1**	**1**	**131**

TABLE 8-5. Number of vessels by port by length class in 2001.[a/] (Page 2 of 2)

	Vessel Length Category							
	<40'	40'-50'	50'-60'	60'-70'	70'-150'	>150'	Unspecified	Total
Fort Bragg	95	18	9	5	2	-	1	130
Albion	17	-	-	-	-	-	-	17
Point Arena	19	-	-	-	-	-	-	19
Fort Bragg Total	**131**	**18**	**9**	**5**	**2**	**0**	**1**	**166**
Bodega Bay	138	24	6	2	1	-	-	171
Cloverdale	24	-	-	-	-	-	-	24
Yountville	14	-	-	-	-	-	1	15
Tomales Bay	1	-	-	-	-	-	-	1
Point Reyes	8	2	-	-	-	-	-	10
Sausilito	50	3	-	-	-	-	-	53
Bodega Bay Total	**235**	**29**	**6**	**2**	**1**	**-**	**1**	**274**
Oakland	1	-	-	-	-	-	-	1
Alameda	3	-	-	-	-	-	-	3
Berkeley	15	-	-	-	-	-	-	15
Richmond	9	-	-	-	1	-	-	10
San Francisco	120	23	5	4	3	-	-	155
Princeton	96	28	7	2	-	-	2	135
San Francisco Total	**479**	**80**	**18**	**8**	**5**	**0**	**3**	**593**
Gilroy	8	-	1	-	-	-	1	10
Santa Cruz	41	5	-	-	-	-	-	46
Moss Landing	90	20	16	4	2	-	-	132
Monterey	76	1	1	-	1	-	2	81
Monterey Total	**215**	**26**	**18**	**4**	**3**	**0**	**3**	**269**
San Simeon	6	-	-	-	-	-	-	6
Morro Bay	93	14	8	6	1	-	-	122
Avila	63	8	3	3	1	-	-	78
Morro Bay Total	**162**	**22**	**11**	**9**	**2**	**0**	**0**	**206**
Santa Barbara	118	14	1	1	1	-	1	136
Santa Cruz Island	1	-	-	-	-	-	-	1
Ventura	27	10	5	-	1	-	-	43
Oxnard	59	5	-	-	-	-	-	64
Port Hueneme	-	6	18	4	3	-	-	31
Santa Barbara Total	**205**	**35**	**24**	**5**	**5**	**0**	**1**	**275**
Terminal Island	70	19	2	1	34	-	-	126
San Pedro	64	11	14	9	14	-	-	112
Willmington	2	-	-	-	-	-	-	2
Catalina Island	40	-	-	1	-	-	-	41
Long Beach	5	1	-	-	-	-	-	6
Newport Beach	17	1	-	-	-	-	-	18
Dana Point	30	3	-	-	-	-	-	33
Los Angeles Total	**228**	**35**	**16**	**11**	**48**	**0**	**0**	**338**
North Shore	45	2	1	-	1	-	-	49
San Diego	41	16	4	1	3	-	-	65
Oceanside	21	3	-	-	2	-	-	26
San Diego Total	**107**	**21**	**5**	**1**	**6**	**0**	**0**	**140**
Other California	9	1	-	-	-	-	-	10
At-Sea Only	**-**	**-**	**-**	**-**	**15**	**-**	**6**	**21**
Grand Totals	**3,068**	**712**	**384**	**178**	**208**	**2**	**28**	**4,580**

NOTE: Does not include at-sea deliveries by catcher-processor. Include deliveries to motherships. Vessels delivering to motherships with other deliveries to shorebased processors were assigned to a port based on their shore based landings. Source: Derived from PacFIN monthly vessel summary files.

a/ Actual period is November 2000 through October 2001.

TABLE 8-6. Number of processors/buyers by primary port in 2001. [a/] (Page 1 of 5)

	Processors/Buyers Buying from Vessels with Limited Entry Trawl Permits						Processors/Buyers Buying from Vessels with Fixed Gear Limited Entry Permits (No Trawl Permit)					Processors/Buyers Buying from Open Access Vessels with More than 5% Revenue from Groundfish					Processors/Buyers Buying from Open Access Vessels with Less than 5% Revenue from Groundfish						Processors/Buyers Buying from Vessels Participating in Other Fisheries							
	Whit-ing	Sable-fish	Near-shore spp	Shelf spp	Slope spp	Total	Sable-fish	Near-shore spp	Shelf spp	Slope spp	Total	Sable-fish	Near-shore spp	Shelf spp	Slope spp	Total	Sable-fish	Near-shore spp	Shelf spp	Slope spp	Total	Total GF	Hal. (Pac & CA)	Shrimp/ Prawns	Crabs	Sal-mon	HMS	CPS	Other	Total
Blaine	1	1	1	2	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	1	-	-	1	5	5
Bellingham	1	1	1	3	1	3	2	1	2	2	2	-	-	-	-	-	1	-	1	1	1	4	2	-	9	-	1	1	40	40
Point Roberts	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	8	8
Friday Harbor	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	8
Anacortes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	14	14
LaConner	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	14	14
Everett	-	-	-	-	-	-	1	-	1	1	1	-	-	-	-	-	-	-	-	-	-	1	1	-	1	1	-	-	11	11
Seattle	-	-	-	-	-	-	1	-	-	1	1	-	-	1	-	1	-	-	1	-	1	2	2	-	7	2	9	-	32	39
Tacoma	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	25	26
Olympia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	1	-	-	9	10
Shelton	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	12	12
Centralia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	8	9
Puget Sound Total	**2**	**2**	**2**	**5**	**2**	**5**	**4**	**1**	**3**	**4**	**4**	**0**	**0**	**1**	**0**	**1**	**1**	**0**	**2**	**1**	**2**	**9**	**5**	**0**	**23**	**8**	**11**	**3**	**186**	**196**
Port Townsend	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	13	13
Quilcene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15	15
Sequim	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	5	5
Port Angeles	-	1	-	2	1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	1	5	2	-	28	29
Neah Bay	-	7	6	7	7	7	1	-	-	1	1	1	-	1	-	2	-	-	-	-	-	7	4	-	-	3	-	-	7	8
La Push	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-	-	1	1	1	1	2	-	1	1	2	-	3	4
Quillayute	-	1	-	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	1	2	1	-	2	4
North Washington Coast Total	**0**	**10**	**7**	**11**	**10**	**12**	**2**	**1**	**1**	**2**	**2**	**2**	**1**	**2**	**1**	**3**	**0**	**0**	**1**	**1**	**1**	**12**	**7**	**0**	**5**	**11**	**6**	**0**	**73**	**78**
Copalis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	1	2
Aberdeen	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	1	3	1	-	2	5
Westport (WA)	1	2	1	2	2	2	4	-	2	3	4	2	-	2	1	3	1	-	5	1	5	6	5	1	16	10	10	3	10	22
Central WA Coast Total	**1**	**2**	**1**	**2**	**2**	**2**	**4**	**0**	**2**	**3**	**4**	**2**	**0**	**2**	**1**	**3**	**1**	**0**	**5**	**1**	**5**	**6**	**6**	**1**	**18**	**13**	**11**	**3**	**13**	**29**

TABLE 8-6. Number of processors/buyers by primary port in 2001. [a/] (Page 2 of 5)

	Processors/Buyers Buying from Vessels with Limited Entry Trawl Permits						Processors/Buyers Buying from Vessels with Fixed Gear Limited Entry Permits (No Trawl Permit)					Processors/Buyers Buying from Open Access Vessels with More than 5% Revenue from Groundfish					Processors/Buyers Buying from Open Access Vessels with Less than 5% Revenue from Groundfish						Processors/Buyers Buying from Vessels Participating in Other Fisheries							
	Whit-ing	Sabl e-fish	Nea r-shor e spp	Shelf spp	Slop e spp	Total	Sabl e-fish	Near-shore spp	Shel f spp	Slope spp	Tot al	Sabl e-fish	Nea r-shor e spp	Shelf spp	Slop e spp	Total	Sabl e-fish	Nea r-shor e spp	Shelf spp	Slop e spp	Total	Total GF	Hal. (Pac & CA)	Shrim p/ Prawn s	Crab s	Sal-mon	HM S	CPS	Othe r	Total
Tokeland	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	2	-	3	3	3	3	1	2	10	-	1	-	14	17
Ilwaco	1	2	2	2	2	2	1	1	1	1	2	1	-	1	1	1	2	1	4	2	4	5	8	2	7	5	9	2	16	19
Pacific County	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	1	-	1	21	22
Columbia River	-	-	-	-	-	-	-	-	-	-	-	-	2	2	-	2	-	1	1	1	1	2	1	-	-	2	1	-	23	23
South WA Coast Total	**1**	**2**	**2**	**2**	**2**	**2**	**1**	**1**	**1**	**1**	**2**	**1**	**2**	**4**	**1**	**4**	**4**	**2**	**8**	**6**	**8**	**10**	**10**	**4**	**19**	**8**	**11**	**3**	**74**	**81**
Astoria	2	4	3	5	5	5	6	2	3	4	6	2	5	5	3	5	4	2	5	4	6	8	8	4	9	9	6	7	8	19
Gearhart-Seaside	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	2	-	-	-	2
Cannon Beach	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1
Nehalem Bay	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	1
Garibaldi (Tillamook)	-	1	2	1	1	2	2	1	2	-	2	-	3	4	-	4	1	4	6	-	6	9	10	1	9	10	5	-	10	25
Netarts	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	2	-	-	-	-	2
Pacific City	-	-	-	-	-	-	-	-	-	-	-	-	3	3	-	3	-	-	-	-	-	3	1	-	3	3	3	-	1	5
Astoria-Tillamook Total	**2**	**5**	**5**	**6**	**6**	**7**	**8**	**3**	**5**	**4**	**8**	**2**	**11**	**12**	**3**	**12**	**5**	**6**	**11**	**4**	**12**	**20**	**19**	**5**	**24**	**25**	**14**	**7**	**20**	**55**
Siletz Bay	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	1	-	-	-	-	1
Depoe Bay	-	-	-	-	-	-	-	-	-	-	-	-	2	2	-	2	1	1	1	-	2	2	2	-	3	2	1	-	2	3
Newport	4	7	5	7	7	9	6	6	8	4	11	4	6	11	2	12	5	5	15	3	16	24	25	3	25	44	33	4	9	63
Waldport	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	1	-	-	-	-	-	1	-	-	6	1	1	-	1	6
Newport Total	**4**	**7**	**5**	**7**	**7**	**9**	**6**	**6**	**8**	**4**	**11**	**4**	**9**	**14**	**2**	**15**	**6**	**6**	**16**	**3**	**18**	**27**	**27**	**3**	**35**	**47**	**35**	**4**	**12**	**73**
Florence	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	4	4	2	-	7	10	7	-	-	15
Winchester	-	-	-	-	-	-	-	-	2	-	2	-	-	-	-	-	-	2	2	-	2	3	4	-	6	5	12	1	3	16
Charleston (Coos Bay)	1	2	3	4	4	5	3	-	2	1	4	2	2	4	1	4	2	5	7	2	7	9	6	2	7	17	25	1	7	33
Bandon	-	-	-	1	-	1	-	-	-	-	-	-	2	2	1	2	-	1	1	1	1	2	1	-	3	7	5	-	1	10
Coos Bay Total	**1**	**2**	**3**	**5**	**4**	**6**	**3**	**0**	**4**	**1**	**6**	**2**	**4**	**6**	**2**	**6**	**2**	**8**	**14**	**3**	**14**	**18**	**13**	**2**	**23**	**39**	**49**	**2**	**11**	**74**

TABLE 8-6. Number of processors/buyers by primary port in 2001. [a/] (Page 3 of 5)

	Processors/Buyers Buying from Vessels with Limited Entry Trawl Permits						Processors/Buyers Buying from Vessels with Fixed Gear Limited Entry Permits (No Trawl Permit)					Processors/Buyers Buying from Open Access Vessels with More than 5% Revenue from Groundfish					Processors/Buyers Buying from Open Access Vessels with Less than 5% Revenue from Groundfish						Processors/Buyers Buying from Vessels Participating in Other Fisheries							
	Whit-ing	Sable-fish	Near-shore spp	Shelf spp	Slope spp	Total	Sable-fish	Near-shore spp	Shelf spp	Slope spp	Total	Sable-fish	Near-shore spp	Shelf spp	Slope spp	Total	Sable-fish	Near-shore spp	Shelf spp	Slope spp	Total	Total GF	Hal. (Pac & CA)	Shrimp/Prawns	Crabs	Sal-mon	HMS	CPS	Other	Total
Port Orford	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	1	-	-	1
Gold Beach	-	-	1	1	-	1	1	1	1	1	1	1	1	1	1	1	-	1	1	1	1	1	1	-	1	1	1	-	1	1
Brookings	1	4	2	3	4	4	2	2	3	1	4	1	8	7	5	8	1	3	3	1	3	10	1	3	8	9	12	1	7	16
Brookings Total	**1**	**4**	**3**	**4**	**4**	**5**	**3**	**3**	**4**	**2**	**5**	**2**	**9**	**8**	**6**	**9**	**1**	**4**	**4**	**2**	**4**	**11**	**3**	**3**	**10**	**10**	**14**	**1**	**8**	**18**
Crescent City	**2**	**4**	**3**	**5**	**4**	**5**	**4**	**6**	**8**	**4**	**8**	**4**	**13**	**14**	**7**	**15**	**3**	**3**	**7**	**3**	**7**	**17**	**3**	**7**	**20**	**7**	**13**	**5**	**11**	**31**
Orick	-	-	-	-	-	-	-	-	-	-	-	-	4	4	1	4	-	-	-	-	-	4	1	-	1	3	1	-	-	4
Trinidad	-	-	-	1	-	1	-	-	-	-	-	-	4	4	-	4	-	-	-	-	-	4	-	1	5	1	2	-	1	7
Eureka Area	-	1	-	2	2	2	2	4	4	2	4	3	4	4	3	4	1	2	1	-	2	5	-	2	10	7	6	-	6	21
Eureka Total	**0**	**1**	**0**	**3**	**2**	**3**	**2**	**4**	**4**	**2**	**4**	**3**	**12**	**12**	**4**	**12**	**1**	**2**	**1**	**0**	**2**	**13**	**1**	**3**	**16**	**11**	**9**	**0**	**7**	**32**
Fort Bragg	-	-	1	-	1	2	1	1	1	1	1	1	9	9	3	10	-	3	2	1	3	11	-	-	5	7	12	-	7	22
Albion	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	1
Point Arena	-	-	-	-	-	-	-	-	1	-	1	1	1	-	-	1	-	1	3	1	3	3	-	1	2	6	2	-	1	6
Elk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	1	1
Fort Bragg Total	**0**	**0**	**1**	**0**	**1**	**2**	**1**	**1**	**3**	**1**	**3**	**2**	**10**	**9**	**3**	**11**	**0**	**4**	**5**	**2**	**6**	**15**	**0**	**1**	**8**	**13**	**14**	**0**	**9**	**30**
Bodega Bay	-	2	2	2	2	2	1	1	4	3	4	1	10	13	6	14	-	3	6	2	6	18	5	2	10	24	10	1	10	44
Cloverdale	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	2	2	-	3	3	3	-	4	4	2	-	4	8
Yountville	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	1	2	1	1	-	3	4	1	-	6	2	-	1	11	13
Tomales Bay	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		1	-	-	1	-	-	-	1
Point Reyes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	1	-	-	-	1
Sausilito	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	2	2	2	-	2	6	3	-	5	9
Bodega Bay Total	**-**	**2**	**2**	**2**	**2**	**2**	**1**	**2**	**4**	**3**	**5**	**1**	**11**	**14**	**6**	**15**	**2**	**6**	**11**	**2**	**14**	**27**	**13**	**2**	**23**	**38**	**15**	**2**	**30**	**76**
Alameda	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	1	-	-	1	2	-	-	1	3
Berkeley	-	-	-	-	-	-	-	-	-	-	-	-	3	3	1	4	-	-	-	1	1	5	2	-	1	3	1	-	1	6
Richmond	-	-	-	-	-	-	1	1	1	1	1	1	1	2	2	3	-	1	1	1	1	3	2	1	1	5	1	1	2	8
San Francisco	-	3	4	5	5	6	2	11	12	4	13	5	20	19	12	24	-	6	5	1	8	31	14	6	11	13	6	2	34	48
Princeton	1	5	6	5	5	6	1	5	5	2	7	4	20	19	5	23	1	5	3	1	6	29	13	2	30	30	19	6	18	59
San Francisco Total	**1**	**8**	**10**	**10**	**10**	**12**	**4**	**17**	**18**	**7**	**21**	**10**	**45**	**43**	**20**	**55**	**1**	**12**	**9**	**4**	**16**	**69**	**31**	**9**	**44**	**53**	**27**	**9**	**56**	**124**

TABLE 8-6. Number of processors/buyers by primary port in 2001. [a/] (Page 4 of 5)

	Processors/Buyers Buying from Vessels with Limited Entry Trawl Permits						Processors/Buyers Buying from Vessels with Fixed Gear Limited Entry Permits (No Trawl Permit)					Processors/Buyers Buying from Open Access Vessels with More than 5% Revenue from Groundfish					Processors/Buyers Buying from Open Access Vessels with Less than 5% Revenue from Groundfish						Processors/Buyers Buying from Vessels Participating in Other Fisheries							
	Whit-ing	Sabl e-fish	Nea r-shor e spp	Shelf spp	Slop e spp	Total	Sabl e-fish	Near-shore spp	Shel f spp	Slope spp	Tot al	Sabl e-fish	Nea r-shor e spp	Shelf spp	Slop e spp	Total	Sabl e-fish	Nea r-shor e spp	Shelf spp	Slop e spp	Total	Total GF	Hal. (Pac & CA)	Shrim p/ Prawn s	Crab s	Sal-mon	HM S	CPS	Othe r	Total
Gilroy	-	-	-	-	-	-	-	-	-	-	-	-	3	3	-	3	-	-	-	-	-	3	-	-	-	-	-	-	2	3
Santa Cruz	-	4	5	5	4	5	1	1	1	2	2	4	12	9	6	12	1	5	4	-	6	14	12	-	9	14	12	4	9	24
Moss Landing	1	2	1	2	2	2	4	4	4	6	8	3	8	6	6	9	2	2	3	3	7	14	11	4	6	20	15	2	7	30
Monterey	1	1	2	2	1	2	-	1	-	1	1	1	7	7	3	7	3	3	3	2	7	10	4	4	3	5	4	3	8	13
Monterey Total	**2**	**7**	**8**	**9**	**7**	**9**	**5**	**6**	**5**	**9**	**11**	**8**	**30**	**25**	**15**	**31**	**6**	**10**	**10**	**5**	**20**	**41**	**27**	**8**	**18**	**39**	**31**	**9**	**26**	**70**
San Simeon	-	-	-	-	-	-	-	-	-	-	-	-	2	2	-	2	-	-	-	-	-	2	-	-	-	1	-	1	2	2
Morro Bay	-	3	1	4	4	4	2	1	1	2	2	2	7	4	4	8	1	5	6	3	7	11	7	3	6	8	17	3	8	21
Avila	-	1	2	1	-	2	-	1	2	-	2	-	7	7	1	7	-	3	2	-	4	9	4	1	3	2	6	1	7	12
Morro Bay Total	**0**	**4**	**3**	**5**	**4**	**6**	**2**	**2**	**3**	**2**	**4**	**2**	**16**	**13**	**5**	**17**	**1**	**8**	**8**	**3**	**11**	**22**	**11**	**4**	**9**	**11**	**23**	**5**	**17**	**35**
Santa Barbara	-	1	1	2	1	2	-	-	-	-	-	-	4	4	2	4	1	9	7	5	13	17	13	14	20	3	7	8	25	37
Ventura	-	1	1	1	1	1	4	2	3	4	4	2	11	9	9	12	1	12	9	10	14	17	13	11	21	-	12	7	18	27
Oxnard	-	-	-	-	-	-	7	6	6	7	11	2	10	7	6	11	-	8	7	7	11	16	10	7	16	-	11	3	16	27
Port Hueneme	1	1	1	1	1	1	1	-	1	1	1	1	2	2	1	2	-	2	1	1	2	2	3	2	2	2	3	8	3	8
Santa Barbara Total	**1**	**3**	**3**	**4**	**3**	**4**	**12**	**8**	**10**	**12**	**16**	**5**	**27**	**22**	**18**	**29**	**2**	**31**	**24**	**23**	**40**	**52**	**39**	**34**	**59**	**5**	**33**	**26**	**62**	**99**
Terminal Island	-	-	-	-	-	-	-	-	-	-	-	2	9	3	4	9	2	3	4	2	4	10	6	3	9	-	7	10	23	31
San Pedro	-	-	-	-	-	-	2	3	2	2	4	1	5	4	3	6	-	9	7	3	10	14	9	-	12	2	21	10	26	34
Willmington	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	1
Catalina Island	-	-	-	-	-	-	2	2	2	2	3	1	5	3	3	7	-	5	1	-	5	10	5	4	10	-	7	4	14	17
Long Beach	-	-	-	-	-	-	-	-	-	-	-	-	2	1	1	2	1	1	-	1	1	2	2	1	3	-	-	2	4	4
Newport Beach	-	-	-	-	-	-	2	2	2	2	2	1	1	1	1	1	1	4	1	-	5	5	4	5	10	-	4	3	7	12
Dana Point	-	-	-	-	-	-	1	-	-	1	1	1	3	3	2	3	-	1	-	-	1	3	1	2	10	-	4	1	6	13
Los Angeles Total	**0**	**0**	**0**	**0**	**0**	**0**	**7**	**7**	**6**	**7**	**10**	**6**	**25**	**15**	**14**	**28**	**4**	**23**	**13**	**6**	**26**	**44**	**27**	**15**	**55**	**2**	**43**	**30**	**81**	**112**
North Shore	-	-	-	-	-	-	-	-	-	-	-	1	4	7	5	8	2	6	8	5	9	11	6	4	12	2	8	5	10	16
San Diego	-	-	-	-	-	-	-	2	1	-	2	-	6	5	3	7	1	4	4	2	5	10	2	1	18	-	12	6	15	23
Oceanside	-	-	-	-	-	-	-	1	-	-	1	-	3	2	2	4	-	4	1	2	4	5	2	1	5	1	3	2	4	8
San Diego Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**1**	**0**	**3**	**1**	**13**	**14**	**10**	**19**	**3**	**14**	**13**	**9**	**18**	**26**	**10**	**6**	**35**	**3**	**23**	**13**	**29**	**47**

TABLE 8-6. Number of processors/buyers by primary port in 2001. [a/] (Page 5 of 5)

	Processors/Buyers Buying from Vessels with Limited Entry Trawl Permits						Processors/Buyers Buying from Vessels with Fixed Gear Limited Entry Permits (No Trawl Permit)					Processors/Buyers Buying from Open Access Vessels with More than 5% Revenue from Groundfish					Processors/Buyers Buying from Open Access Vessels with Less than 5% Revenue from Groundfish						Processors/Buyers Buying from Vessels Participating in Other Fisheries							
	Whit-ing	Sable-fish	Near-shore spp	Shelf spp	Slope spp	Total	Sable-fish	Near-shore spp	Shelf spp	Slope spp	Total	Sable-fish	Near-shore spp	Shelf spp	Slope spp	Total	Sable-fish	Near-shore spp	Shelf spp	Slope spp	Total	Total GF	Hal. (Pac & CA)	Shrimp/ Prawns	Crabs	Sal-mon	HMS	CPS	Other	Total
Other California	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	7	10
At-Sea Only	**12**	**11**	**1**	**12**	**12**	**12**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**12**	**8**	**-**	**1**	**11**	**6**	**12**	**13**	**13**
Grand Totals	**30**	**74**	**59**	**92**	**82**	**103**	**69**	**71**	**90**	**68**	**127**	**57**	**238**	**230**	**118**	**285**	**43**	**139**	**162**	**78**	**224**	**451**	**260**	**107**	**448**	**354**	**388**	**134**	**745**	**1,283**

Source: Derived from PacFIN monthly vessel summary files.
a/ Actual period is November 2000 through October 2001.

TABLE 8-7. Number of buyers/processors by purchase value of raw product (exvessel value) in 2001.[a/] (Page 1 of 1)

	Level of Purchases in Exvessel Value						
	<$5,000	$5,000-$20,000	$20,000-$100,000	$100,000-$300,000	$300,000-$1,000,000	>$1,000,000	Total
Puget Sound	51	40	52	18	19	16	196
North Washington Coast	35	14	15	6	4	4	78
Central WA Coast	9	6	6	1	2	5	29
South WA Coast	31	25	15	4	3	3	81
Astoria - Tillamook	25	8	10	1	7	4	55
Newport	34	17	14	1	3	4	73
Coos Bay	36	26	5	5	0	0	74
Brookings	4	3	6	1	0	0	18
Crescent City	11	11	1	1	3	4	31
Eureka	17	9	3	3	0	0	32
Fort Bragg	16	6	4	0	0	0	30
Bodega Bay - San Francisco	104	39	28	13	13	3	200
Monterey	40	12	8	6	2	2	70
Morro Bay	16	9	4	2	2	2	35
Santa Barbara	32	19	21	15	8	4	99
Los Angeles	37	17	23	16	10	10	113
San Diego	13	10	11	9	0	0	47
At-Sea Only	0	-	-	0	0	0	13
Total	492	254	223	100	76	60	1,283

NOTE: "*" = Values omitted to preserve confidentiality.

a/ Actual period is November 2000 through October 2001.

TABLE 8-8a. Income and employment from commercial fishing activities by port group in 2001.[a/] (Page 1 of 1)

Port Group Area	All Commercial Fishery: Commercial Fishery-Related Income ($,000)	Fishery-Related Income as a share of Total Personal Income (Percent)	(Rank)	Commercial Fishery-Related Employment	Fishery-Related Employment as a share of Total Employment (Percent)	(Rank)	All Groundfish: Income ($,000)	Employ.	Groundfish-Related Income as a share of Total Fishery Income (Percent)	(Rank)
Puget Sound	14,344	0.01%	17	531	0.03%	16	8,694	322	60.61%	1
North WA Coast	8,262	0.36%	9	357	1.14%	8	4,865	210	58.89%	2
Central WA Coast	29,858	2.03%	5	1,091	4.26%	6	7,442	272	24.93%	10
South WA Coast	21,053	4.78%	1	957	14.24%	1	1,557	71	7.39%	14
Astoria/Tillamook	46,402	3.29%	4	1,959	7.72%	4	24,122	1,019	51.98%	3
Newport	45,709	4.27%	2	1,968	10.76%	2	22,122	952	48.40%	5
Coos Bay	23,476	0.20%	11	948	0.44%	11	9,266	374	39.47%	7
Brookings	8,792	1.77%	6	400	5.76%	5	3,754	171	42.70%	6
Crescent City	19,111	3.90%	3	773	9.43%	3	6,246	253	32.68%	9
Eureka	14,729	0.50%	8	591	1.11%	9	7,501	301	50.93%	4
Fort Bragg	15,740	0.73%	7	650	1.82%	7	6,183	255	39.28%	8
Bodega Bay/ San Francisco	39,330	0.02%	15	1,205	0.04%	15	5,744	176	14.60%	13
Monterey	34,174	0.16%	12	1,146	0.39%	12	5,091	171	14.90%	12
Morro Bay	10,348	0.16%	13	374	0.36%	13	2,482	90	23.99%	11
Santa Barbara	98,377	0.26%	10	3,075	0.78%	10	1,396	44	1.42%	16
Los Angeles	149,075	0.04%	14	3,840	0.06%	14	1,148	30	0.77%	17
San Diego	13,431	0.01%	16	367	0.03%	17	625	17	4.65%	15
TOTAL	592,209	0.06%		20,230	0.15%		118,239	4,726	19.97%	

Note: Includes total income and employment impacts: wages and salaries paid to primary producers, processors and suppliers, and the additional income and employment generated when wages and salaries are spent (PFMC FEAM 9/02).

a/ Actual period is November 2000 through October 2001.

TABLE 8-8b. Income and employment from commercial fishing activities by port group in 2001.[a/] (Page 1 of 1)

Port Group Area	Groundfish Limited Entry Trawl: Income ($,000)	Employ.	Limited Entry Groundfish Trawl-Related Income as a share of Fishery Income (Percent)	(Rank)	Other Groundfish Gear: Income ($,000)	Employ.	Other Groundfish-Related Income as a share of Fishery Income (Percent)	(Rank)
Puget Sound	6,558	243	45.72%	2	2,136	79	14.89%	3
North WA Coast	1,318	57	15.96%	10	3,547	153	42.93%	1
Central WA Coast	6,558	240	21.96%	9	885	32	2.96%	14
South WA Coast	1,377	63	6.54%	14	180	8	0.85%	16
Astoria/Tillamook	22,338	943	48.14%	1	1,784	75	3.85%	13
Newport	19,991	861	43.74%	3	2,132	92	4.66%	10
Coos Bay	7,718	312	32.88%	5	1,548	63	6.59%	8
Brookings	1,985	90	22.58%	8	1,769	80	20.12%	2
Crescent City	5,019	203	26.26%	7	1,227	50	6.42%	9
Eureka	6,437	258	43.70%	4	1,064	43	7.23%	7
Fort Bragg	4,503	186	28.61%	6	1,680	69	10.68%	5
Bodega Bay/San Francisco	4,176	128	10.62%	11	1,569	48	3.99%	12
Monterey	2,579	86	7.55%	13	2,512	84	7.35%	6
Morro Bay	1,095	40	10.58%	12	1,388	50	13.41%	4
Santa Barbara	9	0	0.01%	16	1,387	43	1.41%	15
Los Angeles	1	0	0.00%	17	1,147	30	0.77%	17
San Diego	4	0	0.03%	15	621	17	4.62%	11
TOTAL	91,664	3,709	15.48%		26,575	1,017	4.49%	

Note: Includes total income and employment impacts: wages and salaries paid to primary producers, processors and suppliers, and the additional income and employment generated when wages and salaries are spent (PFMC FEAM 9/02).

a/ Actual period is November 2000 through October 2001.

TABLE 8-9. Effort, personal income, and jobs related to the West Coast recreational ocean fisheries in 2001. (Page 1 of 1)

Area		Angler Trips (1,000s) Charter	Angler Trips (1,000s) Private	Angler Trips (1,000s) Total	Coastal Community Income Impacts for the Recreational Fishery ($1,000s) Charter	Coastal Community Income Impacts for the Recreational Fishery ($1,000s) Private	Coastal Community Income Impacts for the Recreational Fishery ($1,000s) Total	Total Jobs
Washington Coast	Total	59	88	147	$5,335	$3,285	$8,620	392
	Groundfish	12	10	23	$1,134	$385	$1,519	69
Oregon	Total	70	140	211	$6,382	$4,911	$11,293	514
	Groundfish	47	22	69	$4,227	$783	$5,011	228
North/Central California[a/]	Total	221	901	1,122	$27,294	$54,172	$81,466	3,363
	Groundfish	141	164	305	$17,414	$9,860	$27,274	1,126
Southern California[b/]	Total	577	1,757	2,334	$72,321	$81,023	$153,345	5,536
	Groundfish	204	252	456	$25,569	$11,621	$37,190	1,343
California Total	Total	798	2,658	3,456	$99,616	$135,195	$234,811	8,899
	Groundfish	345	416	761	$43,983	$21,481	$64,465	2,468
Grand Total	Total	927	2,886	3,813	$111,332	$143,392	$254,724	9,823
	Groundfish	404	449	853	$48,345	$22,649	$70,994	2,765

a/ Includes counties from Monterey north.
b/ Includes counties from San Luis Obispo south.

TABLE 8-10. Urban, rural, and rural farm and non-farm population by state, port group, county, and port. (Source: U.S. Census, 2000, Summary File 3, Table P5.) (Page 1 of 4)

	Total Population		Urban		Rural		Farm		Non-Farm	
State-Port Group-County-Port	Place	BG equiv	Place	BG equiv	Place	BG equiv	Place	BG equiv	Place	BG equiv
Washington	5,894,121		81.99%		18.01%		0.77%		17.24%	
Puget Sound	**986,634**	**1,094,327**	**99.66%**	**97.18%**	**0.34%**	**2.82%**	**0.00%**	**0.05%**	**0.34%**	**2.77%**
Whatcom	166,814		67.74%		32.26%		1.42%		30.83%	
Blaine	3,713	8,757	94.86%	76.21%	5.14%	23.79%	0.00%	0.00%	5.14%	23.79%
Bellingham Bay	66,815	84,788	99.48%	91.96%	0.52%	8.04%	0.00%	0.09%	0.52%	7.95%
San Juan	14,077		0.00%		100.00%		3.13%		96.87%	
Friday Harbor	2,008	6,894	0.00%	0.00%	100.00%	100.00%	0.00%	2.15%	100.00%	97.85%
Skagit	102,979		67.06%		32.94%		1.24%		31.70%	
Anacortes	14,707	21,610	95.78%	79.18%	4.22%	20.82%	0.16%	0.26%	4.07%	20.56%
La Conner	782	1,407	99.36%	55.22%	0.64%	44.78%	0.00%	6.11%	0.64%	38.66%
Snohomish	606,024		89.01%		10.99%		0.26%		10.73%	
Everett	91,290	131,885	99.94%	99.15%	0.06%	0.85%	0.00%	0.09%	0.06%	0.76%
King	1,737,034		96.26%		3.74%		0.07%		3.67%	
Seattle	563,375	563,247	100.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Pierce	700,820		92.15%		7.85%		0.15%		7.70%	
Tacoma	193,177	175,882	99.93%	100.00%	0.07%	0.00%	0.00%	0.00%	0.07%	0.00%
Thurston	207,355		75.34%		24.66%		0.70%		23.96%	
Olympia	42,345	80,443	100.00%	97.88%	0.00%	2.12%	0.00%	0.04%	0.00%	2.07%
Mason	49,405		25.32%		74.68%		0.92%		73.77%	
Shelton	8,422	19,414	100.00%	63.36%	0.00%	36.64%	0.00%	0.30%	0.00%	36.34%
North Washington Coast	**34,950**	**58,855**	**94.59%**	**63.07%**	**5.41%**	**36.93%**	**0.00%**	**0.41%**	**5.41%**	**36.52%**
Jefferson	25,953		44.80%		55.20%		0.94%		54.26%	
Port Townsend	8,325	11,549	93.42%	67.96%	6.58%	32.04%	0.00%	0.48%	6.58%	31.55%
Clallam			52.24%		47.76%		0.64%		47.12%	
Sequim	4,323	16,710	92.53%	46.77%	7.47%	53.23%	0.00%	0.66%	7.47%	52.57%
Port Angeles	18,472	27,992	99.16%	76.65%	0.84%	23.35%	0.00%	0.19%	0.84%	23.16%
Port Angeles E	3,050		97.25%		2.75%		0.00%		2.75%	
Neah Bay	780	1,356	0.00%	0.00%	100.00%	100.00%	0.00%	0.00%	100.00%	100.00%
La Push		1,248		0.00%		100.00%		2.08%		97.92%
South & Central WA Coast	**3,587**	**39,574**	**21.38%**	**60.52%**	**78.62%**	**39.48%**	**0.00%**	**0.50%**	**78.62%**	**38.98%**
Grays Harbor	67,194		60.60%		39.40%		0.90%		38.49%	
Copalis Beach	448	1,597	0.00%	0.00%	100.00%	100.00%	0.00%	0.00%	100.00%	100.00%
Grays Harbor		18,921		79.33%		20.67%		0.45%		20.22%
Westport	2,165	2,802	0.00%	0.00%	100.00%	100.00%	0.00%	0.00%	100.00%	100.00%
Pacific	20,984		48.88%		51.12%		1.38%		49.73%	
Willapa Bay		12,667		59.15%		40.85%		0.47%		40.37%
Ilwaco/Chinook	974	3,587	78.75%	40.37%	21.25%	59.63%	0.00%	1.48%	21.25%	58.15%

TABLE 8-10. Urban, rural, and rural farm and non-farm population by state, port group, county, and port. (Source: U.S. Census, 2000, Summary File 3, Table P5.) (Page 2 of 4)

	Total Population		Urban		Rural		Farm		Non-Farm	
State-Port Group-County-Port	Place	BG equiv	Place	BG equiv	Place	BG equiv	Place	BG equiv	Place	BG equiv
Oregon	3,421,399		78.70%		21.30%		1.87%		19.42%	
Astoria	**18,177**	**38,957**	**90.36%**	**71.51%**	**9.64%**	**28.49%**	**0.06%**	**0.53%**	**9.59%**	**27.96%**
Clatsop	35,630		58.92%		41.08%		1.08%		39.99%	
Astoria	9,807	20,648	99.75%	65.43%	0.25%	34.57%	0.00%	0.65%	0.25%	33.92%
Gearhart	948	7,913	90.19%	89.32%	9.81%	10.68%	0.84%	0.35%	8.97%	10.32%
Seaside	5,822	7,913	99.40%	89.32%	0.60%	10.68%	0.00%	0.35%	0.60%	10.32%
Cannon Beach	1,600	2,483	0.00%	8.58%	100.00%	91.42%	0.13%	0.60%	99.88%	90.82%
Tillamook	**6,289**	**19,876**	**69.55%**	**28.51%**	**30.45%**	**71.49%**	**0.32%**	**3.08%**	**30.13%**	**68.41%**
Tillamook	24,262		23.74%		76.26%		3.10%		73.16%	
Nehalem Bay	261	3,076	0.00%	0.00%	100.00%	100.00%	0.00%	1.07%	100.00%	98.93%
Tillamook/Garibaldi	4,374	11,997	100.00%	47.23%	0.00%	52.77%	0.00%	3.28%	0.00%	49.50%
Netarts Bay	705	1,631	0.00%	0.00%	100.00%	100.00%	2.84%	3.37%	97.16%	96.63%
Pacific City	949	3,172	0.00%	0.00%	100.00%	100.00%	0.00%	4.16%	100.00%	95.84%
Newport	**14,553**	**24,335**	**81.04%**	**61.21%**	**18.96%**	**38.79%**	**0.03%**	**0.85%**	**18.93%**	**37.94%**
Lincoln	44,479		61.98%		38.02%		1.12%		36.90%	
Salmon River		1,072		68.38%		31.62%		0.00%		31.62%
Depoe Bay	1,188	1,914	80.05%	84.54%	19.95%	15.46%	0.00%	0.00%	19.95%	15.46%
Siletz Bay	1,174	2,742	0.00%	0.00%	100.00%	100.00%	0.34%	4.27%	99.66%	95.73%
Newport	9,493	11,921	95.46%	78.28%	4.54%	21.72%	0.00%	0.12%	4.54%	21.60%
Waldport	2,054	4,846	86.71%	63.00%	13.29%	37.00%	0.00%	0.62%	13.29%	36.38%
Yachats	644	1,840	0.00%	8.70%	100.00%	91.30%	0.00%	2.50%	100.00%	88.80%
Coos Bay	**26,171**	**56,901**	**97.83%**	**80.44%**	**2.17%**	**19.56%**	**0.00%**	**0.80%**	**2.17%**	**18.76%**
Lane	322,959		80.58%		19.42%		1.13%		18.29%	
Florence	7,318	10,701	100.00%	79.24%	0.00%	20.76%	0.00%	0.33%	0.00%	20.43%
Douglas	100,399		58.11%		41.89%		2.99%		38.90%	
Winchester Bay	530	6,413	45.66%	70.36%	54.34%	29.64%	0.00%	1.39%	54.34%	28.26%
Coos	62,779		62.56%		37.44%		1.41%		36.03%	
Coos Bay	15,443	33,105	99.50%	90.62%	0.50%	9.38%	0.00%	0.12%	0.50%	9.26%
Bandon	2,880	6,682	92.92%	41.63%	7.08%	58.37%	0.00%	4.35%	7.08%	54.01%
Brookings	**8,380**	**20,137**	**64.00%**	**49.18%**	**36.00%**	**50.82%**	**0.00%**	**0.39%**	**36.00%**	**50.43%**
Curry	21,137		46.86%		53.14%		0.76%		52.39%	
Port Orford	1,153	2,055	0.00%	0.00%	100.00%	100.00%	0.00%	0.68%	100.00%	99.32%
Gold Beach	1,864	4,754	0.00%	0.00%	100.00%	100.00%	0.00%	1.11%	100.00%	98.89%
Brookings	5,363	13,328	100.00%	74.31%	0.00%	25.69%	0.00%	0.08%	0.00%	25.61%

TABLE 8-10. Urban, rural, and rural farm and non-farm population by state, port group, county, and port. (Source: U.S. Census, 2000, Summary File 3, Table P5.) (Page 3 of 4)

	Total Population		Urban		Rural		Farm		Non-Farm	
State-Port Group-County-Port	Place	BG equiv	Place	BG equiv	Place	BG equiv	Place	BG equiv	Place	BG equiv
California			94.46%		5.54%		0.33%		5.21%	
Crescent City	**10,054**	**24,472**	**97.04%**	**76.28%**	**2.96%**	**23.72%**	**0.00%**	**0.20%**	**2.96%**	**23.52%**
Del Norte	27,507		67.86%		32.14%		0.18%		31.96%	
Crescent City	3,888	24,472	99.31%	76.28%	0.69%	23.72%	0.00%	0.20%	0.69%	23.52%
Bertsch/Oceanview CDP	2,097		87.08%		12.92%		0.00%		12.92%	
Crescent City North CDP	4,069		100.00%		0.00%		0.00%		0.00%	
Eureka	**26,260**	**52,460**	**98.74%**	**82.48%**	**1.26%**	**17.52%**	**0.00%**	**0.14%**	**1.26%**	**17.38%**
Humboldt	126,518		69.50%		30.50%		1.00%		29.49%	
Trinidad	331	3,316	0.00%	0.00%	100.00%	100.00%	0.00%	0.42%	100.00%	99.58%
Eureka (Includes Fields Landing)	25,929	49,144	100.00%	88.04%	0.00%	11.96%	0.00%	0.13%	0.00%	11.83%
Fort Bragg	**7,514**	**21,237**	**92.60%**	**43.87%**	**7.40%**	**56.13%**	**0.32%**	**1.42%**	**7.08%**	**54.72%**
Mendocino	86,265		54.04%		45.96%		2.03%		43.94%	
Fort Bragg	7,028	13,249	99.00%	70.31%	1.00%	29.69%	0.26%	0.26%	0.74%	29.43%
Albion		4,075		0.00%		100.00%		4.44%		95.56%
Point Arena	486	3,913	0.00%	0.00%	100.00%	100.00%	1.23%	2.20%	98.77%	97.80%
Bodega Bay	**9,901**	**15,952**	**73.98%**	**49.05%**	**26.02%**	**50.95%**	**0.53%**	**5.07%**	**25.49%**	**45.89%**
Sonoma	458,614		85.71%		14.29%		1.01%		13.28%	
Bodega Bay	1,518	3,529	0.00%	1.53%	100.00%	98.47%	0.00%	5.72%	100.00%	92.75%
Marin	247,289		94.18%		5.82%		0.31%		5.51%	
Tomales Bay	210	503	0.00%	0.00%	100.00%	100.00%	4.76%	20.28%	95.24%	79.72%
Point Reyes	848	4,150	0.00%	0.00%	100.00%	100.00%	4.95%	12.14%	95.05%	87.86%
Sausalito	7,325	7,770	100.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
San Francisco	**1,450,928**	**1,484,046**	99.92%	99.67%	0.08%	0.33%	0.00%	0.01%	0.08%	0.32%
San Francisco	776,733		100.00%		0.00%		0.00%		0.00%	
San Francisco	776,733	776,733	100.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Contra Costa	948,816		97.89%		2.11%		0.06%		2.05%	
Richmond	99,716	110,835	99.03%	99.11%	0.97%	0.89%	0.00%	0.00%	0.97%	0.89%
Alameda	1,443,741		99.43%		0.57%		0.02%		0.55%	
Berkeley	102,743	101,711	100.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Oakland	399,477	399,477	99.97%	99.97%	0.03%	0.03%	0.00%	0.00%	0.03%	0.03%
Alameda	72,259	72,259	99.96%	99.96%	0.04%	0.04%	0.00%	0.00%	0.04%	0.04%
San Mateo	707,161		98.63%		1.37%		0.03%		1.34%	
Princeton		23,031		83.84%		16.16%		0.45%		15.70%

TABLE 8-10. Urban, rural, and rural farm and non-farm population by state, port group, county, and port. (Source: U.S. Census, 2000, Summary File 3, Table P5.) (Page 4 of 4)

	Total Population		Urban		Rural		Farm		Non-Farm	
State-Port Group-County-Port	Place	BG equiv	Place	BG equiv	Place	BG equiv	Place	BG equiv	Place	BG equiv
Monterey	**84,439**	**112,344**	**99.64%**	**92.52%**	**0.36%**	**7.48%**	**0.00%**	**0.03%**	**0.36%**	**7.45%**
Santa Cruz	255,602		85.34%		14.66%		0.28%		14.38%	
Santa Cruz	54,364	78,699	100.00%	93.22%	0.00%	6.78%	0.00%	0.04%	0.00%	6.74%
Monterey	401,762		89.16%		10.84%		0.46%		10.39%	
Moss Landing	302	1,832	0.00%	15.17%	100.00%	84.83%	0.00%	0.16%	100.00%	84.66%
Monterey	29,773	31,813	100.00%	95.25%	0.00%	4.75%	0.00%	0.00%	0.00%	4.75%
Morro Bay	**10,308**	**40,812**	**100.00%**	**87.68%**	**0.00%**	**12.32%**	**0.00%**	**1.48%**	**0.00%**	**10.84%**
San Luis Obispo	246,681		81.18%		18.82%		1.06%		17.76%	
Morro Bay	10,308	37,457	100.00%	88.93%	0.00%	11.07%	0.00%	1.47%	0.00%	9.60%
Avila Beach		3,355		73.71%		26.29%		1.58%		24.71%
Santa Barbara	**284,637**	**400,353**	**99.94%**	**99.21%**	**0.06%**	**0.79%**	**0.00%**	**0.06%**	**0.06%**	**0.73%**
Santa Barbara	399,347		95.16%		4.84%		0.49%		4.35%	
Santa Barbara	92,196	92,252	99.81%	100.00%	0.19%	0.00%	0.00%	0.00%	0.19%	0.00%
Ventura	753,197		96.81%		3.19%		0.42%		2.77%	
Ventura		111,370		97.44%		2.56%		0.21%		2.35%
Oxnard	170,595	171,084	99.99%	99.81%	0.01%	0.19%	0.00%	0.00%	0.01%	0.19%
Port Hueneme	21,846	25,647	100.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Los Angeles	**568,912**	**703,511**	**100.00%**	**100.00%**	**0.00%**	**0.00%**	**0.00%**	**0.00%**	**0.00%**	**0.00%**
Los Angeles	9,519,338		99.29%		0.71%		0.01%		0.70%	
San Pedro		80,641		100.00%		0.00%		0.00%		0.00%
Willmington		53,802		100.00%		0.00%		0.00%		0.00%
Long Beach	461,381	463,767	100.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Terminal Island		1,281		100.00%		0.00%		0.00%		0.00%
Orange	2,846,289		99.81%		0.19%		0.00%		0.19%	
Newport Beach	70,022	74,156	100.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Newport Coast CDP	2,658		100.00%		0.00%		0.00%		0.00%	
Dana Point	34,851	29,864	100.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
San Diego	**1,384,246**	**1,336,350**	99.58%	99.58%	0.42%	0.42%	0.03%	0.03%	0.39%	0.39%
San Diego	2,813,833		96.13%		3.87%		0.25%		3.61%	
Oceanside	160,905	163,414	99.37%	99.17%	0.63%	0.83%	0.19%	0.22%	0.44%	0.61%
San Diego	1,223,341	1,172,936	99.61%	99.64%	0.39%	0.36%	0.00%	0.00%	0.39%	0.36%

Port names in italic- no census place.

Port Angeles East, Bertsch-Oceanview, Crescent City North, and Newport Coast- no separate block group equivalent.

*Includes Fields Landing.

TABLE 8-11. Racial composition by state, port group, county, and port. (Source: U.S. Census, 2000, Summary File 3, Table P6.) (Page 1 of 4)

State-Port Group-County-Port	Total Population		White		Black		Native American		Hawaiian-Pac. Is.		Other		Two or More Races	
	Place	BG Equiv	Place	BG Equiv	Place	BG Equiv	Place	BG Equiv	Place	BG Equiv	Place	BG Equiv	Place	BG Equiv
Washington	5,894,121		81.69%		3.14%		1.55%		5.45%		0.37%		3.89%	
Puget Sound	**986,634**	**1,094,327**	**73.32%**	**74.95%**	**7.38%**	**6.64%**	**1.33%**	**1.39%**	**10.10%**	**9.40%**	**0.44%**	**0.44%**	**2.45%**	**2.37%**
Whatcom	166,814		88.32%		0.61%		2.82%		2.65%		0.07%		2.51%	
Blaine	3,713	8,757	86.70%	90.91%	3.47%	1.86%	0.59%	0.32%	1.89%	1.04%	0.00%	0.00%	2.37%	3.39%
Bellingham Bay	66,815	84,788	88.02%	88.97%	0.80%	0.67%	1.51%	1.42%	4.01%	3.74%	0.12%	0.11%	2.11%	1.96%
San Juan	14,077		95.56%		0.09%		0.72%		0.49%		0.13%		0.72%	
Friday Harbor	2,008	6,894	92.98%	96.17%	0.00%	0.19%	2.14%	0.94%	0.85%	0.25%	0.00%	0.28%	2.84%	0.94%
Skagit	102,979		86.37%		0.30%		1.85%		1.42%		0.11%		7.46%	
Anacortes	14,707	21,610	92.20%	90.56%	0.18%	0.12%	1.52%	4.01%	1.69%	1.39%	0.02%	0.05%	1.81%	1.40%
La Conner	782	1,407	89.51%	81.95%	3.20%	1.78%	1.92%	1.07%	0.26%	0.21%	0.00%	0.00%	0.38%	12.37%
Snohomish	606,024		85.48%		1.58%		1.34%		5.86%		0.21%		1.88%	
Everett	91,290	131,885	80.84%	81.63%	3.14%	2.84%	1.85%	1.70%	6.63%	6.26%	0.27%	0.28%	3.22%	2.89%
King	1,737,034		75.58%		5.27%		0.91%		10.81%		0.48%		2.55%	
Seattle	563,375	563,247	70.03%	70.05%	8.29%	8.30%	1.00%	1.00%	13.11%	13.10%	0.45%	0.45%	2.31%	2.30%
Pierce	700,820		78.33%		6.95%		1.35%		4.95%		0.72%		2.12%	
Tacoma	193,177	175,882	69.25%	69.08%	11.22%	11.13%	1.94%	2.12%	7.42%	7.32%	0.70%	0.76%	2.69%	2.75%
Thurston	207,355		85.38%		2.31%		1.52%		4.54%		0.58%		1.76%	
Olympia	42,345	80,443	84.80%	85.75%	1.92%	1.73%	1.34%	1.27%	5.49%	5.19%	0.23%	0.39%	1.72%	1.47%
Mason	49,405		88.27%		1.20%		3.67%		0.96%		0.64%		2.05%	
Shelton	8,422	19,414	85.47%	86.16%	0.17%	2.06%	2.17%	2.15%	1.09%	1.07%	0.96%	0.80%	6.10%	3.58%
North Washington Coast	**34,950**	**58,855**	**90.90%**	**90.20%**	**0.41%**	**0.29%**	**3.79%**	**4.67%**	**1.52%**	**1.48%**	**0.08%**	**0.07%**	**0.53%**	**0.47%**
Jefferson	25,953		92.27%		0.34%		2.32%		1.12%		0.09%		0.40%	
Port Townsend	8,325	11,549	93.48%	93.25%	0.47%	0.42%	1.20%	1.19%	1.44%	1.45%	0.00%	0.00%	0.34%	0.29%
Clallam	64,525		89.08%		0.72%		5.03%		1.35%		0.09%		1.16%	
Sequim	4,323	16,710	93.48%	94.14%	0.00%	0.03%	1.02%	1.47%	2.54%	1.69%	0.00%	0.00%	1.67%	0.73%
Port Angeles	18,472	27,992	92.06%	91.47%	0.56%	0.40%	2.49%	3.35%	1.36%	1.44%	0.11%	0.12%	0.37%	0.36%
Port Angeles E	3,050		93.77%		0.00%		3.31%		1.67%		0.00%		0.36%	
Neah Bay	780	1,356	10.64%	11.50%	0.26%	0.15%	79.62%	79.35%	0.00%	0.37%	0.90%	0.52%	0.51%	0.44%
La Push		1,248		66.59%		0.24%		28.37%		0.96%		0.00%		1.28%
South & Central WA Coast	**3,587**	**39,574**	**92.95%**	**90.37%**	**0.20%**	**0.23%**	**2.06%**	**2.60%**	**0.20%**	**1.83%**	**0.00%**	**0.04%**	**2.40%**	**2.09%**
Grays Harbor	67,194		88.62%		0.26%		4.95%		0.95%		0.18%		1.95%	
Copalis Beach	448	1,597	97.77%	95.37%	0.00%	0.00%	0.00%	0.38%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Grays Harbor		18,921		89.20%		0.38%		3.65%		1.39%		0.09%		2.44%
Westport	2,165	2,802	94.55%	94.79%	0.32%	0.25%	2.82%	2.36%	0.18%	0.14%	0.00%	0.00%	0.60%	0.46%
Pacific	20,984		90.51%		0.15%		2.10%		2.39%		0.00%		1.96%	
Willapa Bay		12,667		89.60%		0.10%		1.96%		3.58%		0.00%		2.18%
Ilwaco/Chinook	974	3,587	87.17%	93.53%	0.00%	0.00%	1.33%	0.53%	0.31%	0.08%	0.00%	0.00%	7.49%	2.09%

TABLE 8-11. Racial composition by state, port group, county, and port. (Source: U.S. Census, 2000, Summary File 3, Table P6.) (Page 2 of 4)

	Total Population		White		Black		Native American		Hawaiian-Pac. Is.		Other		Two or More Races	
State-Port Group-County-Port	Place	BG Equiv	Place	BG Equiv	Place	BG Equiv	Place	BG Equiv	Place	BG Equiv	Place	BG Equiv	Place	BG Equiv
Oregon	3,421,399		86.44%		1.55%		1.27%		2.90%		0.22%		4.29%	
Astoria	**18,177**	**38,957**	**91.58%**	**92.56%**	**0.46%**	**0.47%**	**0.86%**	**0.96%**	**0.95%**	**0.88%**	**0.07%**	**0.21%**	**2.71%**	**1.94%**
Clatsop	35,630		92.53%		0.71%		0.86%		0.98%		0.19%		1.80%	
Astoria	9,807	20,648	89.59%	91.11%	0.83%	0.83%	0.98%	0.87%	1.27%	1.17%	0.00%	0.27%	2.93%	1.90%
Gearhart	948	7,913	96.94%	94.28%	0.00%	0.05%	0.42%	1.18%	0.42%	0.56%	0.00%	0.15%	0.00%	1.97%
Seaside	5,822	7,913	93.71%	94.28%	0.00%	0.05%	0.91%	1.18%	0.65%	0.56%	0.21%	0.15%	2.68%	1.97%
Cannon Beach	1,600	2,483	92.88%	93.64%	0.13%	0.20%	0.19%	0.32%	0.31%	0.48%	0.00%	0.00%	3.06%	1.97%
Tillamook	**6,289**	**19,876**	**94.39%**	**94.53%**	**0.13%**	**0.24%**	**0.11%**	**0.40%**	**0.11%**	**0.55%**	**0.00%**	**0.08%**	**3.10%**	**1.87%**
Tillamook	24,262		94.37%		0.19%		0.50%		0.50%		0.11%		1.72%	
Nehalem Bay	261	3,076	98.47%	96.72%	0.00%	0.00%	0.00%	0.36%	0.00%	0.65%	0.00%	0.00%	0.00%	0.85%
Tillamook / Garibaldi	4,374	11,997	93.60%	93.22%	0.00%	0.33%	0.16%	0.50%	0.16%	0.70%	0.00%	0.13%	4.46%	2.53%
Netarts Bay	705	1,631	93.76%	96.44%	1.13%	0.49%	0.00%	0.49%	0.00%	0.37%	0.00%	0.00%	0.00%	0.00%
Pacific City	949	3,172	97.37%	96.34%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.32%
Newport	**14,553**	**24,335**	**88.50%**	**89.65%**	**0.25%**	**0.29%**	**3.39%**	**3.20%**	**1.09%**	**0.68%**	**0.08%**	**0.09%**	**2.79%**	**1.88%**
Lincoln	44,479		90.34%		0.22%		2.73%		0.67%		0.26%		1.88%	
Salmon River		1,072		96.08%		0.00%		2.99%		0.00%		0.00%		0.00%
Depoe Bay	1,188	1,914	92.17%	92.89%	0.67%	0.94%	2.27%	1.41%	0.34%	0.21%	0.17%	0.10%	0.34%	0.21%
Siletz Bay	1,174	2,742	72.49%	76.48%	0.00%	0.00%	19.34%	14.41%	1.02%	0.51%	0.26%	0.11%	0.85%	0.36%
Newport	9,493	11,921	89.21%	89.82%	0.26%	0.27%	1.92%	1.98%	1.18%	0.94%	0.06%	0.05%	3.93%	3.21%
Waldport	2,054	4,846	89.58%	92.41%	0.10%	0.14%	2.82%	1.49%	1.31%	0.68%	0.00%	0.00%	0.93%	0.70%
Yachats	644	1,840	97.05%	93.80%	0.31%	0.76%	0.00%	0.92%	0.47%	0.16%	0.00%	0.54%	0.00%	1.41%
Coos Bay	**26,171**	**56,901**	**91.93%**	**92.16%**	**0.37%**	**0.28%**	**1.47%**	**2.13%**	**0.62%**	**0.55%**	**0.07%**	**0.06%**	**1.41%**	**1.14%**
Lane	322,959		90.47%		0.75%		1.09%		1.89%		0.18%		2.02%	
Florence	7,318	10,701	95.93%	95.97%	0.52%	0.57%	1.31%	1.08%	0.22%	0.20%	0.00%	0.00%	0.23%	0.16%
Douglas	100,399		93.72%		0.19%		1.58%		0.59%		0.05%		0.86%	
Winchester Bay	530	6,413	93.77%	93.92%	0.00%	0.08%	0.75%	0.70%	0.00%	0.55%	0.00%	0.00%	0.00%	1.06%
Coos	62,779		91.54%		0.21%		2.55%		0.55%		0.11%		1.19%	
Coos Bay	15,443	33,105	89.94%	90.49%	0.23%	0.21%	1.59%	2.63%	0.94%	0.78%	0.12%	0.10%	1.94%	1.41%
Bandon	2,880	6,682	92.12%	92.68%	0.87%	0.37%	1.39%	2.72%	0.00%	0.00%	0.00%	0.00%	1.88%	1.42%
Brookings	**8,380**	**20,137**	**92.41%**	**93.31%**	**0.19%**	**0.12%**	**2.06%**	**2.32%**	**1.46%**	**0.82%**	**0.08%**	**0.03%**	**1.23%**	**1.04%**
Curry	21,137		93.02%		0.12%		2.41%		0.79%		0.03%		1.02%	
Port Orford	1,153	2,055	92.89%	93.38%	0.26%	0.15%	1.47%	1.46%	0.17%	0.44%	0.00%	0.00%	1.65%	1.02%
Gold Beach	1,864	4,754	95.92%	95.65%	0.27%	0.15%	1.66%	1.43%	0.00%	0.29%	0.38%	0.15%	0.21%	0.17%
Brookings	5,363	13,328	91.09%	92.47%	0.15%	0.11%	2.33%	2.77%	2.24%	1.07%	0.00%	0.00%	1.49%	1.36%

TABLE 8-11. Racial composition by state, port group, county, and port. (Source: U.S. Census, 2000, Summary File 3, Table P6.) (Page 3 of 4)

	Total Population		White		Black		Native American		Hawaiian-Pac. Is.		Other		Two or More Races	
State-Port Group-County-Port	Place	BG Equiv	Place	BG Equiv	Place	BG Equiv	Place	BG Equiv	Place	BG Equiv	Place	BG Equiv	Place	BG Equiv
California	33,871,648		59.41%		6.55%		0.92%		10.87%		0.34%		16.90%	
Crescent City	**10,054**	**24,472**	**79.33%**	**79.15%**	**0.45%**	**4.72%**	**5.32%**	**5.44%**	**3.81%**	**2.47%**	**0.00%**	**0.20%**	**4.24%**	**3.04%**
Del Norte	27,507		78.84%		4.28%		5.71%		2.22%		0.18%		3.84%	
Crescent City	3,888	24,472	77.44%	79.15%	0.67%	4.72%	6.20%	5.44%	4.91%	2.47%	0.00%	0.20%	5.22%	3.04%
Bertsch-Oceanview CDP	2,097		82.74%		0.00%		7.39%		3.29%		0.00%		2.67%	
Crescent City North CDP	4,069		79.38%		0.47%		3.42%		3.02%		0.00%		4.10%	
Eureka	**26,260**	**52,460**	**82.93%**	**85.50%**	**1.20%**	**1.12%**	**4.15%**	**4.01%**	**2.86%**	**2.16%**	**0.16%**	**0.18%**	**2.26%**	**1.99%**
Humboldt	126,518		84.82%		0.77%		5.60%		1.47%		0.11%		2.36%	
Trinidad	331	3,316	88.82%	86.37%	2.42%	0.84%	1.21%	7.00%	1.51%	0.24%	0.00%	0.12%	1.21%	2.20%
Eureka*	25,929	49,144	82.85%	85.44%	1.18%	1.14%	4.19%	3.81%	2.87%	2.29%	0.17%	0.18%	2.27%	1.98%
Fort Bragg	**7,514**	**21,237**	**78.51%**	**85.37%**	**1.70%**	**0.72%**	**2.68%**	**2.86%**	**0.08%**	**0.61%**	**0.00%**	**0.00%**	**10.90%**	**5.93%**
Mendocino	86,265		80.74%		0.69%		4.92%		0.96%		0.11%		8.13%	
Fort Bragg	7,028	13,249	79.04%	84.73%	1.82%	1.15%	2.46%	2.15%	0.04%	0.48%	0.00%	0.00%	10.37%	6.94%
Albion		4,075		92.52%		0.00%		0.00%		1.06%		0.00%		3.53%
Point Arena	486	3,913	70.78%	80.09%	0.00%	0.00%	5.76%	8.25%	0.62%	0.59%	0.00%	0.00%	18.52%	4.98%
Bodega Bay	**9,901**	**15,952**	**90.13%**	**89.04%**	**0.55%**	**0.34%**	**0.49%**	**0.66%**	**4.06%**	**2.99%**	**0.00%**	**0.00%**	**2.17%**	**4.35%**
Sonoma	458,614		81.46%		1.41%		1.13%		3.07%		0.16%		8.57%	
Bodega Bay	1,518	3,529	86.23%	86.26%	0.72%	0.31%	0.53%	1.56%	1.38%	1.73%	0.00%	0.00%	10.41%	8.98%
Marin	247,289		84.00%		2.90%		0.32%		4.43%		0.15%		4.54%	
Tomales Bay	210	503	92.38%	92.05%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	4.77%
Point Reyes	848	4,150	85.50%	86.43%	0.00%	0.00%	3.18%	0.89%	2.59%	0.96%	0.00%	0.00%	3.66%	7.88%
Sausalito	7,325	7,770	91.41%	91.51%	0.59%	0.55%	0.19%	0.18%	4.90%	4.84%	0.00%	0.00%	0.35%	0.33%
San Francisco	**1,450,928**	**1,484,046**	**44.35%**	**45.01%**	**17.52%**	**17.25%**	**0.52%**	**0.53%**	**23.95%**	**23.53%**	**0.52%**	**0.51%**	**8.18%**	**8.20%**
San Francisco	776,733		49.61%		7.60%		0.45%		30.89%		0.46%		6.44%	
San Francisco	776,733	776,733	49.61%	49.61%	7.60%	7.60%	0.45%	0.45%	30.89%	30.89%	0.46%	0.46%	6.44%	6.44%
Contra Costa	948,816		65.30%		9.22%		0.58%		10.88%		0.36%		8.17%	
Richmond	99,716	110,835	31.41%	34.20%	35.80%	33.51%	0.68%	0.72%	12.12%	11.98%	0.40%	0.32%	14.22%	13.69%
Alameda	1,443,741		48.65%		14.71%		0.63%		20.35%		0.64%		8.97%	
Berkeley	102,743	101,711	59.17%	58.96%	13.51%	13.64%	0.44%	0.44%	16.22%	16.27%	0.16%	0.16%	4.76%	4.77%
Oakland	399,477	399,477	31.27%	31.27%	35.37%	35.37%	0.62%	0.62%	15.05%	15.05%	0.65%	0.65%	11.83%	11.83%
Alameda	72,259	72,259	56.91%	56.91%	5.80%	5.80%	0.64%	0.64%	25.88%	25.88%	1.10%	1.10%	3.32%	3.32%
San Mateo	707,161		59.31%		3.45%		0.39%		20.10%		1.21%		10.16%	
Princeton		23,031		81.04%		1.84%		0.67%		2.63%		0.38%		8.96%

TABLE 8-11. Racial composition by state, port group, county, and port. (Source: U.S. Census, 2000, Summary File 3, Table P6.) (Page 4 of 4)

	Total Population		White		Black		Native American		Hawaiian-Pac. Is.		Other		Two or More Races	
State-Port Group-County-Port	Place	BG Equiv	Place	BG Equiv	Place	BG Equiv	Place	BG Equiv	Place	BG Equiv	Place	BG Equiv	Place	BG Equiv
Monterey	**84,439**	**112,344**	**79.23%**	**79.91%**	**1.97%**	**1.85%**	**1.10%**	**1.00%**	**6.08%**	**5.16%**	**0.12%**	**0.22%**	**7.29%**	**7.74%**
Santa Cruz	255,602		75.11%		1.08%		1.05%		3.28%		0.17%		15.22%	
Santa Cruz	54,364	78,699	78.84%	80.43%	1.69%	1.59%	1.40%	1.17%	5.14%	4.19%	0.10%	0.24%	8.68%	8.31%
Monterey	401,762		55.89%		3.73%		0.98%		6.03%		0.45%		28.12%	
Moss Landing	302	1,832	44.70%	39.90%	0.00%	3.93%	0.00%	1.20%	0.00%	3.71%	0.00%	0.00%	29.14%	43.18%
Monterey	29,773	31,813	80.30%	80.93%	2.51%	2.37%	0.56%	0.58%	7.87%	7.66%	0.17%	0.18%	4.52%	4.30%
Morro Bay	**10,308**	**40,812**	**89.51%**	**89.66%**	**0.58%**	**0.47%**	**0.93%**	**0.47%**	**1.07%**	**2.83%**	**0.05%**	**0.03%**	**4.71%**	**3.60%**
San Luis Obispo	246,681		84.59%		1.85%		0.80%		2.78%		0.07%		6.14%	
Morro Bay	10,308	37,457	89.51%	89.17%	0.58%	0.52%	0.93%	0.49%	1.07%	2.91%	0.05%	0.04%	4.71%	3.78%
Avila Beach		3,355		95.17%		0.00%		0.18%		1.88%		0.00%		1.55%
Santa Barbara	**284,637**	**400,353**	**53.46%**	**60.79%**	**3.13%**	**2.59%**	**1.02%**	**1.00%**	**5.75%**	**4.88%**	**0.35%**	**0.30%**	**31.79%**	**25.97%**
Santa Barbara	399,347		72.68%		2.27%		1.08%		3.91%		0.23%		15.39%	
Santa Barbara	92,196	92,252	73.77%	73.87%	1.83%	1.77%	0.89%	0.91%	2.60%	2.49%	0.11%	0.13%	17.24%	17.22%
Ventura	753,197		69.78%		1.87%		0.83%		5.20%		0.22%		18.06%	
Ventura		111,370		78.40%		1.30%		0.97%		2.88%		0.17%		11.86%
Oxnard	170,595	171,084	41.94%	42.31%	3.53%	3.48%	0.95%	0.93%	7.41%	7.35%	0.51%	0.49%	40.86%	40.72%
Port Hueneme	21,846	25,647	57.65%	60.55%	5.57%	5.17%	2.21%	1.96%	6.01%	5.65%	0.10%	0.23%	22.40%	20.33%
Los Angeles	**568,912**	**703,511**	**53.59%**	**53.13%**	**12.15%**	**10.90%**	**0.75%**	**0.84%**	**10.39%**	**9.23%**	**0.96%**	**0.88%**	**17.24%**	**19.79%**
Los Angeles	9,519,338		48.56%		9.63%		0.72%		11.92%		0.29%		23.77%	
San Pedro		80,641		62.95%		6.16%		1.14%		4.52%		0.34%		18.35%
Willmington		53,802		36.11%		3.96%		1.21%		3.18%		0.81%		48.67%
Long Beach	461,381	463,767	45.15%	45.23%	14.87%	14.81%	0.81%	0.82%	11.93%	12.01%	1.12%	1.11%	20.64%	20.53%
Terminal Island		1,281		43.25%		27.09%		0.94%		1.87%		1.48%		23.19%
Orange	2,846,289		64.75%		1.55%		0.62%		13.57%		0.30%		14.94%	
Newport Beach	70,022	74,156	91.57%	90.82%	0.47%	0.54%	0.47%	0.46%	3.94%	4.18%	0.19%	0.19%	1.03%	1.24%
Newport Coast CDP	2,658		82.69%		0.26%		0.00%		17.04%		0.00%		0.00%	
Dana Point	34,851	29,864	86.89%	86.92%	0.49%	0.34%	0.50%	0.50%	2.47%	2.61%	0.53%	0.55%	6.16%	6.06%
San Diego	**1,384,246**	**1,336,350**	**60.78%**	**61.23%**	**7.57%**	**7.37%**	**0.64%**	**0.63%**	**12.67%**	**12.40%**	**0.61%**	**0.60%**	**12.74%**	**12.79%**
San Diego	2,813,833		66.36%		5.63%		0.84%		8.84%		0.48%		12.89%	
Oceanside	160,905	163,414	66.13%	66.21%	6.35%	6.25%	0.78%	0.69%	5.59%	5.60%	1.41%	1.42%	14.66%	14.79%
San Diego	1,223,341	1,172,936	60.08%	60.53%	7.73%	7.53%	0.62%	0.62%	13.60%	13.35%	0.51%	0.49%	12.49%	12.51%

Port names in italic- no census place. Port Angeles East, Bertsch-Oceanview, Crescent City North, and Newport Coast- no separate block group equivalent.

*Includes Fields Landing.

TABLE 8-12. Hispanic population by state, port group, county, and port. (Source: U.S. Census, 2000, Summary File 3, Table P7.) (Page 1 of 3)

State-Port Group-County-Port	Total Population Place	Total Population BG equiv	Hispanic Place	Hispanic BG equiv
Washington	5,894,121		7.46%	
Puget Sound	**986,634**	**1,094,327**	**5.68%**	**5.49%**
Whatcom	166,814		4.99%	
Blaine	3,713	8,757	4.09%	4.82%
Bellingham Bay	66,815	84,788	4.77%	4.36%
San Juan	14,077		2.69%	
Friday Harbor	2,008	6,894	5.93%	2.52%
Skagit	102,979		11.25%	
Anacortes	14,707	21,610	3.03%	2.53%
La Conner	782	1,407	3.32%	14.00%
Snohomish	606,024		4.51%	
Everett	91,290	131,885	6.87%	6.44%
King	1,737,034		5.48%	
Seattle	563,375	563,247	5.26%	5.24%
Pierce	700,820		5.50%	
Tacoma	193,177	175,882	6.85%	6.96%
Thurston	207,355		4.37%	
Olympia	42,345	80,443	4.62%	4.03%
Mason	49,405		4.77%	
Shelton	8,422	19,414	11.83%	7.81%
North Washington Coast	**34,950**	**58,855**	**2.90%**	**2.33%**
Jefferson	25,953		1.75%	
Port Townsend	8,325	11,549	2.37%	2.11%
Clallam	64,525		3.39%	
Sequim	4,323	16,710	4.02%	2.02%
Port Angeles	18,472	27,992	3.05%	2.48%
Port Angeles E	3,050		1.18%	
Neah Bay	780	1,356	5.26%	4.79%
La Push		1,248		2.32%
South & Central WA Coast	**3,587**	**39,574**	**4.10%**	**4.97%**
Grays Harbor	67,194		4.83%	
Copalis Beach	448	1,597	0.00%	0.00%
Grays Harbor		18,921		5.45%
Westport	2,165	2,802	2.63%	2.03%
Pacific	20,984		5.25%	
Willapa Bay		12,667		5.64%
Ilwaco/Chinook	974	3,587	9.24%	4.60%
Oregon	3,421,399		8.01%	
Astoria	**18,177**	**38,957**	**6.60%**	**5.07%**
Clatsop	35,630		4.61%	
Astoria	9,807	20,648	6.34%	4.36%
Gearhart	948	7,913	1.69%	5.60%
Seaside	5,822	7,913	6.51%	5.60%
Cannon Beach	1,600	2,483	11.44%	7.61%
Tillamook	**6,289**	**19,876**	**7.38%**	**5.08%**
Tillamook	24,262		5.07%	
Nehalem Bay	261	3,076	1.53%	3.19%
Tillamook / Garibaldi	4,374	11,997	8.60%	6.55%
Netarts Bay	705	1,631	6.95%	3.00%
Pacific City	949	3,172	3.69%	2.43%

TABLE 8-12. Hispanic population by state, port group, county, and port. (Source: U.S. Census, 2000, Summary File 3, Table P7.) (Page 2 of 3)

	Total Population		Hispanic	
State-Port Group-County-Port	Place	BG equiv	Place	BG equiv
Newport	**14,553**	**24,335**	**6.27%**	**4.80%**
Lincoln	44,479		4.72%	
Salmon River		1,072		4.94%
Depoe Bay	1,188	1,914	1.52%	0.94%
Siletz Bay	1,174	2,742	1.96%	2.77%
Newport	9,493	11,921	8.36%	7.26%
Waldport	2,054	4,846	2.48%	1.75%
Yachats	644	1,840	4.19%	3.86%
Coos Bay	**26,171**	**56,901**	**3.84%**	**3.11%**
Lane	322,959		4.49%	
Florence	7,318	10,701	1.46%	1.64%
Douglas	100,399		2.83%	
Winchester Bay	530	6,413	1.32%	2.79%
Coos	62,779		3.17%	
Coos Bay	15,443	33,105	5.12%	3.79%
Bandon	2,880	6,682	3.47%	2.39%
Brookings	**8,380**	**20,137**	**3.77%**	**3.39%**
Curry	21,137		3.34%	
Port Orford	1,153	2,055	2.69%	3.21%
Gold Beach	1,864	4,754	2.20%	2.38%
Brookings	5,363	13,328	4.55%	3.77%
California	33,871,648		32.38%	
Crescent City	**10,054**	**24,472**	**9.33%**	**13.01%**
Del Norte	27,507		13.48%	
Crescent City	3,888	24,472	10.75%	13.01%
Bertsch-Oceanview	2,097		7.25%	
Crescent City North	4,069		9.04%	
Eureka	**26,260**	**52,460**	**7.17%**	**6.18%**
Humboldt	126,518		6.13%	
Trinidad	331	3,316	4.83%	5.85%
Eureka*	25,929	49,144	7.20%	6.21%
Fort Bragg	**7,514**	**21,237**	**22.56%**	**14.14%**
Mendocino	86,265		16.23%	
Fort Bragg	7,028	13,249	21.91%	15.53%
Albion		4,075		8.59%
Point Arena	486	3,913	31.89%	15.21%
Bodega Bay	**9,901**	**15,952**	**6.11%**	**9.16%**
Sonoma	458,614		17.36%	
Bodega Bay	1,518	3,529	15.74%	12.41%
Marin	247,289		11.10%	
Tomales Bay	210	503	4.76%	3.78%
Point Reyes	848	4,150	12.15%	18.10%
Sausalito	7,325	7,770	3.45%	3.26%
San Francisco	**1,450,928**	**1,484,046**	**16.57%**	**16.65%**
San Francisco	776,733		14.11%	
San Francisco	776,733	776,733	14.11%	14.11%
Contra Costa	948,816		17.71%	
Richmond	99,716	110,835	26.85%	26.11%
Alameda	1,443,741		18.97%	
Berkeley	102,743	101,711	9.76%	9.80%
Oakland	399,477	399,477	21.89%	21.89%
Alameda	72,259	72,259	9.10%	9.10%
San Mateo	707,161		21.83%	
Princeton		23,031		19.92%

TABLE 8-12. Hispanic population by state, port group, county, and port. (Source: U.S. Census, 2000, Summary File 3, Table P7.) (Page 3 of 3)

State-Port Group-County-Port	Total Population		Hispanic	
	Place	BG equiv	Place	BG equiv
Monterey	**84,439**	**112,344**	**15.13%**	**15.98%**
Santa Cruz	255,602		26.83%	
Santa Cruz	54,364	78,699	17.29%	17.08%
Monterey	401,762		46.89%	
Moss Landing	302	1,832	29.14%	59.99%
Monterey	29,773	31,813	11.03%	10.72%
Morro Bay	**10,308**	**40,812**	**11.86%**	**10.88%**
San Luis Obispo	246,681		16.26%	
Morro Bay	10,308	37,457	11.86%	11.58%
Avila Beach		3,355		3.07%
Santa Barbara	**284,637**	**400,353**	**54.28%**	**45.72%**
Santa Barbara	399,347		34.24%	
Santa Barbara	92,196	92,252	35.02%	35.03%
Ventura	753,197		33.45%	
Ventura		111,370		24.57%
Oxnard	170,595	171,084	66.35%	66.30%
Port Hueneme	21,846	25,647	41.28%	38.73%
Los Angeles	**568,912**	**703,511**	**30.53%**	**35.84%**
Los Angeles	9,519,338		44.58%	
San Pedro		80,641		41.68%
Willmington		53,802		83.44%
Long Beach	461,381	463,767	35.75%	35.56%
Terminal Island		1,281		41.76%
Orange	2,846,289		30.79%	
Newport Beach	70,022	74,156	4.66%	4.87%
Newport Coast CDP	2,658		4.70%	
Dana Point	34,851	29,864	15.48%	15.32%
San Diego	**1,384,246**	**1,336,350**	**25.95%**	**25.95%**
San Diego	2,813,833		26.69%	
Oceanside	160,905	163,414	30.26%	30.36%
San Diego	1,223,341	1,172,936	25.38%	25.33%

Port names in italic- no census place. Port Angeles East, Bertsch-Oceanview, Crescent City North, and Newport Coast- no separate block group equivalent.

*Includes Fields Landing.

TABLE 8-13. Age groups by state, port group, county, and port. (Source: U.S. Census, 2000, Summary File 3, Table P8.) (Page 1 of 3)

State-Port Group-County-Port		Total Population Place	Total Population BG Equiv	Age 16 and under Place	Age 16 and under BG Equiv	Age 17-64 Place	Age 17-64 BG Equiv	Age 65 and up Place	Age 65 and up BG Equiv
Washington		5,894,121		24.17%		64.60%		11.23%	
Puget Sound		**986,634**	**1,094,327**	**17.96%**	**18.48%**	**69.88%**	**69.39%**	**12.17%**	**12.13%**
Whatcom		166,814		22.72%		65.64%		11.64%	
	Blaine	3,713	8,757	24.97%	23.98%	57.12%	61.94%	17.91%	14.08%
	Bellingham Bay	66,815	84,788	16.13%	17.75%	71.12%	69.82%	12.75%	12.42%
San Juan		14,077		18.58%		62.34%		19.08%	
	Friday Harbor	2,008	6,894	22.16%	19.86%	60.06%	60.91%	17.78%	19.23%
Skagit		102,979		24.65%		60.78%		14.57%	
	Anacortes	14,707	21,610	22.19%	20.68%	57.33%	58.29%	20.49%	21.03%
	La Conner	782	1,407	19.18%	26.72%	61.89%	60.13%	18.93%	13.15%
Snohomish		606,024		25.85%		65.03%		9.12%	
	Everett	91,290	131,885	23.63%	24.18%	66.09%	66.19%	10.28%	9.62%
King		1,737,034		21.16%		68.36%		10.47%	
	Seattle	563,375	563,247	14.61%	14.61%	73.29%	73.28%	12.10%	12.10%
Pierce		700,820		25.66%		64.16%		10.19%	
	Tacoma	193,177	175,882	24.38%	24.41%	63.84%	63.78%	11.79%	11.81%
Thurston		207,355		23.66%		65.03%		11.31%	
	Olympia	42,345	80,443	20.34%	21.52%	66.59%	65.29%	13.07%	13.19%
Mason		49,405		21.97%		61.63%		16.41%	
	Shelton	8,422	19,414	24.32%	22.62%	58.12%	63.68%	17.56%	13.70%
North Washington Coast		**34,950**	**58,855**	**20.53%**	**20.45%**	**57.25%**	**58.09%**	**22.22%**	**21.47%**
Jefferson		25,953		18.42%		60.54%		21.04%	
	Port Townsend	8,325	11,549	18.97%	18.38%	60.25%	61.64%	20.78%	19.98%
Clallam		64,525		20.44%		58.22%		21.34%	
	Sequim	4,323	16,710	14.02%	16.97%	40.30%	51.01%	45.69%	32.02%
	Port Angeles	18,472	27,992	22.35%	22.48%	58.98%	60.40%	18.67%	17.12%
	Port Angeles E	3,050		19.93%		61.34%		18.72%	
	Neah Bay	780	1,356	32.44%	34.51%	62.05%	60.55%	5.51%	4.94%
	La Push		1,248		25.16%		65.38%		9.46%
South & Central WA Coast		**3,587**	**39,574**	**21.35%**	**22.78%**	**58.52%**	**58.52%**	**20.13%**	**18.70%**
Grays Harbor		67,194		24.17%		60.45%		15.38%	
	Copalis Beach	448	1,597	10.04%	21.85%	61.16%	59.05%	28.79%	19.10%
	Grays Harbor		18,921		25.53%		60.07%		14.40%
	Westport	2,165	2,802	22.26%	21.02%	59.68%	58.67%	18.06%	20.31%
Pacific		20,984		19.99%		57.59%		22.42%	
	Willapa Bay		12,667		20.03%		56.31%		23.66%
	Ilwaco/Chinook	974	3,587	24.54%	19.71%	54.72%	57.85%	20.74%	22.44%
Oregon		3,421,399		23.28%		63.93%		12.80%	
Astoria		**18,177**	**38,957**	**20.58%**	**21.05%**	**62.27%**	**62.82%**	**17.15%**	**16.13%**
Clatsop		35,630		21.86%		62.69%		15.45%	
	Astoria	9,807	20,648	22.44%	22.47%	61.87%	63.15%	15.68%	14.38%
	Gearhart	948	7,913	18.67%	19.65%	64.24%	62.63%	17.09%	17.72%
	Seaside	5,822	7,913	18.83%	19.65%	60.96%	62.63%	20.22%	17.72%
	Cannon Beach	1,600	2,483	16.63%	18.16%	68.31%	61.22%	15.06%	20.62%
Tillamook		**6,289**	**19,876**	**20.21%**	**19.61%**	**61.47%**	**59.78%**	**18.32%**	**20.61%**
Tillamook		24,262		20.64%		59.76%		19.60%	
	Nehalem Bay	261	3,076	29.50%	14.21%	57.85%	57.09%	12.64%	28.71%
	Tillamook / Garibaldi	4,374	11,997	23.41%	22.46%	59.95%	59.46%	16.64%	18.09%
	Netarts Bay	705	1,631	11.63%	13.49%	63.83%	63.76%	24.54%	22.75%
	Pacific City	949	3,172	9.27%	17.21%	67.76%	61.57%	22.97%	21.22%

TABLE 8-13. Age groups by state, port group, county, and port. (Source: U.S. Census, 2000, Summary File 3, Table P8.) (Page 2 of 3)

State-Port Group-County-Port		Total Population Place	Total Population BG Equiv	Age 16 and under Place	Age 16 and under BG Equiv	Age 17-64 Place	Age 17-64 BG Equiv	Age 65 and up Place	Age 65 and up BG Equiv
Newport		**14,553**	**24,335**	**20.48%**	**18.85%**	**60.40%**	**60.87%**	**19.12%**	**20.28%**
Lincoln		44,479		20.11%		60.53%		19.37%	
	Salmon River		1,072		8.40%		70.90%		20.71%
	Depoe Bay	1,188	1,914	12.88%	12.49%	59.18%	59.98%	27.95%	27.53%
	Siletz Bay	1,174	2,742	25.89%	24.65%	61.50%	62.18%	12.61%	13.17%
	Newport	9,493	11,921	20.54%	19.87%	61.84%	61.78%	17.62%	18.35%
	Waldport	2,054	4,846	23.32%	19.50%	54.92%	55.80%	21.76%	24.70%
	Yachats	644	1,840	14.75%	14.62%	56.99%	61.47%	28.26%	23.91%
Coos Bay		**26,171**	**56,901**	**18.75%**	**19.39%**	**55.96%**	**57.59%**	**25.29%**	**23.02%**
Lane		322,959		21.48%		65.22%		13.30%	
	Florence	7,318	10,701	15.06%	15.40%	46.76%	48.66%	38.18%	35.94%
Douglas		100,399		22.51%		59.70%		17.80%	
	Winchester Bay	530	6,413	17.36%	19.29%	64.53%	55.47%	18.11%	25.25%
Coos		62,779		20.27%		60.66%		19.07%	
	Coos Bay	15,443	33,105	20.75%	21.14%	61.16%	60.74%	18.09%	18.11%
	Bandon	2,880	6,682	17.64%	17.17%	49.86%	58.35%	32.50%	24.48%
Brookings		**8,380**	**20,137**	**21.41%**	**17.55%**	**55.73%**	**55.50%**	**22.86%**	**26.95%**
Curry		21,137		17.74%		55.34%		26.91%	
	Port Orford	1,153	2,055	16.39%	15.33%	57.16%	59.37%	26.45%	25.30%
	Gold Beach	1,864	4,754	20.28%	18.32%	63.36%	59.09%	16.36%	22.59%
	Brookings	5,363	13,328	22.88%	17.62%	52.77%	53.62%	24.35%	28.76%
California		33,871,648		25.81%		63.60%		10.59%	
Crescent City		**10,054**	**24,472**	**28.05%**	**23.04%**	**58.84%**	**64.80%**	**13.11%**	**12.16%**
Del Norte		27,507		23.39%		63.99%		12.61%	
	Crescent City	3,888	24,472	29.37%	23.04%	57.20%	64.80%	13.43%	12.16%
	Bertsch-Oceanview CDP	2,097		25.99%		59.32%		14.69%	
	Crescent City North CDP	4,069		27.84%		60.16%		11.99%	
Eureka		**26,260**	**52,460**	**21.23%**	**21.30%**	**64.72%**	**64.62%**	**14.06%**	**14.09%**
Humboldt		126,518		21.86%		65.56%		12.57%	
	Trinidad	331	3,316	13.60%	18.12%	67.67%	65.89%	18.73%	15.98%
	Eureka*	25,929	49,144	21.32%	21.51%	64.68%	64.53%	14.00%	13.96%
Fort Bragg		**7,514**	**21,237**	**23.54%**	**20.53%**	**63.12%**	**63.86%**	**13.34%**	**15.60%**
Mendocino		86,265		23.74%		62.71%		13.55%	
	Fort Bragg	7,028	13,249	22.91%	21.21%	63.46%	63.60%	13.63%	15.19%
	Albion		4,075		17.52%		65.62%		16.86%
	Point Arena	486	3,913	32.72%	21.39%	58.23%	62.92%	9.05%	15.69%
Bodega Bay		**9,901**	**15,952**	**7.93%**	**11.29%**	**77.55%**	**73.87%**	**14.52%**	**14.84%**
Sonoma		458,614		22.92%		64.53%		12.54%	
	Bodega Bay	1,518	3,529	10.87%	12.92%	64.95%	67.72%	24.18%	19.35%
Marin		247,289		19.12%		67.35%		13.53%	
	Tomales Bay	210	503	9.52%	18.29%	77.14%	73.56%	13.33%	8.15%
	Point Reyes	848	4,150	15.92%	18.63%	72.64%	65.40%	11.44%	15.98%
	Sausalito	7,325	7,770	6.35%	6.18%	80.74%	81.20%	12.91%	12.63%
San Francisco		**1,450,928**	**1,484,046**	**17.57%**	**17.71%**	**70.13%**	**70.04%**	**12.29%**	**12.25%**
San Francisco		776,733		13.68%		72.55%		13.77%	
	San Francisco	776,733	776,733	13.68%	13.68%	72.55%	72.55%	13.77%	13.77%
Contra Costa		948,816		25.06%		63.67%		11.27%	
	Richmond	99,716	110,835	26.10%	26.12%	64.26%	63.87%	9.64%	10.01%
Alameda		1,443,741		23.26%		66.51%		10.23%	
	Berkeley	102,743	101,711	13.23%	13.22%	76.52%	76.53%	10.25%	10.25%
	Oakland	399,477	399,477	23.65%	23.65%	65.90%	65.90%	10.45%	10.45%
	Alameda	72,259	72,259	20.24%	20.24%	66.61%	66.61%	13.15%	13.15%
San Mateo		707,161		21.63%		65.89%		12.48%	
	Princeton		23,031		22.35%		68.67%		8.97%

TABLE 8-13. Age groups by state, port group, county, and port. (Source: U.S. Census, 2000, Summary File 3, Table P8.) (Page 3 of 3)

		Total Population		Age 16 and under		Age 17-64		Age 65 and up	
State-Port Group-County-Port		Place	BG Equiv	Place	BG Equiv	Place	BG Equiv	Place	BG Equiv
Monterey		**84,439**	**112,344**	**16.01%**	**16.80%**	**73.20%**	**72.16%**	**10.79%**	**11.04%**
Santa Cruz		255,602		22.34%		67.76%		9.90%	
	Santa Cruz	54,364	78,699	16.22%	17.04%	75.36%	73.64%	8.42%	9.31%
Monterey		401,762		26.88%		63.12%		10.00%	
	Moss Landing	302	1,832	20.20%	21.72%	79.80%	68.61%	0.00%	9.66%
	Monterey	29,773	31,813	15.60%	15.91%	69.18%	68.71%	15.22%	15.38%
Morro Bay		**10,308**	**40,812**	**12.97%**	**16.22%**	**62.35%**	**61.60%**	**24.68%**	**22.18%**
San Luis Obispo		246,681		20.00%		65.53%		14.46%	
	Morro Bay	10,308	37,457	12.97%	16.47%	62.35%	61.60%	24.68%	21.93%
	Avila Beach		3,355		13.41%		61.55%		25.04%
Santa Barbara		**284,637**	**400,353**	**26.03%**	**25.46%**	**64.01%**	**63.78%**	**9.96%**	**10.76%**
Santa Barbara		399,347		23.40%		63.94%		12.66%	
	Santa Barbara	92,196	92,252	18.61%	19.13%	67.65%	66.60%	13.73%	14.28%
Ventura		753,197		26.88%		63.09%		10.03%	
	Ventura		111,370		23.74%		63.83%		12.43%
	Oxnard	170,595	171,084	30.02%	30.00%	62.15%	62.25%	7.83%	7.75%
	Port Hueneme	21,846	25,647	26.15%	25.41%	63.17%	63.66%	10.68%	10.93%
Los Angeles		**568,912**	**703,511**	**25.64%**	**26.09%**	**64.09%**	**63.83%**	**10.27%**	**10.08%**
Los Angeles		9,519,338		26.54%		63.73%		9.74%	
	San Pedro		80,641		25.45%		63.24%		11.31%
	Willmington		53,802		33.49%		60.19%		6.31%
	Long Beach	461,381	463,767	27.75%	27.67%	63.22%	63.29%	9.03%	9.04%
	Terminal Island		1,281		0.00%		95.16%		4.84%
Orange		2,846,289		25.60%		64.61%		9.80%	
	Newport Beach	70,022	74,156	15.07%	15.05%	67.51%	67.89%	17.42%	17.06%
	Newport Coast CDP	2,658		23.97%		70.96%		5.08%	
	Dana Point	34,851	29,864	19.02%	18.55%	68.23%	68.97%	12.75%	12.49%
San Diego		**1,384,246**	**1,336,350**	**23.08%**	**22.99%**	**66.15%**	**66.15%**	**10.77%**	**10.86%**
San Diego		2,813,833		24.30%		64.55%		11.15%	
	Oceanside	160,905	163,414	26.06%	26.40%	60.39%	60.05%	13.55%	13.55%
	San Diego	1,223,341	1,172,936	22.69%	22.51%	66.91%	67.00%	10.40%	10.49%

Port names in italic- no census place.

Port Angeles East, Bertsch-Oceanview, Crescent City North, and Newport Coast- no separate block group equivalent.

*Includes Fields Landing.

TABLE 8-14. Educational attainment by state, port group, county, and port. (Source: U.S. Census, 2000, Summary File 3, Table P37.) (Page 1 of 3)

	Population 25 yrs & up		High School Grad		Som Coll. Or Grad		Post-Coll. Degree		Total- HS grad and above	
State-Port Group-County-Port	Place	BG Equiv	Place	BG Equiv	Place	BG Equiv	Place	BG Equiv	Place	BG Equiv
Washington	3,827,507		24.91%		52.85%		9.32%			
Puget Sound	**678,214**	**749,916**	**19.83%**	**20.21%**	**54.41%**	**54.57%**	**13.65%**	**13.30%**	**87.89%**	**88.08%**
Whatcom	102,787		27.58%		51.00%		8.92%		87.50%	
Blaine	2,505	5,959	28.42%	30.53%	44.07%	46.99%	9.02%	8.89%	81.52%	86.41%
Bellingham Bay	39,202	51,246	23.02%	23.37%	54.35%	54.81%	11.18%	11.00%	88.54%	89.17%
San Juan	10,691		18.68%		60.54%		15.20%		94.42%	
Friday Harbor	1,351	5,113	31.38%	21.73%	50.93%	57.62%	8.88%	13.57%	91.19%	92.92%
Skagit	66,959		26.35%		50.61%		7.00%		83.95%	
Anacortes	10,275	15,574	25.20%	23.99%	56.03%	56.34%	8.05%	9.00%	89.27%	89.33%
La Conner	576	952	17.71%	15.86%	61.11%	56.51%	12.33%	11.45%	91.15%	83.82%
Snohomish	388,997		25.91%		56.37%		6.90%		89.18%	
Everett	57,162	83,240	27.23%	26.78%	51.71%	53.33%	5.43%	5.44%	84.37%	85.55%
King	1,188,740		19.17%		57.76%		13.33%		90.26%	
Seattle	409,582	409,471	15.26%	15.23%	56.90%	56.93%	17.31%	17.35%	89.47%	89.51%
Pierce	442,665		29.78%		50.17%		6.92%		86.87%	
Tacoma	123,992	112,969	29.10%	29.50%	47.62%	47.08%	6.88%	6.60%	83.59%	83.18%
Thurston	135,686		23.78%		54.62%		11.11%		89.50%	
Olympia	28,217	52,810	20.79%	20.25%	55.82%	56.77%	14.98%	14.72%	91.59%	91.74%
Mason	33,936		32.46%		46.26%		4.99%		83.72%	
Shelton	5,352	12,582	30.01%	32.62%	45.65%	43.20%	3.38%	4.22%	79.04%	80.04%
North Washington Coast	**24,836**	**42,346**	**26.64%**	**26.49%**	**50.77%**	**52.02%**	**8.71%**	**9.15%**	**86.12%**	**87.66%**
Jefferson	19,551		27.15%		53.90%		10.51%		91.57%	
Port Townsend	6,266	8,710	22.55%	22.85%	56.72%	57.13%	12.45%	12.93%	91.72%	92.90%
Clallam	45,711		27.77%		49.84%		7.88%		85.49%	
Sequim	3,446	12,962	30.01%	27.11%	43.76%	52.08%	8.47%	9.04%	82.24%	88.23%
Port Angeles	12,520	19,130	27.91%	27.23%	49.66%	50.56%	7.55%	7.83%	85.12%	85.62%
Port Angeles E	2,193		23.99%		52.49%		6.25%		82.72%	
Neah Bay	411	720	36.50%	34.72%	43.07%	43.47%	2.19%	3.75%	81.75%	81.94%
La Push		824		31.07%		38.23%		6.19%		75.49%
South & Central WA Coast	**2,544**	**27,295**	**36.05%**	**33.11%**	**37.70%**	**40.25%**	**6.68%**	**5.46%**	**80.42%**	**78.82%**
Grays Harbor	44,588		34.33%		41.98%		4.78%		81.09%	
Copalis Beach	377	1,166	42.18%	40.91%	22.02%	31.05%	13.26%	9.18%	77.45%	81.13%
Grays Harbor		12,247		33.55%		40.65%		4.57%		78.77%
Westport	1,503	1,986	36.73%	37.56%	38.39%	38.37%	5.06%	4.18%	80.17%	80.11%
Pacific	15,298		31.52%		41.29%		6.08%		78.89%	
Willapa Bay		9,236		31.45%		40.03%		5.97%		77.45%
Ilwaco/Chinook	664	2,660	31.02%	30.08%	45.03%	44.59%	6.63%	7.14%	82.68%	81.80%
Oregon	2,250,998		26.27%		50.18%		8.68%		85.13%	
Astoria	**12,622**	**26,633**	**25.28%**	**27.39%**	**52.69%**	**50.99%**	**7.57%**	**6.66%**	**85.53%**	**85.03%**
Clatsop	24,069		29.05%		50.01%		6.50%		85.56%	
Astoria	6,641	13,623	26.05%	29.92%	52.04%	49.64%	7.60%	6.23%	85.69%	85.79%
Gearhart	707	5,618	19.80%	26.18%	58.70%	50.64%	12.73%	6.37%	91.23%	83.20%
Seaside	4,149	5,618	27.57%	26.18%	49.70%	50.64%	5.28%	6.37%	82.55%	83.20%
Cannon Beach	1,125	1,774	15.73%	15.61%	63.73%	63.53%	12.53%	11.72%	92.00%	90.87%
Tillamook	**4,280**	**14,209**	**38.74%**	**37.18%**	**40.58%**	**41.68%**	**4.63%**	**6.13%**	**83.95%**	**85.00%**
Tillamook	17,145		36.97%		41.04%		6.08%		84.09%	
Nehalem Bay	158	2,446	31.01%	32.22%	53.80%	43.79%	1.90%	10.55%	86.71%	86.55%
Tillamook / Garibaldi	2,777	8,093	44.18%	40.85%	38.89%	40.02%	2.77%	3.51%	85.85%	84.38%
Netarts Bay	553	1,300	32.01%	32.15%	41.05%	41.08%	5.79%	11.23%	78.84%	84.46%
Pacific City	792	2,370	25.88%	32.53%	43.56%	45.53%	10.86%	7.72%	80.30%	85.78%

TABLE 8-14. Educational attainment by state, port group, county, and port. (Source: U.S. Census, 2000, Summary File 3, Table P37.) (Page 2 of 3)

State-Port Group-County-Port	Population 25 yrs & up Place	Population 25 yrs & up BG Equiv	High School Grad Place	High School Grad BG Equiv	Som Coll. Or Grad Place	Som Coll. Or Grad BG Equiv	Post-Coll. Degree Place	Post-Coll. Degree BG Equiv	Total- HS grad and above Place	Total- HS grad and above BG Equiv
Newport	**10,350**	**17,839**	**25.73%**	**26.36%**	**48.59%**	**49.26%**	**10.54%**	**9.64%**	**84.86%**	**85.27%**
Lincoln	32,000		28.98%		47.53%		8.38%		84.88%	
Salmon River		914		19.26%		64.22%		9.74%		93.22%
Depoe Bay	963	1,574	23.99%	25.10%	53.37%	51.78%	10.49%	8.83%	87.85%	85.71%
Siletz Bay	762	1,855	42.91%	39.19%	34.65%	37.68%	1.71%	3.45%	79.27%	80.32%
Newport	6,660	8,500	24.07%	24.38%	48.68%	48.56%	11.89%	11.31%	84.64%	84.25%
Waldport	1,469	3,662	28.59%	27.31%	47.86%	49.81%	7.28%	8.79%	83.73%	85.91%
Yachats	496	1,334	16.53%	24.96%	61.69%	55.10%	15.73%	10.87%	93.95%	90.93%
Coos Bay	**19,074**	**41,141**	**30.82%**	**30.98%**	**45.44%**	**45.83%**	**6.81%**	**6.23%**	**83.08%**	**83.03%**
Lane	210,601		25.87%		51.74%		9.92%		87.53%	
Florence	5,754	8,388	29.77%	31.75%	47.18%	47.19%	8.24%	6.86%	85.19%	85.79%
Douglas	68,783		34.65%		41.39%		4.93%		80.98%	
Winchester Bay	376	4,747	36.97%	30.78%	42.02%	44.93%	7.45%	5.12%	86.44%	80.83%
Coos	44,667		30.73%		45.11%		5.72%		81.56%	
Coos Bay	10,736	22,927	32.16%	31.12%	42.45%	44.42%	6.24%	6.01%	80.85%	81.56%
Bandon	2,208	5,079	26.00%	29.26%	56.07%	50.76%	5.75%	7.19%	87.82%	87.20%
Brookings	**6,092**	**15,440**	**31.39%**	**32.10%**	**45.09%**	**42.49%**	**6.48%**	**6.71%**	**82.96%**	**81.30%**
Curry	16,168		32.11%		42.84%		6.73%		81.67%	
Port Orford	910	1,610	28.57%	29.94%	47.14%	48.32%	9.34%	8.88%	85.05%	87.14%
Gold Beach	1,363	3,621	23.62%	26.82%	45.27%	43.99%	7.85%	10.83%	76.74%	81.63%
Brookings	3,819	10,209	34.83%	34.31%	44.54%	41.04%	5.32%	4.91%	84.68%	80.26%
California	21,298,900		20.13%		47.13%		9.53%		76.79%	
Crescent City	**6,282**	**16,488**	**25.09%**	**27.05%**	**47.09%**	**41.28%**	**3.25%**	**3.03%**	**75.42%**	**71.35%**
Del Norte	18,459		27.47%		41.17%		3.00%		71.64%	
Crescent City	2,346	16,488	24.47%	27.05%	43.27%	41.28%	3.54%	3.03%	71.27%	71.35%
Bertsch-Oceanview CDP	1,396		27.29%		49.86%		1.93%		79.08%	
Crescent City North CDP	2,540		24.45%		49.09%		3.70%		77.24%	
Eureka	**17,296**	**35,157**	**26.57%**	**26.32%**	**49.59%**	**51.51%**	**5.68%**	**6.97%**	**81.83%**	**84.81%**
Humboldt	81,501		25.72%		51.79%		7.40%		84.91%	
Trinidad	263	2,414	12.17%	24.73%	58.17%	49.59%	17.87%	10.48%	88.21%	84.80%
Eureka*	17,033	32,743	26.79%	26.44%	49.46%	51.65%	5.49%	6.72%	81.74%	84.81%
Fort Bragg	**4,853**	**15,058**	**32.10%**	**23.91%**	**43.62%**	**49.06%**	**5.15%**	**11.02%**	**80.88%**	**83.99%**
Mendocino	56,886		26.04%		46.83%		7.96%		80.83%	
Fort Bragg	4,585	9,159	32.87%	29.37%	43.01%	45.59%	5.21%	6.97%	81.09%	81.93%
Albion		3,120		13.14%		53.17%		23.43%		89.74%
Point Arena	268	2,779	19.03%	17.99%	54.10%	55.85%	4.10%	10.47%	77.24%	84.31%
Bodega Bay	**8,762**	**13,408**	**7.78%**	**10.40%**	**60.64%**	**58.83%**	**27.36%**	**24.64%**	**95.78%**	**93.88%**
Sonoma	306,564		20.41%		54.80%		9.71%		84.92%	
Bodega Bay	1,266	2,871	13.90%	17.31%	47.31%	52.49%	25.36%	19.26%	86.57%	89.06%
Marin	183,694		12.44%		58.28%		20.52%		91.25%	
Tomales Bay	157	335	23.57%	19.10%	45.22%	51.34%	21.02%	14.63%	89.81%	85.07%
Point Reyes	653	3,103	15.16%	13.79%	62.02%	56.62%	15.62%	19.53%	92.80%	89.95%
Sausalito	6,686	7,099	5.53%	5.72%	63.39%	62.71%	29.03%	29.53%	97.95%	97.96%

TABLE 8-14. Educational attainment by state, port group, county, and port. (Source: U.S. Census, 2000, Summary File 3, Table P37.) (Page 3 of 3)

	Population 25 yrs & up		High School Grad		Som Coll. Or Grad		Post-Coll. Degree		Total- HS grad and above	
State-Port Group-County-Port	Place	BG Equiv	Place	BG Equiv	Place	BG Equiv	Place	BG Equiv	Place	BG Equiv
San Francisco	**1,037,954**	**1,060,260**	**15.10%**	**15.17%**	**48.87%**	**48.93%**	**16.10%**	**16.03%**	**80.08%**	**80.13%**
San Francisco	595,805		13.87%		50.91%		16.42%		81.19%	
San Francisco	595,805	595,805	13.87%	13.87%	50.91%	50.91%	16.42%	16.42%	81.19%	81.19%
Contra Costa	625,641		19.81%		54.93%		12.17%		86.91%	
Richmond	62,662	69,801	21.82%	22.30%	45.28%	45.64%	8.26%	7.86%	75.35%	75.80%
Alameda	953,716		19.05%		49.64%		13.67%		82.36%	
Berkeley	66,133	65,372	8.61%	8.65%	49.32%	49.30%	34.30%	34.20%	92.24%	92.16%
Oakland	261,402	261,402	17.66%	17.66%	43.40%	43.40%	12.89%	12.89%	73.95%	73.95%
Alameda	51,952	51,952	16.57%	16.57%	56.87%	56.87%	15.00%	15.00%	88.44%	88.44%
San Mateo	490,285		17.45%		53.26%		14.57%		85.28%	
Princeton		15,928		14.03%		52.58%		17.58%		84.19%
Monterey	**54,890**	**74,465**	**15.00%**	**15.35%**	**57.01%**	**57.06%**	**17.97%**	**16.86%**	**89.98%**	**89.26%**
Santa Cruz	164,999		16.56%		54.18%		12.48%		83.22%	
Santa Cruz	33,896	50,950	14.49%	15.22%	57.12%	57.71%	17.49%	16.05%	89.10%	88.99%
Monterey	244,128		18.58%		41.13%		8.72%		68.43%	
Moss Landing	185	1,161	21.08%	18.43%	24.32%	29.63%	23.24%	6.03%	68.65%	54.09%
Monterey	20,809	22,354	15.76%	15.47%	57.12%	56.99%	18.70%	19.26%	91.59%	91.72%
Morro Bay	**7,911**	**30,406**	**24.02%**	**18.60%**	**55.95%**	**59.67%**	**10.58%**	**12.93%**	**90.54%**	**91.20%**
San Luis Obispo	159,196		21.81%		54.43%		9.33%		85.58%	
Morro Bay	7,911	27,743	24.02%	19.36%	55.95%	59.12%	10.58%	12.33%	90.54%	90.81%
Avila Beach		2,663		10.70%		65.38%		19.15%		95.23%
Santa Barbara	**170,399**	**249,910**	**18.33%**	**18.74%**	**41.60%**	**45.63%**	**8.58%**	**9.46%**	**68.51%**	**73.82%**
Santa Barbara	246,729		19.03%		48.81%		11.41%		79.24%	
Santa Barbara	61,096	63,258	15.14%	15.01%	50.54%	50.88%	15.65%	15.99%	81.32%	81.88%
Ventura	471,756		19.70%		50.87%		9.53%		80.10%	
Ventura		74,412		20.05%		54.04%		10.94%		85.02%
Oxnard	96,399	96,654	19.46%	19.27%	35.43%	35.51%	4.57%	4.62%	59.46%	59.40%
Port Hueneme	12,904	15,586	24.96%	24.28%	45.37%	46.96%	5.11%	5.86%	75.44%	77.10%
Los Angeles	**359,294**	**440,572**	**17.09%**	**17.88%**	**49.77%**	**47.35%**	**10.87%**	**9.86%**	**77.73%**	**75.09%**
Los Angeles	5,882,948		18.84%		42.28%		8.78%		69.90%	
San Pedro		52,081		21.60%		45.87%		7.85%		75.32%
Willmington		28,418		20.14%		18.78%		2.39%		41.31%
Long Beach	277,410	279,276	18.82%	18.83%	45.66%	45.84%	8.19%	8.18%	72.66%	72.84%
Terminal Island		1,182		26.23%		30.54%		6.51%		63.28%
Orange	1,813,456		17.50%		51.58%		10.38%		79.46%	
Newport Beach	54,755	57,811	9.64%	9.60%	65.70%	65.85%	21.41%	21.20%	96.74%	96.64%
Newport Coast CDP	1,865		4.56%		60.59%		33.35%		98.50%	
Dana Point	25,264	21,804	15.21%	15.45%	59.65%	59.37%	15.82%	16.09%	90.67%	90.91%
San Diego	**879,930**	**850,910**	**17.58%**	**17.51%**	**52.33%**	**52.23%**	**12.66%**	**12.79%**	**82.57%**	**82.52%**
San Diego	1,773,327		19.85%		51.88%		10.86%		82.58%	
Oceanside	100,688	102,022	22.21%	22.16%	51.31%	51.29%	7.31%	7.32%	80.83%	80.77%
San Diego	779,242	748,888	16.98%	16.87%	52.46%	52.36%	13.35%	13.53%	82.80%	82.76%

Port names in italic- no census place.

Port Angeles East, Bertsch-Oceanview, Crescent City North, and Newport Coast- no separate block group equivalent.

*Includes Fields Landing.

Notes: Table P37 breaks out population by sex, values are summed for calculations. "Some Coll. Or Grad" sums fields some college, less than 1 year; some college, 1 or more years; no degree; Associate degree; and Bachelor's degree. "Post-Coll. Degree" sums fields Master's degree, professional school degree, and Doctorate degree.

TABLE 8-15. Labor force, unemployed as a percent of labor force, employed population and population employed in private sector jobs in agriculture, forestry, fishing and hunting by state, port group, county, and port. (Source: U.S. Census, 2000, Summary File 3, Tables P43 and P51.) (Page 1 of 4)

State-Port Group-County-Port	Pop. In Labor Force		Unemployed		Pop. Employed		Resouce Occupation	
	Place	BG equiv	Place	BG equiv	Place	BG equiv	Place	BG equiv
Washington	3,953,698		4.71%		70.66%		1.54%	
Puget Sound	**712,701**	**784,645**	**4.80%**	**4.71%**	**72.76%**	**72.81%**	**0.37%**	**0.44%**
Whatcom	113,770		5.66%		71.00%		2.11%	
Blaine	2,413	5,804	4.81%	4.91%	64.98%	68.49%	0.37%	1.57%
Bellingham Bay	48,958	61,367	7.88%	6.87%	68.84%	70.08%	0.53%	0.69%
San Juan	9,551		2.26%		69.17%		1.99%	
Friday Harbor	1,410	4,631	3.90%	2.07%	73.69%	68.75%	1.77%	1.38%
Skagit	67,527		5.04%		67.72%		3.59%	
Anacortes	9,506	14,249	3.51%	3.26%	63.63%	63.63%	1.28%	1.54%
La Conner	570	913	2.11%	2.74%	72.98%	71.52%	2.28%	10.08%
Snohomish	408,038		3.88%		74.03%		0.57%	
Everett	62,256	89,980	6.01%	5.39%	67.87%	70.24%	0.32%	0.39%
King	1,231,594		3.54%		75.45%		0.28%	
Seattle	424,042	424,022	4.09%	4.08%	75.82%	75.83%	0.23%	0.23%
Pierce	463,026		4.68%		67.85%		0.54%	
Tacoma	128,143	116,174	5.72%	5.73%	67.73%	67.83%	0.53%	0.39%
Thurston	140,121		4.53%		71.71%		1.15%	
Olympia	29,904	56,100	3.79%	4.12%	72.71%	71.77%	0.65%	0.66%
Mason	30,460		5.75%		63.41%		2.53%	
Shelton	5,499	11,405	5.82%	6.56%	62.94%	66.56%	3.13%	3.42%
North Washington Coast	**23,104**	**38,610**	**5.44%**	**4.95%**	**61.11%**	**61.50%**	**1.53%**	**1.92%**
Jefferson	17,129		4.57%		63.43%		1.90%	
Port Townsend	5,713	7,917	5.22%	4.70%	67.43%	67.39%	1.07%	1.06%
Clallam	40,783		4.99%		59.96%		3.10%	
Sequim	2,753	10,704	2.72%	2.70%	39.99%	52.03%	2.03%	1.91%
Port Angeles	12,137	18,486	5.58%	5.65%	62.35%	64.26%	1.52%	1.83%
Port Angeles E	2,053		5.94%		64.49%		0.63%	
Neah Bay	448	764	19.20%	18.98%	60.94%	61.26%	8.48%	8.25%
La Push		739		8.39%		67.12%		6.90%
South & Central WA Coast	**2,318**	**24,873**	**5.65%**	**5.60%**	**59.32%**	**61.41%**	**4.40%**	**3.72%**
Grays Harbor	42,860		5.85%		64.29%		4.30%	
Copalis Beach	285	989	11.23%	7.89%	40.00%	50.05%	0.00%	1.11%
Grays Harbor		11,911		5.83%		64.13%		3.85%
Westport	1,397	1,804	5.08%	4.93%	61.13%	62.97%	6.30%	5.38%
Pacific	13,264		5.08%		60.23%		4.78%	
Willapa Bay		7,797		5.45%		57.93%		3.72%
Ilwaco/Chinook	636	2,372	4.40%	4.47%	63.99%	62.69%	2.20%	2.91%

TABLE 8-15. Labor force, unemployed as a percent of labor force, employed population and population employed in private sector jobs in agriculture, forestry, fishing and hunting by state, port group, county, and port. (Source: U.S. Census, 2000, Summary File 3, Tables P43 and P51.) (Page 2 of 4)

	Pop. In Labor Force		Unemployed		Pop. Employed		Resouce Occupation	
State-Port Group-County-Port	Place	BG equiv	Place	BG equiv	Place	BG equiv	Place	BG equiv
Oregon	2,306,034		4.88%		70.59%		1.88%	
Astoria	**12,607**	**26,702**	**4.17%**	**4.65%**	**68.07%**	**68.37%**	**1.47%**	**2.07%**
Clatsop	24,171		4.80%		68.25%		2.94%	
Astoria	6,746	14,043	4.94%	5.76%	66.16%	66.43%	2.16%	3.18%
Gearhart	659	5,451	4.10%	3.21%	74.36%	71.29%	0.76%	0.86%
Seaside	4,010	5,451	3.12%	3.21%	69.35%	71.29%	0.72%	0.86%
Cannon Beach	1,192	1,757	3.44%	4.67%	71.06%	65.74%	0.42%	0.80%
Tillamook	**4,401**	**13,358**	**3.61%**	**3.35%**	**70.10%**	**67.34%**	**5.00%**	**7.31%**
Tillamook	16,131		3.15%		67.92%		7.13%	
Nehalem Bay	168	2,121	1.79%	3.44%	76.19%	61.95%	0.00%	5.42%
Tillamook / Garibaldi	3,019	7,847	2.91%	3.24%	73.00%	69.66%	6.86%	8.22%
Netarts Bay	515	1,176	6.41%	4.34%	60.58%	64.97%	0.00%	4.51%
Pacific City	699	2,214	5.01%	3.16%	63.09%	65.54%	1.86%	7.41%
Newport	**9,855**	**16,565**	**6.43%**	**6.04%**	**64.79%**	**63.37%**	**2.20%**	**2.48%**
Lincoln	29,934		5.87%		64.35%		2.35%	
Salmon River		848		5.54%		59.20%		0.00%
Depoe Bay	827	1,358	3.63%	5.30%	62.64%	57.36%	2.54%	1.55%
Siletz Bay	739	1,761	3.92%	4.94%	67.66%	68.20%	2.98%	5.34%
Newport	6,522	8,273	6.65%	6.18%	66.80%	66.58%	2.44%	2.54%
Waldport	1,330	3,103	9.55%	7.90%	57.29%	57.65%	0.83%	1.58%
Yachats	437	1,222	3.20%	3.11%	56.75%	58.84%	0.92%	3.03%
Coos Bay	**17,088**	**37,005**	**5.99%**	**5.83%**	**57.58%**	**58.91%**	**1.80%**	**2.52%**
Lane	221,434		4.78%		70.21%		1.22%	
Florence	4,648	6,757	5.23%	5.11%	47.55%	49.31%	1.83%	1.48%
Douglas	65,221		5.24%		63.89%		2.70%	
Winchester Bay	307	3,960	9.77%	7.47%	45.93%	53.86%	2.61%	4.55%
Coos	40,967		5.70%		61.48%		3.32%	
Coos Bay	10,263	21,915	6.49%	6.07%	62.81%	62.57%	1.98%	2.18%
Bandon	1,870	4,373	4.49%	4.21%	55.72%	59.94%	0.64%	4.02%
Brookings	**5,414**	**12,943**	**3.75%**	**4.22%**	**62.98%**	**59.28%**	**2.20%**	**3.02%**
Curry	13,547		4.66%		58.91%		3.17%	
Port Orford	730	1,291	4.66%	5.19%	54.52%	58.17%	4.38%	7.20%
Gold Beach	1,197	3,083	2.67%	3.24%	70.43%	65.55%	2.09%	1.59%
Brookings	3,487	8,569	3.93%	4.42%	62.20%	57.19%	1.78%	2.91%

TABLE 8-15. Labor force, unemployed as a percent of labor force, employed population and population employed in private sector jobs in agriculture, forestry, fishing and hunting by state, port group, county, and port. (Source: U.S. Census, 2000, Summary File 3, Tables P43 and P51.) (Page 3 of 4)

	Pop. In Labor Force		Unemployed		Pop. Employed		Resouce Occupation	
State-Port Group-County-Port	Place	BG equiv	Place	BG equiv	Place	BG equiv	Place	BG equiv
California	21,763,678		5.10%		67.63%		1.13%	
Crescent City	**6,004**	**12,947**	**6.85%**	**6.94%**	**58.24%**	**60.96%**	**2.81%**	**2.55%**
Del Norte	14,769		7.24%		60.66%		3.53%	
Crescent City	2,220	12,947	8.29%	6.94%	54.68%	60.96%	1.94%	2.55%
Bertsch-Oceanview CDP	1,325		6.79%		57.43%		3.92%	
Crescent City North CDP	2,459		5.57%		61.90%		3.01%	
Eureka	**17,117**	**34,478**	**6.75%**	**6.29%**	**63.45%**	**65.25%**	**1.92%**	**1.99%**
Humboldt	83,373		6.25%		66.48%		2.80%	
Trinidad	232	2,126	5.17%	10.07%	71.98%	57.81%	0.00%	3.90%
Eureka*	16,885	32,352	6.78%	6.04%	63.33%	65.74%	1.95%	1.86%
Fort Bragg	**5,043**	**14,438**	**5.89%**	**5.04%**	**67.08%**	**68.96%**	**5.33%**	**5.14%**
Mendocino	56,458		5.34%		68.33%		4.55%	
Fort Bragg	4,733	9,013	6.13%	6.15%	65.92%	67.74%	5.30%	4.70%
Albion		2,818		2.31%		70.65%		6.25%
Point Arena	310	2,607	2.26%	4.18%	84.84%	71.38%	5.81%	5.45%
Bodega Bay	**8,300**	**12,680**	**1.73%**	**1.84%**	**78.82%**	**77.51%**	**1.08%**	**2.78%**
Sonoma	313,439		3.26%		73.13%		1.73%	
Bodega Bay	1,091	2,496	1.74%	2.16%	65.44%	68.31%	2.66%	3.45%
Marin	174,003		2.27%		74.05%		0.32%	
Tomales Bay	165	375	3.64%	1.60%	91.52%	86.13%	9.70%	7.47%
Point Reyes	648	2,985	1.23%	2.08%	76.23%	75.01%	5.40%	7.67%
Sausalito	6,396	6,824	1.74%	1.63%	81.04%	81.49%	0.16%	0.15%
San Francisco	**1,028,276**	**1,050,134**	**4.39%**	**4.35%**	**71.82%**	**71.88%**	**0.09%**	**0.12%**
San Francisco	578,066		3.57%		74.01%		0.08%	
San Francisco	578,066	578,066	3.57%	3.57%	74.01%	74.01%	0.08%	0.08%
Contra Costa	631,736		3.59%		71.45%		0.23%	
Richmond	62,980	70,028	5.70%	5.47%	67.91%	68.01%	0.16%	0.16%
Alameda	969,813		4.16%		71.44%		0.12%	
Berkeley	76,228	75,468	4.28%	4.28%	73.24%	73.21%	0.04%	0.04%
Oakland	259,802	259,802	6.13%	6.13%	67.26%	67.26%	0.12%	0.12%
Alameda	51,200	51,200	3.33%	3.33%	72.83%	72.83%	0.09%	0.09%
San Mateo	489,964		2.49%		73.81%		0.28%	
Princeton		15,570		2.45%		77.48%		1.64%

TABLE 8-15. Labor force, unemployed as a percent of labor force, employed population and population employed in private sector jobs in agriculture, forestry, fishing and hunting by state, port group, county, and port. (Source: U.S. Census, 2000, Summary File 3, Tables P43 and P51.) (Page 4 of 4)

	Pop. In Labor Force		Unemployed		Pop. Employed		Resouce Occupation	
State-Port Group-County-Port	Place	BG equiv	Place	BG equiv	Place	BG equiv	Place	BG equiv
Monterey	**63,055**	**83,154**	**4.01%**	**4.02%**	**69.44%**	**70.22%**	**0.77%**	**0.97%**
Santa Cruz	177,328		4.70%		72.96%		3.02%	
Santa Cruz	40,027	57,651	4.83%	4.65%	74.06%	73.72%	0.72%	0.88%
Monterey	248,579		6.30%		65.97%		7.87%	
Moss Landing	259	1,281	17.37%	8.74%	80.31%	69.16%	7.72%	9.21%
Monterey	22,769	24,222	2.41%	2.27%	61.19%	61.95%	0.78%	0.73%
Morro Bay	**7,272**	**28,664**	**2.46%**	**2.53%**	**61.67%**	**67.04%**	**2.28%**	**2.36%**
San Luis Obispo	161,072		4.29%		68.09%		2.19%	
Morro Bay	7,272	26,221	2.46%	2.59%	61.67%	67.16%	2.28%	2.56%
Avila Beach		2,443		1.92%		65.74%		0.20%
Santa Barbara	**184,403**	**262,398**	**4.98%**	**4.57%**	**68.79%**	**69.84%**	**4.24%**	**3.35%**
Santa Barbara	264,489		4.92%		68.33%		4.10%	
Santa Barbara	66,236	65,759	4.45%	3.99%	72.10%	71.77%	0.54%	0.58%
Ventura	491,100		3.89%		70.93%		2.54%	
Ventura		75,361		3.93%		72.55%		1.02%
Oxnard	103,952	104,299	5.50%	5.52%	67.72%	67.85%	6.85%	6.96%
Port Hueneme	14,215	16,979	3.71%	3.89%	61.24%	62.57%	2.34%	2.26%
Los Angeles	**369,178**	**451,558**	**5.86%**	**5.86%**	**67.20%**	**66.65%**	**0.09%**	**0.12%**
Los Angeles	6,015,559		5.89%		65.72%		0.11%	
San Pedro		52,204		5.01%		65.94%		0.29%
Willmington		30,346		6.89%		60.19%		0.25%
Long Beach	288,260	290,174	6.83%	6.83%	65.73%	65.76%	0.08%	0.08%
Terminal Island		98		15.31%		57.14%		0.00%
Orange	1,880,724		3.78%		71.19%		0.20%	
Newport Beach	53,446	56,751	2.23%	2.21%	71.69%	72.13%	0.07%	0.08%
Newport Coast CDP	1,943		0.00%		70.72%		0.00%	
Dana Point	25,529	21,985	2.93%	3.01%	74.03%	74.79%	0.21%	0.13%
San Diego	**935,006**	**903,128**	**4.33%**	**4.33%**	**66.89%**	**66.82%**	**0.22%**	**0.23%**
San Diego	1,874,264		4.18%		66.23%		0.40%	
Oceanside	104,176	105,364	3.97%	3.86%	65.33%	65.41%	0.70%	0.75%
San Diego	830,830	797,764	4.38%	4.39%	67.09%	67.01%	0.16%	0.16%

Port names in italic- no census place.

Port Angeles East, Bertsch-Oceanview, Crescent City North, and Newport Coast- no separate block group equivalent.

*Includes Fields Landing.

Notes: Tables P43 and P51 break out population by sex, values are summed for calculations. “Pop. in Labor Force” from Table P43 is for population 16 years old and over. “Pop. Employed” from table P51 is Employed civilian population 16 years and over. “Resource Occupation” sums (for both sexes) private for-profit wage and salary workers and self-employed workers in own not incorporated business in agriculture, forestry, fishing and hunting industries (NAICS 21) from table P51.

TABLE 8-16. Household income indicators by state, port group, county, and port. (Source: U.S. Census, 2000, Summary File 3, Tables P54, P56 and P93.) (Page 1 of 4)

State-Port Group-County-Port			Total Households		Median Income	Average Income		Below Poverty Level	
			Place	BG Equiv	Place	Place	BG Equiv	Place	BG Equiv
Washington			2,272,261		$45,776	$58,653		9.82%	
Puget Sound			**429,785**	**471,269**		**$57,891**	**$58,327**	**11.99%**	**11.56%**
	Whatcom		64,464		$40,005	$51,119		13.65%	
		Blaine	1,485	3,407	$36,900	$50,060	$59,765	14.75%	11.09%
		Bellingham Bay	28,012	34,785	$32,530	$45,139	$48,163	19.49%	17.19%
	San Juan		6,468		$43,491	$67,202		9.63%	
		Friday Harbor	900	3,058	$35,139	$44,305	$69,525	11.78%	8.80%
	Skagit		38,814		$42,381	$55,622		9.55%	
		Anacortes	6,097	8,999	$41,930	$53,547	$59,298	7.77%	7.50%
		La Conner	365	571	$42,344	$50,875	$55,993	8.77%	6.48%
	Snohomish		224,966		$53,060	$62,386		6.48%	
		Everett	36,255	51,630	$40,100	$50,092	$53,698	10.82%	9.48%
	King		711,235		$53,157	$71,101		7.84%	
		Seattle	258,635	258,524	$45,736	$64,511	$64,610	10.71%	10.70%
	Pierce		260,897		$45,204	$54,972		9.59%	
		Tacoma	76,127	69,563	$37,879	$47,251	$46,514	14.08%	14.40%
	Thurston		81,666		$46,975	$56,343		8.76%	
		Olympia	18,673	34,143	$40,846	$49,929	$53,831	12.47%	10.72%
	Mason		18,876		$39,586	$45,665		11.70%	
		Shelton	3,236	6,589	$32,500	$39,186	$42,728	17.24%	13.93%
North Washington Coast			**15,761**	**25,849**		**$41,388**	**$45,252**	**14.26%**	**12.61%**
	Jefferson		11,649		$37,869	$49,079		11.33%	
		Port Townsend	3,912	5,362	$34,536	$47,433	$49,712	14.08%	12.55%
	Clallam		27,187		$36,449	$44,940		12.16%	
		Sequim	2,155	7,590	$27,880	$34,941	$45,632	15.36%	10.41%
		Port Angeles	8,079	11,960	$33,130	$40,209	$43,718	13.18%	12.93%
		Port Angeles E	1,348		$34,730	$43,067	$43,718		
		Neah Bay	267	470	$21,635	$32,037	$31,128	33.33%	32.77%
		La Push		467			$41,382		20.34%
South & Central WA Coast			**1,579**	**16,376**		**$38,804**	**$40,188**	**15.77%**	**14.99%**
	Grays Harbor		26,807		$34,160	$41,862		15.12%	
		Copalis Beach	226	732	$33,194	$33,729	$32,520	19.03%	13.39%
		Grays Harbor		7,351			$42,877		15.60%
		Westport	934	1,248	$32,037	$40,522	$39,929	15.10%	15.54%
	Pacific		9,089		$31,209	$39,521		13.99%	
		Willapa Bay		5,450			$36,976		14.99%
		Ilwaco/Chinook	419	1,595	$29,632	$37,712	$42,493	15.51%	12.41%

TABLE 8-16. Household income indicators by state, port group, county, and port. (Source: U.S. Census, 2000, Summary File 3, Tables P54, P56 and P93.) (Page 2 of 4)

State-Port Group-County-Port			Total Households		Median Income	Average Income		Below Poverty Level	
			Place	BG Equiv	Place	Place	BG Equiv	Place	BG Equiv
Oregon			1,335,109		$40,916	$52,816		10.79%	
Astoria			**8,058**	**16,503**		**$42,807**	**$45,399**	**14.01%**	**12.27%**
	Clatsop		14,741		$36,301	$46,206		11.74%	
		Astoria	4,269	8,369	$33,011	$42,039	$44,314	15.20%	12.44%
		Gearhart	417	3,513	$43,047	$56,584	$45,941	7.67%	12.47%
		Seaside	2,665	3,513	$31,074	$38,751	$45,941	13.96%	12.47%
		Cannon Beach	707	1,108	$39,271	$54,614	$50,167	10.75%	9.75%
Tillamook			**2,742**	**8,521**		**$39,311**	**$42,730**	**11.89%**	**11.44%**
	Tillamook		10,214		$34,269	$44,627		10.89%	
		Nehalem Bay	83	1,457	$40,250	$47,455	$44,006	8.43%	12.77%
		Tillamook / Garibaldi	1,830	4,935	$29,875	$36,301	$39,725	14.15%	12.75%
		Netarts Bay	336	755	$31,204	$39,180	$45,072	10.71%	7.55%
		Pacific City	493	1,374	$33,250	$49,199	$50,880	4.87%	7.50%
Newport			**6,413**	**10,728**		**$44,497**	**$44,715**	**12.38%**	**10.92%**
	Lincoln		19,352		$32,769	$42,409		12.14%	
		Salmon River		552			$50,572		6.88%
		Depoe Bay	608	973	$35,417	$49,811	$45,157	8.06%	7.40%
		Siletz Bay	445	1,028	$38,542	$38,382	$44,845	15.73%	10.70%
		Newport	4,153	5,144	$31,996	$45,750	$46,405	12.18%	11.45%
		Waldport	877	2,194	$33,301	$36,789	$40,280	15.05%	11.90%
		Yachats	330	837	$32,308	$47,671	$41,426	11.21%	12.07%
Coos Bay			**11,698**	**24,746**		**$39,844**	**$39,553**	**14.41%**	**14.83%**
	Lane		130,616		$36,942	$48,062		14.11%	
		Florence	3,601	5,081	$30,505	$36,489	$37,920	11.27%	11.43%
	Douglas		39,867		$33,223	$41,157		12.84%	
		Winchester Bay	254	2,891	$30,139	$36,951	$35,659	20.08%	16.57%
	Coos		26,181		$31,542	$41,013		14.82%	
		Coos Bay	6,538	13,875	$31,212	$41,237	$40,522	15.80%	16.32%
		Bandon	1,305	2,899	$29,492	$42,682	$41,662	15.02%	11.90%
Brookings			**3,637**	**9,102**		**$38,045**	**$39,563**	**12.68%**	**13.28%**
	Curry		9,554		$30,117	$39,638		13.18%	
		Port Orford	572	985	$23,289	$32,845	$34,361	19.76%	19.70%
		Gold Beach	805	2,143	$30,243	$37,501	$41,286	12.17%	12.41%
		Brookings	2,260	5,974	$31,656	$39,556	$39,803	11.06%	12.54%

TABLE 8-16. Household income indicators by state, port group, county, and port. (Source: U.S. Census, 2000, Summary File 3, Tables P54, P56 and P93.) (Page 3 of 4)

State-Port Group-County-Port			Total Households		Median Income	Average Income		Below Poverty Level	
			Place	BG Equiv	Place	Place	BG Equiv	Place	BG Equiv
California			11,512,020		$47,493	$65,628		11.82%	
Crescent City			**3,951**	**8,029**		**$33,119**	**$39,654**	**22.55%**	**18.48%**
	Del Norte		9,185		$29,642	$39,136		18.20%	
		Crescent City	1,541	8,029	$20,133	$29,916	$39,654	30.69%	18.48%
		Bertsch-Oceanview CDP	822		$26,300	$31,490		16.67%	
		Crescent City North CDP	1,588		$29,478	$37,070		17.70%	
Eureka			**11,004**	**21,653**		**$37,712**	**$41,482**	**20.86%**	**17.33%**
	Humboldt		51,235		$31,226	$41,746		18.68%	
		Trinidad	170	1,530	$40,000	$58,371	$40,884	8.24%	21.76%
		Eureka*	10,834	20,123	$25,849	$37,388	$41,527	21.05%	17.00%
Fort Bragg			**3,046**	**8,956**		**$36,769**	**$49,781**	**17.20%**	**12.47%**
	Mendocino		33,331		$35,996	$49,512		13.74%	
		Fort Bragg	2,861	5,463	$28,539	$36,999	$44,081	17.09%	13.31%
		Albion		1,855			$64,880		10.67%
		Point Arena	185	1,638	$27,083	$33,218	$51,693	18.92%	11.72%
Bodega Bay			**5,426**	**8,054**		**$125,927**	**$108,183**	**4.15%**	**6.28%**
	Sonoma		172,690		$53,076	$67,258		6.97%	
		Bodega Bay	696	1,625	$56,818	$79,250	$68,835	1.44%	5.11%
	Marin		100,736		$71,306	$108,756		5.51%	
		Tomales Bay	77	182	$51,953	$63,468	$59,781	0.00%	12.09%
		Point Reyes	378	1,719	$57,292	$88,572	$73,645	7.41%	12.45%
		Sausalito	4,275	4,528	$87,469	$137,954	$137,361	4.37%	4.13%
San Francisco			**590,839**	**602,476**		**$71,723**	**$72,303**	**12.39%**	**12.28%**
	San Francisco		329,850		$55,221	$80,325		10.23%	
		San Francisco	329,850	329,850	$55,221	$80,325	$80,325	10.23%	10.23%
	Contra Costa		344,422		$63,675	$83,675		6.60%	
		Richmond	34,752	38,832	$44,210	$55,686	$55,324	13.80%	13.47%
	Alameda		523,787		$55,946	$72,629		9.82%	
		Berkeley	45,007	44,576	$44,485	$68,437	$67,906	18.33%	18.42%
		Oakland	150,971	150,971	$40,055	$57,267	$57,267	16.07%	16.07%
		Alameda	30,259	30,259	$56,285	$73,388	$73,388	7.10%	7.10%
	San Mateo		254,219		$70,819	$98,874		4.95%	
		Princeton		7,988			$128,189		4.39%
Monterey			**33,133**	**43,865**		**$64,130**	**$67,623**	**11.04%**	**10.25%**
	Santa Cruz		91,244		$53,998	$72,455		9.54%	
		Santa Cruz	20,368	29,842	$50,605	$66,273	$68,772	13.07%	11.54%
	Monterey		121,199		$48,305	$63,944		10.26%	
		Moss Landing	109	569	$66,442	$77,728	$61,468	6.42%	7.03%
		Monterey	12,656	13,454	$49,109	$60,563	$65,336	7.82%	7.50%

TABLE 8-16. Household income indicators by state, port group, county, and port. (Source: U.S. Census, 2000, Summary File 3, Tables P54, P56 and P93.) (Page 4 of 4)

State-Port Group-County-Port			Total Households		Median Income	Average Income		Below Poverty Level	
			Place	BG Equiv	Place	Place	BG Equiv	Place	BG Equiv
Morro Bay			**5,045**	**18,374**		**$43,120**	**$56,804**	**13.16%**	**9.07%**
	San Luis Obispo		92,732		$42,428	$55,550		11.80%	
		Morro Bay	5,045	16,662	$34,379	$43,120	$55,327	13.16%	9.35%
		Avila Beach		1,712			$71,171		6.31%
Santa Barbara			**86,553**	**131,413**		**$61,202**	**$63,423**	**11.15%**	**9.86%**
	Santa Barbara		136,769		$46,677	$65,782		11.60%	
		Santa Barbara	35,720	36,839	$47,498	$66,844	$70,205	10.82%	10.71%
	Ventura		243,503		$59,666	$75,130		7.17%	
		Ventura		42,208			$64,487		7.48%
		Oxnard	43,577	43,765	$48,603	$58,449	$58,778	11.58%	11.44%
		Port Hueneme	7,256	8,601	$42,246	$49,964	$52,788	10.17%	9.94%
Los Angeles			**211,882**	**257,269**		**$68,938**	**$64,901**	**15.23%**	**15.57%**
	Los Angeles		3,136,279		$42,189	$61,811		15.13%	
		San Pedro		30,632			$55,066		14.02%
		Willmington		14,385			$43,188		23.78%
		Long Beach	163,279	164,342	$37,270	$52,981	$53,101	18.24%	18.15%
		Terminal Island		104			$38,963		35.58%
	Orange		936,154		$58,820	$77,543		7.74%	
		Newport Beach	33,148	35,157	$83,455	$132,084	$129,577	4.81%	4.92%
		Newport Coast CDP	1,006		$164,653	$264,648		2.98%	
		Dana Point	14,449	12,649	$63,043	$90,776	$87,190	6.02%	5.97%
San Diego			**507,673**	**492,399**	**$92,034**	**$61,873**	**$61,947**	**11.73%**	**11.87%**
	San Diego		995,492		$47,067	$63,204		10.34%	
		Oceanside	56,547	56,857	$46,301	$56,809	$57,492	9.17%	8.96%
		San Diego	451,126	435,542	$45,733	$62,508	$62,529	12.05%	12.25%

Port names in italic- no census place.

Port Angeles East, Bertsch-Oceanview, Crescent City North, and Newport Coast- no separate block group equivalent.

*Includes Fields Landing.

Note: Average household income calculated by dividing aggregate household income in 1999 from table P54 by the total number of households given in table P52.

TABLE 8-17a. Coastal Counties Economic Profile: 2001. (Page 1 of 2)

State	County	Population	Personal Income ($,000)	Per Capita Personal Income ($)	Rank	Wages & Salaries ($,000)	Wage & Salary Employment	Average Annual Wage	Rank
Washington	Whatcom	170,673	4,192,379	$24,564	32	2,114,526	74,361	$28,436	26
	Skagit	105,236	2,901,787	$27,574	22	1,344,262	46,755	$28,751	24
	Snohomish	623,890	18,379,862	$29,460	17	8,474,469	232,347	$36,473	12
	King	1,753,901	80,617,305	$45,965	4	57,968,327	1,224,623	$47,336	3
	Pierce	718,918	19,123,592	$26,601	24	8,985,363	278,938	$32,213	20
	Thurston	212,831	6,015,831	$28,266	20	2,997,554	91,221	$32,860	19
	Clallam	65,304	1,671,533	$25,596	28	577,617	22,655	$25,496	34
	Jefferson	26,467	763,572	$28,850	18	218,382	9,134	$23,909	41
	Grays Harbor	68,233	1,521,515	$22,299	42	700,511	25,101	$27,908	28
	Pacific	20,766	447,144	$21,533	43	148,885	6,691	$22,252	45
	Wahkiakum	3,769	86,440	$22,934	38	22,741	903	$25,184	38
	Cowlitz	93,752	2,309,418	$24,633	31	1,279,646	40,655	$31,476	22
	Clark	359,337	10,335,767	$28,763	19	4,163,231	124,370	$33,475	17
	Skaminia	9,991	224,570	$22,477	41	50,724	2,036	$24,914	39
	Klickitat	19,301	412,819	$21,388	44	169,524	6,360	$26,655	31
Oregon	Clatsop	35,619	878,501	$24,664	30	415,343	16,462	$25,230	36
	Tillamook	24,477	571,762	$23,359	36	210,304	8,696	$24,184	40
	Lincoln	44,162	1,072,817	$24,293	34	424,292	17,844	$23,778	42
	Lane	324,300	8,419,843	$25,963	25	4,227,811	150,099	$28,167	27
	Douglas	100,309	2,311,002	$23,039	37	1,060,450	39,622	$26,764	30
	Coos	62,374	1,424,226	$22,834	39	569,451	22,366	$25,461	35
	Curry	21,071	519,836	$24,671	29	154,578	6,940	$22,273	44
	Columbia	44,267	1,147,914	$25,932	27	308,356	10,735	$28,724	25
	Multnomah	669,762	22,831,399	$34,089	11	17,622,969	472,626	$37,287	11
	Hood River	20,528	462,060	$22,509	40	248,852	10,494	$23,714	43
	Wasco	23,769	577,671	$24,304	33	265,875	9,683	$27,458	29
	Del Norte	27,367	483,737	$17,676	45	204,647	7,992	$25,606	33

TABLE 8-17a. Coastal Counties Economic Profile: 2001. (Page 2 of 2)

State	County	Population	Personal Income ($,000)	Per Capita Personal Income ($)	Rank	Wages & Salaries ($,000)	Wage & Salary Employment	Average Annual Wage	Rank
California									
	Humboldt	126,591	3,026,604	$23,909	35	1,361,763	53,072	$25,659	32
	Mendocino	86,800	2,252,193	$25,947	26	905,491	35,949	$25,188	37
	Sonoma	466,466	16,172,878	$34,671	10	7,499,243	209,407	$35,812	13
	Marin	248,837	15,697,430	$63,083	1	5,241,032	121,340	$43,193	6
	Napa	127,926	4,744,264	$37,086	7	2,320,881	67,268	$34,502	15
	Solano	405,565	10,881,241	$26,830	23	4,591,746	136,863	$33,550	16
	Contra Costa	978,729	41,098,522	$41,992	5	16,175,738	363,372	$44,516	5
	Alameda	1,475,331	56,974,006	$38,618	6	34,485,200	748,518	$46,071	4
	San Francisco	775,978	43,311,877	$55,816	3	38,416,304	630,154	$60,963	2
	San Mateo	708,710	41,038,760	$57,906	2	24,514,233	396,229	$61,869	1
	Santa Cruz	255,697	9,426,281	$36,865	8	3,833,732	111,000	$34,538	14
	Monterey	409,008	12,229,942	$29,901	16	5,824,801	182,700	$31,882	21
	San Luis Obispo	251,126	7,010,602	$27,917	21	3,046,755	105,685	$28,829	23
	Santa Barbara	401,339	13,540,609	$33,739	13	6,476,417	194,714	$33,261	18
	Ventura	770,285	24,828,184	$32,232	14	11,972,971	320,403	$37,368	10
	Los Angeles	9,677,220	296,232,770	$30,611	15	179,269,456	4,424,333	$40,519	7
	Orange	2,900,200	106,284,489	$36,647	9	60,852,829	1,526,308	$39,869	8
	San Diego	2,869,900	97,240,725	$33,883	12	53,507,978	1,420,849	$37,659	9
	TOTAL	28,586,082	991,695,679	$34,692		575,225,260	14,007,873	$41,064	

Source: U.S. Department of Commerce / Bureau of Economic Analysis / Regional Economic Information System (REIS)

TABLE 8-17b. Coastal Counties Economic Profile: 2001. (Page 1 of 2)

State	County	Dividends, Interest & Rent ($,000)	D.I.&.R. per capita	Rank	Transfer Payments ($,000)	Transfer Payment s per capita	Rank	net Residence Adjustment ($,000)	Res. Adj. per capita	Rank
Washington	Whatcom	970,114	$5,684	30	679,149	$3,979	27	42,842	$251	26
	Skagit	695,957	$6,613	20	493,386	$4,688	18	53,395	$507	22
	Snohomish	2,829,326	$4,535	39	2,058,977	$3,300	41	3,958,718	$6,345	6
	King	14,961,952	$8,531	8	6,481,483	$3,695	31	-7,413,977	-$4,227	43
	Pierce	3,285,154	$4,570	38	2,860,860	$3,979	26	2,254,601	$3,136	11
	Thurston	1,110,777	$5,219	36	872,466	$4,099	25	514,280	$2,416	14
	Clallam	540,259	$8,273	11	386,682	$5,921	3	8,204	$126	33
	Jefferson	260,172	$9,830	5	149,161	$5,636	5	76,700	$2,898	12
	Grays Harbor	296,361	$4,343	42	383,310	$5,618	6	16,004	$235	27
	Pacific	116,668	$5,618	33	130,744	$6,296	1	14,706	$708	18
	Wahkiakum	23,808	$6,317	23	20,009	$5,309	11	14,438	$3,831	10
	Cowlitz	404,617	$4,316	43	479,724	$5,117	14	-39,028	-$416	39
	Clark	2,021,252	$5,625	32	1,328,400	$3,697	30	2,060,315	$5,734	8
	Skaminia	44,631	$4,467	40	36,471	$3,650	34	82,443	$8,252	4
	Klickitat	108,962	$5,645	31	102,486	$5,310	10	3,147	$163	31
Oregon	Clatsop	205,219	$5,762	27	158,028	$4,437	19	3,206	$90	34
	Tillamook	153,343	$6,265	24	128,198	$5,237	13	3,252	$133	32
	Lincoln	295,467	$6,691	19	246,222	$5,575	7	-2,714	-$61	35
	Lane	1,975,383	$6,091	25	1,428,727	$4,406	20	53,082	$164	30
	Douglas	522,790	$5,212	37	551,145	$5,494	8	-16,694	-$166	36
	Coos	354,778	$5,688	29	355,443	$5,699	4	17,938	$288	25
	Curry	180,741	$8,578	7	130,570	$6,197	2	10,012	$475	23
	Columbia	193,854	$4,379	41	181,823	$4,107	24	393,134	$8,881	3
	Multnomah	4,528,166	$6,761	18	2,851,081	$4,257	21	-5,298,341	-$7,911	44
	Hood River	118,773	$5,786	26	72,295	$3,522	37	-19,937	-$971	41
	Wasco	136,543	$5,745	28	116,760	$4,912	16	15,241	$641	20

TABLE 8-17b. Coastal Counties Economic Profile: 2001. (Page 2 of 2)

State	County	Dividends, Interest & Rent ($,000)	D.I.&.R. per capita	Rank	Transfer Payments ($,000)	Transfer Payments per capita	Rank	net Residence Adjustment ($,000)	Res. Adj. per capita	Rank
California	Del Norte	90,459	$3,305	45	147,523	$5,391	9	-17,987	-$657	40
	Humboldt	672,509	$5,312	35	647,486	$5,115	15	-41,460	-$328	37
	Mendocino	587,738	$6,771	17	455,472	$5,247	12	15,980	$184	28
	Sonoma	3,900,414	$8,362	10	1,703,132	$3,651	33	1,327,120	$2,845	13
	Marin	4,531,883	$18,212	1	868,723	$3,491	38	3,311,965	$13,310	1
	Napa	1,152,754	$9,011	6	529,143	$4,136	23	218,052	$1,705	15
	Solano	1,611,915	$3,974	44	1,324,642	$3,266	42	2,552,806	$6,294	7
	Contra Costa	8,293,067	$8,473	9	3,610,056	$3,689	32	9,013,445	$9,209	2
	Alameda	9,457,498	$6,410	21	5,770,910	$3,912	28	1,726,178	$1,170	17
	San Francisco	9,065,200	$11,682	3	3,647,078	$4,700	17	-14,618,935	-$18,839	45
	San Mateo	9,428,151	$13,303	2	2,238,066	$3,158	44	952,615	$1,344	16
	Santa Cruz	1,992,530	$7,793	12	844,294	$3,302	40	1,805,743	$7,062	5
	Monterey	2,839,193	$6,942	15	1,366,320	$3,341	39	121,598	$297	24
	San Luis Obispo	1,940,351	$7,727	13	935,292	$3,724	29	151,125	$602	21
	Santa Barbara	4,206,721	$10,482	4	1,415,228	$3,526	36	-145,358	-$362	38
	Ventura	4,874,431	$6,328	22	2,469,328	$3,206	43	3,066,579	$3,981	9
	Los Angeles	53,683,113	$5,547	34	40,382,542	$4,173	22	-18,831,606	-$1,946	42
	Orange	20,321,546	$7,007	14	8,765,149	$3,022	45	2,000,111	$690	19
	San Diego	19,845,857	$6,915	16	10,441,722	$3,638	35	474,703	$165	29
	TOTAL	194,830,397	$6,816		110,245,706	$3,857		-10,112,359	-$354	

Source: U.S. Department of Commerce / Bureau of Economic Analysis / Regional Economic Information System (REIS).

TABLE 8-18. County unemployment rates, 2002. (Page 1 of 1)

State County	Unemployment Rate (2002)	Rank
Washington	7.2%	
Whatcom	6.3%	14
Skagit	7.7%	29
Snohomish	7.7%	28
King	6.5%	16
Pierce	7.5%	26
Thurston	5.8%	12
Clallam	7.5%	25
Jefferson	6.6%	18
Grays Harbor	9.5%	39
Pacific	8.6%	34
Wahkiakum	7.7%	30
Cowlitz	10.8%	43
Clark	9.1%	36
Skaminia	11.3%	44
Klickitat	14.3%	45
Oregon	7.5%	
Clatsop	6.5%	15
Tillamook	6.0%	13
Lincoln	7.7%	27
Lane	6.8%	22
Douglas	8.9%	35
Coos	8.6%	33
Curry	6.7%	19
Columbia	10.4%	41
Multnomah	8.5%	32
Hood River	9.5%	38
Wasco	9.8%	40
California	6.7%	
Del Norte	9.2%	37
Humboldt	6.5%	17
Mendocino	7.2%	23
Sonoma	4.5%	7
Marin	4.0%	2
Napa	4.3%	5
Solano	5.5%	11
Contra Costa	5.2%	9
Alameda	6.8%	21
San Francisco	7.3%	24
San Mateo	5.0%	8
Santa Cruz	8.0%	31
Monterey	10.4%	42
San Luis Obispo	3.4%	1
Santa Barbara	4.2%	4
Ventura	5.5%	10
Los Angeles	6.8%	20
Orange	4.1%	3
San Diego	4.3%	6
National	5.8%	

Source: U.S. Bureau of Labor Statistics.

TABLE 8-19. Thresholds for reference communities. (Page 1 of 1)

	Block Groups	Total Population	Thresholds Nonwhite	Native Am	Hispanic	Av Income	Poverty
North	3,024	3,591,291	29.67%	2.47%	8.07%	$40,622.24	14.73%
Central	3,041	4,537,804	65.93%	0.96%	28.03%	$50,541.69	13.90%
South	5,592	8,320,410	64.97%	1.21%	50.76%	$41,998.59	17.98%

TABLE 8-20. Summary of qualifying communities. (Page 1 of 3)

			% Nonwhite		% Native Am.		% Hispanic		Income		Poverty	
			B	P	B	P	B	P	B	P	B	P
Washington												
	Puget Sound											
		Blaine										
		Bellingham Bay										
		Friday Harbor										
		Anacortes										
		La Conner										
		Everett										
		Seattle										
		Tacoma										
		Olympia										
		Shelton										
	North Washington Coast											
		Port Townsend										
		Sequim										
		Port Angeles										
		Port Angeles E										
		Neah Bay										
		La Push										
	South & Central WA Coast											
		Copalis Beach										
		Grays Harbor										
		Westport										
		Willapa Bay										
		Ilwaco/Chinook										
Oregon												
	Astoria											
		Astoria										
		Gearhart										
		Seaside										
		Cannon Beach										
	Tillamook											
		Nehalem Bay										
		Tillamook / Garibaldi										
		Netarts Bay										
		Pacific City										
	Newport											
		Salmon River										
		Depoe Bay										
		Siletz Bay										
		Newport										
		Waldport										
		Yachats										
	Coos Bay											
		Florence										
		Winchester Bay										
		Coos Bay										
		Bandon										

TABLE 8-20. Summary of qualifying communities. (Page 2 of 3)

			% Nonwhite		% Native Am.		% Hispanic		Income		Poverty	
			B	P	B	P	B	P	B	P	B	P
	Brookings											
		Port Orford										
		Gold Beach										
		Brookings										
California												
	Crescent City											
		Crescent City										
	Eureka											
		Trinidad										
		Eureka										
	Fort Bragg											
		Fort Bragg										
		Albion										
		Point Arena										
	Bodega Bay											
		Bodega Bay										
		Tomales Bay										
		Point Reyes										
		Sausalito										
	San Francisco											
		San Francisco										
		Richmond										
		Berkeley										
		Oakland										
		Alameda										
		Princeton										
	Monterey											
		Santa Cruz										
		Moss Landing										
		Monterey										
	Morro Bay											
		Morro Bay										
		Avila Beach										
	Santa Barbara											
		Santa Barbara										
		Ventura										
		Oxnard										
		Port Hueneme										
	Los Angeles											
		San Pedro										
		Willmington										
		Long Beach										
		Terminal Island										
		Newport Beach										
		Dana Point										
	San Diego											
		Oceanside										
		San Diego										
Totals												
	North		4	3	15	8	5	7	13	20	12	19
	Central		1	2	2	2	1	1	0	1	2	2
	South		0	0	2	1	2	1	1	0	3	1
Grand Total			5	5	19	11	8	9	14	21	17	22

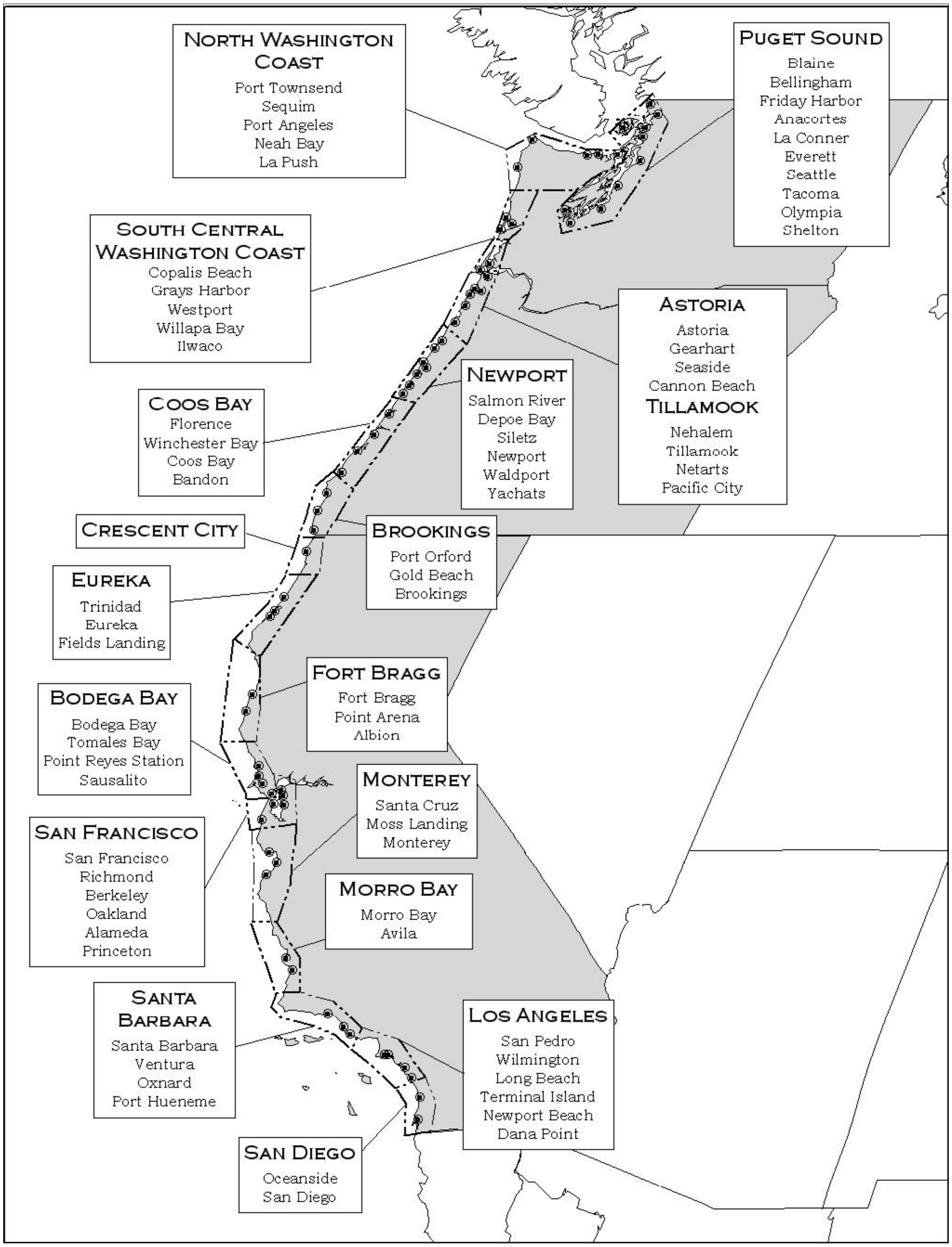

FIGURE 8-1. Port groups and ports.

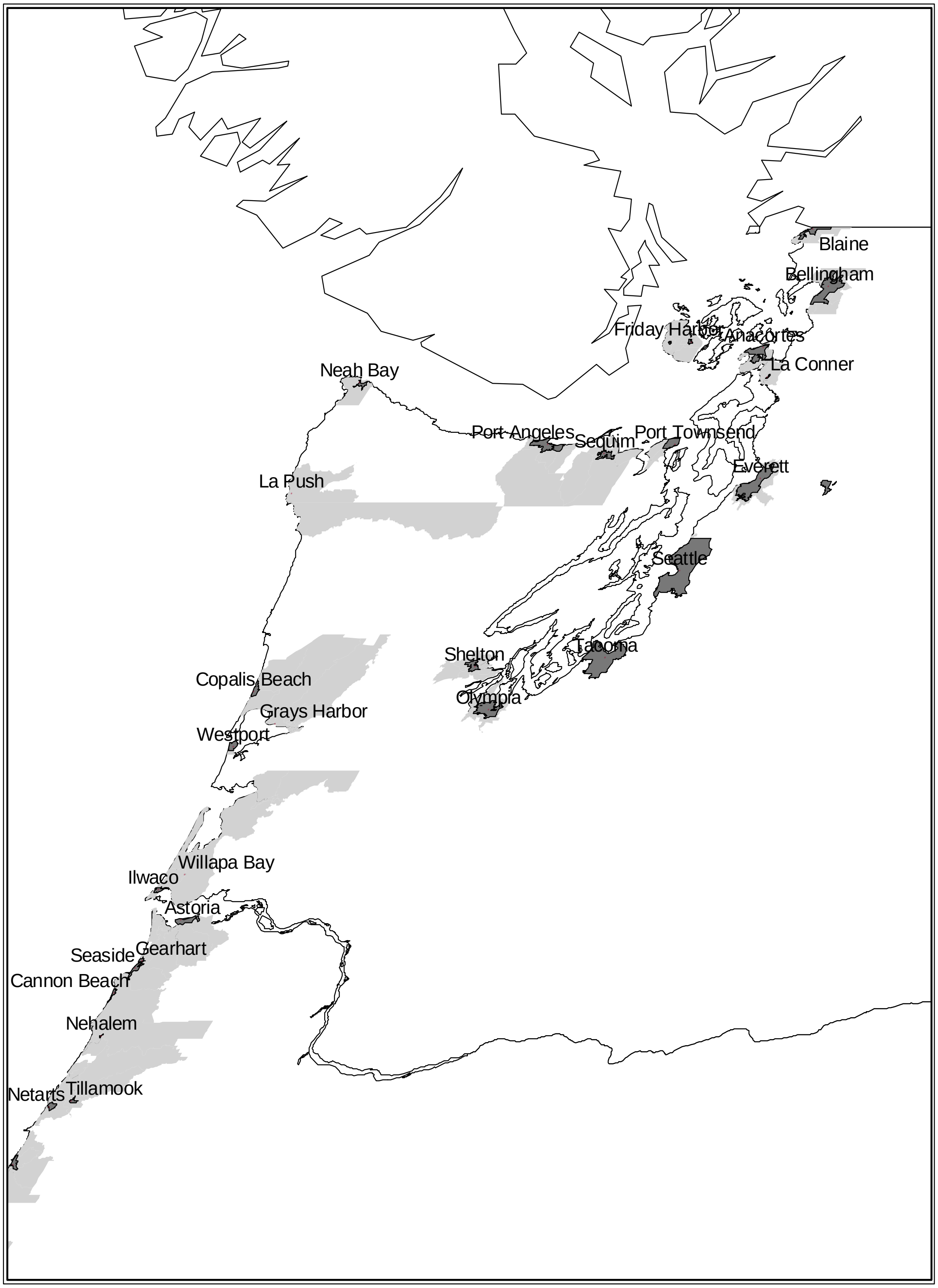

FIGURE 8-2. Census places and block group regions for ports in Washington State.

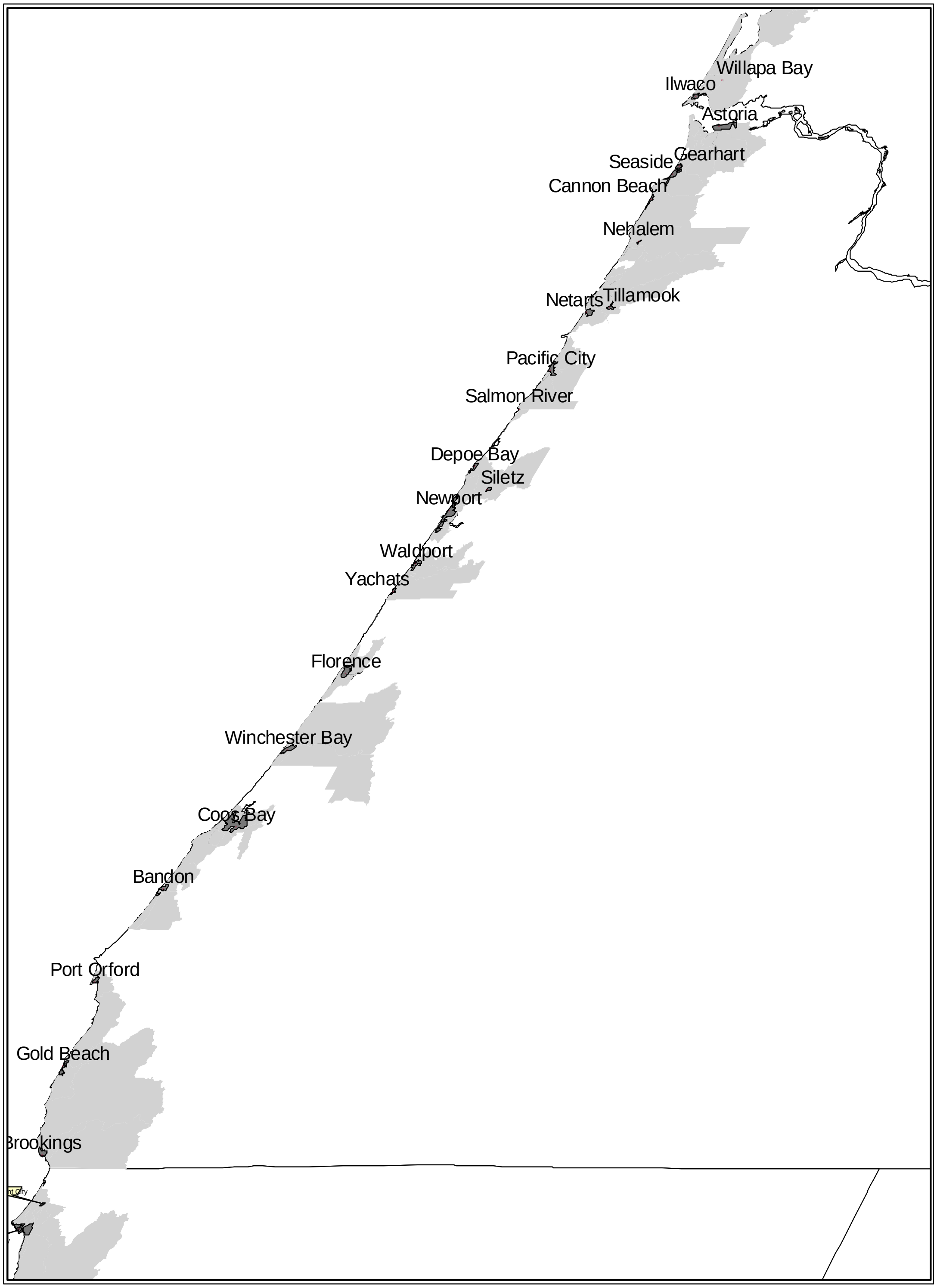

FIGURE 8-3. Census places and block group regions for ports in Oregon.

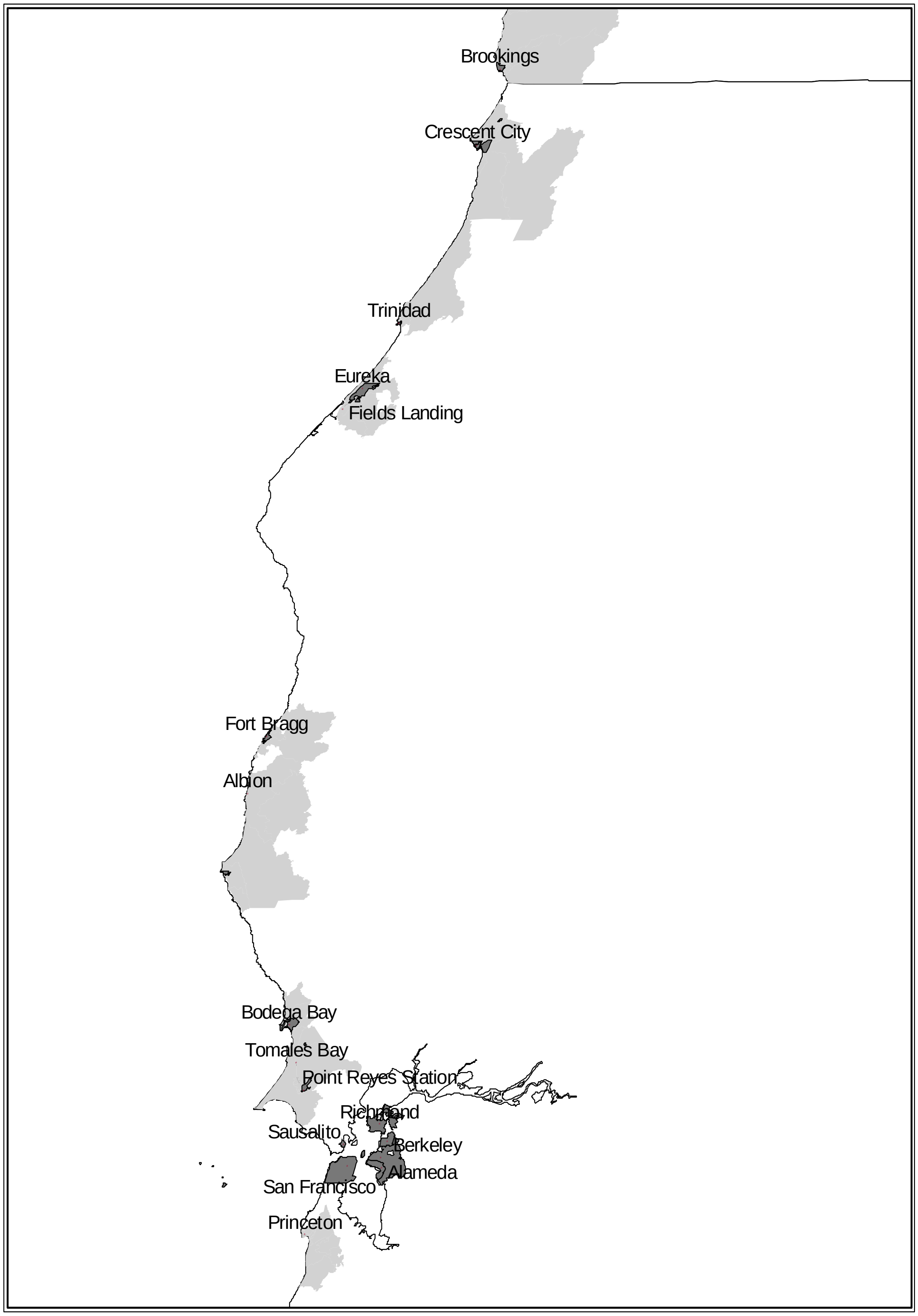

FIGURE 8-4. Census places and block group regions for ports in Northern California.

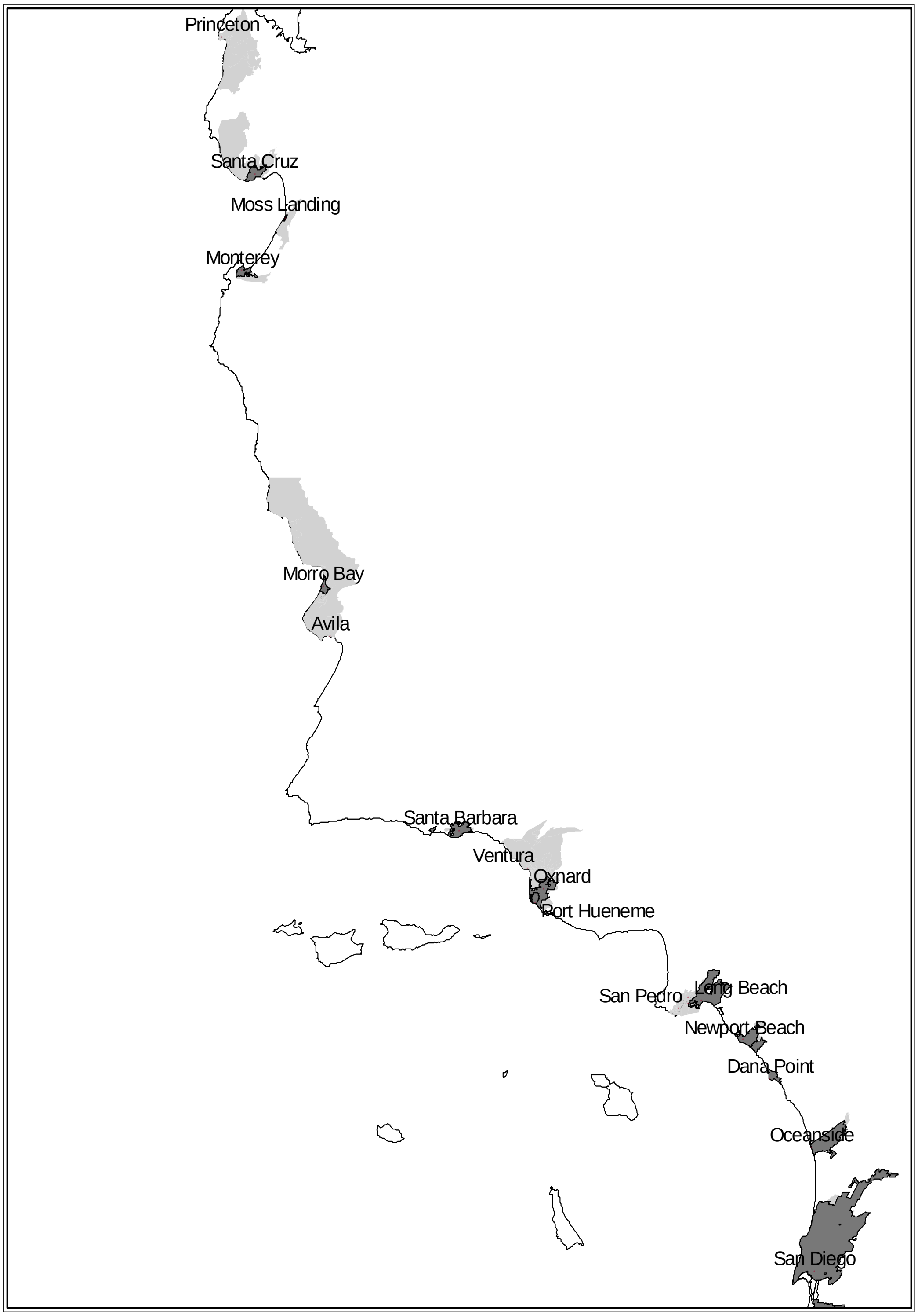

FIGURE 8-5. Census places and block group regions for ports in Southern California.

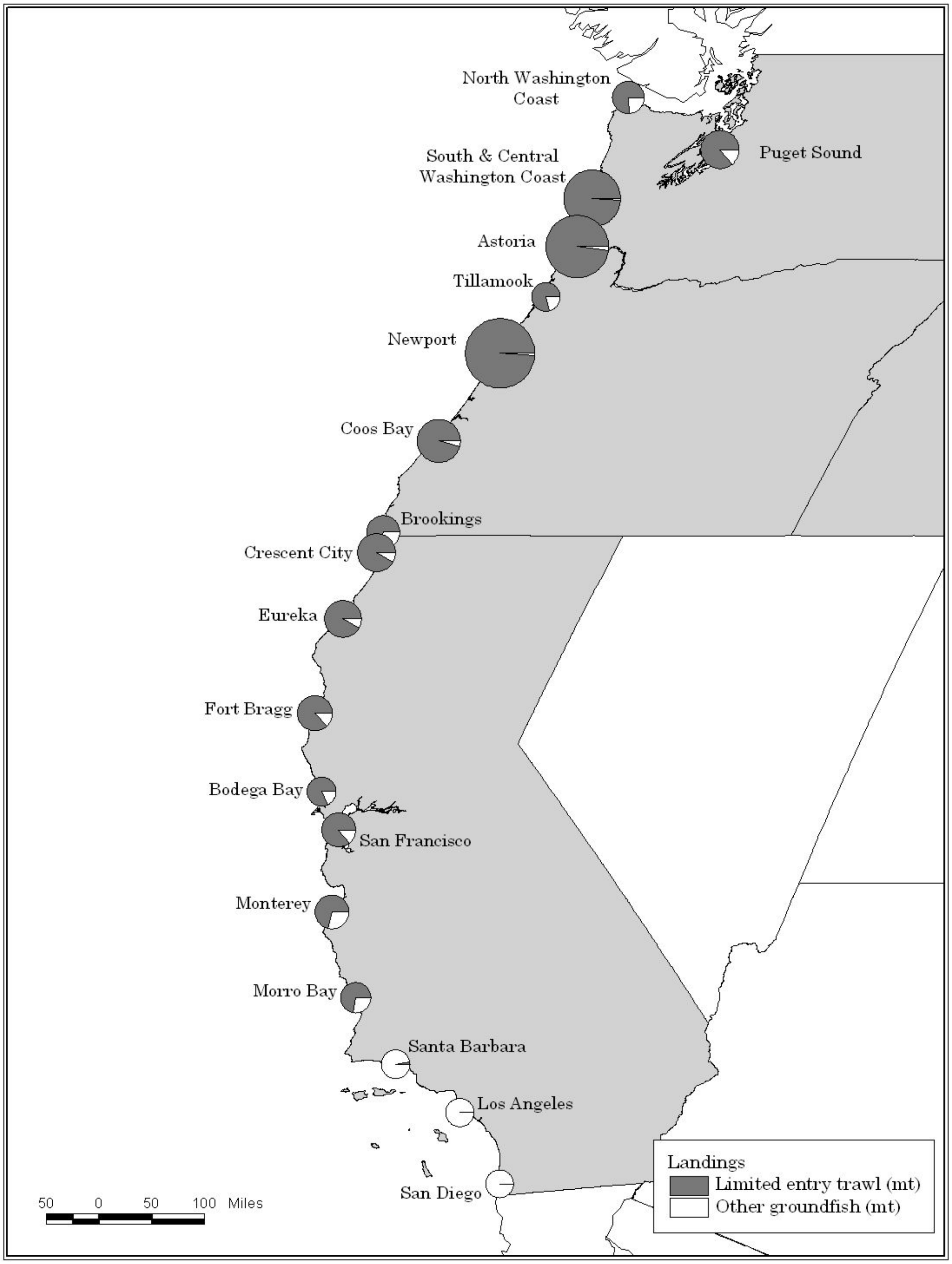

FIGURE 8-6. Distribution of groundfish landings in 2001 by round weight for port groups.

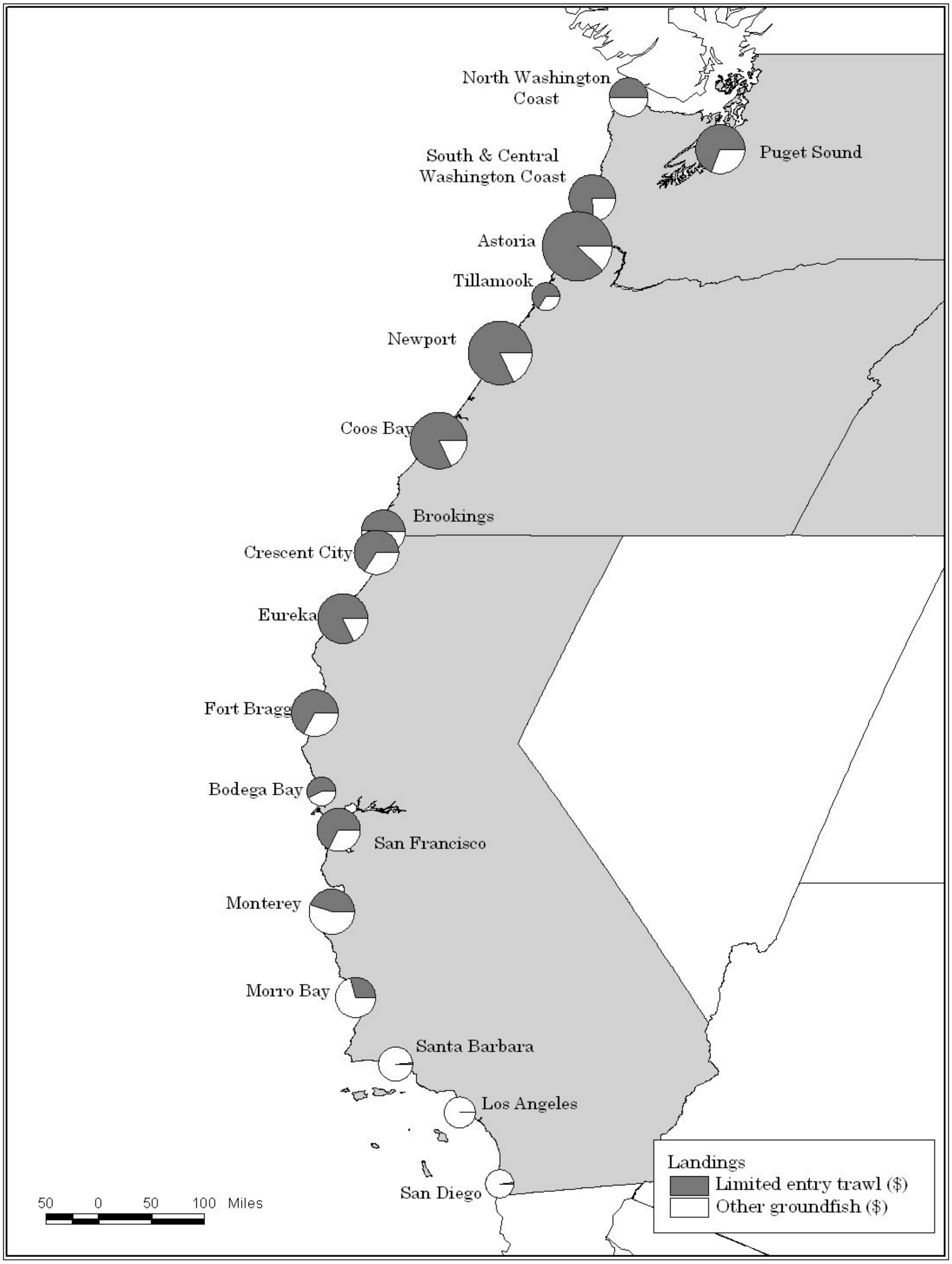

FIGURE 8-7. Distribution of groundfish landings in 2001 by exvessel value for port groups.

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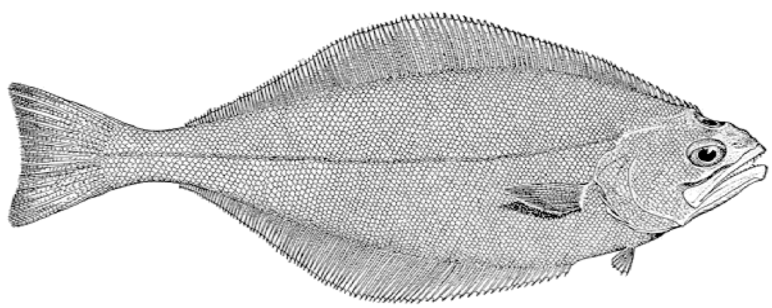
APPENDIX B
TO THE
PROPOSED ACCEPTABLE BIOLOGICAL CATCH AND OPTIMUM YIELD SPECIFICATIONS AND MANAGEMENT MEASURES FOR THE 2005-2006 PACIFIC COAST GROUNDFISH FISHERY

PROPOSED ARROWTOOTH FLOUNDER-ROCKFISH CONSERVATION AREA TRAWL FISHING PROGRAM
SCOPING DOCUMENT

Proposed
Arrowtooth Flounder -
Rockfish Conservation Area (AT-RCA)
Trawl Fishing Program

Scoping Document



May 2004

Washington Department of Fish and Wildlife
Intergovernmental Resource Management
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**WASHINGTON DEPARTMENT OF FISH AND WILDLIFE (WDFW)
PROPOSED
ARROWTOOTH FLOUNDER-ROCKFISH CONSERVATION AREA (AT-RCA)
TRAWL FISHING PROGRAM**

SCOPING DOCUMENT

1. BACKGROUND AND PURPOSE

Excluding Pacific whiting, the West Coast groundfish fishery stocks and harvests have been declining since the early 1990s. Since 1993, due to the increasingly severe harvest restrictions, landings of groundfish have fallen. Most of the decline has occurred in recent years with current levels of harvest being less than half of the harvests achieved in 1993. Over the last two decades, an unusually low level of recruitment into the fishery has occurred for many groundfish species.

Changes in the oceanic regime and an abnormally high number of El Nino events are likely to have contributed to the decline in the recruitment of several important long-lived rockfish species. These causes have exacerbated the difficulties in setting harvest quotas that attempted to counteract the decline in these stocks. This has a primary effect on the fishers and their crews, and secondary effects on port communities and fishery-related businesses, such as fish processors. The complex dynamics of managing the groundfish fisheries is further affected by the fact that recovery of these long-lived species will range from 10 years at the minimum to in excess of 50 years.

In recent years, the Pacific Fishery Management Council has been presented with new scientific information which suggests that productivity of West Coast groundfish is unusually low. As a result, more restrictive management measures have been adopted since 1998. During the 1983-1999 period, coastwide non-whiting landings have decreased 65 percent from 107,000 metric tons to 38,000 metric tons. In terms of revenue for the same period, non-whiting revenues have declined by 54 percent from $99.9 million to $46 million. The decline in abundance has been particularly severe for rockfish and flatfishes which account for about half of the non-whiting revenue.

Since 1998, the Pacific Council has initiated rebuilding plans for nine overfished groundfish species. Critical to these rebuilding plans and to the overall improvement of groundfish management is the need for more and better scientific data. There are 82 species covered under the West Coast Groundfish Fishery Management Plan, and at present, there is little or no data on a large number of these species. There is a need for comprehensive, timely and credible data for priority species to aid in the conservation and rebuilding efforts for these stocks.

In January 2000, the Secretary of Commerce declared a commercial fishery failure in the Pacific Coast groundfish fishery. In response to the request for disaster assistance, Congress appropriated $5 million in federal assistance to the affected states. Washington State received $1.5 million of the total appropriation, and a portion of those Disaster Relief funds ($300K) went to WDFW to implement its At-Sea Data Collection Program.

The AT-RCA program has been conducted under an Exempted Fishing Permit (EFP) for four years, as part of the WDFW At-Sea Data Collection Program. This project was initiated in 2001 to allow fishers access to healthier groundfish stocks while meeting the rebuilding targets of overfished stocks, and to collect bycatch data through an at-sea observer program. It was understood that the data collected in these programs would assist with future fishery management by producing valuable and accurate data on the amount, location and species composition of the bycatch of rockfish associated with these fisheries, rather than using calculated bycatch assumptions. It was also thought that these data would allow the Pacific Council to establish trip limits in the future that maximize fishing opportunities on healthy stocks while meeting conservation goals for depleted stocks.

Pacific Coast groundfish are managed by the Pacific Fishery Management Council under a federal fishery management plan (FMP). The management goals of the FMP are to:

1. Prevent overfishing by managing for appropriate harvest levels and prevent any net loss of the habitat of living marine resources.

2. Maximize the value of the groundfish resource as a whole.

3. Achieve the maximum biological yield of the overall groundfish fishery, promote year-round availability of quality seafood to the consumer, and promote recreational fishing opportunities.

In 2000, the Council adopted a Groundfish Fishery Strategic Plan. Strategic plan goals include:

- To adopt understandable, enforceable, and stable regulations that, to the greatest extent possible, meet the FMP's goals and objectives and the requirements of the Magnuson-Stevens Act.

- To establish an allowable level of catch that prevents overfishing while achieving optimum yield based on best available science.

- To quantify the amount and species of fish caught by the various gears in the groundfish fishery and account for total fishery-related removals.

The Groundfish Strategic Plan suggests that observer coverage be prioritized, perhaps focusing on collecting total mortality data for overfished groundfish stocks. As a secondary priority, the plan also states that an observer program should supplement the collection of data for stock assessments. Both of these objectives, along with the goals outlined above, are addressed with the proposed AT-RCA program.

The purpose of the AT-RCA program is to assist the Pacific Fishery Management Council in achieving the goals of the FMP by collecting bycatch data on overfished stocks (e.g., canary rockfish) to allow for informed management decisions, while maximizing safe harvest levels of healthier stocks (e.g., arrowtooth flounder).

Specifically, the objectives of the AT-RCA program are to:

- Use data collected from previous fisheries conducted under Exempted Fishing Permits to provide trawl fishers limited access to the federal trawl rockfish conservation area to target arrowtooth flounder.

- Continue to measure bycatch rates for canary and other rockfish associated with the arrowtooth flounder fishery through an at-sea observer program.

- Require the retention of all rockfish to acquire biological (age and sex) data for stock assessments through state shoreside sampling programs.

- Collect data that could be used to augment the National Marine Fisheries Service (NMFS) groundfish observer program.

- Encourage innovative ideas to develop and test selective gears.

While the AT-RCA program has been implemented through an EFP, NMFS has provided strong guidance that EFPs should have a termination date, and should not be used solely for the economic benefit of the participants. Again, from the initiation of the EFP, NMFS and the Council stressed the importance of using the data collected in these programs on a broader scale to assist with future fishery management. There was also support to apply these data to establish trip limits in the future that maximize fishing opportunities on healthy stocks while meeting conservation goals for depleted stocks.

The requirements of the AT-RCA program have been refined over time; in 2001 and 2002, the program primarily focused on the use of state-sponsored monitors onboard vessels to monitor bycatch, and collect discard data and biological samples. Beginning in 2003, WDFW required participating fishers to use an excluder device in an effort to minimize rockfish bycatch. There were no specific parameters identified; participating fishers were allowed to experiment with different excluder types. All of the participants used one of three types of excluders–these are defined and required as part of the 2004 EFP, and as part of the proposed AT-RCA program. Also for 2004, the participants will not have full access to the trawl rockfish conservation area (RCA), but are required to avoid areas of higher rockfish bycatch within the RCA. These closed areas have been defined through results from the first three years of the EFP, and are part of the provisions of the proposed AT-RCA program.

As the EFP has been refined over time, with more requirements each year, the participating fishers have been adamant in their belief that the majority of the bycatch reduction is a result of having an onboard monitor and hard bycatch caps for overfished rockfish, primarily canary. The presence on an onboard observer or state-sponsored monitor has caused the fishers to change their fishing behavior. They are actively avoiding areas with higher bycatch rates, experimenting with gear modifications to exclude rockfish, and taking a more precautionary approach to fishing practices in general, in order to stay within their bycatch caps while maximizing targeted catch.

WDFW believes that the AT-RCA program has been a success as an EFP and the data collected has been extremely valuable. Aside from the bycatch and biological data, the EFP has demonstrated that certain management tools, such as an at-sea monitoring program, bycatch caps for overfished rockfish, and mandatory rockfish retention, can be successfully implemented and also supported by fishers by providing economic incentives.

Since this management approach has been successfully demonstrated and refined over the four years of the program, there is little value in continuing the AT-RCA program as an EFP and much to be gained by moving the program into federal regulations. Because the EFP has been funded with state Disaster Relief monies, participation in the EFP has been limited to Washington-licensed trawl fishers; having the program defined in federal regulations would provide the opportunity to participate in the AT-RCA program to all West Coast trawl fishers.

2. ALTERNATIVES

Alternative 1. No action alternative (status quo). This alternative reflects no special provision for a conservation area approach to provide targeted trawl fishing opportunity for arrowtooth flounder, either through an EFP or federal regulations. Under this alternative, the EFP would be discontinued and arrowtooth fishers and processors would have to harvest and fill markets with arrowtooth that may be available outside the trawl RCA. It would result in no changes in management costs and no increase in costs for trawl fishers. For those participants in the Washington arrowtooth flounder EFP, there would be significant reductions in revenue. There would also be significant impacts to the facilities that process arrowtooth flounder and to their communities as a result of discontinuing the EFP. The vessels that fished under the EFP would likely fish seaward of the trawl RCA to access higher large footrope limits. As a result, there could be changes in fishing mortality of targeted stocks (arrowtooth flounder and petrale sole), bycatch of overfished rockfish and non-rockfish species, EFH impacts as a result of changing areas fished, and enforcement costs. The expected impacts of this alternative are compared with the expected impacts of Alternative 2 in the analysis of Alternative 2 below.

Alternative 2. Implement the provisions of the previous Washington Arrowtooth Flounder EFP into federal regulations. This alternative would integrate all of the provisions of the Washington arrowtooth flounder EFP into regulations pertaining to limited entry trawl permitted vessels fishing for groundfish within the EEZ. Specifically, this option would allow trawl fishers to access portions of the trawl RCA north of Destruction Island, WA, and have higher limits for arrowtooth flounder and petrale sole for the May-August time period. The provisions of this alternative include: implementation of a full rockfish retention program; 100% observer coverage (either by a state-sponsored monitor or a federal observer); fully funded by the permit holder; bycatch caps for overfished stocks; rockfish excluder requirements; and VMS declaration requirements. A full description of the regulatory provisions for this alternative are contained in Appendix A.

3. ANALYSIS

Management Costs - There is expected to be an increase in management costs as a result of modifying the VMS declaration system and administering the state-sponsored monitoring programs. The intent of this regulation would be to add a declaration code to the existing NMFS VMS declaration system. Fishers who would like to participate in the program would need to declare, through the VMS declaration system, on or before February 15 of each calendar year (i.e., must declare by February 15, 2005, in order to participate in May-August 2005). The estimated cost of adding the declaration code to the NMFS VMS declaration system is a one-time cost of $15,000.

Following receipt of the declaration notice, NMFS staff would provide Groundfish Management Team representatives with the list of participants. State agency representatives would then be responsible for contacting the vessel owners within their respective states, and securing contracts with those individuals for the program. The key elements of this contract include: the provisions of the AT-RCA program (observer coverage, bycatch caps, rockfish retention, area closures, and gear requirements), a payment schedule for the state-sponsored monitoring program, and a designated processing facility (to be completed by the vessel owner). The costs associated with this administrative task will vary, depending on the amount of vessels that declare and, subsequently, the number of contracts that will need to be prepared and issued; however, the estimated cost of this activity is expected to be minimal (< $200 per year).

Once the contracts have been secured with the participating vessels, the state agencies will meet with the representatives from the designated processing facilities that have been specified in the state/vessel contract, to review the provisions of the program as well as secure contracts with them. The key elements of this contract include: Provisions to comply with the rockfish retention provision--processing facilities receiving the fish will need to record the rockfish above trip limits, but required to be retained under this program, on a separate fish ticket–and the requirement to forfeit the value of those rockfish above limits to the state. The costs associated with this administrative task will vary, depending on the amount of processing facilities involved. The initial (first-year) estimated cost of this activity is expected to be about $500; however, this cost should be reduced in subsequent years (< $200 per year).

After the contracts are in place, the state agencies will follow their respective procedures for hiring temporary personnel as state-sponsored monitors. Once staff have been hired, additional time will need to be spent training the at-sea monitors consistent with the NMFS Observer Training Manual. Training activities will need to include: safety training; sampling methodology; rockfish and flatfish identification; equipment training; and familiarity with the provisions of the program (estimated training time is about ten days). The task of hiring and training the state-sponsored monitors is estimated to be about $3,000 per year.

Beyond training, there will be additional costs associated with supervising the monitors and overseeing the program. To the extent that these tasks can be absorbed with existing staff resources, these administrative costs for the duration of the four-month program are estimated to be about $5,000. If additional supervisory staff needs to be hired, the projected costs would be increased to about $12,000. The budget detail for the management cost estimates are contained in Appendix B.

Participant Costs and Revenue

Under Alternative 2, the participating permit holders would be liable for reimbursing the respective state agencies for the costs associated with the state-sponsored monitoring program. The estimated costs for the monitoring program will vary by state, but is estimated to be about $4,000 to $4,500 per month, or $16,000 to $18,000 for the full four-month program. Table 1. describes the average ex-vessel revenue above trip limits for the vessels participating in the Washington arrowtooth flounder EFP in 2002 and 2003. The reason the ex-vessel revenue increased in 2003 is a combination of an increase in effort (one significant vessel only participated for two months in 2002) and a decrease in trip limits for arrowtooth flounder and petrale sole in 2003 (small footrope limits).

Table 1. Average ex-vessel revenue above trip limits for the 2002 and 2003 Washington arrowtooth flounder EFPs.

	Arrowtooth	**Petrale**	**Total**
2002	$36,951	$6,881	$43,832
2003	$42,843	$45,268	$88,111

The trip limits which were in place for May-August for 2002 and 2003, and planned for 2004, are contained in Table 2. Table 3. uses the Fisheries Economic Assessment Model (FEAM) to project the impacts at the processor, vessel, local, and state levels for the value above trip limits in the 2002 and 2003 Washington arrowtooth flounder EFPs.

Table 2. Limited entry trawl trip limits for May-August north of 40°10'N latitude, 2002-2004.

	2002		**2003**		**2004**	
			Per 2 months		Per 2 months	
	Per trip	**Per mo.**	**Lg Foot**	**Sm Foot**	**Lg Foot**	**Sm Foot**
Arrowtooth	7,500	30,000	200,000	5,000	150,000	6,000
Petrale		15,000	30,000	10,000	100,000	25,000

Table 3. Projected impacts using FEAM model for the value above trip limits in the Washington arrowtooth flounder EFP in 2002 and 2003.

	2002			**2003**		
	Arrowtooth	**Petrale**	**Total**	**Arrowtooth**	**Petrale**	**Total**
Processor Impact	$687,287	$11,636	$698,922	$796,875	$76,544	$873,419
Vessel Impact	$368,918	$68,702	$437,620	$427,742	$451,954	$879,696
Total Impact	$1,056,205	$80,338	$1,136,542	$1,224,616	$528,497	$1,753,115
At Local Level	$940,022	$71,501	$1,011,523	$1,089,909	$470,363	$1,560,272
At State Level	$1,160,521	$88,272	$1,248,793	$1,345,566	$580,695	$1,926,261

There are many factors to consider in projecting vessel revenue for participants fishing under this program, including individual effort, individual costs, market limits, and knowledge of the fishery. However, using the average revenue derived from the Washington EFPs, the amount of revenue generated from having access to the trawl RCA and higher trip limits for arrowtooth and petrale outweighs the costs of the state-sponsored monitoring program. Average revenue in 2003 of $88,000 vs. estimated monitoring costs of $18,000 for a net gain of $70,000 (before costs for crew, fuel, ice, etc. are deducted).

Fishing Mortality of Targeted Stocks

Arrowtooth flounder move onto the shelf during the summer months (May-August) (Rickey 1995), so, under Alternative 1, it is unlikely that fishers using large footrope gear and fishing seaward of the trawl RCA during these months would fulfill the large footrope limits for arrowtooth flounder (200,000 lbs/2 mo. in 2003). Further, with the increase in size of the RCA in 2004 (moving from 100 fms to 60 fms for May-June, and from 100 fms to 75 fms in July-August), fishers using small footrope gear may also have difficulty achieving the small footrope limits shoreward of the RCA. Therefore, if Alternative 2 is adopted, there would be an expected increase in the fishing mortality of targeted stocks (arrowtooth flounder and petrale sole) as part of this program. However, this increased mortality probably would be similar to that experienced under the EFP given the average vessel landings of arrowtooth and petrale (within 93% for arrowtooth and 100% for petrale) that occurred with the 2003 limits for large footrope gear (Table 4.). To the extent that the projected catches of targeted stocks modeled preseason assumed that the large footrope limits would be achieved by some vessels, there may not be an increase in fishing mortality of targeted stocks beyond what was projected.

Table 4. Total and average vessel landings of targeted stocks above trip limits in the Washington arrowtooth flounder EFP in 2002 and 2003.

	2002		**2003**	
	Total	**Per Mo.**	**Total**	**Per Mo.**
Arrowtooth	369,509	92,377	428,427	107,107
Petrale	6,256	1,564	41,153	10,288

Community Impacts

There are two processing facilities that consistently participated in the Washington arrowtooth flounder EFP located in Bellingham and Blaine, Washington. Landings of arrowtooth flounder and petrale sole from non-EFP participating vessels to these facilities during the EFP period are minimal. As noted above, successfully catching arrowtooth flounder to fill available markets in the May-August period is likely dependent upon accessing the trawl RCA. If product were not available for these processing facilities to buy, significant reductions in employment and/or plant closures would result.

Bycatch

There is expected to be a full accounting of bycatch of rockfish (*Sebastes and Sebastelobus*) under this program with the 100% observer coverage and full rockfish retention requirements.

Estimates of bycatch of prohibited species will also be collected; however, estimates of non-rockfish bycatch (e.g., flatfish, lingcod) will not be collected. Under the definition of bycatch in the Magnuson-Stevens Act (i.e., discarded fish), rockfish bycatch will be reduced to zero. It is also significant to note that over the first three years of the program, less than one percent (by weight) of the rockfish that were required to be retained were unmarketable. Further, the full rockfish retention provisions of the program were strongly supported by participating processors and fishers. To the extent that rocky areas within the RCA would remain closed, and participating fishers will avoid areas of higher rockfish bycatch, this could likely result in a decrease of rockfish bycatch mortality. It is difficult to project how this program would affect bycatch of non-rockfish species because if Alternative 2 is not adopted, then most of the fishers would likely be fishing seaward of the RCA to access the higher large footrope limits; therefore, the amount of bycatch of non-rockfish species may not change. The species caught and discarded may vary, however, with higher amounts of flatfish within the RCA vs. higher amounts of Dover sole, shortspine and longspine thornyheads, and sablefish seaward of the RCA.

Enforcement

It is difficult to assess the impact to enforcement costs under Alternative 2. Fishers participating in the AT-RCA program would be shifting from the limited entry groundfish trawl fishery which would not represent an increase in overall fishing effort. There could be costs associated with an increase in the number of fishers that can access the trawl RCA. However, with 100% observer coverage under this program, and declaration requirements under the VMS system, enforcement costs might be reduced since landings of arrowtooth flounder and petrale would not need to be tracked against limits under Alternative 2.

Protected Species Interactions

There is not expected to be any increase in protected species interactions as a result of this action.

EFH Impacts

Because the proposed program is area-specific within the RCA and high rocky relief areas favored by rockfish will remain closed, this proposal is not expected to increase impacts to EFH for rockfish. Flat, muddy areas favored by flatfish, however, will be open to fishing and there may be an increase in impacts to those areas.

Data Requirements

There are no additional data requirements beyond what is currently required under state and federal law. Logbooks as required by state regulations must be maintained by the vessel operator, and trips taken under the program must be noted on the logbook sheets.

4. ALTERNATIVES CONSIDERED AND ELIMINATED

An alternative that implemented all of the provisions of Alternative 2 except for the 100% observer coverage requirement was considered. This option was eliminated because the participants in the Washington arrowtooth flounder EFP indicated that the program worked because of the observer coverage requirement. The state-sponsored monitors onboard the vessels helped ensure compliance with the bycatch caps. Having the monitors onboard resulted in positive changes in fishing behavior–skippers avoided known areas of higher abundances of rockfish, canary, in particular. Skippers also changed other fishing practices, such as experimenting with rockfish excluder devices, shortening tow time, and fishing in areas and during times of the day when canary rockfish are less available, in an effort to reduce rockfish catches. Requiring 100% observer coverage for this program, coupled with a hard bycatch cap for overfished rockfish species, helps ensure that vessels fishing in areas which are closed for rockfish conservation (RCA) do not exceed their projected rockfish catches, which could affect other West Coast fisheries that harvest groundfish. Further, data are not available to analyze what the projected impacts to overfished rockfish would be in the absence of observer coverage and bycatch caps as these provisions were required under the EFP and fishery independent data have not been collected.

5. REFERENCES CITED

Rickey, Martha H. 1995. Maturity, spawning, and seasonal movement of arrowtooth flounder, *Atheresthes stomias,* off Washington. Fishery Bulletin 93:127-138.

REGULATORY PROVISIONS FOR ALTERNATIVE 2.

1. FISHING PERIODS

A. The fishing activities described below would be permitted during the months of May, June, July, and August of each year.

2. REPORTING REQUIREMENTS

A. The operator of any vessel registered to a limited entry permit with a trawl endorsement must provide NMFS with a declaration report, as specified below, to identify the intent to fish within the trawl conservation area north of Destruction Island, as defined in the Federal Register.

B. Declaration reports will be submitted to NMFS through the current VMS declaration system.

C. Declaration reports must be received by February 15th of the year when fishing in the conservation area will occur. (For example, to fish for arrowtooth in the trawl conservation area in May 2005, a declaration report must be received by February 15, 2005.)

3. FISHING RESTRICTIONS

A. Discards

1. All fish caught during a tow under the AT-RCA program must be brought onboard the vessel.

2. All rockfish brought on board the vessel while fishing under the AT-RCA program must be retained onboard the fishing vessel and delivered to a designated processor.

B. Groundfish trip limits

1. The targeted species, arrowtooth flounder, is not subject to a monthly trip limit, but is constrained by the incidental catch of canary rockfish which will be applied as follows:

a. Up to 250 lbs per month of canary rockfish may be landed per vessel in tows conducted under the AT-RCA program, which includes all tows within the federal trawl conservation area. If the vessel has already reached the current small footrope monthly limits for arrowtooth flounder and petrale sole as published in the Federal Register when the 250 lbs of canary rockfish are caught, the vessel cannot prosecute any additional targeted arrowtooth tows for the remainder of the month and cannot retain any additional arrowtooth flounder or petrale sole.

b. If a vessel has **not** already reached the current small footrope monthly limit for arrowtooth flounder as published in the Federal Register when the 250 lbs of canary rockfish are caught, the vessel may target arrowtooth flounder, and/or retain arrowtooth flounder until the small footrope monthly limit is reached. If the vessel has not already reached the current small footrope monthly limit for petrale sole as published in the Federal Register when the 250 lbs of canary rockfish are caught, the vessel may continue to retain petrale sole until the small footrope monthly limit is reached.

c. Once the monthly canary rockfish cap has been reached, the vessel cannot fish within the trawl RCA for the remainder of the calendar month.

d. An individual bycatch cap of 1,000 lbs. of canary rockfish will also apply to each vessel. Once this cap has been reached by an individual vessel in AT-RCA permitted tows, the vessel will not be allowed to continue to fish under the AT-RCA program.

e. All tows conducted within the federal trawl conservation area are considered AT-RCA permitted tows.

f. Petrale sole caught in a directed arrowtooth tow would not be subject to a monthly limit. Current groundfish trip limits for species other than arrowtooth flounder and petrale sole will apply to vessels operating under this program except that retention of rockfish over the limits will not be in violation of 50 CFR 660.323, so long as such overages are surrendered to the state in which the fish were landed.

g. No directed "arrowtooth flounder" tows may be made south of Destruction Island (47°40'30" N. lat.).

h. Specific descriptions of the designated areas within the trawl conservation area that would be open to fishing activities under the AT-RCA program are described in Attachment 1.

4. LANDINGS

A. The AT-RCA program is valid only for landings made a processing plants that have been specifically designated by the state. To ensure that the purposes of the AT-RCA program are implemented, the state is required to have a written agreement, signed by a representative of a processing plant, before that processing plant is accepted as a “designated processor.” The state will provide instructions to each participating processing plant specifying the plant’s role and responsibilities in relation to this program, including the process for forfeiting overages to the state.

B. The state must require that all fish caught during an AT-RCA permitted fishing trip, with the exception of spiny dogfish (*Squalus acanthias*) be offloaded at only one designated processing plant (i.e., the offloading of catch from one trip cannot be split between processing plants). Once offloading has commenced at a designated processing plant, all fish, except spiny dogfish, onboard the AT-RCA permitted vessel must be offloaded at that plant. Spiny dogfish may be offloaded at another designated plant, providing all of those taken during an individual fishing trip are offloaded at that plant.

5. GEAR RESTRICTIONS

A. The AT-RCA program is valid only for fishing with legal trawl gear, as currently defined in federal regulations.

B. While fishing under the AT-RCA program, an approved rockfish excluder must be used. Approved rockfish excluders are:

1. Diamond Opening - A diamond-shaped opening cut into the top of the body of the net with the rear of the opening 15 meshes forward of the point where the body of the net connects to the intermediate. Each leg of the diamond must be at least 36 inches in length and cut on the bar.

2. Triangle Opening - A triangle-shaped opening cut into the top of the body of the net with the point of the triangle toward the opening of the net and the base of the triangle 15 meshes forward of the point where the body of the net connects to the intermediate. The sides of the triangle must be at least 48 inches in length and cut on the bar. The base of the triangle must be at least 36 inches in length.

3. Large Mesh - Large mesh in the top of the net immediately behind the headrope consisting of meshes at least 10 inches in diameter (between the knots) . This large-mesh panel must be at least the equivalent of 15 meshes of 10-inch mesh (150 inches). This would include, for example, an opening at least 150 inches in length using only jib lines to connect the headrope to the body of the net.

C. Additionally, the fishing circle (widest circumference) of any net used under the AT-RCA program shall be limited to 450 meshes of 5 ½-inch mesh (between the knots), or the equivalent diameter if a different mesh size is used at the widest circumference of the net (for example, 354 meshes of 7-inch mesh).

D. Vessels fishing under the AT-RCA program would be allowed to have more than one type of legal trawl gear onboard the vessel; however large footrope trawl gear can only be used for directed arrowtooth tows on the continental slope where the depth, throughout the tow, is greater than 120 fathoms.

6. DATA REQUIREMENTS

A. Trawl Logs. Trawl logbooks as required by state law must be maintained by the vessel operator. "AT-RCA" shall be written on the log for each trip conducted under the AT-RCA program.

1. Estimated pounds of all retained species caught in each tow must be recorded in the logbooks.

2. Before setting the gear the vessel operators must record the intended target species in the logbook.

B. Other Reports. This program does not relieve the vessel operator from any other state or federal reporting requirements.

7. OBSERVER REQUIREMENTS

A. All vessels fishing under the AT-RCA program must carry a state-sponsored observer or a federal observer the state has agreed to use as a substitute to monitor fishing strategies and bycatch caps, collect data to estimate catch and incidental catch, and observe the retention of all rockfish. Necessary arrangements will be made by the state to ensure that an on board observer is carried on all AT-RCA program trips.

B. State-sponsored observers will remain onboard all of the vessel's trips for the two-month cumulative period in which AT-RCA program fishing occurs (even those trips not targeting arrowtooth flounder).

C. Vessels carrying observers under the AT-RCA program must abide by groundfish observer regulations at 50 CFR 660.360 (d) & (j).

D. All state-sponsored observers carried by vessels fishing under the AT-RCA program must have successfully completed an observer training course that prepares them for collecting data that is compatible with sampling protocols defined in the NMFS Pacific Coast groundfish observer manual.

E. NMFS Observer coverage requirements at 50 CFR 660.360 are independent of AT-RCA program observer requirements. Vessels that carry a state-sponsored observer may also be required to carry a NMFS observer. A state observer is not a substitute for a NMFS observer and a vessel carrying a state observer is not exempt from federal observer requirements.

F. The vessel operator must provide adequate departure and arrival notification to a designated state office including reasonable notice of unexpected changes in fishing plans, to allow for sampling of the catch at offloading and for deployment of at-sea observers.

8. PAYMENT OF OBSERVER FEES

1. AT-RCA program participants are liable for funding of state-sponsored observers for observation duties required under the AT-RCA program.

2. AT-RCA program participants are required to secure a written agreement with the state sponsoring the observers for the AT-RCA program. Written agreements would be valid for the calendar year issued and will expire each year on August 31st.

3. The written agreement must be signed by the AT-RCA program participant and an official representative of the state and will include, but is not limited to, an agreement to abide by the regulations of the AT-RCA program, including funding for state-sponsored observers. The agreement will specify the applicable fees and a payment schedule for those fees (estimated to be approximately $4,000-4,500 per month).

4. Funding for state-sponsored observers must be received by the designated state office a minimum of 30 days prior to the beginning of the fishing period in which fishing under the AT-RCA program will occur. For example, funding for fishing in Period 3 (May-June) is due by April 1; funding for fishing in Period 4 (July-August) is due by June 1.

9. SANCTIONS

Failure of a vessel owner, operator, or the program participant to comply with the terms and conditions of the AT-RCA program, a notice issued under 50 CFR Part 660, Subpart G, any other applicable provision of 50 CFR Parts 600 and 660 Subpart G, the Magnuson-Stevens Act, or any other regulations promulgated thereunder, may be grounds for revocation, suspension, or modification of this program as well as civil or criminal penalties under the Magnuson-Stevens Act with respect to all persons and vessels conducting activities under the AT-RCA program.

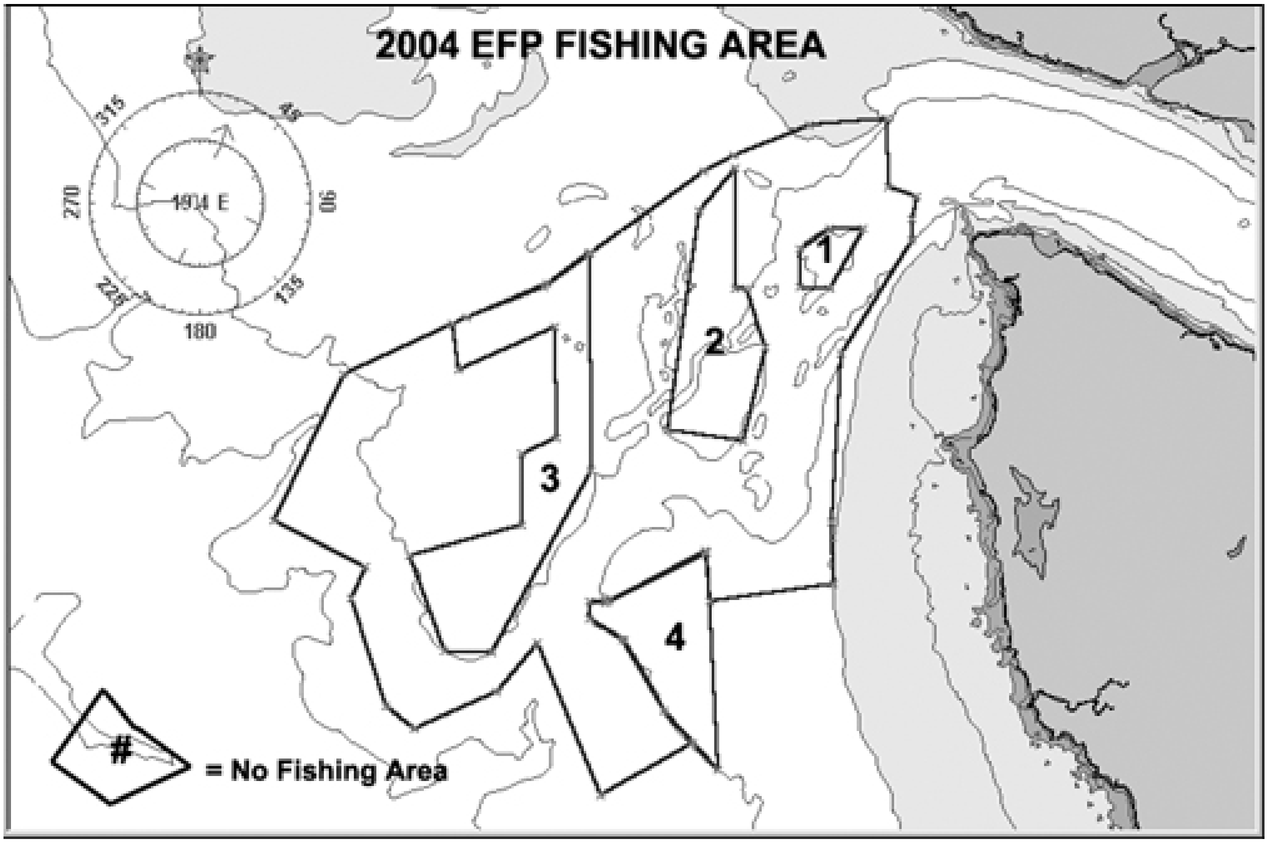
ATTACHMENT 1

Perimeter of 2004 Arrowtooth EFP Fishing Area

1	48	25.60 N	124	49.01 W
2	48	26.21 N	124	51.62 W
3	48	30.36 N	124	51.73 W
4	48	29.98 N	124	58.86 W
5	48	28.17 N	125	5.87 W
6	48	27.17 N	125	8.53 W
7	48	20.13 N	125	23.28 W
8	48	18.29 N	125	30.34 W
9	48	14.77 N	125	41.75 W
10	48	5.82 N	125	48.07 W
11	48	2.97 N	125	39.64 W
12	48	1.05 N	125	41.02 W
13	47	54.43 N	125	37.75 W
14	47	53.01 N	125	35.24 W
15	47	55.28 N	125	27.65 W
16	47	58.29 N	125	23.87 W
17	47	48.93 N	125	18.09 W
18	47	52.11 N	125	9.62 W
19	47	54.06 N	125	12.20 W
20	47	58.48 N	125	15.90 W
21	47	59.75 N	125	19.07 W
22	48	0.83 N	125	18.99 W
23	48	0.85 N	125	17.29 W
24	48	3.92 N	125	8.42 W
25	48	0.85 N	125	8.05 W
26	48	1.92 N	124	56.71 W
27	48	5.70 N	124	56.79 W
28	48	15.98 N	124	55.91 W
29	48	22.99 N	124	49.41 W
30	48	24.25 N	124	49.37 W
31	48	25.60 N	124	49.01 W

No Fishing Zones Within the Perimeter of the Arrowtooth Area

ZONE 1				
1	48	23.69 N	124	53.84 W
2	48	23.64 N	124	57.00 W
3	48	22.43 N	124	59.66 W
4	48	20.06 N	124	59.66 W
5	48	20.03 N	124	56.93 W
6	48	23.69 N	124	53.84 W
ZONE 2				
1	48	27.34 N	125	5.65 W
2	48	24.78 N	125	9.07 W
3	48	11.32 N	125	11.91 W
4	48	10.69 N	125	4.93 W
5	48	16.42 N	125	2.89 W
6	48	19.96 N	125	4.60 W
7	48	20.03 N	125	5.69 W
8	48	27.34 N	125	5.65 W
ZONE 3				
1	48	22.17 N	125	19.07 W
2	48	8.91 N	125	18.96 W
3	47	57.70 N	125	28.12 W
4	47	57.85 N	125	32.48 W
5	48	3.70 N	125	35.57 W
6	48	5.55 N	125	25.36 W
7	48	9.93 N	125	25.28 W
8	48	10.86 N	125	22.05 W
9	48	17.63 N	125	22.23 W
10	48	15.01 N	125	31.17 W
11	48	17.85 N	125	31.72 W
12	48	20.25 N	125	22.92 W
13	48	22.19 N	125	19.07 W
ZONE 4				
1	48	3.90 N	125	8.27 W
2	48	0.78 N	125	17.54 W
3	48	0.87 N	125	19.07 W
4	47	59.75 N	125	19.07 W
5	47	58.53 N	125	15.98 W
6	47	54.09 N	125	12.20 W
7	47	50.44 N	125	7.22 W
8	48	3.90 N	125	8.31 W


2004 EFP FISHING AREA
315
45
270
90
225
135
180
1
2
3
4
#
= No Fishing Area

MANAGEMENT COSTS FOR ALTERNATIVE 2.
BUDGET SUMMARY AND DETAIL

Tasks (Responsible Party)

A. Adding declaration code to NMFS VMS declaration system (NMFS)
B. Securing contracts with participating vessel owners (States)
C. Meeting and securing contracts with participating processors (States)
D. Hiring and training state-sponsored monitors (States)
E. Supervising monitors and overseeing program (States)

Costs

A. $15,000
B. < $200
C. $500 (first year); < $200 (subsequent years)
D. $3,000
E. $5,000 (existing staff resources); ~ $12,000 (new staff)

Budget Detail

A. Cost estimate provided from NMFS Northwest Region via e-mail (March 2, 2004)
B. State Biologist/Policy Coordinator - Salary and Benefits @ $4,500 per month (~$25.00 per hour) for < 8 hours
C. State Biologist/Policy Coordinator - Salary and Benefits @ $4,500 per month for 2.5 days
D. State Biologist/Policy Coordinator - Salary and Benefits @ $4,500 per month for 1 week ($1,000) + State Scientific Technician/Biologist - Salary and Benefits @ $3,000 per month for 3 weeks ($2,000)
E. State Scientific Technician/Biologist - Salary and Benefits @ $3,000 per month for 1.6 months (existing staff); or 4 months (new staff)

APPENDIX C
TO THE
PROPOSED ACCEPTABLE BIOLOGICAL CATCH AND OPTIMUM YIELD SPECIFICATIONS AND MANAGEMENT MEASURES
FOR THE
2005-2006 PACIFIC COAST GROUNDFISH FISHERY

WIDOW ROCKFISH BYCATCH AREA MANAGEMENT

Potential for Reduction in Widow Rockfish Bycatch in the Pacific Hake Fishery Using Bycatch Avoidance Areas

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Situation

The bycatch of widow rockfish in all sectors of the Pacific hake fishery has been significant in scale but variable among sectors (Table 1). However, there has also been a dramatic time trend of significant reduction in widow rockfish bycatch since 1999, likely due to a combination of factors including lower hake OYs, lower widow rockfish relative abundance, outreach by managers to inform fishers of rationale for bycatch reduction, and active avoidance of widow rockfish habitat by the fleet. Indeed, each sector has shown dramatic and consecutive reductions to the all-time low catches that occurred in 2003.

Table 1. Summary of the of the US Pacific hake fishery through 2003. Weights are in metric tons.

Year	Hake US optimum yield (mt)	Widow RF US optimum yield (mt)	Mothership Widow RF bycatch (mt)	Catcher/ Processor Widow RF bycatch (mt)	Shoreside Widow RF bycatch (mt)
1999	232,000	4,981	48.00	101.00	191.74
2000	232,000	4,291	151.00	70.00	82.54
2001	190,400	2,260	29.19	139.71	43.60
2002	129,600	853	20.50	115.10	5.32
2003	148,200	832	0.69	11.56	8.97

In spite of these reductions, the overfished status of widow rockfish and associated low OYs have placed the PFMC in the position of restricting the hake harvest in an effort to constrain the potential for high bycatch of widow rockfish for all sectors. Analysis by the Oregon Department of Fish and Wildlife may aid in this discussion by providing an alternative to reducing the hake OY by focusing on minimizing the bycatch of widow rockfish more directly.

We believe that reducing hake OY is an inefficient and ineffective method for reducing widow bycatch for the following reasons. Widow rockfish bycatch is rare, with almost all of the widow rockfish captured occurring in only a handful of tows. These high-bycatch tows are essentially random, so within a season there is no relationship between the amount of hake caught and the amount of widow rockfish encountered. Although the probability of a high-bycatch tow increases as more tows are conducted, only a few high-bycatch tows could easily exceed the expected catches for the fishery. One of the only predictable aspects of widow rockfish bycatch is where it occurs. On a gross scale, it occurs within the RCA, namely along rocky areas of the shelf break. We propose to use this geographic pattern in bycatch to predictably minimize bycatch in the future hake fishery.

Approach
We have taken a GIS approach to identifying locations along the coast in each sector that tend to show high bycatch rates. We used data from 1999-2003 from each sector. For each sector, catch of hake and widow rockfish from each tow plotted as low, med and high bycatch rates using logbook tow locations. Tows with zero bycatch are also shown so that the total distribution of fishing effort is visible. For shoreside sector trips with multiple tows, the bycatch rate was calculated for the trip and then indicated as low, med, and high for every tow of the trip from logbook data. This procedure was conducted for catcher processors (CP), mothership (MS) and shoreside (SS) sectors. Note however that because bycatch has decreased dramatically, most of the high-density areas (areas with yellow and red symbols) are made mainly tows from earlier years. None-the-less, these represent areas that show high bycatch rates through multiple years, and so are useful in defining areas where widow rockfish bycatch is more probable.

Several fishery characteristics are obvious in the GIS plot (Figure 1). First, the SS sector typically fishes shallower than the CP sector, but overlaps well with the MS sector. All sectors overlap almost completely in areas where the shelf or shelf break is especially narrow (*e.g.* Heceta Bank). Secondly, the CP fishery tends to fish the full latitudinal range from 42°N to 48°N, though the focus of their effort was to the north in 99-01 and to the south in 02-03.

We identified areas where widow bycatch was likely regardless of sector, and created boxes surrounding them for each of enforcement and compliance. We identified 4 boxes coastwide (red boxes in Figure 1). We then eliminated the tows within a given box, recalculated the mean annual bycatch rate for each sector and expanded for a simulated hake allocation of 91,350 mt SS, 73,950 mt CP and 52,500 mt MS (based on 2004 allocation). The bycatch rate was determined using the same methodology developed by the GMT in March for the 2004 hake allocation (40%: '03, 30%: '02, 20%: '01, 10%: '00).

Results show that much of the widow bycatch can be isolated in these areas (Table 2-attached). The locations of high bycatch were different for each sector, but significant reductions could be made with any box. Because little difference in bycatch would be expected if vessels from any sector fished in these areas, we recommend that these areas be considered high bycatch areas for the fishery, not for any specific sector. The resulting decrease in widow rockfish bycatch is shown in Table 3. Of course, closing the entire RCA

Table 3. Estimated bycatch of widow rockfish (mt) in the Pacific hake fishery in 2004 after closure of areas with historically high bycatch rates.

Option	Shoreside	Mothership	Catcher-Processor	Total Estimated Widow	% Reduction
No Closure	25.90	55.07	391.41	472.38	
Box 1 Only	24.96	10.06	130.82	165.84	65%
Box 2 Only	24.21	19.87	74.59	118.67	75%
Box 3 Only	29.60	20.55	62.62	112.77	76%
Box 4 Only	25.81	18.54	148.20	192.55	59%
Entire RCA	6.77	10.20	27.58	44.55	91%

to midwater fishing had the largest impact, similar to the results in the poster presentation by Wiedoff and Parker (2004). Also note the relatively minor differences in hake bycatch rate expected after exclusion of any area. Therefore, the relative effectiveness of the closure areas is due mainly to the avoidance of widow rockfish bycatch, not to changes in the hake catch rate.

Risks

One potential risk for closing some areas to fishing is that of increasing bycatch of some other species as the fishing effort shifts to other areas. Bycatch of other species is also patchy in time and space (Figure 2). Although not analyzed here, bycatch of yellowtail rockfish occurs in similar areas with widow rockfish, so some overall decrease in yellowtail rockfish bycatch would be expected. Bycatch of young sablefish is more dependent on large year classes which analysis suggests is predictable a year in advance and can be addressed in that way.

Our work indicates that the mean rate of hake catch/h is the same inside and outside bycatch avoidance areas and so no increase in fishing time should result from closing any or all bycatch avoidance areas. Aside from changes in where they can fish and changes in travel time, we do not see a pronounced effect of this approach on fishing efficiency.

Of course there is always the risk of encountering high bycatch of widow rockfish even when fishing outside the bycatch avoidance areas. However, this risk is less when fishing outside bycatch avoidance areas than if fishing anywhere with a lower hake OY.

The bycatch rates presented do not incorporate the variation in bycatch for each sector. Therefore, small changes in the rate, or estimated catch should not be viewed as significant. Also, in 2002 the CP sector experienced one large tow that accounts for almost 80 of its bycatch. The presence of this tow dramatically changes the bycatch rates for that year and the corresponding predicted rate. We excluded that tow, but show what the average 2002 rate would have been in the margin with an asterisk.

Recommendations

- Identification and avoidance of bycatch avoidance areas allows the fishery to avoid known areas of high widow bycatch using midwater trawl gear. The resulting decrease in widow rockfish bycatch is fairly predictable and should not be impacted by the scale of the hake OY.
- We recommend that the number of closure areas be the minimal number needed. The number of bycatch avoidance areas chosen is up to the council process, but because of enforcement issues and the likelihood that the time-trend in bycatch is a major factor influencing bycatch.
- Bycatch avoidance areas chosen should apply to all hake sectors because fishing in an identified zone by any sector is likely to produce higher bycatch.

APPENDIX D
TO THE
PROPOSED ACCEPTABLE BIOLOGICAL CATCH AND OPTIMUM YIELD SPECIFICATIONS AND MANAGEMENT MEASURES
FOR THE
2005-2006 PACIFIC COAST GROUNDFISH FISHERY

COUNCIL FISHERIES INCOME IMPACT MODELING

(Excerpted and adapted from: the Final Report of West Coast Groundfish Fishery Economic Assessment Model Update Project, Cooperative Agreement No. NEPA-0402, The Research Group, September 28, 2003.)

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1.0 Introduction

The Pacific Fishery Management Council (Council) uses economic impact models to assess the income impacts resulting from West Coast commercial and recreational fisheries. Data on reported landings taken from a recent PacFIN vessel summary, or estimates of recreational angler trips, are combined with regional economic response coefficients generated by the Fishery Economic Assessment Model (FEAM) to estimate local income impacts resulting from observed historical fishing activity and/or activity levels expected under alternative fisheries management scenarios (Jensen 1996).

Regional economic response coefficients are taken from input-output models. These models were constructed using the IMPLAN economic modeling software originally developed by the U.S. Forest Service (MIG 2000). IMPLAN can be used to construct county or multi-county models for any region in the United States. The regional models are based on technical coefficients from a national input-output model, local employment and payroll data and estimated regional trade propensities. IMPLAN adjusts the national level data to fit the economic composition and estimated trade balance of a chosen region. Some valid criticisms have been directed at synthesized input-output as opposed to survey based input-output. First, the synthesized industry spending coefficients are based on average relationships between industries aggregated at a national scale. These generalized relationships may not apply to the specific region under study. However, an input-output model, unlike many other economic models, is constrained and consistent. The model is a double entry book keeping system of accounts. Total sales must equal total purchases in each sector and for the economy as whole, including imports and exports from the study region.

One limitation of this type of regional impact analysis is that it presents a picture of the economy at a single point in time. This picture is based on historical ratios between different sectors of the economy rather than a dynamic structure of changing relationships. When prices or costs change, consumers and producers respond by substituting among final goods, substituting among inputs to production, migrating between regions, and shutting down businesses that are no longer profitable. To evaluate these sorts of changes, economists must first estimate the direct effects and translate these into equivalent changes in final demand that are then used to drive the input-output model. Accurate estimates of regional impact are dependent upon the projections of direct effects on the sectors that drive the input-output model. It has also been suggested that this type of regional analysis tends to overstate actual impacts because it assumes that all possible adjustments to disturbance are instantaneous and permanent, and that behavioral responses to disturbances are limited. For example, people who lose a job are assumed to stay unemployed. In reality, people and businesses adjust over time as they try alternative occupations, technologies and locations.

Economic changes triggered by disturbances can be short-run or long-run. Short-run impacts include the initial construction or other temporary changes in spending that typically last for less than a few years. Long-run effects, on the other hand, include the more permanent aspects of economic adjustment as industries, workers and consumers react to emerging economic realities. Examples of long-run adjustments include construction of new facilities, adoption of labor-saving technology, and outsourcing of intermediate production steps. Results generated by input-output models are generally considered to be better indicators of impacts in the short-run than over the long-run.

IMPLAN itself includes only a single aggregated commercial fisheries sector and two seafood processing sectors. Data for these sectors is notoriously sparse since much of the employment is informal or part time and so is not covered by state unemployment insurance programs or recorded in county employment data. Consequently, it is necessary to construct "custom" expenditure coefficients for commercial fishing and processing industry spending categories. To do this FEAM combines elements of IMPLAN sectoral expenditure functions to better fit the observed spending patterns of vessels and processors for labor, provisioning, repairs and other costs. The custom category coefficients are then entered into a computer program that handles the accounting of vessel harvests and vessel and processor expenditures, and multiplies these by IMPLAN total income coefficients to calculate the income multiplier effects.

2.0 Limitations

The regional economic impacts calculated using economic impact models are indicators of the dislocation costs that may occur in the event of reductions in ocean fisheries, but are not indicators of the net loss to the nation from such reductions. If sufficient quantitative information and defensible analytical models are available, net gain or loss to the nation determined through a benefit-cost analysis is the value suggested by Executive Order 12866 and the Regulatory Flexibility Act (5 U.S. C. 601 *et seq.*) for analyzing actions of federally managed fisheries (NMFS 2000).[1/, 2/]

In general, there is no particular relationship between regional economic impacts and changes in net economic value (NEV) derived from a benefit-cost analysis, and regional economic impacts are certainly not additive with NEV. However, both measures are useful for showing the consequences of management actions. Regional income impact estimates provide a measure that is comparable to values often used to describe activities in nonfishing sectors of the economy. If the fishing activity is reduced, personal income would not necessarily be reduced by a proportional amount. The effect on personal income in the local and national economies will depend on alternative activities available and the location of those activities. If there were a reduction in the ocean fisheries, over the long run, workers in the commercial and recreational fisheries, vessel and processing plant owners, and food fish consumers would adjust by changing their behavior in observable ways. The types of the alternative activity adopted compared with the fishing activity foregone determines the net effect of the change in ocean fisheries on total income.

For example, if as a result of reduced fishing opportunity a worker on a vessel loses her job and receives government assistance. If no new job or income is created elsewhere in the economy, then the net loss to the nation and local economy with respect to the worker's job is measured by the entire prior wages of that worker. However, if additional income is generated elsewhere in the

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1/ Other laws, such as the Magnuson-Stevens Fishery Conservation and Management Act, the National Environmental Policy Act, and the Endangered Species Act also have economic analysis requirements.

2/ The benefit-cost analysis from management actions includes the sum of changes in: consumer surplus derived from recreational fishing, consumer surplus derived from nonconsumptive use, existence value, and consumer and producer surplus from commercial fishing landings, less management costs (administration, monitoring, and enforcement).

economy either through increased harvest in other fisheries or through consumers' redirection of their food expenditures, with the consequent generation of additional income and jobs in another fishery or food producing industry, then the magnitude of the net loss in income should be reduced by some portion of the value of the increased economic activity elsewhere in the economy. The effect on the local economy may differ from the effect on the national economy to the degree the alternative activities occur outside the local community.

FEAM personal income estimates provide an indicator of the magnitude of the possible redirection of money between fishing-dependent and nonfishing-dependent sectors that may result from changes in the fishery. The amount of redirection represents a dislocation that may have economic and social costs that would not be reflected in a typical NEV analysis. However, income impacts should not be used as a substitute for a proper assessment using benefit-cost framework.

3.0 Commercial Fishing Economic Impact Model

Landings data and industry (vessels and processors) economic factors are used to develop the commercial fishing economic impact model. FEAM was developed by Hans Radtke and William Jensen for the West Coast Fisheries Development Foundation in 1984, resulting from a need to utilize existing data on fisheries to estimate the economic contribution of the fishing industry to regional economies. The Council first utilized this model in response to a threatened lawsuit by the Small Business Administration that contended the Council had not considered the economic and social impact of their salmon management decisions on small businesses. FEAM combines an IMPLAN input/output model with landings and other local industry information to generate economic analysis relating to fishery resource use. IMPLAN-generated response coefficients are applied to specific business expenditures to calculate the personal income contributions of these expenditures. FEAM results have been useful because much of the commercial fishing industry information is not described in published employment data.

Commercial fishing landings data is a model input and is received from the Pacific Coast Fisheries Information Network (PacFIN) data system. PacFIN contains a standardized compilation of selected information from state fishticket databases maintained by West Coast states. Landing volume and exvessel value data flows through the model from the harvesting sectors (boat and gear type) through the intermediate use (buyers and processors) to final demand (consumers). The contribution of the resulting economic activity to the local economy is measured by the amount of personal income generated. IMPLAN derived response coefficients translate direct business spending into the household personal income.

The FEAM model is a menu driven computer program that allows the analyst to change data and key assumptions about harvesting and processing activities. When subtracted from baseline conditions, the model results show the economic impacts of fishery and fishing industry changes. The personal income estimates can be made for any single or multiple of counties. It is assumed that county boundaries surrounding a port-of-landing define economic regions. To the degree that processing activities, the vessel home port, and the homes of workers and owners in the industry are located in the port of landing, the personal income generated is more likely to occur in the community associated with the port of landing than in other areas of the county. To the degree processing activities, the vessel home port, and the homes of workers and owners in the industry are located outside of the county, the person income estimates likely overestimate income generated in the county. Where landings are made in one port and a vessel is home located in another port or the workers live in another port, or where processors transfer product from one port to another, there are likely some cross-impacts between ports that are not measured or are attributed to the wrong geographic area. Some of the cross impacts may cancel each other out.

For each defined area, the key elements of the commercial FEAM model are:

- Response coefficients (Generated by IMPLAN and applied to expenditures of the firms and income earned by those employed and owning fishing enterprises).
- Inventories of vessels (number of fishing vessels of different types by port).
- Harvester fixed costs.
- Harvester variable costs (expenditures per pound landed).
- Inventories of processors and buyers (number of processors/buyers of different types by port).
- Processor/buyer fixed costs.
- Processor/buyer variable costs, processor margins and recovery rates by product form and species.
- Inventories of the species, weights and value of fish landed.
- Distribution of species among harvesters.
- Distribution of species among processors.

With the exception of the response coefficients, each of these segments requires input by the model user. Inventories and distribution information was derived largely from PacFIN data. Information on processor and buyer inventories (counts of firms by type and community) was augmented by prior knowledge of the industry. The processor margins and harvester and processor budgets were based on interviews and numerous studies.

Three types of income are included in the income impact estimates:

- Direct (earnings of labor and owners in the harvesting and processing sectors).
- Indirect (earnings of labor and owners in firms supplying harvesters and processors [e.g., wages paid by a gear manufacturer]).
- Induced (earnings of labor and owners that occur when those earning direct and indirect income spend their income [e.g., income earned by the owner of a grocery store]).

IMPLAN response coefficients were based on the 1998 economy, and landings data is for year 2000. Modeling results can be extended to other years based on processor and harvester marginal impacts per pound. Per pound processor margins and expenditures are assumed to be constant, and harvester impacts are adjusted based on changes in exvessel price. Species and port-specific ratios per pound are multiplied by the price for a particular year to get an income impact estimate for that year.

The following figure illustrates how a difference in exvessel price for troll chinook affects marginal impacts per pound. A concern in using this approach is that the more the exvessel price deviates from the range of prices used to develop the estimate in the base year, the more the estimate of harvester related income impacts is likely to be inaccurate and the more likely that processor margins will change.

The FEAM results for average economic impact factors by species/gear categories are then transported to a spreadsheet for convenience in analyzing management alternatives. There is a great level of detail to the spreadsheet model, however, there are several major simplifying assumptions:

1. The model relies on response coefficients generalized from IMPLAN. Several studies have evaluated the overall performance of IMPLAN, and although results are inconclusive, IMPLAN's outcomes have been shown to be plausible (Crihfield and Campbell 1991); (Rickman and Schwer 1995). Nevertheless, it is prudent to be aware of several simplifying assumptions concerning the structure and data contained in the model. In addition to the problems generally associated with input-output modeling, IMPLAN implicitly assumes national average production coefficients and margins, and uses a set of econometric equations to predict interregional trade flows at the regional level. Users of IMPLAN must be willing to accept these assumptions and estimation methods or else have the ability to incorporate user-supplied data to improve the accuracy of their impact estimates.

2. The inter-industry dollar flows from 1998 IMPLAN coefficients apply to the analysis year.

3. The marginal economic impacts from harvesters and processors per landed pound at the state level also apply to port areas. This implies that the type of processing and fleet mix is uniform for each port group. However, there is some fleet variability captured in the analysis due to species and gear combinations, and the marginal economic impacts are adjusted by port area prices.

4. The amount of processing done within each state and port area equals the amount landed. That is, there is no cross hauling of raw product.

5. The sum of port areas within each state will not equal the state total. This is because (a) not all landings reported by PacFIN are associated with a port, and (b) the port area price is used to calculate local harvester economic impacts rather than the statewide average price.

6. The three-state economic impacts are a sum of individual state economic impacts, rather than completing a region-wide analysis. This is because many species management regimes that affect landing locations, exvessel price, processing product forms, etc. are associated with state boundaries.

7. With three exceptions, there is only one finished product form per species category. The exceptions are Dungeness crab, albacore tuna, and Pacific whiting.

8. Exprocessor sales price is estimated using cost calculation from the FEAM model or using published sales price information for the product form sold in an area.

9. Fish license fees and product taxes/surcharges are constantly changing. The current model was specified to use year 2000 fees.

10. Marginal impacts are a constant percentage of average impacts. To estimate marginal impacts per pound, divide average impacts by 89%.

4.0 Recreational Fishing Economic Impact Model

Recreational fishing economic impacts measure the economic activity (business sales, jobs, or personal income) generated by the spending of recreational fishing participants. Calculating these impacts is simple when angler effort, expenditures, and economic response coefficients are all known. Trip and equipment related impacts are determined by the following formulas:

1. Total trip-related economic impacts = total trips x spending per trip x economic response coefficients.

2. Total annual angler expenditure economic impacts = total anglers x annual equipment costs x economic response coefficients.

Total trip-related impacts are disaggregated by mode (boat, shore, charter, etc.), residency of the fisher (resident or non-resident), location of the trip, and type of expenditures (bait, lodging, license fees, etc.).

Total annual angler expenditure impacts are disaggregated by type of equipment purchased, and adjusted to reflect effective counts of representative spenders.[3/]

Decision makers need to be aware of the assumptions used to estimate each of the terms in these formulas to correctly reveal how changes in recreational fisheries management may affect the economy.

For each defined area, the key elements of the recreational FEAM model are:

- Response coefficients. (Generated by IMPLAN and applied to estimated expenditures by recreational angling businesses and independent recreational anglers.)
- Estimated number of angler trips by type of trip (guided, charter, private).
- Businesses fixed and variable costs (guides and charters).
- Independent angler per trip expenditures and annual equipment expenditures.

The outputs of the model are personal income and number of jobs. Jobs are calculated by dividing the personal income estimate by BEA earnings per job.

3/ Survey results usually show “typical” and “representative” spending by anglers. Typical spending occurs when purchases are made for an item. In this case, zeros are not included when tabulating average spending per angler. Representative spending occurs when purchases are made for some items but not others. In this case zeros are included when tabulating average spending per angler.

Two alternative information sources were used to calibrate the recreational model. The first alternative used (Gentner 2001) for trips, participants, and annual and per trip spending. The second alternative used (PFMC 2003) for trip estimates, (USFWS 2003) participation estimates, and (Gentner 2001) for spending per trip.

Gentner's publication describes the results of a Marine Recreational Fisheries Statistics Survey economic add-on survey that was administered on the West Coast in 2000. Gentner's trips are for saltwater fisheries at the state level for Oregon and Washington and for two regions (northern and southern) in California. Application to smaller sub-state regions thus assumes that local trip expenditures are the same as the state average. However local IMPLAN economic response coefficients that are specific to the sub-state region an be applied.

Gentner divides fishing trips by whether the angler's residence is located within or outside of the region. However, the trips are not categorized by target species. So even though the declared target species for recreational trips is available through RecFIN, the current recreational FEAM model assumes the same average spending patterns no matter what the declared target species.[4/]

Obtaining angler counts and their place of residence is also problematic because available sources of information, such as RecFIN, usually do not provide these tallies directly. Methods for estimating angler counts, such as using a factor based on annual average effort per angler, need to be devised.

Spending per trip is highly dependent on fishing mode, trip duration, and location. Anglers fishing from boats, hiring guides or charters, or staying overnight will obviously spend more money than those who do not. Sometimes the trip occurs in remote locations where there are no businesses. Trip spending may occur elsewhere (resident home or somewhere along the way) than in the destination economy being analyzed. Annual equipment costs are also highly variable depending on anglers' fishing interest, avidity, and ability to afford amenities in fishing pursuits. All of these factors need to be considered to make economic impact analyses sensitive to management alternatives.

Recreational fishing is usually considered a household decision for using discretionary income. If not spent for fishing, other forms of household leisure would likely be substituted. Household income spent for local recreational fishing is derived from jobs in other industries, so fishing by residents is not considered to be bringing new money into the economy. However non-residents traveling to an area are bringing new money into an economy. Regional economic impact analysis typically only considers non-resident angler expenditures made at the destination as contributing to the local economy. Clearly, though, resident spending does support recreational activity. Anglers may choose to travel to other regions to fish. Therefore, their expenditures near home represent a type of "import substitution" to a regional economy.

4/ The Recreational Fisheries Information Network (RecFIN) is an online retrieval database sponsored by the Pacific States Marine Fisheries Commission. The database contains results from the Marine Recreational Fisheries Statistics Survey (MRFSS) Program and cooperative angler surveys administered by states.

5.0 Economic Valuation

Economic valuation assessments measure the economic welfare that users derive from fish resources. Anglers obtain benefits above and beyond their expenditures, however, these benefits are not shown through spending in the market place. Non-market valuation methods must be used, such as the hedonic price approach (Mendelsohn *et al.* 1992); the travel cost method (Smith 1989); and the contingent valuation method (Hoehn 1987).

The hedonic model is limited in its scope of application (Getz and Huang 1978), so the travel cost and contingent valuation methods are more commonly employed. The comparative measurement using any of these methods is to subtract the fishing costs from the assessed benefit for the derivation of NEV. This differs from measuring the gross economic value where the assessed benefit is added to the actual expenditures to fish. Calculating the per trip NEV is controversial because, theoretically, a fisheries total prosecution effort, benefits, and costs would have to first be known.

Moreover, this would calculate average value when marginal value should be used for determining incremental changes in fisheries. (Marginal NEV is what an angler is willing to pay to catch an additional fish less costs for pursuing that fish.)

The project did not have the budget resources to determine original per trip NEV through special surveys. Furthermore, NMFS, Southwest Fisheries Science Center is using the MRFSS economic add-on survey to develop an NEV model. Therefore, per trip NEV estimates were borrowed from other studies as placeholders until more recent information from other studies is available. The borrowing of trip related NEV is called the benefit transfer approach. A major problem with this approach is the violation of the assumption that individuals share a common representative utility function. Practically speaking, one individual will place a value on a fishing experience based on a number of variables, including catch rates, size of fish, site characteristics, and their own personal avidity and motives to fish. Intuitively, transferring values from one group fishing in one location to another group at a different location at a different time may introduce large errors in the estimate. Minimizing differences in site and species conditions and angler demographics and motivations when selecting studies to borrow per trip values will help in alleviating the errors. Decision makers should recognize the inherent problems in determining NEV through the benefit transfer approach when reviewing management alternatives.

There are other use values that data sources for trip and angler counts may omit. Data sources generally only tabulate consumptive trip purposes, but trips can be made for nonconsumptive use of fish resources. Diving to observe fish would be an example. Other examples of nonconsumptive use values come from scientific research, indirect benefits from preserving ecological functions, etc. (Bishop 1987).

6.0 Nonuse Values

There are other valuations that can be given to fish resources. There are some people who are willing to pay for a resource, even though they never use it. This type of nonuse value is called existence value, because people are willing to pay to ensure the resource exists, in case they want to use it in the future or to ensure the resource exists for future generations to enjoy. There are extensions of existence value that economists like to discuss, such as option value, amenity value, bequest value, and others. All of these values are useful concepts for trying to understand what it means for measuring the worth of the resources. While the modeling for this project did not calculate nonuse values, all types of values to society may be important to decision makers. For example, if a particular fish resource is not threatened with extinction, then the existence value is probably not relevant. If there are vary large changes to fish resources through management actions, then the average use values are important. If there are only incremental changes, then the marginal use value would be a more applicable comparison.

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APPENDIX E
TO THE
PROPOSED ACCEPTABLE BIOLOGICAL CATCH AND OPTIMUM YIELD SPECIFICATIONS AND MANAGEMENT MEASURES
FOR THE
2005-2006 PACIFIC COAST GROUNDFISH FISHERY

RESPONSE TO COMMENTS ON THE DEIS

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→SFD

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

October 8, 2004

Reply To
Attn Of: ETPA-088

Ref: 04-047-NOA

NOAA-NMFS
RECEIVED
OCT 21 2004
NORTHWEST REGIONAL

D. Robert Lohn, Regional Administrator
NMFS/NOAA - Northwest Region
7600 Sand Point Way N.E., Bldg 1
Seattle, WA 98115-0070

Dear Mr. Lohn:

The U.S. Environmental Protection Agency (EPA) has reviewed the draft Environmental Impact Statement (EIS) for **Proposed Acceptable Biological Catch and Optimum Yield Specifications and Management Measures for the 2005 - 2006 Pacific Coast Groundfish Fishery** (CEQ No. 040404) in accordance with our responsibilities under the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act. Section 309, independent of NEPA, specifically directs EPA to review and comment in writing on the environmental impacts associated with all major federal actions and the document's adequacy in meeting NEPA requirements.

The draft EIS proposes to establish harvest levels (optimum yields) based on acceptable biological catch for stocks and stock complexes managed under the Pacific Coast Groundfish Fishery Management Plan for 2005 and 2006. The proposed action also establishes harvest guidelines for groundfish species, species groups, and geographic subunits, which are caught in a variety of fisheries occurring off the coasts of Washington, Oregon and California. Management measures include cumulative landing limits for species, gear restrictions and recreational bag and size limits.

The EIS identifies four harvest level and four management measure action alternatives. The four harvest level action alternatives include a low, medium and high Optimum Yield (OY) alternative and a Pacific Fishery Management Council Preferred alternative. The Low OY alternative represents the most precautionary approach to the management of harvest levels reflecting the most conservative interpretation of stock assessment results. The EIS identifies the Low OY alternative as the environmentally preferable alternative. The High OY alternative is the least precautionary alternative that assumes most long-term risk for the greatest short-term benefit. The Medium OY alternative and the Pacific Fishery Management Council's Preferred Alternative propose harvest levels with intermediate levels of precaution. The Pacific Fishery Management Council Preferred Alternative is more precautionary than the Medium OY alternative as it proposes lower harvest levels for overfished species.

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The EIS proposes four management action alternatives with various impacts on west coast marine ecosystems and essential fish habitat, overfished and target species, ESA listed species, marine mammals and the public. The Pacific Fishery Management Council preferred management alternative allows higher catches of target species than are projected to occur under the other action alternatives while preventing overfishing. The EIS identifies management Alternative 1 as the environmentally preferable alternative.

Based on our review and evaluation, we have assigned the following ratings to the alternatives evaluated in the draft EIS.

Harvest Alternative	**Rating**
Low Optimum Yield	LO (Lack of Objections)
Medium Optimum Yield	EC-2 (Environmental Concerns-Insufficient Information)
High Optimum Yield	EC-2 (Environmental Concerns-Insufficient Information)
Pacific Fishery Management Council	LO (Lack of Objections)
Management Alternative	**Rating**
Alternative 1	LO (Lack of Objections)
Alternative 2	EC-2 (Environmental Concerns-Insufficient Information)
Alternative 3	EC-2 (Environmental Concerns-Insufficient Information)
Pacific Fishery Management Council	EC-2 (Environmental Concerns-Insufficient Information)

An overall rating of EC-2 (Environmental Concerns - Insufficient Information) along with a summary of our comments will be published in the *Federal Register*. A copy of the rating system used in conducting our review is enclosed for your reference.

Our concerns with the EIS focus on projected exceedances of optimum yields for canary and widow rockfish, observer coverage and impacts on essential fish habitat. Detailed comments discussing our concerns are provided below.

Thank you for the opportunity to review this draft EIS. If you would like to discuss these issues, please contact Mike Letourneau at (206) 553-6382.

Sincerely,

Christine Reichgott

Christine Reichgott, Manager
NEPA Review Unit

Enclosures

EPA's Detailed Comments
Proposed Acceptable Biological Catch and Optimum Yield Specifications
and
Management Measures for the 2005 - 2006 Pacific Coast Groundfish Fishery
Draft Environmental Impact Statement

Optimum Yield Projections for Canary and Widow Rockfish

The EIS states that management Alternatives 2 and 3 will result in exceeding the Optimum Yield (OY) for canary and widow rockfish. The EIS estimates that Alternative 3 would result in overages of more than twice the OY for widow rockfish and concludes that the OY exceedances for canary and widow rockfish projected from Alternatives 2 and 3 would result in significant adverse impacts. Even with the most conservative of rebuilding plans that include minimum OYs for these overfished species, maximum sustainable yields would not be met for decades.

While the EIS discusses the benefits of these alternatives, these benefits are short-term and the impacts from these alternatives would be extensive and long-term. Mitigation measures such as those included in the Pacific Fishery Management Council Preferred Alternative (i.e., additional bycatch reduction measures in the Pacific whiting fishery and de facto sector-wide bycatch caps for canary and widow rockfish) could prevent OY from being exceeded under management Alternative 2. However, the projected overages in Alternative 3 are of such a great magnitude that it is unlikely that mitigation measures would effectively reduce total bycatch mortality for these species to levels below their OYs.

The EIS should include mitigation measures to reduce the projected take of canary and widow rockfish in all management alternatives. In addition, the EIS should assure that these mitigation measures would meet OYs for canary and widow rockfish. These measures may include the closing of fisheries when it is projected that the OYs for canary and widow rockfish would be met.

Observer Coverage

Significant uncertainties in the data utilized for determining optimum yields include data on bycatch across all fisheries. The National Marine Fisheries Service (NMFS) implemented an observer program for groundfish fisheries in 2001 and data from that program was first available in early 2003. This observer data results in much more accurate bycatch estimates. Effective bycatch accounting and control mechanisms are critical for staying within target catch optimum yields and the first element in limiting bycatch is accurately measuring bycatch rates by time, area, depth, gear type and fishing strategy. The best available means of obtaining bycatch rate information is through the observer program.

Camera monitors onboard ships are a good mechanism for monitoring the retention of bycatch. However, cameras do not provide a means of accurately accounting for species composition and weight of bycatch that is discarded. At present, electronic monitoring technology is not accurate enough to identify species and estimate the weight of discarded fish more than 63% of the time. Therefore, we support 100% observer coverage as proposed in management Alternatives 1 until such time that video and electronic monitoring of bycatch equals or exceeds that of the observer program. While we recognize that there are risks associated with 100% observer coverage (i.e., low participation in a fishery because of the cost of the observer equipment and bycatch caps), these risks can be offset with incentives such as switching to deep water complex target species thus avoiding overfished species. In addition, we support quota incentives to those fishers and vessels that accommodate observers, until such time that 100% observer coverage can be provided.

Impacts on Habitat

The Magnuson-Stevens Act obligates the Fisheries Councils and NMFS to identify and characterize essential fish habitat that is necessary to allow for groundfish production to support long-term sustainable fisheries for groundfish and for groundfish contributions to a healthy ecosystem. Trawling gear is known to modify seafloor habitats by altering benthic habitat complexity and by removing or damaging infauna and sessile organisms. Other fisheries related changes in the physical environment include changes in water quality associated with vessel traffic and fish processing discards.

The EIS describes adverse impacts of fishing on Essential Fish Habitat (EFH) including ecosystem effects, in very general terms. While the management alternatives presented in the EIS are evaluated for their impacts on ecosystems and EFH, these comparisons are based on differences in fishing effort between the alternatives not on specific impacts various habitats may sustain. The EIS provides very specific spatial and temporal management measures for fishing effort (i.e., the use of selective flatfish trawl gear in the Rockfish Conservation Area north of 40°10' latitude, at depths between 75 fathoms and 150 fathoms in January and February); however, it only discusses impacts to EFH in nonspecific terms regardless of location, time and fishing gear utilized. For example, the management action alternatives propose expanding and decreasing the size of the current Rockfish Conservation Area (RCA). The EIS concludes that the alternatives with the greatest decrease in the RCA would result in the greatest amount of impacts on EFH due to the proposed increase in available fishing area and thus increased fishing effort. The EIS does not discuss the types of habitat that are currently present in the RCA, the amount and type of habitat that will be made more or less vulnerable to fishing impacts due to increasing or decreasing the size of the RCA, and what effects these habitat impacts will have on target and non-target fish species.

While sufficient information may not currently exist to perform a precise quantitative analysis of the impacts the groundfish fishery would have on the various fish habitats under each of the proposed management alternatives, the EIS should discuss in more detail what is known about the habitats in the proposed fishing areas and how the alternatives vary in the magnitude of their impacts. In particular, the EIS should discuss how the spatial and temporal distribution of fishing efforts with various gear (e.g., selective flatfish trawl gear, large footrope gear) will impact the various habitats (e.g., rocky and non-rocky shelf habitats), for each of the proposed management alternatives.

U.S. Environmental Protection Agency Rating System for Draft Environmental Impact Statements Definitions and Follow-Up Action*

Environmental Impact of the Action

LO – Lack of Objections

The U.S. Environmental Protection Agency (EPA) review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC – Environmental Concerns

EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce these impacts.

EO – Environmental Objections

EPA review has identified significant environmental impacts that should be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no-action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU – Environmentally Unsatisfactory

EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the Council on Environmental Quality (CEQ).

Adequacy of the Impact Statement

Category 1 – Adequate

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis of data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2 – Insufficient Information

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses or discussion should be included in the final EIS.

Category 3 – Inadequate

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the National Environmental Policy Act and or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

* From EPA Manual 1640 Policy and Procedures for the Review of Federal Actions Impacting the Environment. February, 1987.

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NATURAL RESOURCES DEFENSE COUNCIL

October 12, 2004

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BY FAX (206-526-6736) AND MAIL

D. Robert Lohn
Regional Administrator
National Marine Fisheries Service
7600 Sand Point Way, N.E., Bldg. 1
Seattle, WA 98115-0070

Dear Mr. Lohn:

On behalf of the over 1 million members and activists of NRDC (Natural Resources Defense Council), we are writing to comment on the draft environmental impact statement ("DEIS") on the 2005-2006 specifications and management measures ("specifications") for the Pacific groundfish fishery. For the following reasons, the DEIS fails to comply with the requirements of the National Environmental Policy Act ("NEPA") and the Magnuson-Stevens Act ("MSA"). First, crucial information is inaccurate or omitted entirely. Second, the National Marine Fisheries Service ("NMFS") fails to consider adequate alternative harvest levels and alternative bycatch reduction measures for overfished species. Third, the analysis fails to discuss adequately the specifications' effects on overfished species, bycatch reduction, rockfish conservation areas ("RCAs"), and essential fish habitat ("EFH"). Finally, the DEIS fails to address sufficiently the cumulative impacts of repeated overfishing as well as its effects on EFH and the marine ecosystem.

I. THE DEIS LACKS DATA THAT IS CRUCIAL TO THE INFORMED DECISIONMAKING PROCESS REQUIRED OF NEPA AND THE MSA.

The DEIS fails to include data that is essential to understanding and evaluating the environmental effects of the proposed specifications. For example, the document omits relevant information regarding total catch and bycatch mortality for recent years. This data is excluded without any explanation despite its central importance for judging the effect of past fishing harvests and the effectiveness of NMFS's management of fishing mortality. It does not suffice to include only draft estimated total mortality of selected species when more accurate actual catch and bycatch data exists and is being (or should be) used to calculate future harvest levels.

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This information is essential to a reasoned decisionmaking process for establishing future harvests and for evaluating the comparative merits of the alternatives considered. Information pertaining to the actual catch and bycatch mortality over the past five years is crucial for reviewing the relative direct, indirect, and cumulative impacts of the various alternative harvest levels being considered.

Failure to include this information also violates the MSA and NMFS's regulations implementing the MSA. See 16 U.S.C. § 1852(a)(5) (requiring that fishery management plans ("FMPs") include "catch by species in numbers of fish or weight thereof"); see also 50 C.F.R. § 600.315(b)(1) (explaining that "successful fishery management depends, in part, on the timely availability, quality, and quantity of scientific information, as well as on the thorough analysis of this information, and the extent to which the information is applied"). The DEIS acknowledges that "the availability of data is critical to the effective management of fishery resources," DEIS at 7.3.1.2, yet fails to include important data, such as comprehensive actual catch and bycatch mortality totals by species. NMFS must clearly disclose the relevant information – including recent catch data – and explain how that information affects its decisions on future harvests. It is insufficient to merely cite to the stock and rebuilding assessments on which the agency purportedly relies.

Unfortunately, not only is crucial data omitted from the draft EIS, but some of the data that is included – such as estimates for total mortality – conflicts with similar data included in the scientific reports on which the document relies. For example, the DEIS' estimated total catch for bocaccio in 2002 is listed at 140.3 mt (40.3% above optimum yield ("OY")), yet the total catch contained in the 2003 MacCall Stock Assessment on which NMFS relies lists 2002 catch at 201 mt (101% above OY). Alec D. MacCall, Southwest Fisheries Science Center, National Marine Fisheries Service, Status of Bocaccio of California in 2003 ii (June 2003). The mortality estimates for the eight overfished groundfish species contained in the DEIS' mortality scorecards is also at odds with the estimates provided in NMFS' proposed rule implementing the 2005-2006 specifications. Compare DEIS at Tables 2-13a and 2-13b, and 69 Fed. Reg. 56550, 566631-56647. For example, the estimated recreational take for lingcod in 2005 in the DEIS scorecard is 8 mt greater than that contained within the proposed rule. Id. A discrepancy of several mt also exists in the two documents regarding the lingcod commercial take. Id. NMFS cannot argue that it considered the best scientific information available in making a reasoned decision when its own numbers do not even add up. Additionally, the public cannot effectively review and respond to NMFS' environmental analysis when the data on which it relies is unclear, confusing, and inconsistent.

As the DEIS correctly notes, risk and uncertainty are inherent in fishery management due to imperfect sources of data, inaccurate or inadequate monitoring, and unknown future environmental conditions. DEIS at 7.1.3. However, these limitations are only compounded by NMFS's unclear, inconsistent, and, at times, absent depiction of the data that it does have available to it.

The DEIS also fails to discuss adequately the underlying stock assessments and rebuilding assessments on which the alternatives are based, including uncertainties inherent to the assessments. Such discussion must be part of the analysis regarding alternative harvest levels.

Finally, the DEIS fails to consider the estimated total mortality of overfished species by fishery for 2006 for any of the action alternatives except for the Council-preferred Alternative. Charts 2-5, 2-10, 2-11, 2-12. In choosing to establish specifications for both 2005 and 2006, NMFS must provide complete analysis of predicted mortality for both years.

II. THE DEIS FAILS TO CONSIDER A REASONABLE RANGE OF ALTERNATIVES

A central component of NEPA is the requirement that agencies "study, develop and describe alternatives to recommended courses of action in any proposal which involves conflicts concerning alternative uses of available resources". 42 U.S.C. § 4332(2)(E). In interpreting this requirement, the Ninth Circuit has held that "informed and meaningful consideration of alternatives ... is an integral part of [NEPA's] statutory scheme. Bob Marshall Alliance v. Hodel, 852 F.2d 1223, 1228 (9th Cir. 1988). Courts have struck down environmental impact statements where agencies have failed to consider a reasonable range of alternatives or omitted from consideration viable alternatives. Muckleshoot Indian Tribe v. U.S. Forest Service, 177 F.3d 800, 813-814 (9th Cir. 1999). The DEIS fails to consider adequate alternative harvest levels and alternative bycatch reduction measures for overfished species. The following examples are intended to be illustrative rather than comprehensive.

A. The DEIS Fails to Consider Alternative Harvest Levels Adequately for Several Overfished Species.

Darkblotched Rockfish

The DEIS fails to consider any alternative harvest levels for darkblotched rockfish other than the status quo and Council-preferred Alternatives. See DEIS Tables 2-1(a) and 2-1(b). Furthermore, the discussion entitled "Alternative Harvest Levels" does not actually discuss any alternatives for darkblotched rockfish. The brief section is instead devoted to an illogical attempt to explain NMFS's disturbing decision to set OY at ABC (discussed in section III.A above). NMFS is required to consider and discuss fully alternative harvest levels for darkblotched rockfish other than the one proposed. At least one of those alternatives must consider setting OY below ABC.

Since 2000, actual total mortality for the species has exceeded harvest specifications at least three times, and is projected to do so again in 2004. See Draft Summary Minutes of the Ad Hoc Allocation Committee of the Pacific Fishery Management Council 3 (Aug. 27, 2001) (mortality exceeded OY by 24% in 2000); see also Jean Beyer Rogers, Pacific Fishery Management Council, Darkblotched Rockfish (*Sebastes crameri*) 2003 Stock Status and Rebuilding Update, Vol. 1: Status of the Pacific Coast Groundfish Fishery Through 2003 and Recommended Acceptable Biological Catches for 2004 (Stock Assessment and Fishery Evaluation) 5 (2003) (mortality exceeded OY by 31.5% in 2001); DEIS Tables 4.1-4.2

(estimated mortality exceeded OY by 20% in 2002); Pacific Fishery Management Council, GMT Report on Initial Consideration of Status of Fisheries and Inseason Adjustments Addendum C.2.b (Sept. 2004) (projecting 2004 mortality for darkblotched to be more than 15% over the OY/ABC). Based on recent past experience, setting the OY at ABC is exceedingly likely to result in overfishing and is thus a highly risky strategy. The DEIS must consider alternative harvest levels for darkblotched rockfish that account for these continuing overharvests.

Canary Rockfish

The DEIS considers only two alternative harvest levels to the status quo for canary rockfish: 43 mt and 48 mt for 2005 and 45 mt and 51 mt for 2006. DEIS Tables 2-1(a) and 2-1(b). Interestingly, NMFS's short discussion of alternative harvest levels refers to three alternatives – Low, Medium, and High OY. See DEIS at 2.1.2.3. Perhaps most significantly, neither the Tables nor the discussion explains what the proposed harvest level is under the Council-preferred Alternative. NMFS must consider a wider range of alternatives for canary rockfish.

Bocaccio

The DEIS fails to explain why bocaccio are assessed separately south of 40° 10' N latitude from those to the north. DEIS at 2.1.2.1. It is unclear whether a stock assessment has ever been performed on the northern population. NMFS must explain on what basis it believes that only the southern population is overfished. NMFS must also present alternative harvest levels for the northern population.

Lingcod

None of the alternative harvest levels for lingcod is lower than OY for 2004. DEIS Tables 2-1(a) and 2-1(b). None of the alternative harvest levels discussed account for past overfishing despite the fact that OY for lingcod has been exceeded at least three of the past five years. DEIS at 2.1.1.2; see Draft Summary Minutes of the Ad Hoc Allocation Committee of the Pacific Fishery Management Council 3 (Aug. 27, 2001) (reporting total catch for 2000 of 483 mt, or 28% over OY); see also DEIS Tables 4.1-4.2 (estimating total mortality in 2002 at 980 mt, or 70% over OY; and in 2003 at 1366.6 mt, or 110% over OY). Indeed, total catch for 2003 even exceeded ABC. See DEIS Tables 4.2 (estimating total mortality in 2003 at 1366.6 mt, or 62% over ABC). NMFS is required to consider alternative harvest levels for 2005-2006 that account for its repeated inability to constrain mortality below the harvest levels.

B. The DEIS Fails to Consider Alternative Bycatch Reductions Measures Adequately.

NMFS is required to implement conservation and management measures that minimize bycatch and bycatch mortality to the extent practicable. 16. U.S.C. § 1851(a)(9). Bycatch reduction is essential to NMFS' overall obligation to prevent overfishing, 16 U.S.C. §§ 1802(28), 1851(a)(1), and to rebuild overfished species as quickly as possible, 16 U.S.C. § 1854(e). In order to comply with these statutory requirements, NMFS must analyze all potentially practicable bycatch minimization measures and adopt all those that are practicable. The DEIS fails to do either.

Bycatch Caps

NRDC agrees with the proposed rule authorizing NMFS to close the whiting fishery if canary or widow rockfish bycatch limits are reached but believes that the closures should be mandatory not permissive. NMFS is required by law to reduce bycatch. 16 U.S.C. §§ 1851(a)(9), 1853(a)(11). Consistent with its duty to prevent overfishing, 16 U.S.C. §§ 1802(28), 1851(a)(1), and to rebuild overfished species as quickly as possible, 16 U.S.C. § 1854(e), NMFS should implement a system of bycatch caps that requires the closure of the fishery when bycatch limits are exceeded. NMFS must consider this alternative in the EIS.

Alternative Management Measures to Reduce Bycatch

In a departure from past analyses, NMFS creates a "separate decisional step" between the choice of ABC/OY for each species and the development of management measures to accomplish the selected harvest levels. See DEIS at 1.3.2. As a result, the DEIS only considers alternative management measures for the Council-preferred Alternative. The practical effect of this new approach is a failure to consider the ways in which alternative management measures could further reduce bycatch of overfished species while maximizing the catch of more healthy stocks. Absent such consideration, neither NMFS nor the public can fully appreciate and weigh the potential tradeoffs between long-term sustainability and short-term maximization of the resource. These trade-offs are an inherent and essential part of NMFS' decisionmaking that must be discussed fully.

NEPA requires that the EIS systematically explain what management measures would be used under each alternative and how each differing regime would variably affect bycatch rates. It is not enough merely to list expected bycatch mortality by species on the mortality scorecards found in Tables 2-5, 2-10, 2-11, 2-12, and 2-13. The analysis must explain how the choice of alternative management measures will affect those rates.

Several bycatch reduction measures that have been proven extremely effective are mentioned in the DEIS but quickly discarded without sufficient explanation. For example, the analysis of alternatives for the whiting trawl fisheries describes several measures, such as more widespread use of closed areas, the use of a "penalty box" strategy, and the strategic closing off of hot-spots known to contain high co-occurring overfished species. See DEI 4.3.2.1. Despite an ODFW staff report finding that such measures "can drastically reduce widow bycatch," the Council-preferred Alternative does not act on any of them. DEIS at 4.3.2.1. The only explanation provided for failing to do so is that "NMFS did not wish to recommend these management measures until it had a chance to review additional analyses and hear industry comment." Id. NMFS must consider each of these management tools as an alternative in the EIS.

III. THE DEIS FAILS TO DISCLOSE AND ANALYZE ADEQUATELY THE ENVIRONMENTAL EFFECTS OF THE PROPOSED SPECIFICATIONS.

NEPA requires that an EIS include a "detailed statement" on the environmental impacts and effects of each alternative. 42 U.S.C. § 4332; 40 C.F.R. § 1502.16. The Supreme Court has stressed the importance of this requirement in ensuring that the agency has before it "*detailed information* concerning significant environmental impacts" before making a decision. Roberston v. Methow Valley Citizens Council, 490 U.S. 332, 349 (1989) (emphasis added). The DEIS provides inadequate analysis of the environmental effects of the proposed specifications on overfished species, bycatch reduction, rockfish conservation areas, and essential fish habitat.

A. The DEIS' Analysis of Impacts on Overfished Species is Inadequate.

NEPA requires that an environmental impact statement "rigorously explore and objectively evaluate all reasonable alternatives," 40 C.F.R. § 1502.14, and, *in a separate section*, discuss the environmental consequences of each alternative, 40 C.F.R. § 1502.16. Importantly, the evaluation of alternatives and the discussion on the environmental effects of those alternates must be distinct and non-duplicative. Id. The DEIS blatantly disregards this requirement by cutting and pasting the discussion of alternatives contained in Chapter 2 with the discussion of their impacts contained in Chapter 4. Compare DEIS at 2.1 with 4.3.

Additionally, the species-by-species analysis pertaining to alternative harvest levels and their impacts that is provided lacks genuine analysis, is based on extremely tentative scientific conclusions, and is riddled with inconsistencies. The following examples illustrate many, but not all, of these shortcomings.

Darkblotched Rockfish

NMFS has chosen to set optimum yield ("OY") for the overfished darkblotched rockfish at the allowable biological catch ("ABC") for 2005 and 2006. This decision conflicts with the mandate to rebuild overfished species as quickly as possible, the need for caution in light of uncertain scientific stock assessments, and NMFS' policy calling for harvest levels to be set below ABC for overfished species. The decisionmaking process for darkblotched epitomizes NMFS' general modus operendi whereby "[m]anagement immediately tries to capitalize on any apparent stock increase or marginal fishing opportunity, but only slowly responds to apparent decreases in stock." Andrew A. Rosenberg, Managing to the Margins: The Overexploitation of Fisheries, 1 Frontiers in Ecology and the Environment 102 (2003).

NMFS fails to address these pertinent issues and justify its decision accordingly. The Agency bases its decision to set harvest levels at the ABC threshold on "recent strong recruitment" in the 2000 and 2001 classes. NMFS projects that these juveniles will enter the fishery at some point in the future but are "too small to have fully recruited to the fishery in 2004-2006." DEIS at 2.1.2.5 and 4.3.1.7. NMFS seems to be gambling that projected strong recruitment numbers will eventually recruit to the fishery at some point beyond 2006, but that such predictions are too uncertain to have any present affect on the species' ABC. Such a gamble lacks both common sense and support in the scientific analysis on which NMFS claims to be relying. NMFS must discuss the environmental consequences of setting such high harvest levels in the case that the projected strong recruitment class never matures into the fishery.

Amazingly, NMFS admits that the optimistic recruitment numbers on which the high harvest levels are based have "not been completely validated in the data used to assess the stock." Id. NMFS also acknowledges that the "risk of error progressively increased from including those recruitment estimates because they were based on increasingly limited data." Id. NMFS' decision to set harvest levels at ABC appears based entirely on this unvalidated and uncorroborated data. Such irrational reasoning is indefensible. NMFS must discuss fully the environmental consequences of the severe overfishing that will occur if the data upon which it relies turns out to be an inaccurate overestimation of the 2000 and 2001 recruitment classes.

NMFS' decision to set such high harvest levels is inconsistent with the scientific studies on which it purports to rely. The 2003 Stock Assessment cautions against over reliance on the 2000 and 2001 numbers: "Information on 2000 and 2001 recruitments should be carefully monitored. High estimates for both the 1995 and 1998 recruits were later reduced when more information was received." Jean Beyer Rogers, Pacific Fishery Management Council, Darkblotched Rockfish (*Sebastes crameri*) 2003 Stock Status and Rebuilding Update, Vol. 1: Status of the Pacific Coast Groundfish Fishery Through 2003 and Recommended Acceptable Biological Catches for 2004 (Stock Assessment and Fishery Evaluation) 5 (2003). The DEIS conveniently omits any mention of these findings despite referencing the 2003 Rogers Assessment as the basis for its decision. NEPA requires that NMFS fully analyze and discuss the quality of the information on which it is relying and how it accounted for that quality in its choice to set harvest levels so high for the darkblotched rockfish.

NMFS' decision to front-load predicted strong recruitment numbers as justification for setting the darkblotched OY at ABC is contradicted by a growing recognition among scientists that high year classes may be less likely to recruit to a depleted fishery. See DEIS at App. A 2.3.2. The DEIS explains how this works:

> Researchers are beginning to identify cultivation/depensation effects that run counter to traditional ideas of density-dependent population response (Pauly *et al.* 2002). Adults of a given species may control the abundance of species preying on their juveniles. If the number of adults is reduced below some level, this predation is unchecked, leading to serial recruitment failure. This process is hypothesized for large-sized rockfish species; declines in several of these species are correlated with increases in the abundance of smaller-sized rockfish species. The latter may be preying on the former's juveniles (Piner 2001).

Id. NMFS must consider this scientific phenomenon in its analysis of the recent strong recruitment classes for darkblotched rockfish and determine whether such an optimistic reliance on recruitment data is warranted at this time.

NMFS explains the relationship between OY and ABC for overfished species as follows: "the OY is typically the management target and is usually less than the ABC, based on the need to rebuild stocks to B_{msy}." DEIS at 4.1. The decision to set the OY at the ABC for darkblotched, a severely overfished species that is well below B_{msy}, is entirely inconsistent with NMFS' own policy. The DEIS fails to explain this apparent contradiction.

The DEIS also fails to consider recent overharvests of darkblotched rockfish. See supra Part II.A. Undeterred by these recent failings of the regulatory management regime to prevent overfishing, NMFS decided to set the 2004 harvest level for the darkblotched at the ABC. The Groundfish Management Team ("GMT") recently reported to NMFS that it projects 2004 mortality for darkblotched to be more than 15% over the OY/ABC. Pacific Fisheries Management Council, GMT Report on Initial Consideration of Status of Fisheries and Inseason Adjustments Addendum C.2.b (Sept. 2004). Recurrent overfishing of the most depleted species indicates a systemic failure of NMFS' management policy that must be addressed in this DEIS and, more broadly, in an entire overhaul of that policy.

Canary Rockfish

NMFS has chosen to include a buffer between projected mortality and harvest levels for overfished species that it claims results in an added layer of protection to prevent overfishing. The DEIS explains that such a buffer is especially important for "constraining species" such as canary rockfish due to the high cost and difficulty of monitoring and inseason management actions needed to avoid exceeding the OYs for such species. DEIS at 7.3.1.1. Illogically, the buffer for canary rockfish – the very species used to justify the need for a buffer – is smaller in the Council-preferred alternative than for any of the other overfished species other than the widow rockfish, which is afforded no buffer at all. See DEIS Tables 2.13a and 2.13b (5.4% buffer in 2005 and 3.8% in 2006). NEPA requires that NMFS explain fully its rationale for including buffers for overfished species and what size buffers are necessary to avoid overfishing. NMFS must also explain the variance in the size of buffers selected for the different overfished species and the environmental consequences of any of the buffers being exceeded.

Widow Rockfish

The DEIS fails to address fully the uncertainties in the data underlying the alternative harvest levels presented for the widow rockfish and how those uncertainties could alter the calculus in successfully rebuilding the species. See DEIS at 2.1.2.9 and 4.3.1.11. The limited discussion states that "the range of harvest specifications attempts to analyze varying rebuilding probabilities and model uncertainties in the assessment and rebuilding analysis," but does not begin to explain the analysis or its potential ramifications on the successful rebuilding of the species. Id. The scientific stock assessment and rebuilding analysis on which the range of 2005-2006 harvest specifications is based cautions that "the primary source of information on trends in abundance of widow rockfish . . . is a questionable source of information for widow rockfish." Xi He, et al., National Marine Fisheries Service, Status of the Widow Rockfish Resource in 2003 3 (May 2003). The DEIS must explain and analyze the consequences of its actions to ensure informed decisionmaking and public participation. It is unclear whether any consideration is given to the questionable source of information on which NMFS relies in setting widow harvest specifications. If NMFS has done so, it must explain how this basic uncertainty plays into its decision to choose the highest harvest level for widow rockfish among all the alternatives considered.

As mentioned above, the proposed specifications provide no buffer for widow rockfish, one of the most depleted species. It is unreasonable to choose an alternative with no buffer given the major uncertainties in the reliability of the stock assessment mentioned above. The DEIS fails to explain the rationale for choosing this approach.

Bocaccio

The DEIS lacks any meaningful discussion of how alternative bocaccio harvest levels would affect the species's prospects of rebuilding successfully. See DEIS at 2.1.2.1 and 4.3.1.3. Total mortality for bocaccio has exceeded OY every year since 2000, in at least one case by more than 100%. The DEIS does not even mention this astounding track record. NMFS must consider what impacts such continuous overfishing have on the viability of the rebuilding plan and the assumptions contained therein. Failure to do so violates NEPA.

The DEIS also fails to explain NMFS' reasoning behind the 23% increase in OY for bocaccio from 2004 to 2005. Consistent with the conclusory rationale used to justify high harvest levels for most of the overfished species, the DEIS blindly relies on the assumptions and conclusions contained within stock assessments and rebuilding plans without any explanation for the reader. NMFS must do more than merely cite to a stock assessment or rebuilding analysis to fulfill NEPA's requirement that it discuss the environmental consequences of its actions.

In the section entitled "Irreversible Resource Commitments," the DEIS mentions that "there is not enough information to determine a definite threshold below which population decline is irreversible" due to the "variability in assessment results." DEIS at 9.2. Such a conclusion cries out for a more precautionary approach to setting harvest levels for overfished species. In addition, this is precisely the type of information – great uncertainty regarding irreversible population decline for an overfished species – that must be addressed more thoroughly in the DEIS' explanation for choosing the preferred harvest level over more precautionary alternatives.

The DEIS also fails to investigate the potential impacts of the trip-limit allocation of bocaccio to large footrope trawl in the preferred alternative for limited entry trawl gear south of 40 degrees 10 minutes. Since large footropes can only be used seaward of the RCA, the bocaccio caught under this trip limit are likely to be the large old fish that dwell at depth. Several new studies show that big old fish are particularly productive, and that their young grow and survive more successfully than those of more junior members of the population.[1] The DEIS should explain how the strategy of encouraging commercial trawl catch of big old fish helps

[1] Bobko, Stephen J. and Steven A. Berkeley, 2004. Maturity, ovarian cycle, fecundity and age-specific parturition of black rockfish, Fish. Bull. 102: 418-429. Berkeley, Steven A. and Mark Hixon, Ralph Larson, and Milton Love, 2004. Fisheries sustainability via protection of age structure and spatial distribution of fish populations. Fisheries (in press). Berkeley, Steven A., Colin Chapman and Susan Sogard, 2004. Maternal age as a determinant of larval growth and survival in a marine fish, *Sebastes melanops*. Ecology 85(5), pp. 1258-1264.

rebuild the bocaccio population as soon as possible, and how that strategy meshes with these new findings.

B. The DEIS' Analysis of Bycatch Reduction is Inadequate.

The DEIS employs a different analytical approach to estimate bycatch impacts on the non-whiting trawl fishery for Action Alternatives 1 through 3 than it does under the Council-preferred Alternative. See DEIS at 4.3.2.1. The Council-preferred Alternative employs a bycatch model that applies the bycatch rate from the selective flatfish trawl (SFFT) experimental fishing permit ("EFP") in lieu of the bycatch model used in Action Alternative 1-3 that bases its models on bycatch rates from the WCGOP observer program. Id. This approach leads to "predicted savings in rockfish [that] are even more substantial" than the approach that calculates bycatch based on observer data alone. Id. Expansion of the SFFT gear to the entire fishery is a prudent approach to reducing bycatch. However, as NMFS acknowledges, the SFFT gear has never been tested during the winter months so it is inappropriate and risky to assume lower bycatch rates for the fishery year-round until that data have been fully validated. The DEIS explores four options for extrapolating winter SFFT bycatch rates from the limited data available and ultimately chooses the least cautious approach. Id. NMFS must analyze the environmental consequences of significantly increased bycatch in the winter months if these estimates prove inaccurate.

C. The DEIS' Analysis of Rockfish Conservation Areas is Inadequate.

NMFS is proposing to reduce the size of the non-whiting trawl RCA by 40%. DEIS at Table 3-1. This is the smallest amongst the RCA alternatives. Id. NMFS does not discuss how this choice will affect the successful rebuilding of overfished species. The discussion of environmental effects is limited to a vague prediction that "this alternative will have the greatest impact on EFH and the ecosystem because projected target species catch, acting as a proxy for fishing effort, is highest under this alternative." DEIS at 3.5. The unjustified and unanalyzed decision to dramatically reduce the size of the RCA conflicts with the DEIS' broad proclamation that "these Rockfish Conservation Areas (RCAs) were a key feature of 2003 management, and continue to be so today." DEIS at 1.3.2. The DEIS must discuss fully the potential environmental consequences of shrinking the RCA and must compare these consequences with the environmental and conservation advantages of keeping the RCA to its current boundaries.

The DEIS fails to analyze the impacts of the various RCA alternatives on overfished groundfish species and, more generally, the marine ecosystem. NMFS explains that "the extent of the RCAs . . . are smaller under the Council-preferred Alternative . . . because it reduces the size of the closed areas in need of enforcement." DEIS at 7.5.5. However, in the very next sentence, NMFS contradicts its own justification for a smaller RCA by stating that "regulatory complexity and costs to the management regime due to the size of commercial closed areas . . . are not anticipated to differ substantially between the alternatives." Id. Later in its analysis, the DEIS explains that vessel costs and safety are reduced along with the size of the RCA. See DEIS at 8.3.1.5. If lower costs are the chosen rationale for shrinking the size of the RCA, then NMFS must be clear about this and explain who will benefit from the savings – the regulatory regime, the fishing community, or both. Regardless of whether the justification is reduced cost or something else, the DEIS must also analyze the expected environmental impacts of reducing the RCA. It makes little sense, of course, to reduce the size of the RCAs in order to save on enforcement costs if the consequence of that decision is to increase mortality of overfished species.

Another problem with the analysis pertaining to RCAs is that the DEIS applies inconsistent reasoning between the decisions to reduce the size of the trawl RCA but to maintain the status quo for the non-trawl RCA. The DEIS correctly resists calls to shrink the non-trawl RCA because "[t]he estimated mortality of overfished shelf species (bocaccio, cowcod, canary, lingcod, widow, and yelloweye) would be progressively higher [if the RCA was reduced in size] since more fishing is progressively allowed in depths where these species are found." DEIS at 4.3.2.2. However, it is completely arbitrary and capricious for NMFS to base its decision to maintain the size of the non-trawl RCA on sound science and the need to rebuild overfished species yet ignore these realities in its decision to reduce the size of the trawl RCA. The DEIS must apply the same scientific standards and decisionmaking criteria to both analyses.

D. The DEIS' Analysis of Impacts on Essential Fish Habitat and the Ecosystem is Inadequate.

The MSA requires NMFS to describe, identify and minimize impacts to essential fish habitat ("EFH"). 16 U.S.C. §§ 1853(a)(7), 1855(b). NMFS claims to recognize its obligation to analyze how the proposed specifications and management measures will impact EFH and the ecosystem in general. See DEIS 3.1 ("[m]anagement measure alternatives that affect fishing activities having potential adverse effects on EFH must be evaluated"). However, rather than actually evaluate these impacts in relation to the proposed specifications, NMFS merely provides a general overview of the scientific literature on the general effects to EFH of a variety of fishing and non-fishing related activities. See generally DEIS App. A. NMFS has decided not to predict the effects of other actions, such as setting harvest specifications," until after it completes its programmatic EFH EIS sometime in February 2006. DEIS App. A at 4.5. NMFS must evaluate impacts of the proposed specifications to EFH within this NEPA review. As Appendix A demonstrates, NMFS possesses considerable information on EFH.

IV. THE DEIS FAILS TO ANALYZE CUMULATIVE IMPACTS ADEQUATELY.

NMFS's discussion of cumulative impacts is vague and incomplete. NEPA requires NMFS to address the cumulative effects which result from the incremental impact of the proposed fishing specifications "when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions." 40 C.F.R. § 1508.7. The DEIS fails to analyze adequately the cumulative effects of past overfishing and the cumulative impacts on EFH and the marine ecosystem.

A. The DEIS Fails to Consider the Cumulative Effects of Past Overharvests.

NMFS must discuss the cumulative effects of past overharvests and how these past overharvests were accounted for in developing the 2005-2006 harvest levels. See Lands Council v. Powell, 379 F.3d 738, 744-746 (9th Cir. 2004) (requiring timber harvest EIS to discuss impacts from past harvests in consideration of alternatives and to provide adequate data of the time, type, place, and scale of past timber harvests). The DEIS lacks any discussion of the ramifications of past overharvests on the 2005-2006 specifications, especially regarding the most overfished species.

NMFS acknowledges that past overfishing is a cumulative effect that could jeopardize the sustainability of overfished species, but completely ignores consideration of the cumulative effects of repetitive overfishing. The DEIS explicitly states that "[p]ast overfishing has resulted in the overfished status for eight groundfish stocks, jeopardizing sustainability" and that "[r]ecurrent overfishing would further jeopardize stocks." DEIS at 9.7. However, NMFS also explains that "[t]ruly jeopardizing the sustainability of a stock is more likely to result from the cumulative effect of overfishing over a longer period than the 2005-2006 management cycle." Id. In essence, NMFS is saying that overfishing can jeopardize sustainability, but that is unlikely to occur within the next few years, even if overfishing continues. Unfortunately, NMFS seems to be relying more on faith than sound science or rational analysis. NMFS must explain its belief and support its decisions on this issue. The DEIS does neither.

In lieu of any true cumulative impacts analysis, NMFS merely directs the reader to the tables listing the estimated mortality on the eight overfished species from various sources under the different alternatives. See DEIS at 4.4. The brief section lacks any discussion at all regarding how bycatch of overfished species would be affected under the different Action Alternatives. The section merely identifies canary rockfish as the most at risk of exceeding its harvest level because bycatch comprises nearly all of its OY. The only proposal NMFS can muster is that "tracking canary rockfish mortalities closely inseason will be critical to avoid overfishing that stock." Id.

The DEIS also declares that management measures in 2005-2006 are intended to respond to past overharvests, but does not explain sufficiently what measures it plans to employ and specifically how they will respond to past overfishing. DEIS at 4.2.

B. The DEIS Fails to Consider the Cumulative Impacts on Essential Fish Habitat and Ecosystems.

The analysis of cumulative impacts on EFH and the marine ecosystem is similarly undeveloped and vague. Although the DEIS mentions that past fishing activity "likely resulted in substantial impacts to EFH and . . . ecosystem structure," the document lacks any discussion or explanation as to what those impacts were or how they may effect the long term viability of a sustainable groundfish fishery. DEIS at 3.4. In addition, no mention is made regarding the cumulative impacts on the ecosystem and EFH of chronic overharvesting of overfished species.

The DEIS fails to address how the cumulative impacts on the ecosystem and EFH would vary depending on which alternatives are chosen. This lack of cumulative impacts analysis is said to be the result of insufficient information on whether "the magnitude of cumulative effects under the alternatives will differ from the relative magnitude of direct and indirect effects." DEIS at 3.5. Rather than derive an answer to this question, NMFS instead chooses to summarily conclude that "those alternatives producing greater direct and indirect impacts would be expected to result in greater cumulative impacts," and not discuss what those impacts would be. Id. NMFS has failed to perform the analysis required by NEPA.

V. Conclusion

The DEIS on the proposed 2005-2006 specifications fails to meet the requirements of NEPA. Accordingly, we urge the Council and NMFS to provide more detailed information on the decisionmaking process; consider adequate alternative harvest levels and alternative bycatch reduction measures for overfished species; assess fully the specifications' effects on overfished species, bycatch reduction, RCAs, and EFH; and consider adequately the cumulative effects of repeated overfishing on overfished species and EFH. NMFS must take all other steps necessary to bring this DEIS into compliance with the requirements of NEPA.

Sincerely,

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3.0 Responses to Comments Received on the Draft EIS

The 45-day public comment period on the Groundfish Harvest Specifications DEIS closed on October 12, 2004 (69 FR 52668). NMFS received a comment letter from EPA in accordance with the requirements of NEPA and Section 309 of the Clean Air Act. In their comment letter, EPA rated the alternatives. Additionally, NMFS received a comment letter from the Natural Resources Defense Council (NRDC), an environmental advocacy organization. The EPA letter and comments and the NRDC letter are reproduced in Section 1.0 and 2.0 of this appendix. The next two sections provide responses to the comments in these two letters.

3.1 Response to Comments from EPA

The EPA had three comments attached to their letter. Responses to their comments are given below the headings used in their letter.

Optimum Yield Projections for Canary and Widow Rockfish

EPA notes that harvests under Alternatives 2 and 3 are projected to exceed OYs for canary and widow rockfish established by the Council. As noted, the Council-preferred alternative includes sufficient mitigation, partly in the form of bycatch caps for the whiting fishery, so that projected harvest does not exceed OYs. If the Council had decided to choose a package of management measures modeled after those in Alternatives 2 or 3, mitigation measures sufficient to constrain harvests to OYs would have been developed and included in the alternative. In other words, the Council and NMFS, as a matter of policy, do not establish management measures that are projected to allow harvests exceeding the OYs also established as part of the proposed action.

Observer Coverage

NMFS has not proposed electronic monitoring as a substitute for human observers. Electronic monitoring equipment is primarily useful in identifying where a vessel is located or what fishing activities are taking place on board that vessel. For example, NMFS has been testing the use of camera monitors in the full-retention shorebased whiting fishery. In this fishery, participating vessels retain all of their catch and do not sort it until the vessel is at the dock. Camera monitors were tested in the summer of 2004 to determine whether they would be useful tools for verifying whether the participating vessels had retained all of their catch or dumped some catch at sea. Because the vessels do not sort their catch at sea, species-specific identification of catch is not necessary.

Depending on the goal of an observer program, 100% observer coverage may not be necessary. WCGOP is a total catch sampling program, meaning that a portion of the groundfish catch is sampled and bycatch estimates are extrapolated for the fleet from those samples. Vessels participating in the at-sea whiting fisheries are being monitored for real-time accounting of catch and bycatch, thus they carry observers around the clock. For sectors where a full retention program is possible, camera monitoring in company with current VMS requirements may be a sufficient monitoring program. For sectors where real-time data is needed to monitor individual quota (IQ) catch of particular species, 100% observer coverage may be appropriate.

EPA also supports quota incentives for fishers and vessels that accommodate observers. This is a feature in the preferred alternative in the FEIS for the bycatch mitigation program, distributed by NMFS in September 2004. The Council is also evaluating various monitoring requirements in connection with the Trawl IQ EIS, currently under Council development. At their November meeting, the Council will discuss both future steps for implementing their preferred alternative in the Bycatch FEIS and for developing a range of alternatives for the Trawl IQ EIS.

Impacts on Habitat

EPA states that the EIS should discuss the spatial and temporal distribution of fishing effort by various gear types and resulting impacts on various habitats. These types of data are not currently available, so the EIS provides a general estimate of the distribution of effort based on the distribution of projected catches seaward and shoreward of the RCA. NMFS and the Council agree that more information needs to be gathered on the effects of fishing on EFH. NMFS is currently developing an EIS, both to improve the information base and propose mitigation measures for fishing-related impacts. This DEIS is scheduled to be completed in February 2005.

3.2 Response to Comments from NRDC

Responses to comments provided by NRDC are given below under headings used in their letter.

I. The DEIS Lacks Data That is Crucial to the Informed Decisionmaking Process Required of NEPA and the MSA

The NRDC claims the DEIS has not provided crucial data for informed groundfish management decision-making and cites the following points to bolster these claims:

1. Failure to provide actual catch and bycatch mortalities for the past five years.
2. Failure to provide adequate discussion of the underlying stock assessments and rebuilding analyses on which alternatives are based.
3. Failure to consider estimated mortalities of overfished species by fishery for 2006 for alternatives other than the Council-preferred Alternative.

The best estimates of total mortality in 2002 and 2003 West Coast fisheries, including landings and discard mortalities (or bycatch), are provided in DEIS Tables 4-1 and 4-2. Species-specific data is not available for all groundfish species because not all groundfish species are noted individually on landings receipts. Commercially unimportant species or species landed in small amounts tend to be landed as part of a species aggregation, such as “minor slope rockfish.”

Total landings for all West Coast fisheries that have taken groundfish from 1981-2003 are provided in Table 8-1a. Additional groundfish landings and discard estimates for the 1999-2003 whiting trawl fisheries are provided in Table 4-11, groundfish mortalities in the 2000-2003 tribal fisheries in Tables 4-15 and 4-16, groundfish mortalities in 1996-2003 Washington recreational fisheries in Table 4-18, groundfish landings in the 2000-2003 Oregon recreational fisheries in Table 4-21, and groundfish mortalities in the 2003 California recreational fishery in Table 4-25. The GMT and scientists from the NMFS Northwest Fisheries Science Center deliberated on how far back to hindcast groundfish discard mortalities using WCGOP data to produce the analogous historical catch information provided in Tables 4-1 and 4-2. Their professional judgement was that WCGOP data collected since the fall of 2001 should only be used to estimate discards during the period since WCGOP implementation. Using these data to estimate discards prior to the 2002 fishing year was not recommended since harvest specifications, trip limits, and other aspects of the management regime were dramatically different prior to 2002, which has a direct effect on discard rates. Therefore, only assumed rates of discard were available for those years. Furthermore, the GMT believed these older, less informed estimates of total mortality were not particularly useful for projecting impacts of alternative 2005 and 2006 groundfish management measures, given the different suite of fishery constraints and the new depth-based management regime.

Total catch estimates from 2004 are not included in the FEIS because the 2004 fishing year will not have ended by the time the FEIS is required to be completed. Data from the 2004 fishing year, including observer data, will become available in 2005. At this time, these 2004 fishing year data are preliminary and incomplete. The Council and NMFS plan to adjust management measures inseason as necessary, including potential changes in the configuration of RCAs, in response to fishery status or new information. Section 7.3.1.1. describes this process and details a schedule developed by the Groundfish Information Policy Committee where new WCGOP information on bycatch in limited entry trawl, limited entry fixed gear, and open access sectors will be introduced to the 2005 and 2006 fisheries on an inseason basis.

Regarding claim number two, the DEIS cites all the relevant stock assessments and rebuilding analyses used for 2005-2006 groundfish management decision-making. Key conclusions and summaries from these publications are provided in DEIS chapters 2 and 4, with all the underlying science otherwise incorporated by reference. All the relevant stock assessments, stock assessment review panel reports, and rebuilding analyses can also be found in published Stock Assessment and Fishery Evaluation (SAFE) documents on the Council's website at http://www.pcouncil.org/groundfish/gfstocks.html.

As explained in section 2.2.4 of the DEIS, there is only a total catch accounting of 2005 management measures in the "bycatch scorecards" provided for the non-preferred action alternatives since "there is only a minor variation in some 2005 and 2006 OYs (Tables 2-1a and 2-1b) that cannot be discerned in the aggregated mortality estimates for those sectors where there are annual differences." Such minor differences in expected 2005 and 2006 fishery impacts are explored throughout the DEIS.

Finally, the commenter stated that mortality estimates in the DEIS scorecards (Tables 2-13a and 2-13b) differed from the mortality estimates of overfished species provided in the proposed rule to implement the 2005-2006 specifications and management measures. The only species for which the total catch OYs for both years differs between the DEIS and the proposed rule is lingcod, where the 2005 and 2006 OYs are listed in Tables 2-13a and 2-13b as 2,414 mt and in the proposed rule as 2,413 mt, a difference attributable to rounding. There is also a typographic error in the proposed rule's 2006 ABC/OY table under the entry for cowcod, which incorrectly shows both the Monterey and Conception area OYs as 2.4 mt, when they should be shown as 2.1 mt each. NMFS will make this correction in its final rule. The mortality estimates in Tables 2-13a and 2-13b are those adopted by the Council. NMFS will review any additional typographic errors pointed out by the commenter and correct them, if necessary, in the final rule for this action.

II. The DEIS Fails to Consider a Reasonable Range of Alternatives

The commenters state that the EIS fails to consider a reasonable range of alternatives for harvest levels and bycatch reduction measures. The range of harvest levels that can be considered is constrained by policies for setting ABC, based on available scientific information, outlined in Section 4.3 of the Groundfish FMP. For overfished species, rebuilding plans place constraints on the OYs that can be considered. For assessed stocks, the most recent stock assessment places boundaries on the range of OYs that can be considered, usually reflecting scientific uncertainty in the assessment models. The EIS considers a reasonable range of OYs falling within the constraints imposed by these policies and a science-based approach. Bycatch reduction, especially for overfished species, is an important part of the management strategy. The range of reduction measures that could be implemented given currently available data is fully explored in the EIS. These issues are discussed in more detail below.

A. The DEIS Fails to Consider Alternative Harvest Levels Adequately For Several Overfished Species

Darkblotched Rockfish

The NRDC takes issue with the range of alternative harvest levels considered for darkblotched rockfish and found the decision to set the OY equal to the ABC to be "disturbing." The range of considered harvest levels for darkblotched rockfish was consistent with the darkblotched rockfish rebuilding plan adopted by Groundfish FMP Amendment 16-2. The new darkblotched rockfish stock assessment and rebuilding analysis (Rogers 2003a) provided alternative yield projections that were the basis for the range of alternative harvest levels explored in the DEIS. The Council-preferred Alternative does not modify the target rebuilding year decided under the adopted rebuilding plan, nor the harvest control rule modified from the rebuilding plan during the 2004 Groundfish Specifications process. The 2005 and 2006 darkblotched rockfish harvest specifications under the Council-preferred alternatives are therefore based on projections from the stock assessment/rebuilding analysis consistent with these past decisions.

The decision to set the OY equal to the ABC was predicated on the ABC being the legal limit for a harvest specification under the MSA and NSGs. The darkblotched rockfish ABC is based on a proxy harvest rate applied to the current estimate of exploitable biomass. As explained in the DEIS, the Rogers (2003a) stock assessment/rebuilding analysis projected rebuilding OYs that were higher than the ABC derived using the proxy harvest rate. Therefore, limiting the OY to the lower ABC specification is considered a risk-averse decision that will result in faster rebuilding than required by the rebuilding plan.

Finally, the Council revisited some groundfish management measures at their September 2004 meeting, subsequent to preparation and publication of the DEIS, in response to new information about expected darkblotched rockfish impacts. The FEIS documents a Council recommendation to revise 2005 and 2006 trawl management measures to extend the seaward boundary of the trawl RCA from 150 fm to 200 fm north of 38° N latitude and to halve the slope rockfish trawl trip limit to reduce expected darkblotched rockfish impacts. These revisions were considered necessary after observing darkblotched rockfish impacts in the summer 2004 trawl fishery that were higher than expected. These revisions were designed to ensure the 2005 and 2006 harvests remain below the adopted OYs.

Canary Rockfish

The range of considered harvest levels for canary rockfish is consistent with the canary rockfish rebuilding plan adopted by Groundfish FMP Amendment 16-2. As explained in the DEIS, differential size selectivity of commercial and recreational fishing gears leads to differential total mortality impacts of canary rockfish as the ratio of projected commercial and recreational take varies. Therefore, the alternative canary rockfish harvest levels analyzed simply reflect differential commercial and recreational impacts; all of which are impact-neutral in terms of the adopted rebuilding plan. No modification of the specified canary rockfish target rebuilding year or harvest control rule were contemplated in the 2005 and 2006 groundfish management decision, since there was not a new stock assessment or rebuilding analysis conducted on which to base a broader range of harvest level alternatives. The commenter is correct, however, in noting that Tables 2-1a and 2-1b neglected to include the final Council OY alternative for canary rockfish. Those tables have been corrected in this FEIS.

Bocaccio

NMFS agrees that the DEIS should have explained why bocaccio were assessed separately south of 40°10' N latitude. The FEIS discusses the research indicating the lack of genetic mixing between the stock located south of 40°10' N latitude and the stock located in waters off northern Washington. It is the stock south of 40°10' N latitude that has been assessed as overfished. NMFS trawl survey information also indicates a break in bocaccio distribution north and south with very few bocaccio ever observed in waters off northen California and Oregon. The stock was never formally assessed north of 40°10' N latitude due to a lack of available information.

Bocaccio are managed in the north as part of the Remaining Rockfish North complex. While a separate ABC and OY were determined in the Rogers et al. (1996) assessment of Sebastes based on historical landings in the north, the management unit is the Remaining Rockfish North complex due to the paucity of information for a quantitative stock-specific assessment. Therefore, the judgement of the GMT and other DEIS authors was that there was not enough information available to develop and analyze a range of harvest level alternatives for the Remaining Rockfish North complex, nor was this particularly necessary due to the lack of expected impacts given the depth-based area closures and gear restrictions that were part of the considered 2005-2006 management actions in the north. For 2005-2006, the Remaining Rockfish North complex will be managed under the Council's precautionary policy of setting the complex's total catch OY at 56.25% of historic landing levels (historical catch * 0.75 = ABC, ABC * 0.75 = total catch OY).

Lingcod

The NRDC takes issue with the range of considered harvest levels for lingcod and the fact that none of the alternatives analyzed are lower than the 2004 OY. The new lingcod stock assessment and rebuilding analysis (Jagielo et al. 2004) indicate a much higher lingcod spawning stock biomass than when the stock was last assessed. The Council's SSC further analyzed lingcod status at the March 2004 Council meeting, which considered the higher than expected 2003 catches. Catch exceedances from prior years were incorporated into the lingcod stock assessment. The SSC analysis of the lingcod assessment, which is summarized in DEIS Table 2-3, shows the stock has recovered to within 99.3% of the spawning biomass target and has, in fact, exceeded rebuilding plan goals north of 40°10' N latitude and is exceeding expected rebuilding plan progress on a coastwide basis. Lingcod's rapid and vigorous response to rebuilding measures has resulted in increased lingcod abundance and availability to commercial and recreational fisheries. The new assessment/rebuilding analysis also allows consideration of modifying strategic rebuilding parameters, such as the target rebuilding year and the harvest control rule. The Low OY harvest level alternative applied the previously-specified harvest control rule from the lingcod rebuilding plan adopted by Groundfish FMP Amendment 16-2 to the new estimate of exploitable biomass, while the other harvest level alternatives consider changes to the harvest control rule. While the Low OY harvest level alternative is still larger than the No Action (2004) OY, it is due to the new estimate of a much larger stock biomass. The Council-preferred Alternative also specifies conservative measures to manage lingcod to ensure timely stock recovery. Such management measures include conservative recreational and commercial harvest guidelines that, in combination, project total mortality impacts that are less than 40% of the recommended lingcod OY in 2005 and 2006 (Tables 2-13a and 2-13b, respectively). These measures are considered responsive to past overharvest of lingcod and risk-averse for rebuilding the stock.

B. The DEIS Fails to Consider Alternative Bycatch Reduction Measures Adequately

The alternatives encompass several bycatch reduction mechanisms that can be implemented under the current management regime, including RCA restrictions for the non-whiting trawl, fixed gear and open access commercial sectors; depth and season restrictions in recreational fisheries; new trawl requirements to require proven bycatch-reducing gear modifications; and differential trip limits as an incentive to fish in areas deeper than those inhabited by overfished species. Additionally, the Council-preferred alternative includes bycatch caps in fisheries where monitoring exists to substantiate total catch, namely the Pacific whiting fisheries.

Relative to Pacific whiting, setting specific harvest specifications for the 2005 and 2006 Pacific whiting fisheries are not part of the suite of actions considered in this EIS. However, the Council did specify set-asides for stocks that could potentially constrain opportunities in the Pacific whiting and other West Coast fishing sectors. Adoption of harvest specifications for the 2005 Pacific whiting fishery will occur through Council and NMFS action in March 2005. A new stock assessment for Pacific whiting is underway and is anticipated for review in February 2005. NMFS and the Council do not currently have the information necessary to establish or evaluate the value of area closures in the whiting fishery. However, NMFS and the Council plan to evaluate these possible tools for use in the fishery, and, if appropriate, could implement them through a separate rulemaking process. The "penalty box" proposal was raised late in the process, and is difficult to implement in the federal regulations because of the due process issues raised. Voluntary avoidance of areas of high bycatch of overfished species as a means of harvesting Pacific whiting quotas while staying below bycatch caps may be sufficient to limit impacts to overfished species in the Pacific whiting trawl fishery. Additionally, the Council-preferred Alternative includes bycatch caps on canary rockfish and widow rockfish for the Pacific whiting trawl fleet.

III. The DEIS Fails to Disclose and Analyze Adequately the Environmental Effects of the Proposed Specifications

The commenters state that the EIS does not provide detailed information on the environmental impacts of the proposed action, especially in relation to overfished species, bycatch reduction, RCAs and essential fish habitat. However, the EIS does provide extensive and detailed discussion of the impacts of the alternatives across a range of environmental components in Chapters 3 through 8 of the document. Comments on these specific issues are addressed below.

A. The DEIS' Analysis of Impacts on Overfished Species is Inadequate

Darkblotched Rockfish

As explained in the response to NRDC comments in section II.A, setting the OY equal to the ABC is not risk-prone since the rebuilding analysis concludes higher OYs than the ABC would rebuild the stock within the timeframe recommended in the National Standard 1 Guidelines with a high probability. The Rogers (2003a) assessment and rebuilding analysis concludes an OY of 333 mt in 2005 (and 362 mt in 2006) would rebuild to the biomass goal of 40% of unfished biomass with an 80% probability within the maximum allowable time. This OY specification relies on preliminary evidence of relatively strong 2000 and 2001 year classes. However, the Council's recommendation to set the OY at a lower level and equal to the ABC (269 mt in 2005 and 294 mt in 2006), does not rely on this recent recruitment assumption as the NRDC claims in their response. The Council-preferred OY for darkblotched rockfish simply applies the proxy harvest rate of F45% to current estimates of exploitable biomass and does not include the potential effect of the 2000 and 2001 year classes on the 2005 and 2006 fisheries. The Rogers (2003a) assessment/rebuilding analysis does factor in the actual harvests in historical fisheries, whether they were estimated above prescribed limits or not. Therefore, the underlying science does account for past fishing mortalities.

Canary Rockfish

This comment refers to discussions in Chapter 7 of the EIS pertaining to impacts to the management regime. The concept of harvest specification buffers is explained in the FEIS in section 7.3.1.1. The Council and NMFS plan to minimize impacts to overfished species and to manage groundfish fisheries in 2005 and 2006 to attain but not exceed rebuilding OYs. Management measure alternatives that do not fully utilize OYs can provide inseason management flexibility and reduce the impacts to the management regime and the risk of exceeding the OYs. However, providing these "buffers" can be a difficult challenge for constraining species such as canary rockfish and it may not always be possible to prevent significant inseason adjustments in response to new information or fishery status. The Council and NMFS weighed the benefits to the management regime against the socioeconomic costs from adopting management measures projected to harvest less than the rebuilding OY when considering the alternatives. As stated in Section 7.3.1.1, improved fishery monitoring of commercial and recreational fisheries, including continuation of the WCGOP and implementation of the CRFS will help the Council and NMFS achieve the goal of managing 2005 and 2006 groundfish fisheries within rebuilding OYs.

Widow Rockfish

The widow rockfish stock assessment (He et al. 2003b) and rebuilding analysis (He et al. 2003a) are relatively data-poor, as noted in the DEIS. The alternative widow rockfish harvest levels analyzed in the DEIS represent the range of plausible model outputs recommended by the Council's SSC and are consistent with the widow rockfish rebuilding plan adopted by Groundfish Amendment 16-3. The alternative harvest levels considered in the Amendment 16-3 EIS allow a thorough exploration of the uncertainty of data sources underlying this range of alternative harvest levels. These uncertainties were summarized in this DEIS, with more specific discussion incorporated by reference to the Amendment 16-3 EIS.

The NRDC confuses the apparent lack of a "buffer" in the overfished species' bycatch accounting tables or "bycatch scorecards" (Tables 2-13a and 2-13b for the 2005 and 2006 Council-preferred alternative, respectively) with an intent to manage for the highest widow rockfish harvest level. As stated clearly in section 2.2.4.1, the Council is focusing its widow rockfish bycatch reduction measures on the whiting fishery, where the vast majority of impacts to this stock occur. While a suite of potential bycatch reduction management measures for future whiting trawl fisheries are analyzed in the DEIS, 2005 whiting trawl management measures will not be decided by the Council until March 2005. Tables 2-13a and 2-13b, the 2005 and 2006 bycatch scorecards for the Council-preferred Alternative, note the residual yield of widow rockfish that might be available to the whiting trawl fishery after accounting for impacts in all other fishery sectors, which may be considered bycatch caps for these fisheries. These caps will not be exceeded and actual total mortality could fall below these caps.

Bocaccio

The alternative bocaccio harvest levels analyzed in the DEIS represent the range of plausible model outputs recommended by the Council's SSC and are consistent with the adopted bocaccio rebuilding plan adopted by Groundfish Amendment 16-3. The alternative harvest levels considered in the Amendment 16-3 EIS thoroughly explored the uncertainty of data sources underlying this range of alternative harvest levels and provides a decision table from the MacCall (2003a) rebuilding analysis exploring likely rebuilding consequences of choosing an assessment model that does not represent the true state of nature. These uncertainties were summarized in this DEIS, with more specific discussion incorporated by reference to the Amendment 16-3 EIS.

The DEIS did not adequately explain the difference in the No Action (2004) bocaccio harvest level and considered 2005 and 2006 harvest levels. The basis for the 2004 specification was added to section 4.3.1.3 in the FEIS. The basis for the 2005-2006 specifications may be found in section 4.3.1 of the EIS.

The commenters cite discussion in DEIS section 9.2 of the risk of irreversible decline if an overfished species' population size were to fall below some minimum threshold. They argue that this discussion "cries out for a more precautionary approach" with respect to bocaccio. The section summarizes potential irreversible resource commitments, one type of impact out of a range of impacts that must be discussed as part of an environmental impact analysis (40 CFR 1502.16). These are commitments which cause some permanent loss of an environmental attribute or service. The passage partially quoted by the commenters is in reference to theoretical work, and that is why "there is not enough information to determine a definite threshold below which population decline is irreversible." This discussion is meant to be speculative and is presaged by the statement "Cumulative, past, current, and future specifications could result in an irreversible commitment if a stock were extirpated or if population size is reduced to such a degree that even if harvesting stopped completely the stock would not recover." If an overfished species, including bocaccio, were to reach a population size small enough to present even a moderate risk of extinction, NMFS would be obligated to list that species under the ESA and manage the stock accordingly. Section 4.5.3.7 in the Groundfish FMP states that measures under an ESA-mandated recovery plan or biological opinion would supercede rebuilding plan measures if the ESA-related measures are more stringent. On January 30, 2001, the NRDC, Center for Biological Diversity, and The Ocean Conservancy petitioned NMFS to list bocaccio as threatened under the ESA. NMFS found that such a listing was not warranted (67 FR 69704, November 19, 2002). This finding used the 2002 bocaccio stock assessment (MacCall 2002), which estimated the age 2+ population at slightly less than 3,000 mt. The 2003 bocaccio OY was chosen based on an associated sustainability analysis, which showed a high probability of no further decline during the next 100 years with a 2003 harvest level of 20 mt or less. The next bocaccio assessment (MacCall 2003b), using new recruitment data, estimated the age 1+ population at just over 7,000 mt and indicated higher population productivity. Given this information, it is unlikely that the bocaccio population risks the kind of "extinction spiral" discussed in general terms in Section 9.2. Management measures implemented pursuant to the rebuilding strategy for bocaccio are precautionary, are estimated to result in a 70% probability of stock rebuilding, and are unlikely to result in the severe population declines cited by the commenters and discussed in Section 9.2.

The rationale for specifying a bocaccio trip limit for large footrope trawls south of 40°10' N latitude was added to section 4.3.2.1 in the FEIS. While there is no change to the seaward boundary of the southern trawl RCA from No Action, the specified trip limit under the Council-preferred Alternative is designed to allow better shoreside monitoring of incidental mortalities of bocaccio caught as bycatch while targeting deep-water target species such as Dover sole, thornyheads, and sablefish. The GMT believes such a small trip limit (300 pounds/two months) will not encourage targeting of bocaccio, a species that is not considered desired or a valuable commercial target species. This trip limit represents a slight increase from the large footrope trip limit under the No Action Alternative of 100 pounds/month.

B. The DEIS' Analysis of Bycatch Reduction is Inadequate

The NRDC correctly notes the analytical approach to modeling impacts using selective flatfish trawls in the north varies between Action Alternatives 1-3 and the Council-preferred Alternative. While the explanation for the different analytical approaches is provided in DEIS section 4.3.2.1, the NRDC incorrectly surmises the method used to analyze the Council-preferred Alternative is the most risk-prone of the four methods considered. The approach used to model the Council-preferred Alternative was recommended by the GMT because the selective flatfish trawl's effectiveness at avoiding depleted rockfish is based on the behavior of rockfish when encountering the gear, not on variable distribution of rockfish or other seasonal effects. Nevertheless, the Council decided to buffer the uncertainty in expected impacts in non-whiting trawl fisheries by assuming a higher potential impact of the most constraining species (canary rockfish) than the new bycatch model predicts. The difference is a bycatch model point estimate of 5.2 mt of incidentally-caught canary rockfish versus a "buffered" impact projection of 8.0 mt under the Council-preferred Alternative. The Council's September 2004 refinement of trawl management measures in response to higher than expected darkblotched rockfish impacts, specifically the reduction in the slope rockfish trip limit and the seaward extension of the trawl RCA to 200 fm, further reduced the estimated impact of canary rockfish from 5.2 mt to 4.7 mt, thereby increasing the trawl impact buffer. The rationale for these linked decisions is thoroughly explored in DEIS section 4.3.2.1.

C. The DEIS' Analysis of Rockfish Conservation Areas is Inadequate

RCAs are analyzed first and foremost for impacts to overfished species with the intent of reducing bycatch. Section 4.3.2.1 presents alternate levels of projected target species' landings and impacts to rebuilding species under various RCA configurations and includes the underlying science-based bycatch rates from the WCGOP and studies on selective trawl gear. Various RCA configurations, coupled with trip limit alternatives, are intended to provide opportunities to harvest target species while constraining mortality on overfished species to rebuilding OYs, thereby achieving rebuilding goals. Often, the tradeoff for larger or smaller RCAs is larger or smaller trip limits, all designed to stay at or below rebuilding OYs. While issues such as vessel safety, socioeconomic costs and benefits, fishing impacts to EFH, and increased enforcement and management burdens are all presented in the DEIS for Council and NMFS consideration, the principle rationale for RCAs and their configurations is the reduction of bycatch by restricting fishing in areas of relatively high abundance of overfished species.

Additionally, the Council and NMFS plan to adjust management measures inseason as necessary, including potential changes in the configuration of RCAs, in response to fishery status or new information. Section 7.3.1.1. describes this process and details a schedule developed by the Groundfish Information Policy Committee where new WCGOP information on bycatch in limited entry trawl, limited entry fixed gear, and open access sectors will be introduced to the 2005 and 2006 fisheries on an inseason basis.

The letter refers to seemingly contradictory language in Section 7.5.5 of the EIS. The intent of this section of the EIS is to summarize impacts to the management regime that result from the alternatives, in this case the Council-preferred Alternative. This language has been revised to clarify that the impact to the enforcement burden due to the size of the RCA has been reduced considerably with the implementation of the Vessel Monitoring System. The intent of this language is not to imply that the trawl RCA configuration under the Council-preferred alternative was based solely on enforcement concerns or impacts to the fishery management regime. Again, the principle rationale for RCAs and their configurations is the reduction of bycatch by restricting fisheries in areas of relatively high abundance of the adult life stage of overfished species.

Relative to the size and configuration of RCAs, the commenters suggest there is a science-based approach to decisions on non-trawl RCAs and a lack of such considerations on decisions affecting trawl RCAs. In fact, the trawl RCA configuration is based on a greater amount of scientific evidence than the nontrawl RCA. As stated above and detailed in Section 4.3.2, the trawl RCA was analyzed using recently observed bycatch rates from the WCGOP as well as trawl gear research conducted by ODFW. It is also noted in Section 4.3.2.2 that less information is currently available on bycatch in the limited entry fixed gear fishery when compared to the trawl sector and that data is being collected in the WCGOP to improve our understanding of non-trawl commercial bycatch. When fully quoted, Section 4.3.2.2 states that "there is clearly an effect of varying the size of the nontrawl RCA on the estimated mortality of overfished species that can *only be addressed qualitatively*. The estimated mortality of overfished shelf species (bocaccio, cowcod, canary, lingcod, widow, and yelloweye) would be progressively higher under Action Alternatives 3, 2, and 1 since more fishing is progressively allowed in depths where these species are found." (Emphasis added.) Furthermore, this section makes it clear that new information is being collected on non-trawl bycatch in the WCGOP with anticipated improvements in impact assessment to be considered for use in inseason management of 2005 and 2006 fisheries (also see Section 7.3.1.1 for the schedule of anticipated new information in 2005 and 2006).

D. The DEIS' Analysis of Impacts on Essential Fish Habitat and Ecosystem is Inadequate

The commenters state that the evaluation of impacts to EFH and the ecosystem is inadequate because it "merely provides a general overview of the scientific literature on the general effects of EFH" and NMFS has decided not to predict the effect of setting harvest specifications "until after it completes its programmatic EFH EIS." The "general overview" found in Appendix A and Section 3.1 of the document describes the affected environment, or baseline conditions. CEQ regulations at 40 CFR 1502.15 state

> The environmental impact statement shall succinctly describe the environment of the area(s) to be affected by the alternatives under consideration. The descriptions shall be no longer than is necessary to understand the effects of the alternatives.... Agencies shall avoid useless bulk in statements and shall concentrate effort and attention on important issues.

The affected environment description is at a level of detail sufficient to give the reader an understanding of current conditions and adequately summarizes current scientific understanding of the status of West Coast

EFH and ecosystems. The second statement, that "NMFS has decided not to predict effects" misconstrues what is stated in Section 3.2. The section, discussing the criteria used to evaluate impacts, points out that current data on the distribution and intensity of fishing effort is limited, making it difficult to predict effects with geographic specificity. Furthermore, the relationship between a given quantum of fishing effort, or impact, and the effect on habitat function is unknown. The development of a "comprehensive risk assessment" model as part of the EFH EIS process is mentioned in relation to how incomplete or unavailable information is addressed, in adherence to 40 CFR 1502.22. It simply notes that once the EFH EIS is completed, it may be possible to predict effects with more specificity. While acknowledging the difficulty in predicting impacts because of unavailable information, the EIS does compare the alternatives in terms of their relative effects on EFH and ecosystems.

IV. The DEIS Fails to Analyze Cumulative Impacts Adequately

The commenters state that the cumulative impacts analysis is vague and incomplete. However, the EIS evaluates cumulative impacts across the full range of environmental components addressed by the analysis. The commenters cite two parts of the cumulative impact analysis to support their allegation. These are addressed below.

A. The DEIS Fails to Consider the Cumulative Effects of Past Overfishing

The commenters note the EIS discloses that past overfishing could jeopardize sustainability of stocks. This is part of the discussion in Section 9.7 of unavoidable adverse impacts, as required by CEQ regulations at 40 CFR 1502.16. This discussion emphasizes that this is a potential adverse effect, which would depend on a continuing mis-specification of harvest levels or an inability to constrain total mortality to correctly specified OYs. NMFS addresses the effects of past over-harvest first by accounting for historical harvests in the stock assessments used to set OYs. These analyses, which are discussed in Section 4.3, form the basis for the range of OYs considered in the EIS. In addition, for fisheries which have shown a risk of overharvest in the past, the Council has set more precautionary management measures in order to mitigate these cumulative effects. For example, high catch rates in the California recreational groundfish fishery during 2003, which contributed to overfishing of lingcod stocks, were given greater weight in the catch projection model for 2005-2006 used to develop management measures for that fishery, resulting in more restrictive management measures. The EIS discusses the bycatch of overfished species under the different alternatives at section 4.3.2.

B. The DEIS Fails to Consider the Cumulative Impacts on Essential Fish Habitat and Ecosystems

As noted above, the EIS acknowledges that currently the information necessary to fully evaluate the impacts of fishing on EFH and ecosystems is unavailable. In Section 3.4, the EIS describes past, present, and reasonably foreseeable future actions affecting EFH, aside from the proposed action. However, given the inability to quantitatively predict direct and indirect effects to EFH of this or other actions, the most reasonable supposition is that past, present, and future actions outside of this action would have an equal effect across all the alternatives, so the differential impact of the alternatives to this action would be the primary contributor to cumulative effects.