NATIONAL MARINE FISHERIES SERVICE REPORT ON GROUNDFISH MANAGEMENT

Situation: The National Marine Fisheries Service (NMFS) will report on its regulatory activities and developments relevant to groundfish fisheries. Specific items for discussion include an update on 2003 regulations, a briefing on recent negotiations with Canada concerning whiting allocation and management, an update on changes to the 2003 Stock Assessment Review (STAR) Process, and other issues of interest to the Council.

Council Task:

1. Discussion.

Reference Materials: None

Agenda Order:

a. Regulatory Matters — Bill Robinson
b. Stock Assessment Review (STAR) Schedule Changes — Elizabeth Clarke
c. Reports and Comments of Advisory Bodies
d. Public Comment
e. Council Discussion

PFMC
03/21/03

STATE OF CALIFORNIA -- THE RESOURCES AGENCY GRAY DAVIS, *Governor*

DEPARTMENT OF FISH AND GAME
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SANTA BARBARA, CA 93109
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18 March 2003

Mr. Bill Robinson
Assistant Regional Administrator
National Marine Fisheries Service – Northwest Region
7600 Sand Point Way NE, BIN C15700
Seattle, WA 98115-0070

Dear Mr. Robinson:

Enclosed please find our application for an Exempted Fishing Permit (EFP) to conduct a shelf flatfish selectivity study using modified trawl gear with short footrope. As you may recall, the need for this EFP was discussed at the November 2002 meeting of the Pacific Fishery Management Council (Council), where it was removed from consideration until further modification of the 2002 EFP design was completed to incorporate a modified gear test. The enclosed application incorporates the necessary modifications.

The application was prepared by Department of Fish and Game staff in consultation with the National Marine Fisheries Service staff. There is industry support for the proposed EFP. We have confirmed that disaster relief funds, set aside for this data collection project last year, remain available for this EFP.

Sincerely,

Marija Vojkovich, Representative
California Department of Fish and Game

cc: Pacific Fishery Management Council
7700 NE Ambassador Place, Suite 200
Portland, OR 97220-1384

Application for Issuance of an Exempted Fishing Permit Test a Selective Flatfish Trawl (including Scottish Seine) in an area otherwise closed to fishing

A. **Date of application:** April 8, 2003

B. **Applicant Contact**
California Department of Fish and Game
350 Harbor Blvd.
Belmont, CA 94002

Contact: Susan Ashcraft (650) 631-6786
Dave Thomas (510) 581-7358

C. **Statement of purpose and goals of the experiment, for which an EFP is needed, including a general description of the arrangements for the disposition of all species harvested under the EFP:**

The purpose of the experiment is to determine whether a shelf flatfish fishery can be prosecuted in an otherwise closed area using modified trawl gear designed to minimize the bycatch of overfished rockfish species.

Pacific Coast groundfish are managed by the Pacific Fishery Management Council (PFMC) under a federal fishery management plan (FMP) for the west coast. The management goals of the FMP are to:

- Prevent overfishing by managing for appropriate harvest levels and prevent any net loss of the habitat of living marine resources.
- Maximize the value of the groundfish resource as a whole.
- 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.

The experiment conducted through an EFP will assist the PFMC in achieving the goals set forth in the FMP while collecting bycatch data on overfished stocks and evaluating the effectiveness of trawl gear modifications in avoiding bycatch of overfished stocks.

The specific goals of the experiment are:

- To evaluate the effectiveness of modified trawl gear to catch shelf flatfish while minimizing take of overfished rockfish species.

- To measure bycatch rates of bocaccio and other rockfish species that may be associated with the small footrope trawl shelf flatfish fishery between 60 fm (shoreward boundary of the trawl RCA) and 100 fm through an at-sea observer program.

- To provide fishermen with an incentive to modify their gear by giving them the opportunity to take shelf flatfish in areas that are otherwise closed.

Disposition of the species harvested under the EFP will be as follows:

- Species caught within the normal current trip limits may be retained and sold by the vessel.

- All rockfish caught while targeting shelf flatfish during the EFP must be retained and offloaded. Overages of rockfish must be surrendered and proceeds from these species in excess of trip limits will be forfeited to the State of California.

D. Valid justification explaining why issuance of an EFP is warranted:

Since 1998, the PFMC has initiated rebuilding plans for several species, including bocaccio rockfish. Conservation areas have since been established and closed to groundfish fishing in order to prevent harvest of the overfished stocks in multi-species fisheries. 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 FMP, 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.

The shelf flatfish are an extremely important group of groundfish in the California groundfish fisheries. These stocks are believed to be healthy, and California fishers and processors have worked aggressively to develop strong markets for these species. A component of the California trawl fleet and processors are heavily dependent upon these flatfish.

A depth closure was enacted from July 1 to December 31, 2002 to prohibit landing of all shelf groundfish, including vessels using small footrope trawl gear to target flatfish. An EFP was approved for use in the shelf flatfish trawl fishery during this closed period. Results from the 2002 EFP indicated that the incidental take of bocaccio and other sensitive rockfish species was minimal in depths from 3 miles to 70 fm using conventional flatfish trawl gear.

A new EFP is warranted to conduct a fishery experiment in deeper water, where the likelihood of incidental take of bocaccio increases. An important condition added under this EFP is a requirement to use a modified trawl design to determine if bocaccio and other shelf rockfish catch is kept to a minimum using the modified trawl gear.

E. **A statement of whether the proposed experimental fishing has broader significance than the applicant's individual goals.**

The applicant of this EFP believes that the information collected during this experiment will have significance, broader than the applicant's individual goals, applicable to fisheries throughout California and the West Coast.

- The experiment will produce data on the amount and location of any bocaccio and other depleted rockfish bycatch in the shelf flatfish fishery using this trawl.
- Results indicating that rockfish bycatch rates are minimized while using this modified trawl could lead to a management tool that allows the Council to maximize sustainable access to healthy shelf flatfish stocks while depleted rockfish stocks are rebuilt.
- This EFP complements a concurrent EFP experiment that is being conducted off the coast of Oregon, in slope habitat to avoid catch of overfished darkblotched rockfish, and a previous EFP experiment conducted in 2002 in shelf habitat, to avoid catch of overfished canary rockfish. An experiment off the coast of California in shelf habitat to evaluate ability to avoid overfished bocaccio rockfish will increase coastwide validity and applicability of the use of the modified trawl design.

F. **Vessels covered under the EFP:**

Vessels covered under the EFP will include those which have historically participated in the targeted shelf flatfish fishery off California according to criteria used in the 2002 flatfish EFP:

- Vessels must have landed into California ports at least 10,000 pounds of shelf flatfish (California halibut, Pacific sanddab, English sole, sand and rock sole, starry flounder, and unspecified flatfishes) taken with trawl gear in each of two years during 1998 to 2000.
- Vessels must have a valid California delivery permit.

Vessels identified as qualifiers in the 2002 EFP process will qualify for this pool of applicants.

A letter of inquiry will be sent to the owners of each of the qualifying vessels requesting a statement of interest to be returned by a specified closing date.

A maximum of **six** vessels will be selected to participate throughout the EFP fishing period, with a goal of issuing permits to two vessels per California port group between Pt. Conception and Pt. Mendocino. Potential port complexes are Morro Bay/Avila, Monterey/Moss Landing, and Half Moon Bay/San Francisco/Bodega Bay.

Applications received will be selected at random following the closing date if more vessels apply than can be accommodated by observers.

Any EFP may be canceled and made available to another vessel if the permitted vessel: 1) does not follow the terms and conditions of the permit; 2) fails to follow federal or State fishing regulations; 3) does not prosecute shelf flatfish using small footrope trawl gear as provided in the EFP; or 4) does not reasonable accommodate the observer or cooperate with the applicant.

A permitted vessel may withdraw once from the EFP program and resume participation the following month.

G. **A description of the species (target and incidental) to be harvested under the EFP and the amount(s) of such harvest necessary to conduct the experiment:**

The target species are collectively referred to as *shelf flatfish* and include California halibut, Pacific sanddab, English sole, rock and sand sole, and unspecified flatfish. The maximum expected catch per vessel for all species will be the normal trip limits. The current allowable trip limit for other flatfish is 70,000 pounds per two months of which no more than 10,000 pounds may be petrale sole (These will be adjusted to match any in-season trip limit changes in the fishery.). California halibut is not included in the trip limit and is estimated later in this section. Total harvest of target species for the EFP fishery will therefore be:

Species/Species Group	Vessels * no. periods in EFP[1]	Maximum allowable catch (lbs)
Other flatfish	6*2=12	840,000 of which no more than 120,000 is Petrale sole

[1] There are 6 vessels that will be operating for the entire EFP period, encompassing 2 periods of cumulative trip limits.

All rockfish species will be landed to enhance biological sampling and to document the actual rockfish mortality, with catch thresholds in place for overfished rockfish species to ensure that take remains below allocated bycatch caps. The EFP thresholds for incidental take of bocaccio, cowcod, canary, and yelloweye rockfish will be applied as follows:

fishing month. Additionally, an individual vessel will be constrained to a maximum of 50 pounds of cowcod rockfish per fishing month. If that amount is exceeded for any of the four species, then all fishing by that vessel will be terminated for the balance of the month, but may resume for the following month.

- Monthly cumulative threshold: The cumulative amount of bocaccio, canary, or yelloweye rockfish harvested by all vessels fishing under the EFP must not exceed 500 pounds in a fishing month. Additionally, the cumulative amount of cowcod rockfish must not exceed 100 pounds. If that amount is exceeded for any of the four species by all vessels combined, then all EFP fishing will be terminated for the remainder of the month, but may resume for the following month.

- EFP threshold: The cumulative amount of bocaccio, canary, or yelloweye rockfish harvested by all vessels fishing under the EFP must not exceed 1,000 pounds at any time. Additionally, the cumulative amount of cowcod rockfish must not exceed 250 pounds at any time. If the cumulative EFP threshold amount is exceeded for any of the four species, then all EFP fishing will be terminated for the remainder of the year.

No reliable data exists to provide expectations of catch using comparable gears in the shelf fishery. We have therefore based estimates of expected fishing mortality on bycatch rates from our 2002 EFP experiment, except that estimated take of overfished rockfish species is based on the EFP species thresholds contained in this proposal. Actual bycatch rates of these overfished rockfish species during the 2002 EFP fm were well below these thresholds, with bycatch rates of 0.01% for bocaccio, 0.02% for cowcod rockfish, and 0% for canary and yelloweye rockfish. Although 2002 NMFS observer data indicates that from 70 fm to the 100 fm depth proposed in this study, the probability of bocaccio catch increases significantly when using unmodified conventional flatfish trawl gear, it is anticipated that the use of the selective flatfish trawl during this EFP period will significantly reduce the probable take of overfished rockfish, including bocaccio. However, some bycatch is likely to occur. Therefore, the total estimated fish mortality for overfished rockfish species provided is the species thresholds for this EFP, as follows:

Species/Species Group	EFP Threshold (lbs)	Total Estimated Catch (lbs)
Bocaccio Rockfish	1,000	1,000
Canary Rockfish	1,000	1,000
Cowcod Rockfish	250	250
Yelloweye Rockfish	1,000	1,000

Based on bycatch information from our EFP program in 2002, the following catches would be expected in addition to target flatfish and overfished rockfish species, if the bycatch rates were the same as in 2002:

Species/Species Group	Bycatch Rate[1] (2002)	Expected Bycatch[2] (lbs)
Other Flatfish	2.67	22,455
California Halibut	8.02	67,332
Nearshore Rockfish	0.14	1,183
Shelf Rockfish	2.86	24,042
Lingcod	0.56	4,699
Sablefish	0.44	3,678
Sharks	1.23	10,367
Skates	5.87	49,295
Crab, Dungeness and misc.	7.02	59,000
King Salmon	0.09	774
Green Sturgeon	0.06	465
Misc. Fish[3]	4.74	39,820
Nominal Bycatch Species[4]	0.16	1,334

1 Bycatch is defined as the total landed and discarded pounds of a species relative to the total landed target species group (i.e., the trip limit). An estimate of discarded 'other flatfish' is included in this table as discards of target species may occur due to size, market, etc.

2 There are six vessels that will be operating for the entire 4 months of the EFP, encompassing 2 periods of cumulative trip limits. Expected bycatch is bycatch rate*70,000(2-month trip limit)*6*2.

3 Miscellaneous fish includes white croaker, squid, hake, ratfish, sculpin, and shad, and other misc. fish.

4 Nominal bycatch includes species with *individual bycatch rates* of <0.05% in 2002, and includes the following species: slope rockfish, white seabass, striped bass, cabezon, surfperch, greenlings, midshipman, and surfperch.

H. **For each vessel covered by the EFP, the approximate time(s) and place(s) fishing will take place:**

- The test fishery will be conducted from July 1 through October 31, 2003.
- The EFP will be valid in those Pacific Ocean waters adjacent to California coastwide between 3 miles and a maximum depth of 100 fm. While this depth exceeds the inner boundary for the trawl RCA (60 fm during the proposed study period), this depth is necessary to test the modified trawl gear in areas with a history of bocaccio catches.

I. **All participating vessels under the authority of the EFP ~~must~~:**

- must Exclusively employ legal small footrope trawl as defined in current federal regulation, except that modification is required to create a severely cut-back

I. **All participating vessels under the authority of the EFP:**

- Must exclusively employ legal small footrope trawl as defined in current federal regulation, except that modification is required to create a severely cut-back top section, which allows roundfishes to "rise" out of the trawl while flatfish, which remain near the bottom, are captured.

- Must apply and submit a net plan for approval. Net plans must meet specifications utilized by the 2002 Oregon Flatfish EFP proposal, which specified that *"The trawl must have a headrope to footrope ratio of at least 1.30. The trawl must have a maximum rise of 5 ft at the center of the headrope. There must be no floats along the middle 50% of the headrope"*, except for Scottish seine, for which there must be no floats along the middle 25% of the headrope.

- Must carry a National Marine Fisheries Service-trained observer onboard all trips using the selective flatfish net in the NTZ. A total of three observers is necessary to execute the EFP. Vessels participating in the program must share observer time.

- Must land all fish caught under the authority of the EFP into the State of California.

- Must sign a contract with the State of California detailing the vessel's responsibility for the EFP fishery. Failure to abide by the conditions in the contract or to follow provisions in the EFP will result in revocation of the contract and of the EFP for the year.

J. **Signature of the applicant:**

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California Department of Fish and Game

REPORT ON THE BYCATCH WORKSHOP AND OBSERVER DATA UPDATE

Situation: On Monday April 7, a joint session of the Scientific and Statistical Committee (SSC), Groundfish Management Team (GMT), and Groundfish Advisory Subpanel (GAP) is scheduled to discuss the January Bycatch Workshop and to provide an update on the use of observer data collected since September 2001. The session is designed to facilitate attendance by Council members and the public, so as to save presentation time during the Council session.

Bycatch Workshop

The Bycatch Workshop was held in Seattle January 27-29, 2003. The primary purpose of the workshop was to review the methodology that has been used in the past to estimate bycatch and to consider how new observer data will be incorporated to improve future estimates of fishing mortality and bycatch.

The workshop panel consisted of ten members, two from each of the following Council advisory bodies: SSC Economics Subcommittee (Dr. Mike Dalton ,Chair and Ms. Cindy Thomson), SSC Groundfish Subcommittee (Mr. Tom Jagielo and Dr. Martin Dorn), GAP (Mr. Rod Moore and Mr. Marion Larkin), GMT (Mr. Brian Culver and Dr. Alec MacCall); and two independent reviewers (Ms. Cynthia Jones and Mr. David Agnew).

A final report was issued by the Bycatch Workshop Panel on February 19, 2003. A copy of this report is provided as Exhibit E.2, Attachment 1.

Observer Data Update

A preliminary report and summary analysis of the observer program data was released in January 2003, and will be made available for the April 7 joint session. The report is also available on the Northwest Fisheries Science Center website at: <http://www.nwfsc.noaa.gov/fram/Observer/datareport.htm>.

During the April 7 joint session, the Northwest Fisheries Science Center will provide a report on the issues and schedule for incorporating data from the West Coast Groundfish Observer Program into fishery management decision making. A status report as of the Briefing Book deadline is provided as Exhibit E.2, Attachment 2. During the Council session, Dr. Elizabeth Clarke will give a brief summary of the expected schedule subsequent to the April Council meeting.

Council Task:

1. **Discussion about implications of the Bycatch Workshop results and the schedule for incorporating data from the observer program.**

Reference Materials:

1. Final Report Council Bycatch Model Review Workshop (Exhibit E.2, Attachment 1).
2. Observer Data Analysis Status Report March 2003, NWFSC (Exhibit E.2, Attachment 2).

Agenda Order:

a. Agendum Overview — Ed Waters
b. NMFS Report — Elizabeth Clarke
c. Reports and Comments of Advisory Bodies
d. Public Comment
e. Council Discussion

PFMC
03/25/03

FINAL REPORT
PACIFIC FISHERY MANAGEMENT COUNCIL
BYCATCH MODEL REVIEW WORKSHOP
January 27-29, 2003

Review Panel Members

SSC Economics Subcommittee:
- Dr. Michael Dalton - California State University, Monterey Bay (chair)
- Ms. Cindy Thomson - NMFS Southwest Fisheries Science Center, Santa Cruz

SSC Groundfish Subcommittee:
- Dr. Martin Dorn - NMFS Alaska Fisheries Science Center, Seattle
- Mr. Tom Jagielo - Washington Department of Fish and Wildlife

External Reviewers:
- Mr. David Agnew - Imperial College, London, United Kingdom
- Ms. Cynthia Jones - Old Dominion University, Norfolk, Virginia

Groundfish Management Team:
- Mr. Brian Culver - Washington Department of Fish and Wildlife
- Dr. Alec MacCall - NMFS Southwest Fisheries Science Center, Santa Cruz

Groundfish Advisory Panel:
- Mr. Marion Larkin - Groundfish trawl representative
- Mr. Rod Moore - Processor representative

Overview

The Pacific Fishery Management Council (Council) first adopted trip limits for the groundfish fishery in the early 1980s. These regulations were intended to slow the rate of harvest of individual species, thereby supporting a year-round fishery while ensuring that harvest of each species did not exceed its optimum yield (OY). As trip limits declined, the Council gradually replaced them with cumulative landings limits (i.e., vessel landings limits per time period rather than per trip) that were intended to discourage discards while giving vessels more operational flexibility than they had under trip limits. Currently, the temporal duration of cumulative limits is two months. Because cumulative limits apply to landings and not catch, fishing can continue for other species once the limit for a particular species is reached. However, unintended bycatch can occur while fishing for these other species. Catch in excess of limits cannot be legally retained and is assumed to be discarded.

For purposes of this report, bycatch is defined to include all fish taken on a trip other than landings (retention) of target species. Thus bycatch includes discard of target species, as well as landings and discard of non-target species. The groundfish trawl bycatch model focuses on a particular subset of bycatch, that is, bycatch (landings + discard) of non-target (in this case, overfished) groundfish species.

The bycatch model was developed in 2001 by the Council's Groundfish Management Team (GMT) to project the effect of 2002 target species bimonthly limits on trawl bycatch of overfished species (i.e., lingcod, Pacific ocean perch, canary, darkblotched, widow and bocaccio rockfish). In 2003, in addition to bimonthly limits, the Council also implemented highly restrictive depth-based fishery closures to ensure bycatch of overfished species did not exceed their OYs. In order to facilitate the Council's consideration of management alternatives, the GMT modified the bycatch model used in 2002 to evaluate the combined effects of depth-based closures and bimonthly limits.

At their November 2002 meeting, the Council agreed to a recommendation from the Scientific and Statistical Committee (SSC) that a workshop be convened to review the bycatch model. The Council assigned responsibility for technical aspects of the workshop to the SSC; the National Marine Fisheries Service (NMFS) Northwest Fisheries Science Center (NWFSC) agreed to be responsible for meeting logistics. Terms of Reference for the workshop, including a draft agenda, are contained in Attachment 1 of this report.

The panel convened on January 27-29, 2003 at the NWFSC in Seattle, Washington. Prior to the meeting, Dr. Jim Hastie provided the panel with documentation on the bycatch model (Hastie, undated). The panel appreciates the thoroughness with which Dr. Hastie's document addressed the requirements of the terms of reference.

The panel also received other papers (Pikitch, Erickson and Wallace, 1988; Methot, Helser and Hastie, 2000; Wallace and Methot 2002; Gillis, Pikitch and Peterman, 1995; Babcock and Pikitch 2000) that provide information on previous efforts to collect and analyze data pertaining to groundfish trawl bycatch on the West Coast. Highlights of these papers are as follows:

- Pikitch *et al.* (1988) conducted the first comprehensive analysis of bycatch and discard in the West Coast groundfish trawl fishery. Their analysis is based on data from a voluntary at-sea observer program (hereafter referred to as the Pikitch study) conducted aboard commercial groundfish trawl vessels operating from Newport, Astoria, and Coos Bay, Oregon from June 1985 through December 1987. The analysis distinguishes major fishing strategies by gear, target species, and depth of fishing and provides estimates of discard rates by strategy and species for species managed by Council trip limits. Results of the analysis show a significant relationship between discard rates and trip limits.

- Methot *et al.* (2000) analyze discard of target species in the West Coast Dover sole/thornyhead/trawl-caught sablefish complex (DTS) bottom trawl fishery. Their analysis is the first to use data from the Enhanced Data Collection Program (EDCP), a voluntary observer program initiated by the Oregon Trawl Commission and the Oregon Department of Fish and Wildlife in conjunction with NMFS and other partners. The EDCP was conducted from Crescent City, California to Bellingham, Washington over the period November 1995 through December 1998. The analysis treats each trip in the EDCP data as a random draw without considering any vessel specific effects. Discard of DTS for each trawl trip landing DTS is estimated as a function of the remaining amount of the vessel's cumulative limit.

- Wallace and Methot (2002) analyze halibut bycatch in the West Coast bottom trawl groundfish fishery. The analysis uses data from the EDCP, combined with logbook data on trawl effort and fishticket data for Oregon and Washington from the Pacific Coast Fisheries Information Network (PacFIN). Bycatch rates are estimated as a function of tow hours, instead of target strategy as done by Pikitch *et al.* (1998).

- Gillis *et al.* (1995) use optimal foraging theory to develop a dynamic model of discard due to high-grading, whereby fishermen discard marketable but lower-valued fish to leave space for more valuable fish that may be caught before the end of a trip. High-grading is distinct from discard associated with regulatory landings limits, the primary cause of discard in the West Coast groundfish fishery. This analysis applies dynamic programming methods to simulate discard of high, low, and medium valued classes of sablefish as a function of seasonal trip limits and availability. The analysis is based on data from the Oregon trawl fishery collected in the Pikitch study.

- Babcock and Pikitch (2000) extend the dynamic programming approach of Gillis *et al.* (1995) to include other fishing strategies and consider discard from all sources. The data come from a mesh size study involving voluntary observers aboard Oregon and Washington groundfish trawlers during 1988-1990. Results simulate discard of various species including sablefish, widow and yellowtail rockfish as a function of trip limits.

Groundfish Trawl Bycatch Model and Its Use in the Council Management Process

The general approach of the groundfish trawl bycatch model involves construction of an annual baseline participation pattern (landings by target species, target fishery, bimonthly period, management area, and depth) for individual groundfish trawl vessels. A set of algorithms is used to predict how the baseline pattern of individual vessels would be constrained by proposed management measures (closed areas, bimonthly limits). Aggregate effects are then predicted by summing the effects of the management measures across individual vessels. In order to understand specifically how groundfish trawl bycatch is estimated, it is important to understand both the details of the bycatch model and the manner in which it is utilized in the management process.

Step 1 - Defining the Baseline

Participation by individual vessels in specific target fisheries and time periods can vary widely from one year to the next, depending on species abundance and regulatory and market conditions in nongroundfish (e.g., shrimp) as well as groundfish fisheries. To ensure the baseline captures the possibility of extensive fishery participation within target fisheries and time periods and reflects recent fishery conditions, multiple years of fishticket data (1999-2001) are used to define the baseline, with greater weight given to data from more recent years (Hastie, Table 6). The baseline is defined on a vessel-by-vessel basis, with each trip made by each vessel assigned to a bimonthly period and management area. Each trip is also assigned to a target fishery based on explicit criteria (Hastie, Table 1). For each vessel, bimonthly period and management area, the landings distribution of each target species among target fisheries is also estimated.

To reflect the effect of the depth-based closures considered in 2003, the baseline defined in the 2002 version of the model was augmented to include information on the depth distribution of landings. Specifically, 1999 logbook data are used to estimate the relative depth distribution of each target species taken by each vessel in each bimonthly period and management area. The absolute level of landings associated with each depth stratum is then estimated by multiplying baseline landings for each vessel, target species, period, and area by the relative depth distribution of landings for the same vessel, target species, period, and area.

Step 2 - Predicting Redistribution of Harvest Associated with Depth-based Closures

For each depth-based closure scenario evaluated, an *ad hoc* effort redistribution formula (Hastie, Table 9) is used to predict the extent to which harvest taken at proposed closed depths would be redistributed to depths remaining open. Specifically, for each vessel, bimonthly period and management area, landings of each target species during the baseline period are summed across those depth strata that would remain open to fishing in 2003, and the percentage of the vessel's total baseline landings accounted for by these open depths is calculated. This percentage is entered into the redistribution formula to predict landings after the closure in the absence of a bimonthly limit constraint. Actual landings of each target species by each vessel in each period and area are then estimated by constraining the landings level predicted by the redistribution formula from exceeding the bimonthly limit for the species. Total landings of each target species after the closure are then estimated by summing appropriately across vessels, periods, and areas.

Step 3 - Selecting Bycatch Rates

For each overfished species and target fishery, the bycatch rate is calculated as the poundage of the overfished species caught (landings + discard) in the target fishery divided by the poundage of all target species landed in the same fishery. Bycatch rates are estimated on a target fishery basis to avoid the double counting that would occur if they were estimated on a target species basis.

For the area north of Cape Mendocino, a range of bycatch rates for each overfished species is derived for each bimonthly period/target fishery stratum, using data from the 1999 logbooks and the Pikitch and EDCP studies (Hastie, Table 3a). For the area south of Cape Mendocino, the 1999 logbooks are used to derive bycatch rates in each of the same strata (Hastie, Table 3b).[1/] For the northern management area, the GMT devises a range of bycatch rates for Council consideration, by evaluating the Table 3a rates in terms of factors such as sample size and the timeliness of the data source from which each rate was derived (the Pikitch rates being the most outdated, the logbook rates the most current) (Hastie, Table 4a). For the southern area, the range (Hastie, Table 4b) is calculated as ___ 50% of the rates contained in Table 3b.

The rates used in the bycatch model are selected by the Council (Hastie, Tables 12a, and 12b), based on the ranges provided in Hastie's Tables 4a and 4b and additional information from the GMT regarding the historical performance of the rates in predicting retained bycatch. In this regard, the GMT gave special consideration to bocaccio. Specifically, given that bocaccio harvest in the first four months of 2002

1/ Coverage of the area south of Cape Mendocino by the Pikitch and EDCP surveys was too limited to allow use of these data sources to estimate bycatch rates in the southern area.

exceeded model projections by 350% (Hastie, Table 7), the GMT increased the raw logbook bycatch rates for bocaccio by factors of 3.9 to 9.0 for depths less than 80 fathoms and by a factor of 2.0 for depths greater than 150 fathoms. These upward adjustments are intended to improve model performance with regard to bocaccio bycatch.
Bycatch rates for each overfished species in each target fishery, bimonthly period, management area, and depth are calculated from the 1999 logbooks based on the start position of the tow. These rates are calibrated to the Council-approved bycatch rates, by multiplying each logbook rate by the ratio of the corresponding Council-approved rate to the (all depths) logbook rate. These calibrated rates are then compared with information from the NMFS trawl survey regarding the depth distribution of bycatch species. In cases where a positive bycatch rate is estimated for a depth at which a particular bycatch species is not found (according to trawl survey data), the rate is set to zero. This latter procedure is intended to help correct for possible erroneous inferences in the logbooks regarding depth of harvest associated with the fact that the start depth of the tow reported in the logbook database is not necessarily the depth at which the fish are caught.

Step 4 - Predicting Bycatch Levels

Landings of each target species within each target fishery are estimated for each vessel, bimonthly period, and management area by multiplying the projected landings of each target species by each vessel in each period and area after the closure (derived in step 2) by the baseline landings distribution of target species among target fisheries for the same vessel, period, and area (derived in step 1). Landings of all target species within each target fishery are derived for each vessel, period, and area by summing appropriately across species. Bycatch of each overfished species is estimated by multiplying total target species landings projected for each vessel in each target fishery, bimonthly period, and management area after the depth-based closures by the appropriate bycatch rate (derived in step 3). Total bycatch of each species is then estimated by summing appropriately across vessels, fisheries, periods, and areas.

Step 5 - Model Evaluation and Iteration

If either (i) projected landings of any target species (derived in step 2) exceeds the trawl landed OY for that species or (ii) projected bycatch of any overfished species (derived in step 4) exceeds the trawl bycatch OY for that species, target species bimonthly limits and/or depth closures are adjusted, and the model is rerun. Model iterations continue until all regulatory conditions are met. This iterative process is manual rather than automated.

Comments on Technical Merits and/or Deficiencies of the Bycatch Model

The bycatch model explicitly links groundfish policy instruments (bimonthly limits and depth closures) to the intended regulatory objective (ensuring that estimated bycatch of each overfished species does not exceed OY). The model is complex, reflecting the complexity of trawl regulations and fishing behavior. The detailed stratification of fishing activity - by vessel, bimonthly period, management area, target species, target fishery, and depth - reflects the demands that are placed on the model. The panel does not know if available data can support the level of stratification used in the model.

The effort redistribution formula used in the model is *ad hoc*. Furthermore, it will not be possible to assess the predictive ability of the redistribution formula even when 2003 logbook data become available, as the formula-generated harvest estimates are subject to bimonthly limit constraints before being converted into actual harvest projections. Use of the redistribution formula was prompted by recognition of the limited usefulness of recent historical data for predicting 2003 fishing activity, given the unprecedented depth-based closures implemented in that year. The formula is expected to be phased out, as fishticket and logbook data for 2003 and beyond become available.

The bycatch rates used in the model are selected by the Council from a range of rates derived from logbook, Pikitch, and EDCP data. Factors such as sample size, currency of the data used to estimate each rate, and historical performance of the rates in predicting retained bycatch are considered in the final selection of bycatch rates. These are all appropriate factors to consider. The manner in which the bycatch rates are selected is *ad hoc* and constrained by the limitations of existing data. It is not possible for the panel to directly evaluate the accuracy of the bycatch rates.

The model is deterministic (as opposed to stochastic) and does not include any explicit consideration of risk. Moreover, it is not possible for the panel to evaluate whether the model implicitly reflects any particular attitude toward risk. For instance, while the effort redistribution formula takes a "middle ground" in terms of assuming partial (rather than 0% or 100%) redistribution of effort from closed to open areas, it is not possible to know whether assuming a "middle ground" is risk neutral relative to the extent of the effort shift actually occurring as a result of the closures. A risk averse strategy would be to assume 100% redistribution of effort. The need to validate this and other model assumptions has not yet received any attention.

With regard to overall model performance, preliminary data from January through April 2002 suggest that the ability of the model to predict target species landings varies widely by species (Hastie, Table 7). The percent deviation between actual and projected landings ranges from –14% to +36%, with the notable exception of widow and yellowtail rockfish. The large deviations indicated for widow and yellowtail rockfish (-97% and -75% respectively) are due to the fact the 2002 bimonthly limits for these species were so low as to discourage targeted fishing. This result suggests the model is better suited to projecting landings associated with marginal changes in bimonthly limits than changes significant enough to affect the targeting behavior of the fleet.

A comparison of actual and projected cumulative landings of target species in 2002 (Hastie, Table 8) shows annual deviations ranging from -9% to +39%, suggesting a tendency for bimonthly deviations to even out over the course of the year. According to Dr. Hastie, actual landings of target species (even longspines, for which the model underestimates actual landings by 39%) were consistently lower than their respective OYs in 2002. This result is due largely to the effect of bycatch constraints on target fishery activity. The effect of errors in target species landings projections on bycatch estimates is difficult to evaluate and varies by species, depending on the extent to which each target species contributes to total landings in each target fishery and the bycatch rates associated with each fishery.

Hastie’s Table 7 also provides a comparison of model projections of bycatch with bycatch estimates. The panel notes it is not possible to meaningfully evaluate the model’s ability to predict total bycatch, as the bycatch estimates reported in the table combine "real world" data on bycatch landings with *ad hoc* assumptions regarding bycatch discard. Even the "real world" portion of bycatch cannot be compared against model projections, as model results cannot be disaggregated to distinguish between landings and discard of bycatch species.

The model should not be considered the only (or the best) modeling approach to estimating and monitoring bycatch. However, it is a reasonable approach, given the data and time constraints present at the time of model development and the unprecedented nature of the depth-based closures that the model attempts to address. *Due to the uncertainties surrounding the model and the bycatch rate assumptions, it is critical the model be validated against results from the early months of the 2003 fishery before being utilized in the 2004 management cycle. The lack of attention to methods of validating model assumptions and data must also be addressed with some urgency. Over the longer term, the panel recommends that an effort-based model be developed that explicitly considers the separate effects of changes in effort and catch per unit of effort (CPUE) on bycatch. As a first step, it is important the data requirements of such a model be identified and addressed.*

Comments on Technical Merits and/or Deficiencies of the Data

The bycatch model relies heavily on trawl logbook data. Trawl logbooks provide detailed tow-by-tow data that allow identification of the mix of fishing strategies pursued on a trip. Logbooks also provide depth data needed to evaluate effects of the depth-based closures implemented by the Council in 2003. Relative to other available historical sources of bycatch data (i.e., the Pikitch and EDCP studies), logbook data are collected on an ongoing annual basis and provide larger sample sizes and broader geographic coverage.

The logbooks also have their limitations. For instance, the logbook program is administered by the three states within their respective boundaries, and each state uses different procedures to adjust the hailed

weights reported in the logbooks. The logbooks provide information on retained bycatch, but not discards. While the logbooks include fields for the start and end location of tows, only the start location is entered into the database. Some inaccuracy in catch location can be expected, regardless of whether catch is characterized in terms of start or end location of the tow. It is not clear to the panel whether vessel operators would be able to provide more accurate information regarding location of catch on a tow-by-tow basis, although it was noted that operators who use net-mounted transducers know where the majority of their fish are caught.
The bycatch model relies on 1999-2001 fishticket data to characterize baseline trawl fishing activity by vessel, target species, target fishery, bimonthly period, and management area. While fishtickets are a useful source of information on target fishery, logbooks would be a more discriminating source of information, as the tow-by-tow data contained in the logbooks would allow the assignment of multiple target strategies to a single trip. Dr. Hastie indicates the use of logbooks to evaluate target strategy is a high priority for further model development.

The bycatch model relies on 1999 logbook data to estimate the depth distribution of landings. The use of more recent years of logbook data would be better suited for ensuring the bycatch model captures recent behavior of the fleet with regard to depth of landings.

Data from the 1999 logbooks, the 1995-1998 EDCP study and the 1985-1987 Pikitch study were used to establish an initial range of bycatch rates for further consideration by the GMT and Council. The use of pre-2000 data as a starting point for determining appropriate bycatch rates for the current fishery is problematic, given the significant changes that have occurred in terms of regulations (reduced cumulative limits, small footrope restriction) and the types of fishing opportunities and incentives faced by the fleet. The use of 1999 logbook data to estimate bycatch rates is necessitated by the fact that 1999 is the most recent year in which cumulative limits were sufficiently high to allow estimation of bycatch rates. However, unlike the EDCP and Pikitch data, which include information on both landings and discards, it is significant to note that only landings (not discards) are reported in the logbooks. The magnitude of the introduced error and its effect on logbook-derived bycatch rates is unknown.

Integrating Model and Data from Observer Program

The West Coast Groundfish Observer Program is intended to collect data on discards, not retained catch. Although the observer program was not originally designed to provide input to the bycatch model (which did not exist at the time the program was initiated), observer data will be an important input into the bycatch model as they become available.

Since the objective of the observer program is to provide data on discarded catch only, reconstruction of bycatch rates by target fishery requires information on retained catch. Retained catch is available from (1) observer-recorded hailed weights, (2) fishtickets, (3) unadjusted logbook data, and (4) fishticket-adjusted logbook data. Adjusted logbook data are the preferred source of information on retained catch.

Evaluation of the number of observed tows, trips, and vessels in 2001 and 2002 (Appendix C) indicates relatively sparse coverage in many model strata. In some cases the lack of coverage may be attributed to little or no fishing effort in the stratum. Reliance on observer data to estimate bycatch rates will require a strategy for combining data across strata when sample sizes are inadequate to support an estimate for an individual stratum.

A number of opportunities exist for collapsing target fishery and season strata to increase the sample size within strata, including (1) eliminating the arrowtooth target strategy, (2) combining periods 1 and 6 for the petrale sole target, and (3) combining several periods to estimate bycatch for the DTS target in the winter season. Given the limited targeting opportunities under the current management system, another alternative is to dispense with target fishery strata entirely and collapse the model to deep and shallow water strata in the north and south.

With regard to the specific issue of seasonal aggregation, the panel suggests the following approaches:

- Combining data across all periods and estimating an annual bycatch rate.
- Combining data from adjacent periods as needed.
- Applying the seasonal pattern of bycatch in the 1999 logbook data to the annual rate.

Although each of these alternatives has some merit, the panel is reluctant to recommend a preferred method without seeing a comparison of the seasonal bycatch patterns that are produced by each method. The panel recommends a comparison of this type be conducted, based on a minimum sample size of two vessels and 10 tows per stratum.

As a follow-up to this workshop, the panel recommends the SSC do the following: (1) review the sampling protocol used in the observer program, (2) evaluate how to best integrate the observer data into the bycatch model, and (3) provide advice regarding the issue of small observer sample sizes in the context of the stratification used in the bycatch model. One task specific to (3) would be to review the comparison of seasonal bycatch patterns associated with the three alternative approaches identified above for obtaining bycatch rates for strata without sufficient observer data. Dr. Hastie has agreed to perform this comparison for the SSC.

As more observer data become available, consideration should be given to whether data from only the most recent year should be used, or whether data from previous years should also be used. There is a tradeoff between increasing the sample size (and precision) of bycatch rate estimates by including more years of data versus the potential of estimating bycatch rates that do not reflect current conditions. If multiple years of data are needed to obtain sufficiently precise bycatch rates, a weighting scheme with more weight on the most recent data should be considered, such as a running average or an exponentially weighted average.

Recommendations for Bycatch Estimation in 2003 and Beyond

Inseason Management in 2003

For inseason management in 2003, the panel recommends the current model be used, with potential adjustment of historical vessel landings and/or bycatch rates to bring the projected inseason landings into agreement with fishticket and observer data. Any adjustment of model bycatch rates should be presented to the SSC for review and comment, along with a comparison of model-projected inseason landings with actual landings of target species and all bycatch species managed under rebuilding plans.

2004 and Beyond

1. *As soon as feasible, the panel recommends the bycatch rates currently used in the model be replaced with rates from the observer program, in accordance with guidance provided by the SSC.* Since the observer program is intended to provide estimates of discarded catch only, reconstruction of bycatch rates by target fishery will also require information on retained catch. *The panel recommends state agencies give high priority to making 2002 fishticket-adjusted logbook data available by April of 2003, so bycatch rates can be estimated for the 2004 management cycle using the 2002 observer data in combination with the best available estimates of retained catch. Timely availability of adjusted logbook data will continue to be important in future years.*

2. The bycatch model currently defines the baseline level of fishing trips and assigns landings of target species to a target fishery on the basis of 1999-2001 fishticket data. *The panel recommends target fishery assignments be based on the most recent years of logbook data, as the tow-by-tow data contained in the logbooks provide greater discrimination than the fishtickets in terms of allowing for multiple target strategies on a single trip.*

3. The bycatch model currently relies on 1999 logbook data to estimate the depth distribution of landings. *The panel recommends the three most recent years of available logbook data be used to estimate*

depth distribution. The depth distribution should be updated each year with the most currently available logbook data.

4. Until logbook data for 2003 (the first year of the depth-related closures) become available, it will be necessary to continue relying on the effort redistribution formula, in combination with pre-2003 logbook data, to project fishery participation and depth distribution of harvest. The effort distribution formula is *ad hoc* and cannot be independently validated. Even if the formula provides a reasonable depiction of effort redistribution between 2002 and 2003, the formula is likely to become more outdated the longer it is used, as fishermen displaced from closed areas become more adept at operating in open areas. The panel notes that 2003 logbook data (because they represent actual behavior after the depth-based closures) will likely provide a much better basis for predicting future bycatch than an untestable redistribution formula. The potential repercussions of delay in receipt of 2003 logbook data may be exacerbated by the shift to multi-year management of the groundfish fishery. Specifically, unless the 2003 logbook data become available early enough in 2004 to affect Council deliberations for the 2005-2006 management cycle, the Council's ability to take advantage of information contained in the 2003 data would be limited to inseason adjustments until the 2007-2008 management cycle. *The panel recommends fishticket-adjusted logbooks for 2003 be made available by April of 2004 to allow information pertaining to fishing behavior after the Council's depth-based closures to be incorporated into the bycatch model in time for the 2005-2006 management cycle. Timely receipt of logbook data (as well as fishticket data) is both an immediate and ongoing need.*

5. The bycatch model is an empirical model with critical *ad hoc* assumptions. The only possible test of the model is how well the model predicts what actually occurs. Once the changes to the bycatch model recommended by this panel for the 2004 management cycle are made (e.g., use of 1999-2001 logbook data to assign harvest to target fisheries and estimate the depth distribution of harvest, use of fishticket-adjusted observer data rather than 1999 logbook data to estimate bycatch rates), the model should be run with the depth closures and cumulative limits in effect in 2003. *Model results should be compared with actual harvest levels from the early months of 2003 and correction factors applied, as appropriate, to calibrate the model for 2004.*

6. *The choice of bycatch rates is a technical, not a policy, decision. This decision should be made by the GMT, in consultation with the GAP, and subject to the approval of the SSC.*

Other Research and Data Recommendations

1. The three states use different procedures for adjusting hailed weights in the trawl logbooks. *These adjustment procedures should be evaluated in terms of their comparability and potentially differential effects on bycatch estimation results.*

2. The effort redistribution formula used in the bycatch model is actually a catch redistribution formula that reflects the combined effects of changes in effort and CPUE. The validity of the formula cannot be tested. As suggested above, dynamic optimization models and discrete choice models are potentially useful frameworks for evaluating the effects of depth-based area closures; such models are based on testable hypotheses and can be used to distinguish the separate effects of closures on effort and CPUE. Explicit consideration of effort effects will make the model more transparent in terms of fleet behavior assumptions and thus facilitate the ability of the industry to make concrete suggestions for model improvement. Explicit consideration of CPUE effects will allow the effect of changes in stock abundance and environmental factors to be reflected in the model. *The panel recommends that suitable optimization models be devised, and the data needed to estimate such models be collected, so model development can proceed*.[1/]

3. Uncertainty in the bycatch rates obtained from the observer program should be evaluated using bootstrap variance estimates. In order for this type of analysis to be feasible, it will be necessary to eliminate the *ad hoc* features of the current bycatch model and recast the model into an automated

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2/ Babcock and Pikitch (2000) and the papers presented at the October 2002 NMFS Social Science Workshop in Silver Spring, Maryland may provide a useful starting point for model development.

framework. *Dealing with uncertainty should be an important consideration in future development of the bycatch model.*

4. Optimization models may be useful for identifying and evaluating a broad range of management alternatives for consideration by the Council. For instance, such models may facilitate evaluation of alternative combinations of depth-based closures and bimonthly limits relative to Council objectives. While no single model outcome or single objective is expected to be the deciding factor in setting regulations, models of this type may enhance the ability of the Council to identify a broad range of regulatory options and anticipate the effects of these options in a more systematic and transparent manner. *The panel recommends development of such models as a long term research goal.*

5. While the focus of this panel has been on evaluation and improvement of bycatch estimates for the limited entry trawl fleet, it is important to note that trawlers account for a minor portion of the harvest of some overfished species (e.g., bocaccio, lingcod). *The panel recommends a technical review of procedures and data currently used to account for total catch by recreational, fixed gear, and open access sectors of the groundfish fishery be undertaken in the near future, and solutions be devised to address whatever deficiencies may exist in such procedures and data.*

6. Some modification of existing recreational sampling procedures and design of new procedures will be occurring as a result of the ongoing reorganization of Recreational Fishery Information Network (RecFIN). *The panel recommends that all recreational fishery sampling protocols be designed to produce statistically valid estimates of total catch, and sound procedures be devised to ensure appropriate calibration in transitioning from current to future data collection and estimation methods.*

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ATTACHMENT 1

Terms of Reference for the January Bycatch Workshop
December 5, 2002

Introduction

In 2001, the Natural Resources Defense Council (NRDC) filed a lawsuit against the U.S. Secretary of Commerce that successfully challenged the adequacy of the bycatch rates used by the Pacific Fishery Management Council (Council) in setting annual specifications for the groundfish fishery in 2001. The Council's Groundfish Management Team (GMT) subsequently developed and documented a bycatch model that was intended to enhance the transparency and accuracy of its bycatch estimation methods. The details of this new model were discussed at a September 25, 2001 GMT meeting attended by other interested parties - including representatives from the NRDC and the Council's Scientific and Statistical Committee (SSC). This model was used to set annual specifications for the 2002 fishery.

Partway through the 2002 season, amid concerns regarding premature attainment of the bocaccio OY and to ensure the OY for darkblotched rockfish would not be exceeded prior to the end of the season, the Council imposed inseason adjustment measures on the groundfish fishery in the form of depth-based area closures. Area closures of this type will continue to be a key element of groundfish fishery management in 2003 and beyond. In order to improve its ability to conduct preseason evaluation of the effects of such closures on bycatch and discards, the GMT incorporated a number of new features into the 2002 bycatch model - including calibration of bycatch rates to depth strata and a behavioral response formula that predicts the redistribution of trawl effort and catch associated with area closures. At the Council's September 2002 meeting, the SSC noted the briefing it had received regarding this revised bycatch model was only the first step toward a comprehensive evaluation of the type of bycatch estimation methodology that will be required in conjunction with the depth-based area closures being utilized by the Council. The SSC offered to organize a bycatch model review panel that would, (1) review the methodological aspects of the bycatch model and (2) make recommendations regarding how new observer data being gathered by the NMFS Northwest Fisheries Science Center (NWFSC) would be incorporated into the bycatch model.

A panel will convene during January 27-29, 2003 in Seattle, Washington to be briefed on the nature and status of the new observer data, to formally review all elements of the bycatch model, and to recommend an approach for incorporating the new observer data (as the data become available) into the bycatch model. The panel will include two members each from the SSC Economics Subcommittee, the SSC Groundfish Subcommittee, the GMT, the Groundfish Advisory Subpanel (GAP), and independent experts. The chair of the SSC Economics Subcommittee will chair the panel. The NWFSC, Fishery Regulation Assessment Model (FRAM) Division will be responsible for the overall logistics of the meeting and for obtaining the services of the independent experts as panel members. Dr. Ed Waters will be the primary Council staff contact for the panel.

Terms of Reference for the Bycatch Model Review Panel

1. **Briefly review existing literature and methodologies for estimating bycatch rates and discards, including the use of observer data.** Methodologies reviewed should include, at least, the study by Pikitch *et al.* (1988), and previous work based on the Enhanced Data Collection Project (EDCP) and trawl logbook data. Summaries of these approaches and documentation of how these approaches have been used for management should be made available to all panel members by Friday January 17, 2003.

2. **Review documentation, code, and results for the bycatch model.** Complete documentation of the bycatch model should be available to all panel members by Friday January 17, 2003. The documentation should contain the following:

   (a) An introductory section that briefly reviews past work. Review of past work should include an overview of the 2001 version of the bycatch model, how it was used for management, and a table that compares results of its predictions for 2002 with observed data for the 2002 season.

(b) A data section that thoroughly describes all sources of data used in the bycatch model, for example fishticket and logbook data.
(c) A section on model structure that clearly identifies and describes all of the model's assumptions, including behavioral assumptions such as those pertaining to effort shifts. The section on model structure should clearly describe how the data are stratified for purposes of the model, and identify how target strategies are associated with individual tows in model runs.
(d) A results section that presents baseline results of the model, including estimates of bycatch rates and discards, in a tabular format, that facilitates comparison with results from other analyses.
(e) A section on sensitivity analysis of the bycatch model that presents results with variations and perturbations in model inputs from baseline levels. At a minimum, the sensitivity analysis should include at least two variations from baseline levels for bycatch rates in particular strata and the parameter values used in the power function that determines shifts in fishing effort. A clear rationale for the particular scenarios should be provided.
(f) A discussion section that summarizes results, including a qualitative discussion of uncertainty that relates explicitly to the sensitivity analysis, and an outline of next steps to be taken with the bycatch model, including a proposal for incorporating the observer data.
(g) A references section that lists citations for all relevant literature.
(h) An appendix to the model documentation that contains a thoroughly commented printout of the model code.
(i) A second appendix that describes all input data files, including field descriptions for the records in each of the files, and contains sample printouts with the format for each of the input data files.
(j) A third appendix that describes model outputs, including descriptions of each field in all output files, and contains sample printouts with the format of each output file.

3. **Review status of NMFS West Coast observer data and coverage.** The observer data is anticipated to be work in progress at the time of the workshop, and final results are not expected. A progress report on the observer data should be available to all panel members by Monday January 27, 2003. The report should include the following elements:

   (a) A description of how the observer data are collected, descriptions of fields in the observer data, the strata sampled, and summary statistics for each of the fields and strata in the data;.
   (b) Maps delineating the exact geographical area covered by the observer data overlaid with maps of the areas closed by the Council's 2003 management specifications.
   (c) Problems encountered while compiling the observer data, with any suggestions for avoiding these problems in the future.
   (d) A schedule for next steps including the anticipated date for completing work with the observer data and when the data will be available for the bycatch model.

4. **Review proposals for incorporating observer data into the 2003 bycatch model.** Alternative proposals for incorporating the observer data into the bycatch model should be considered and discussed.

5. **Provide a report for the Council.** A comprehensive report that clearly documents the findings and recommendations of the review panel and describes research and data needs will be made available to the Council, SSC, GMT, GAP, and other advisory bodies following the workshop. The rapporteurs and workshop chair will have primary responsibility for writing the report. A draft of the report should be prepared before the end of the workshop on January 29, so that all panelists will have an opportunity to comment before adjourning.

Because a major focus of the panel will be the behavioral response of the fleet to area-based regulations, and because the GMT and GAP representatives have significant expertise in this area, the GMT and GAP representatives will be co-equal voting members of the panel. The opinions and views of all panelists will be weighted equally in the determination of final outcomes. The panel will be responsible for determining whether the terms above are met by (i) the bycatch model document, and (ii) the progress report on the observer data. The panel should strive to reach consensus on these items and a recommended approach for using the bycatch model with the observer data. If the panel cannot reach consensus for any reason, the nature of the disagreement must be described in the panel's report.

These Terms of Reference concern technical aspects of the bycatch model, the observer data, and use of the observer data with the bycatch model. The panel will strive for a risk-neutral approach in its report and deliberations. A reasonable range of uncertainty should be reflected in the bycatch model documentation and the report prepared by the panel. Recommendations and requests to the presenters and other participants at the panel meeting for additional or revised analyses must be clear, explicit, and in writing. A written summary of discussion on significant technical points and lists of all panel recommendations and requests are required in the panel report. The report should be completed, at least in draft form, prior to the end of the meeting. The chair and rapporteurs are responsible for carrying out any follow-up work to complete the panel's report.

Draft Agenda

Monday January 27

10:00-10:15	Welcome, introductions, and logistics
10:15-10:30	Review terms of reference, approve agenda, assign rapporteurs
10:30-12:00	Presentations on existing methodologies for estimating bycatch rates and discards
12:00-1:00	Lunch
1:00-3:00	Presentation of bycatch model
3:00-4:30	Discussion of bycatch model and methodologies
4:30-5:00	Instructions to model authors regarding overnight model runs
5:00-5:30	Review of rapporteur notes on bycatch model

Tuesday January 28

8:00-9:00	Review revisions and discussion of bycatch model
9:00-11:00	Draft report on bycatch model
11:00-12:00	Presentation of observer data
12:00-1:00	Lunch
1:00-2:00	Discussion of observer data
2:00-3:00	Presentation of proposal for incorporating observer data into bycatch model
3:00-4:30	Discussion of proposal for incorporating observer data into bycatch model
4:30-5:00	Review of rapporteur notes on observer data and proposal

Wednesday January 29

8:00-10:00	Review revisions and discussion
10:00-11:00	Draft report on observer data
11:00-12:00	Draft report on proposal for incorporating observer data into bycatch model
12:00-1:00	Lunch
1:00-3:30	Review reports
3:30-4:30	Summarize research and data needs and finalize reports
4:30	Adjourn

PFMC
03/25/03

OBSERVER DATA ANALYSIS STATUS REPORT
MARCH 2003, NWFSC

MATCHING LOGBOOKS AND FISH TICKETS WITH OBSERVER DATA

The primary goal of the observer program is to estimate discard as accurately as possible. In order to develop information on total catch, the amount of retained catch must be known as well. Our plan is to use logbook and/or fish tickets for an estimate of retained catch. The observers do record a measure of retained catch. In most cases this reflects the boat's hail weight. These numbers must be reconciled with the fish ticket information by much the same process as the states now use to adjust logbook data.

Status of matching observer data with logbooks

The simplest way to get retained catch on a tow-by-tow basis would be to use the adjusted logbooks that the states produce. Unfortunately, all the state logbooks will not be available until at least the end of March. After they become available, we expect there to be a considerable amount of work involved in matching observed tows to the appropriate logbook records, and defining protocols that will be used where matches are not possible. Before modeling of management options for 2004 can begin, these bycatch rates must be available.

Status of matching observer data with fish tickets

In order to start the bycatch modeling before the logbook information is available we are attempting to use the fish tickets (in lieu of logbooks) with observer data to make calculations of total catch. In order to do so we must match fish tickets with the appropriate observed trip. The matching has proven to be complicated and as of the middle of March is partially completed. We subjected the data to a two-stage evaluation. First, we matched each observed trip to landings records with the same fish ticket numbers recorded by the observer. Next, we compared the retained tonnage recorded by the observer with the associated fish ticket tonnage in four broad species categories: all groundfish except whiting, all DTS, all flatfish, and all *Sebastes* species. The percentage difference between the fish ticket tonnage and the observer tonnage was calculated in each of these categories. In cases where both the fish ticket and observer amounts were less than 0.2 mt within a category, the percentage difference between the values was ignored (i.e. set to zero). For 237 of the 619 observer trips reviewed, this percentage difference was no greater than 10% in <u>every</u> category. These were viewed as good matches and subsequently adjusted using the fish ticket/logbook ratio. In another 133 cases, the percentage difference fell to between 10% and 20%. All of these were reviewed manually and determined to be good matches and subsequently adjusted according to the fishticket/logbook ratio. The remaining 249 trips were then reviewed manually with respect to the above general poundage categories. Of this group, 224 were felt to be good matches, leaving a total of 25 trips (4% of the total) that require additional research to determine whether a match with the fish ticket data is possible. Because of the limited total number of observed trips, it is important to find matches in as many of these cases as possible.

Progress on other related Analyses

Several analyses must be completed before the observer information can be used in the existing bycatch management model.

Analyses to look at how representative the observer data are

It is important to know if the observed trips accurately represent the catches and fishing patterns of the entire fleet. Based on a preliminary matching of fish tickets and observer records, a comparison of observed and unobserved trips was developed. This comparison focuses on three types of concerns regarding the representativeness of the data. One involves average landings per trip and per vessel-period between observed and unobserved vessels, at several levels of geographic stratification. Another focuses on differences in each vessel's average landings when observed and when unobserved. And the third involves the percentages of grouped-species landings associated with observed and unobserved vessels, within subregions of the coast. These results are still undergoing internal review and are likely to be revised as the matching of observer and fishticket data improves.

Develop database that includes only trips that target groundfish.

The bycatch management model only uses information from fishing trips that target groundfish. Therefore, the data were examined to remove non-groundfish trips. Procedures were developed for removing tows from the analytical data set where retained non-groundfish poundage exceeds retained groundfish poundage. Due to tows with a high percentage of CA halibut, there will be roughly 60% fewer groundfish tows from the area south of 40°10' and shallower than 60 fm than reflected in the preliminary counts presented at the bycatch workshop. The information from the trips which target California halibut will be analyzed separately in the future.

Examination of stratification schemes for use of observer data in bycatch management model

Based on a preliminary matching of fish tickets and observer records, variances for bycatch ratios under some alternative post-stratifications of the data were calculated and summarized for discussion with the SSC at the March Council meeting. With the level of stratification used for modeling the 2003 fishery, the variances were high in many instances. Reducing the number of strata in the bycatch management model reduces the variances of the bycatch rate estimates.

Continuing Data analyses

At our presentation to the Council in April the result of the analyses described above will be updated and a summary of results of additional analyses will be presented.

Exhibit E.2.c
Supplemental GAP Report
April 2003

GROUNDFISH ADVISORY SUBPANEL STATEMENT ON REPORT ON THE BYCATCH WORKSHOP AND OBSERVER DATA UPDATE

The Groundfish Advisory Subpanel (GAP) met jointly with the Scientific and Statistical Committee and the Groundfish Management Team to review the results of the bycatch workshop and the data analysis conducted by the NMFS Northwest Fisheries Science Center on some of the results of the Pacific groundfish observer program. While the GAP had no comments on the workshop report, it does have several comments on the data analysis and the revised bycatch model developed as a result of that analysis.

First, the GAP is deeply concerned that - in spite of assurances to the contrary - NMFS continues to release piecemeal data from the observer program. To date, only trawl observer data has been released (and initially released unfiltered, prompting at least one sensational newspaper article which mis-used the data to reach erroneous conclusions), even though 20% of the coverage has been on limited entry fixed gear and open access vessels. Bycatch assumptions are being used by the Council to establish management measures, yet we have no way of knowing whether these assumptions are correct. NMFS needs to provide the Council with the full range of data.

Second, the data being used to supplement the observer data and establish bycatch projections is wholly inadequate. Part of the bycatch model continues to be based on 1999 logbook data, which - given the change in management - is completely useless as an indicator of fleet behavior. The bycatch model continues to rely on hindcasting that is nearly prehistoric, since it lacks updated logbook and fishticket information.

Third, the model tries to estimate the presumably positive effects in terms of bycatch reduction of the significant area closures and other management measures imposed on both commercial and recreational fishermen, but cannot do so, because it lacks up-to-date information. As a result, the fisheries are still being managed by old assumptions using old data. Even the bycatch workshop noted that the data are incomplete and need further analysis.

Fourth, some members of the GAP raised questions with using data that comes from a brand new system that may still have problem areas, especially in the area of species identification. Several examples were given where mis-identification problems have occurred. The GAP recognizes that observer reports are available to vessel operators; unfortunately, obtaining those reports has occasionally been difficult. The GAP suggests that the NMFS observer program instruct the observers to make clear to the vessel operator that the report is available, or perhaps to automatically give a copy to the operator.

Fifth, even the existing bycatch model can overestimate bycatch impacts. Last year, significant changes in management were imposed in order to avoid over harvest of darkblotched rockfish. However, in hindsight, keeping the prior management regulations in place would have led to total catch levels that were the same as originally projected.

Last, the GAP believes there is an urgent need to use real-time data. We need to investigate the use of data collection methods such as card swipes and electronic logbooks to get that data available to managers. While raw observer data should not be the basis for all management changes, inferences can be developed from that data that can be used to ground truth model projections.

The GAP appreciates the tremendous amount of work Dr. Jim Hastie and others at the Northwest Fisheries Science Center have put into developing the bycatch model. However, the majority of the GAP strongly believes it is premature to use the model projections we have, to date, as a means of establishing inseason management recommendations. The GAP urges Dr. Hastie and his colleagues to continue refining the model, so more complete information can be provided to the Council later this year.

A minority of the GAP believes the revised model and the data used to develop it represent the best scientific information available and - since it was judged acceptable - needs to be used for inseason management at this time.

PFMC
04/09/03

GROUNDFISH MANAGEMENT TEAM REPORT ON THE BYCATCH MODEL WORKSHOP AND OBSERVER DATA UPDATE

The Groundfish Management Team (GMT) received a presentation of the review panel report on the bycatch model and the estimated bycatch rates from the first year of the groundfish observer program. The GMT concurs with the Scientific and Statistical Committee (SSC) in its endorsement of the bycatch review panel recommendations, including the replacement of the bycatch rates currently used in the model with the rates from the observer program as soon as feasible.

The GMT also notes that while the current focus on observer data is its incorporation into the bycatch model for eight overfished species, the observer program was implemented to provide a fleetwide standardized reporting methodology for bycatch. As final discard estimates become available from the program, the information should be used to adjust landed catches to account for total mortality for the full suite of species.

PFMC
04/09/03

SALMON ADVISORY SUBPANEL REPORT ON REPORT ON THE BYCATCH WORKSHOP AND OBSERVER DATA UPDATE

The Salmon Advisory Subpanel (SAS) would like the Groundfish Advisory Subpanel (GAP) to give appropriate pre-issue notice when there is an issue having salmon management implications.

The SAS recognizes the complexities of dealing with incidental harvest from other Council-managed fisheries. In light of that, the SAS would respectfully request that whenever the GAP deals with issues that could potentially affect salmon management, they ensure SAS notification and participation.

PFMC
04/09/03

SCIENTIFIC AND STATISTICAL COMMITTEE REPORT ON REPORT ON THE BYCATCH WORKSHOP AND OBSERVER DATA UPDATE

Dr. Michael Dalton (panel chair) presented the review panel report on the bycatch model. The Scientific and Statistical Committee (SSC) commends the review panel for a thorough and careful review of the bycatch model and data inputs. The panel report includes a number of recommendations for improving the bycatch model. These include both short-term recommendations for 2003 and 2004 and longer term recommendations for model development. The SSC fully endorses the panel recommendations. A key panel recommendation was that "as soon as feasible, the bycatch rates currently used in the model be replaced with rates from the observer program, in accordance with guidance by the SSC."

Dr. Jim Hastie presented observer estimates of bycatch rates from the first year of the observer program (bi-monthly periods 5 and 6 of 2001 and bi-monthly periods 1 through 4 of 2002). To estimate bycatch rates, hail weights of retained catch were adjusted by fishtickets. Adjusted logbook data are not yet available to estimate retained catch. To calculate bycatch rates for use in the bycatch model, observer data can potentially be post-stratified by target fishery, period, area, and depth zone. Dr. Hastie presented tables of bycatch ratios (total bycatch/total landings) for various levels of stratification. As expected, there is a clear tradeoff between the level of stratification and precision of the estimated bycatch ratio. Lower coefficients of variation (CV) are obtained when fewer strata are used.

The SSC considers the example of a four-cell stratification (north-south, shallow-deep) as just one of several possible stratifications of the observer bycatch data. It is important to have a good stratification scheme, one which takes into account both the tradeoff between the number of strata and precision of the bycatch estimates and the utility of the model to evaluate complex management alternatives. Formal model selection criteria, such as AIC (Akaike Information Criterion), may be one possible approach to determine the appropriate level of stratification.

Comparison of bycatch projections for 2003 between observer-based bycatch rates and bycatch rates used previously indicates higher catch projections (in some cases much higher) for all overfished groundfish stocks with the exception of widow rockfish.

Bycatch projections using observer bycatch rates with alternative stratifications indicate sensitivity to the level of stratification, particularly whether or not a target fishery strata is defined. The SSC notes that with only a year of observer sampling available, the data are too sparse to support fully stratified bycatch estimates (i.e., by target fishery, bi-monthly period, area, and depth zone), particularly in the southern area. Additional work is needed to (1) characterize uncertainty in bycatch projections, and (2) further evaluate the sensitivity of bycatch projections to alternative levels of stratification.

The SSC considers the bycatch rates based on observer data to be the best available scientific data for use in the bycatch model. Notwithstanding the unresolved issues regarding stratification, the SSC recommends bycatch rates based on observer data be used for evaluating management alternatives for 2004 and for inseason management in 2003. The SSC urges the Council to move quickly to use the new bycatch rates for inseason management, as delay could severely restrict the range of potential management alternatives later in the year. For this meeting, the SSC recommends the Groundfish Management Team omit the target fishery strata and consider only bycatch rates stratified by area, depth zone, and perhaps season. Target fisheries were defined on the basis of historical fishing patterns, and there is little evidence these targeting strategies still exist under the current management policies.

PFMC
04/09/03

Exhibit E.2.d
Supplemental Public Comment
April 2003

OCEANA.

Phil Kline / Karen Garrison during public comment period

2501 M Street, NW Washington DC 20037

PRELIMINARY ANALYSIS OF BYCATCH IN PACIFIC TRAWL FISHERIES: OVERVIEW OF CONCLUSIONS FROM 2001-2002 OBSERVER DATA

Michael F. Hirshfield, Ph.D.
Santi Roberts

April 3, 2003

Bocaccio bycatch in 2003 may be substantially greater than expected. The observed bycatch of bocaccio in the southern flatfish fishery, in waters less than 100 fm, was comparable to the bycatch assumed for the entire southern flatfish fishery for 2003 (2.32 mt observed vs. 2.48 mt from Hastie Report), *even though only roughly 10% of that fishery was observed.* Estimates of the annual bocaccio bycatch from the observer data for this fishery alone (from 17 to 33 mt) are close to or greater than the entire 2003 allowable catch of 20 mt of bocaccio for all fisheries. Although 2003 reductions in effort and depth closures mean estimates from the observer data are likely to be too high, *bycatch would have to be 90% less to reach the levels expected by the Council for 2003.*

Canary rockfish bycatch in 2003 may be substantially greater than expected. The observed bycatch of canary rockfish in the northern flatfish fishery, in waters less than 100 fm, was 40% of the bycatch assumed for the entire flatfish fishery, (5.4 mt observed vs. 13 mt from Hastie Report), *even though only roughly 10% of that fishery was observed.* Again, estimates of the annual canary rockfish catch from the observer data for this fishery alone (38 to 75 mt) are close to or greater than the entire 2003 allowable catch of 44 mt for all fisheries. Although 2003 reductions in effort and depth closures mean estimates from the observer data are likely to be too high, *bycatch would have to be 75% less to reach the levels expected by the Council for 2003.*

Lingcod bycatch in 2003 may be substantially greater than expected. Similarly, observed lingcod bycatch in the northern and southern shallow flatfish fishery was over half of the bycatch estimated for the entire flatfish fishery (37 mt observed vs. 67.5 from Hastie Report). Over eighty percent by weight of the observed lingcod catch was discarded.

The DTS complex fishery has substantial discards of target species. In the deep (greater than 200 fm) DTS fishery coastwide, observed dover sole discards were 18% of total dover sole catch; observed thornyhead species (combined) discards were 23% of total thornyhead catch, and sablefish discards were 59% of total sablefish catch.

Observed bycatch of widow rockfish, darkblotched rockfish, and Pacific Ocean perch in 2003 may be less than expected. Annual estimates of bycatch based on observer data for the shallow flatfish fisheries and the deep DTS fisheries was less than Hastie Report estimates for all three species (20% of estimated for widow, 25% of estimated for darkblotched, and 37% of estimated for POP).

ASSUMPTIONS, DEFINITIONS, METHODS:

Bycatch totals are summed over the observer year (mid 2001 through mid 2002).

Bycatch is defined as discards for target species and retained plus discards for non-target species.

Bycatch rates are defined as % of retained target species.

Allowable catch limits for 2003 are taken from Pacific Council News, October 2002, Table 1, Council OY.

Model estimates for total 2003 bycatch are from Hastie Report, Table 19 or 27.

Observer based estimates of total 2003 bycatch were calculated by multiplying annual observed totals (from Observer Report, Appendix Tables II and III) by 7.1 and14.3, and converting to metric tons. This approach assumes that the observer coverage is representative of the fishery in 2003, and is an unbiased 14% and 7% (respectively) sample of the fisheries. (The Observer Report concluded that the observer program achieved between 7% and 14% coverage, with an overall level of 10%.)

Only 5 bimonthly periods were observed for the flatfish/south/shallow fishery; the model (Hastie Report, Table 12b) assumes significant bycatch for lingcod, relatively low bycatch for bocaccio, and no bycatch for canary, during the missing period. If the model is correct, annual estimates of lingcod bycatch in this fishery, in particular, could be roughly 20% higher, assuming comparable target species catches in this period.

INFORMATION SOURCES:

Northwest Fisheries Science Center West Coast Groundfish Observer Program Initial Data Report and Summary Analysis (January, 2003) (referred to as "Observer Report")

Hastie, James. Discussion of Bycatch Modeling Methods Developed for Evaluating Management Measures for the 2002 and 2003 Groundfish Trawl Fisheries, prepared for the PFMC's Bycatch Model Review Panel (January, 2003) (referred to as "Hastie Report")

Pacific Council News, October 2002.

For further information, contact Michael Hirshfield at (202) 833-3900 ext. 915.

STATUS OF GROUNDFISH FISHERIES AND CONSIDERATION OF INSEASON ADJUSTMENTS

Situation: In the current groundfish management program, the Council sets annual harvest targets (optimum yield [OY] levels) and individual vessel landing limits for specified periods, with the understanding these vessel landing limits will likely need to be adjusted periodically through the year in order to attain, but not exceed, the OYs. The initial vessel landing limits are based on predicted participation rates, estimates of how successful participants will be at attaining their limits for each period, and comparisons with previous years. The Groundfish Management Team (GMT) tracks landings data throughout the year and periodically makes projections based on all the information available. The GMT presents these landings data and projections to the Groundfish Advisory Subpanel (GAP), and they discuss adjustments that may be necessary and beneficial.

In 2003, the Council adopted depth-based area closures as a strategy to allow fishing opportunities with dramatically lower OYs for overfished species than in previous years. This meeting will be the first opportunity to verify the effectiveness of depth-based management in constraining total catch of overfished species. The GMT will review landings to date and other typical information in comparison to preseason expectations.

Additionally, there may be consideration for using data obtained from the first year of the NMFS West Coast Observer Program. The original target date for use of observer data in groundfish fishery management decision-making was June 2003. However, at the time of the printing of the briefing book materials, it was unclear whether observer data will be ready for use in evaluating the 2003 groundfish fisheries at this meeting. There will be a joint session between the GAP, the GMT, and the Scientific and Statistical Committee (SSC) on the SSC Bycatch Workshop and the observer data on Monday April 7; the Council is scheduled to consider the status of the observer information under agenda item E.2 immediately preceding this agenda item.

The Council is to consider advice from the GMT, GAP, SSC, and the public on recommended inseason adjustments to the groundfish fishery and adopt tentative changes as necessary. Review of the tentative changes and final adoption of inseason adjustments to 2003 groundfish management measures is scheduled for Thursday, April 10 under agenda item E.8.

Council Action:

1. Consider and adopt tentative inseason adjustments, if necessary.

Reference Materials:

1. Public comments received by March 21, 2003 (Exhibit E.3d, Public Comment).

Agenda Order:

a. Agendum Overview — Mike Burner
b. GMT Report — Jim Hastie
c. Reports and Comments of Advisory Bodies
d. Public Comment
e. **Council Action:** Consider and Adopt Inseason Adjustments, if Necessary

PFMC
03/21/03

ENFORCEMENT CONSULTANTS REPORT ON STATUS OF GROUNDFISH FISHERIES AND CONSIDERATION OF INSEASON ADJUSTMENTS

With the implemenation of depth-based management, coupled with current trip limit and B Platoon strategies, a level of complexity has been built into enforcement that the Enforcement Consultants (EC) would like the Council to consider. As currently configured, B Platton fishing periods and Rockfish Conservation Areas (RCAs) are staggered by two weeks. For enforcement, this meant that when the RCA lines shifted on March 1st, instead of enforcing six lines determined by 862 waypoints defining RCAs coastwide, we had for two weeks the responsibility of enforcing12 lines as determined by 1,724 waypoints defining RCAs coastwide. This situation will occur each time the lines shift throughout the year.

The EC fully understands the reasons for the B Platoon system and is not asking that B Platoon be scrapped. Rather, the EC would like to see RCA areas enforced independent of the B Platoon system. We request one set of lines regardless of platoon. If this proposal was adopted, the two week shifted opportunity incurred by B Platoon vessels in the spring would be made up in November when the B Platoon vessels would actually incur a benefit. However, we also recognize that with more than one line change during the management year, this benefit may not be realized.

This modification would greatly benefit enforcement efforts and take one step towards simplifying an extremely complex regulatory regime.

PFMC
04/09/03

February 9, 2003

Pacific Fishery Management Council
7700 NE Ambassador Place, Suite 200
Portland, Oregon 97220-1384

RECEIVED
FEB 1 3 2003
PFMC

To Council Members,

We request that you reconfigure the cow cod closure area to conform with the rock fish conservation areas, and allow fixed gear outside the 150 fathom curve.

We request that the straight lines be abandoned and either Garmin or C-map GPS chart plotters be substituted (C-map is accurate) as it will make it simpler if fishermen and enforcement are on the same page instead of debating some imaginary lines.

The cow cod conservation area causes severe health and safety issues. I am forced to fish 120 miles offshore in a small boat without being able to seek the shelter of the islands in the event of bad weather. We are fishing so far offshore that we are out of range of the weather broadcast, risking the chance of sudden gales and heavy weather and possibly having our vessel overwhelmed. The slope fish are available in large quantities inside the CCA with no intermixing with shelf species.

The purported science used for the CCA is extremely dubious at best. A few of my favorites are:

The calcofi plankton tows 140 miles off the southern California bight.

The problem with this is the current comes from Mexico this distance from the California coast- Mexican cow cod.

Further science is this phrase:

The model we used produced an improbably high bio mass so we had to readjust our numbers downward.

All the numbers were imaginary in the first place with absolutely no stock assessments whatsoever.

You should also do away with that transit corridor, as it causes travel in a dangerous direction, plus the many extra hours of travel and increased fuel consumption.

The original excuse for the massive area closure was that enforcement could not do fathom curves. Well, now you have created fathom curves with the R.C.A's. The islands are inside CCA with fathom curves and you still have this massive area closure. We want fixed gear access to the slope fishery outside 150 fathoms everywhere. This is a minuscule fishery in Southern California with low quotas and few participants. In all our 30 years, we have never caught a shelf rock fish on the slope!

Phil Schenck
Owner/Operator
F/V Terri's Gale

14212 Alta Street
Westminster, California
92683
714-898-7825 home phone/ FAX

cc:
Fish & Game Commission
Robert R. Treanor, Executive Director

California State Assembly:
Patricia Bates
Bill Campbell
John Campbell
Lou Correa
Lynn Daucher
Thomas Harman
Ken Maddox
et al
California House of Representatives
Dana Rohrabacher
Christopher Cox
Darrell Issa
Gary Miller
Edward Royce
et al
California Senators
Dick Ackerman
Joseph Dunn
Ross Johnson
et al

RECEIVED
JAN 2 1 2003
PFMC

January 12, 2003

Dr. Hans Radtke, Chairman
c/o John DeVore
7700 N E. Ambassador Ave., #200
Portland, OR 97220-1384

Re: California Recreational Fishing Opportunities

Dear Dr. Radtke:

Currently, a depth-based closure is in effect south of 40° 10' North, regulating all recreational fishing for ground fish to 20 fathoms or less.

No provision is made to allow for fishing in waters of 150 fathoms or deeper, as is available to the open-access commercial fishery. This effectively allots 100% of the slope rockfish take to the commercial allocation and affords nothing to the recreational fishery.

Perhaps this is merely an oversight, as this split certainly is not equitable. Allowing recreational fishing for ground fish species at depths greater than 150 fathoms would be of minimal impact on the resource, as very few recreational fishermen would likely be interested in this type of fishing.

I am asking that you reconsider this depth-based closure to allow recreational fishing to be comparable to the open-access commercial fishery, and allow fishing in waters of 150 fathoms or greater.

Sincerely,

Michael Hoffman
23861 Candor Lane
Lake Forest, CA 92630

Southern California Trawlers Association

February 11, 2003

RECEIVED

FEB 18 2003

PFMC

Mr. Hans Radke, Chairman
Pacific Fishery Management Council
7700 NE Ambassador Place, Suite 200
Portland, OR 97220-1384
June 20, 2002

RE: PROPOSED CHANGES TO SOUTHERN CALIFORNIA COWCOD CONSERVATION CLOSURE AREAS

Dear Mr. Radke:

The Southern California Trawler's Association is a group of eighteen small trawlers (80% from 32 feet to 45 feet, largest is 60 feet in length) fishing out of the ports of Morro Bay, Santa Barbara, Ventura, and San Pedro, principally in the Santa Barbara Channel. We fish for ridgeback shrimp, spot prawns, sea cucumbers and (mostly live) halibut. A few of our members also fish for pink shrimp.

A proposal is now being circulated among Council Committees that may make changes to the Southern California Cowcod Conservation Area established over the last couple of years to rebuild cowcod stocks. Our Association members are concerned that these proposed changed to the boundary lines of the Cowcod Conservation Area will significantly impact our members without adding measurable conservation benefits to cowcod stocks.

After the closure was initiated, Association members who used to trawl for spot prawns in the area started fishing deeper, outside the closed area, and found a few areas that hold spot prawns, enough, at least, to keep the boats working. The current boundaries approximate the 150 fathom depth contours. The proposed boundaries in most places would close fishing to our members out to 200 fathoms, a depth beyond which spot prawns do not inhabit in commercial quantities. Further, our small boats don't carry enough cable or horsepower to fish the net in that deep of water.

We feel that by staying outside of 150 fathoms, we have complied with both the spirit and the letter of the PFMC Groundfish Amendments to conserve cowcod. To our knowledge, none of our members have caught a cowcod while trawling for spot prawns outside 150 fathoms since the closure of the Cowcod Conservation Area. From our perspective, we have done everything asked of us to conserve cowcod. The Council set 150 fathoms as the maximum depth at which cowcod are normally found, and our spot prawn fishing outside the Conservation Area is bearing out this wisdom.

6 Harbor Way, Box 101 Santa Barbara, California 93109

We urge the Council not to adopt this change to the Cowcod Conservation Area boundaries in light of the questionable additional conservation benefits it provides cowcod, especially when the effects of this kind of change under the Magnuson Act must be looked at in a balanced view considering also the social and economic impacts to members of our Association, all of whom are individual family fishermen.

This proposed regulation must also be viewed in context of the other Groundfish Plan amendments that have essentially closed most of the Continental Shelf south of Point Conception to trawling between 100 and 150 fathoms. These depth zones are predominantly where we traditionally have fished for spot prawns. Therefore, most of our spot prawn grounds have already been prohibited. We have been eking out market orders by adhering to all of the groundfish conservation measures, but barely. Now, with the proposed changes to the Cowcod Conservation Area, our last few spot prawn areas would be halved again, since the Island side of the Santa Barbara Channel was also restricted for our exempted trawl fisheries south of Point Conception.

For these reasons, we urge the Council not to make further changes to the boundaries of the Cowcod Conservation Area. The idea that improved enforcement will result from these proposed changes isn't consistent with modern navigational technology. Our members have been able to avoid entering the existing CCA without difficulty using modem GPS and fathometers. The new Department of Fish and Game enforcement vessels are even better equipped than ours. They, too, should have no problem detecting the existing boundary and water depths.

Our Association members support Council measures that promote long-term sustainability of our fisheries. The proposed changes, however, offer no demonstrable conservation benefits to cowcod while significantly impacting what little spot prawn trawl grounds that remain to us, given all the other conservation measures we are now in compliance with.

Thank you for the opportunity to comment on these proposed changes to the Southern California Cowcod Conservation Area. If you have any questions or comments for our members, please do not hesitate to contact me at (805) 566-1400 or fish4u1@msn.com.

Sincerely, Mike M'Corkle

Mike McCorkle, President
Southern California Trawler's Association

Cc: Dr. Don McIsaac, Executive Director, PFMC
Mr. John DeVore, Groundfish Staff Officer, PFMC
Mr. Jim Seger, Fisheries Economics Staff Officer, PFMC
Mr. Rod Moore, Groundfish Advisory Subpanel
Dr. Alec McCall, Scientific and Statistical Committee
Dr.. Steve Ralston, Scientific and Statistical Committee
Dr. Cindy Thompson, Scientific and Statistical Committee
Mr. L.B. Boydston, Ad-Hoc Allocation Committee
Ms. Marija Vojkovich, Department of Fish and Game
Mr. Brian Culver, Groundfish Management Team
Dr. James Hastie, Groundfish Management Team
Mr. Zeke Grader, Pacific Coast Federation of Fishermen's Associations

Subject: Fwd: Tougher Groundfish Regulations Needed
From: "PFMC Comments" <pfmc.comments@noaa.gov>
Date: Mon, 03 Mar 2003 08:03:18 -0800
To: John.DeVore@noaa.gov
CC: Mike.Burner@noaa.gov

X-Mozilla-Status: 0001
X-Mozilla-Status2: 00000000
Return-Path: <pfmc.comments@noaa.gov>
Received: from mercury.akctr.noaa.gov ([127.0.0.1]) by mercury.akctr.noaa.gov (Netscape Messaging Server 4.15 mercury Jun 21 2001 23:53:48) with ESMTP id HB6KLJ00.55F; Mon, 3 Mar 2003 08:03:19 -0800
Message-ID: <8c39af8be23e.8be23e8c39af@mercury.akctr.noaa.gov>
X-Mailer: Netscape Webmail
MIME-Version: 1.0
Content-Language: en
X-Accept-Language: en
Content-Type: multipart/mixed; boundary="--1da05537687a6e75"

Pacific Fishery Management Council
7700 NE Ambassador Place, Suite 200
Portland, Oregon 97220-1384
Phone: 503-820-2280
Fax: 503-820-2299
On the web at: http://www.pcouncil.org

Subject: Tougher Groundfish Regulations Needed
From: (Branden Leach) branden@leach.net
Date: Sat, 1 Mar 2003 08:09:08 -0800
To: rhight@dfg.ca.gov
CC: rtreanor@dfg.ca.gov, mvojkovi@dfg2.ca.gov, governor@governor.ca.gov, Assemblymember.Wayne@assembly.ca.gov, Assemblymember.Hollingsworth@assembly.ca.gov, carol.wallisch@sen.ca.gov, Senator.Oller@sen.ca.gov, pfmc.comments@noaa.gov

X-Mozilla-Status: 0001
X-Mozilla-Status2: 00000000
Return-Path: <pfmc.comments@noaa.gov>
Received: from mercury.akctr.noaa.gov ([127.0.0.1]) by mercury.akctr.noaa.gov (Netscape Messaging Server 4.15 mercury Jun 21 2001 23:53:48) with ESMTP id HB6KLJ00.55F; Mon, 3 Mar 2003 08:03:19 -0800
Message-ID: <8c39af8be23e.8be23e8c39af@mercury.akctr.noaa.gov>
X-Mailer: Netscape Webmail
MIME-Version: 1.0
Content-Language: en
X-Accept-Language: en
Content-Type: multipart/mixed; boundary="--1da05537687a6e75"

I have been fishing the California coast for more than 30 years. In the last ten years I have seen the average size of rockfish decline steadily. At the same time I have seen the size and frequency of lingcod decline as well. I stongly support the draconian measures described above to preserve and restore these fish stocks. I believe the burden of a fishing moratorium should fall on all of us, sport and commercial angelers as well, though primarily on commerical fishermen since there are fewer of them and they take a greater number of fish. Furthermore, if enforcement required raising taxes I would support this provided the burden was progressive and the funds went directly to the DFG instead of into the State's general fund. Thank you.

I, as a California recreational angler, find the increasing body of evidence indicating the severe depletion of California's groundfish stocks alarming. I believe the interim CDFG regulations will prove inadequate to stop further deterioration of the stocks and urge the department to implement the following measures.

Immediately end the use of traps for catching fish.

Restrict commercial fishing to the use of rod-and-reel gear in waters less than 60 fathoms, and limit the number of fish caught per day per vessel. We are in agreement with, and support the United Anglers proposed limit of 20 fish per day per commercial fishing vessel.

Require all rockfish catches be landed at designated landing sites where DFG employees are present to monitor and sample the catch.
Documentation of the catch by CDFG would be provided. Charging commercial vessels would fund the program.

Require all merchants to document purchases and sales of rockfish so they could be tracked back to the fisherman.

Seasonal closures should be timed when the majority of species in an area are spawning, such as banning ling cod fishing in water less than 20 fathoms in December and January.

Begin recruitment and training of an enforcement staff large enough to make the regulations effective.

Dramatically increase penalties for any violation of Fish & Game regulations associated with groundfish; including poaching and possession of undocumented catch, to include seizure of assets.

Begin moving to a computer based licensing system such as in use by the State of Oregon. This would allow limiting the amount of days the recreational anglers could target rockfish through the use of stamps affixed to the license.

These emergency measures, if enacted and enforced, may allow us to save this valuable public resource while the while the long-term solutions and regulations required to create a sustainable fishery are established.

Sincerely,
Branden Leach
oceano

ARTICLE:
Tougher Interim Regulations Needed to Protect Rockfish Stocks

By: Richard Alves 2-12-01
Fishsniffer.com

"The West Coast groundfish fishery cannot ever reach sustainable levels, either biologically or economically, if it continues as is," wrote the Pacific Marine Conservation Council in their newsletter last summer. The PMCC is a non-profit group based in Astoria Oregon.

Government agencies, commercial fishermen and sport anglers agree the California groundfish fishery is in trouble. After years of inaction, and many species of rockfish being on the verge of collapse, the California Department of Fish and Game, at the insistence of the Pacific Fishery Management Council Commission have enacted interim regulations aimed at protecting the fishery while the long-term solutions are to be determined over the course of the year.

The caveat being, the regulations have been formulated without any accurate data regarding the fishery or the fishery harvest. I can't tell you how hard it has been to find any data on the fishery, and the information published by CDFG, http://www.dfg.ca.gov/mrd/mlma/reports/ (Only the Acrobat Files have the numbers), is unbelievable if given more than a cursory reading.

The problem with the Interim Regulations, http://www.fishsniffer.com/steelhead/020201rockfishregs.html, is they fail to address the most serious threats to the fishery, highly efficient commercial gear, blanket harvest (http://www.fishsniffer.com/steelhead/021201bgrockfish.html#fishtrap), and illegal catch, while at the same time create economic havoc for the sportfishing and coastal tourism industry.

Regulations enacted without effective enforcement and severe penalties will prove futile. Unfortunately the history of CDFG enforcement is not encouraging. They are simply understaffed for the challenges they are facing. Unless manpower is increased and the agency is better organized, whatever regulations are adopted, are doomed to failure.

For Example:

An interim rockfish species quota has been adopted by the California Fish And Game Commission, however, the CDFG has yet to establish verification methods or obtain the funding to pay for them.

Meanwhile, the commercial livefish boats are systematically cleaning out the nearshore fishery. "On Friday, October 27, 2000, five commercial livefish boats were working 50 traps in a kelp bed the size of a football field inside Noyo Cove. The traps were set five or ten yards apart," a Fish Sniffer Reader reported.

A 1996 NMFS study showed that most of the live fish sold in their sample of San Francisco fish markets and restaurants were sub legal and/or undocumented.

At this moment we are heading into another season where the documentation of the commercial catch will be spotty at best, while the unreported illegal catch goes completely undocumented. Current lack of enforcing reporting statutes for commercial passenger fishing vessels, party boats, also brings into question the validity of that source of data, http://www.fishsniffer.com/steelhead/021201bgrockfish.html#available.

But rest assured, the fishery will be hammered for another year while we attend endless hearings to develop another set of temporary regulations, which the State can't enforce. Unless California can find the courage and determination to make meaningful change stick, the future of the groundfish species in California is bleak.

Where do we go from here?

Immediately end the use of traps for catching fish.

Restrict commercial fishing to the use of rod-and-reel gear in waters less than 60 fathoms, and limit the number of fish caught per day per vessel. We are in agreement with, and support the United Anglers proposed limit of 20 fish per day per commercial fishing vessel.

Require all rockfish catches be landed at designated landing sites where DFG employees are present to monitor and sample the catch.
Documentation of the catch by CDFG would be provided. Charging commercial vessels would fund the program.

Require all merchants to document purchases and sales of rockfish so they could be tracked back to the fisherman.

Seasonal closures should be timed when the majority of species in an area are spawning, such as banning ling cod fishing in water less than 20 fathoms in December and January.

Begin recruitment and training of an enforcement staff large enough to make the regulations effective.

Dramatically increase penalties for any violation of Fish & Game regulations associated with groundfish; including poaching and possession of undocumented catch, to include seizure of assets.

Begin moving to a computer based licensing system such as in use by the State of Oregon. This would allow limiting the amount of days the recreational anglers could target rockfish through the use of stamps affixed to the license.

These emergency measures, if enacted and enforced, may allow us to save this valuable public resource while the while the long-term solutions and regulations required to create a sustainable fishery are established.

Exhibit E.3.d
Supplemental Public Comment 2
April 2003

-02-03 WED 16:14

FISHING VESSEL OWNERS' ASSOCIATION
INCOPORATED

ROOM 232, WEST WALL BUILDING • 4005 20TH AVE. W.
SEATTLE, WASHINGTON 98199-1290
PHONE (206) 284-4720 • FAX (206) 283-3341

SINCE 1914

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APR 2 2003
PFMC

April 2, 2003

Dr. Donald McIsaac
Executive Director
Pacific Fishery Management Council
7700 N.E. Ambassador Pl. #200
Portland, OR 97220-1384

RE: Regulatory Comment on Fathom Curves

Dear Dr. McIsaac:

The members of the Fishing Vessel Owners' Association request that you consider a change in three coordinates that make up the 100 fathom line off the coast of Washington.

We request a change in point number (3) to 48° 08.8/125° 39.3. Beginning in mid-July, the Sablefish come up over the grounds associated with this point. The grounds are the most productive grounds for the North Coast longline fleet and this small change will allow the fleet to better adjust for tidal consideration. The tide tends to come from the northwest. The current coordinates will make it very difficult to fish this area that is historically an important spot.

Additionally, we request a change at points 8 and 9 to 47° 57.6/125° 31.3 and 48° 00.2/125° 26.4 respectively for similar reasons as stated above.

Sincerely,

Eric Olsen by: cmb

Eric Olsen
President

EO:cmb

REVIEW OF THE PROCESS FOR SETTING 2004 GROUNDFISH SPECIFICATIONS

Situation: The Council began discussion of this year's process for setting 2004 groundfish annual specifications and management measures last year while deliberating how to transition into a multi-year management process. It was generally agreed that a three-meeting process where initial harvest specifications and management measure alternatives would be decided in June, final harvest specifications and a refinement of management measure alternatives would be decided in September, and final management measures adopted in November would be preferred over a two-meeting process that culminates in final decisions in September. However, in order to accommodate proper notice and comment rulemaking under a three-meeting process, 2003 specifications and management measures would need to be unchanged (rolled over) for the first four months of 2004; continuing status quo regulations for January through April 2004 would require no additional notice and comment beyond that achieved in 2003. In this case, new specifications and management measures would be implemented on May 1, 2004 under a National Environmental Policy Act (NEPA) decision-making process that includes a proper notice and comment period. The advantage to this strategy is a more thoughtful process for deciding 2004 management measures and the ability for Council and NMFS staff to focus on other initiatives this summer such as development of rebuilding plans.

The ability to roll over all existing 2003 specifications for the first four months of 2004 depends on the Council's comfort in the ability of those management measures to prevent early optimum yield (OY) attainment next year. Considerations for a Council decision on adopting a three- or two-meeting process include, (1) the implications of applying results from the NMFS West Coast Groundfish Observer Program, (2) the first assessment of the adequacy of 2003 management measures to prevent early OY attainment, and (3) the implications of new stock assessments in 2003. While the Council will not know the results of new stock assessments until June, there may be some indications from initial observer program results and fishery landings to date in 2003 that could be considered for this decision. In the event of a two-meeting process with significantly changed specifications for 2004, a separate environmental assessment will be required for another emergency rule for the period January through February 2004.

A final option for Council consideration is a three-meeting process with somewhat changed specifications that would require an emergency rule for the four-month period January through April 2004.

Related agendums that are relevant to a Council decision on the process for setting 2004 groundfish specifications are E.2, Report on the Bycatch Workshop and Observer Data Update, E.3, Status of Groundfish Fisheries and Consideration of Inseason Adjustments, and E.5, Groundfish Fishery Management Plan (FMP) Amendment 16 - Rebuilding Plans.

Council Action:

1. **Adopt a three-meeting process or a two-meeting process for development of 2004 groundfish specifications.**

Reference Materials: None.

Agenda Order:

a. Agendum Overview — John DeVore
b. Reports and Comments of Advisory Bodies
c. Public Comment
d. **Council Action:** Adopt a Three-Meeting Process or a Two-Meeting Process

PFMC
03/21/03

GROUNDFISH ADVISORY SUBPANEL STATEMENT ON REVIEW OF THE PROCESS FOR SETTING 2004 GROUNDFISH SPECIFICATIONS

The Groundfish Advisory Subpanel (GAP) discussed the options available to the Council for setting 2004 groundfish specifications.

While the GAP has generally preferred developing specifications in a three-meeting process, the GAP is aware of the funding and personnel limitations faced by NMFS. The GAP also recognizes that the November meeting will already involve development of groundfish specifications for the 2005/2006 period. The GAP, therefore, believes the Council has little choice other than to develop the 2004 specifications in a two-meeting process, using the June and September meetings and emergency rulemaking procedures to ensure the fishery begins on time in January 2004.

The GAP also notes, as it has in the past, that some of NMFS' burden could be alleviated if it was willing to utilize industry expertise when developing the final regulatory package. For example, there have been several corrections needed in the published boundary lines for the Rockfish Conservation Area. Had knowledgeable individuals in the industry been allowed to cross check the latitude/longitude points, some of those corrections could have been avoided.

PFMC
04/09/03

GROUNDFISH MANAGEMENT TEAM COMMENTS ON REVIEW OF THE PROCESS FOR SETTING 2004 GROUNDFISH SPECIFICATIONS

The Groundfish Management Team (GMT) reviewed the letter to the Council from NMFS Northwest Region regarding the basis for the decision on whether setting the 2004 annual specifications could be a two-, or three-meeting process. As described in the letter, implementing a three-meeting process would depend upon whether the "January through April 2003 management measures were adequate for re-use during January through April 2004 with few, if any changes."

Given the preview presented at this meeting on incorporating the information derived from the federal observer program, the GMT feels it is unlikely the management measures currently in place will work for the January through April 2004 fishery. Therefore, the GMT recommends a two-meeting process.

PFMC
04/08/03

Exhibit E.4.b
Supplemental NMFS Report
April 2003

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Sustainable Fisheries Division
7600 Sand Point Way N.E., Bldg. #1
Seattle, Washington 98115-0070

MAR 31 2003

1504-17-010

Dr. Hans Radtke, Chairman
Pacific Fishery Management Council
7700 NE Ambassador Place, Suite 200
Portland, OR 97220-1384

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Dear Dr. Radtke: Hans

At the April Council meeting, agendum E.4. has the Council considering either a 2-meeting or 3-meeting process for developing the 2004 specifications and management measures.

Last November, the Council considered a process to transition from the current practice of developing groundfish specifications and management measures annually to the biennial process set out in Amendment 17. At that time, the Council determined that a decision on whether the 2004 specifications and management measures would be developed through a 2-meeting or 3-meeting process would be made at the April 2003 Council meeting. The basis for the decision was to depend on a determination of whether the January-April 2003 management measures were adequate for re-use during January-April 2004 with few, if any, changes. If the January-April 2003 management measures were adequate to repromulgate for the January-April 2004 period, they would be promulgated through notice and comment rulemaking (proposed and final rule) in late 2003. This would allow the Council to use a 3-meeting process beginning in June and ending with the November Council meeting, followed by a second rulemaking for May-December 2004 following the November meeting. If the January-April 2003 management measures were not adequate to repromulgate for January-April 2004, then the 2004 specifications and management measures would be considered in a 2-meeting process similar to that used for 2003.

I believe that it would be most prudent for the Council to plan that by early summer, new bycatch rates for several overfished species derived from the first year of observer data will be available, and will likely indicate that the January-April 2003 management measures will not be adequate for the same period in 2004. In that case, I don't think that a 3-meeting process for the 2004 specifications and management measures is a possibility. As you know, the specifications and management measures have become increasingly complex in recent years, particularly last year. The agency is no longer able to draft and implement the annual specifications and management measures over the short, less than 2-month time period following a November meeting, particularly given our court-mandated public notice and comment obligation. Frankly, there is not even sufficient time to implement an emergency rule by January 1 because of the complexity of the regulatory package. Based on the 2003 experience, we need at least from the September Council meeting.

I understand and share everyone's view that developing the 2003 groundfish specifications and management measures through a 2-meeting process was extremely difficult and frustrating. The Council was dealing with new science that came into the process late and we had to develop significant new changes to the management measures by creating large conservation areas. These drastic changes also caused problems for the States. State management agencies were not able to finalize their desired management recommendations until near the end of the September 2003 meeting.

I hope that we can learn from last year's process, and with some pre-planning, make the 2-meeting process more reasonable. The following suggestions are for the Council's consideration and are intended to make a 2-meeting process go more smoothly:

1. Resist making major changes to the overall management framework for 2004 unless absolutely necessary. Revisions to current closed area boundaries should only be made to better protect overfished species, to provide more clarity of closed area boundaries for fishers and enforcers, or to allow vessels access to more healthy stocks in areas where incidental take of overfished species is unlikely to occur.

2. Proposed changes to the closed area boundaries and other management recommendations should be developed in as much detail as possible prior to the start of the September meeting, and preferably by the time of the Ad-Hoc Allocation Committee meeting. This would give the GMT a head start in evaluating the viability of different proposals.

Although there are no guarantees that we won't be blind-sided by new information, if the Council, States and Tribes emphasize early planning for the September Council meeting, we have a fair chance the 2-meeting process for 2004 will go more smoothly.

Sincerely,

Bill

William L. Robinson
Assistant Regional Administrator
For Sustainable Fisheries

GROUNDFISH FISHERY MANAGEMENT PLAN (FMP) AMENDMENT 16 - REBUILDING PLANS

Situation: There are nine overfished groundfish species on the west coast managed under Council interim rebuilding measures adopted at previous meetings as either rebuilding plans or rebuilding strategies for yet-to-be completed rebuilding plans. As a result of litigation, the Federal District Court for the Northern District of California ruled in August 2001 that rebuilding plans for all nine species are required to be formally adopted as either fishery management plan (FMP) amendments or regulatory amendments, not as the policy documents the Council had adopted. Additionally, the court ruled that the process of adopting the framework for rebuilding plans was inadequate under the National Environmental Policy Act (NEPA). This effectively means there are no approved rebuilding plans in place at this time.

The Council decided in November 2001 that a FMP amendment package should be prepared to framework the process and standards for incorporating rebuilding plans into the FMP or into regulations. Subsequently, a draft amendment package (FMP Amendment 16) was prepared with a Process and Standards for Rebuilding Plans section and elements of rebuilding plans for darkblotched rockfish, Pacific ocean perch (POP), lingcod, and cowcod. This document was considered by Council in June 2002, and a motion was passed restructuring the alternatives in the Process and Standards section. In November 2002 the Council chose preferred alternatives for all process and standards issues, except a part of Issue 1: the form and required elements of rebuilding plans. Although the Council recommended adopting rebuilding plan elements as regulations, the Council did not decide which elements should be so adopted. The Council also provided guidance on alternatives that should be analyzed in the individual species' rebuilding plans as well as other analytical elements.

Since the June 2002 meeting, a new organization for the Amendment 16 rebuilding plan package has been developed and a slightly different process is proposed for incorporating rebuilding plan elements in regulations. The first component, the Process and Standards for Rebuilding Plans, would now be analyzed in an Environmental Assessment and be labeled as number 16-1 of the amendment package (Attachment 2). Four individual species' rebuilding plans would be included in a second component, analyzed in a single draft EIS as Amendment 16-2. The remaining rebuilding plans would be incorporated in one or more subsequent EIS documents, all of which would be part of an Amendment 16 package. The numbering and organizational approach for Amendment 16 drafts would then be:

- Amendment 16-1: Process and Standards for Rebuilding Plans
- Amendment 16-2, Part I: Introduction to Species Specific Groundfish Rebuilding Plans (not available at this time)
- Amendment 16-2, Part II: Darkblotched Rockfish Rebuilding Plan
- Amendment 16-2, Part III: Pacific Ocean Perch Rebuilding Plan
- Amendment 16-2, Part IV: Canary Rockfish Rebuilding Plan
- Amendment 16-2, Part V: Lingcod Rebuilding Plan
- Amendment 16-2, Part VI: Environmental Overview (not available at this time)
- Amendment 16-2, Part VII: Combined and Cumulative Effects (not available at this time)
- Amendment 16-3: Rebuilding Plans for Cowcod, Yelloweye Rockfish, and Widow Rockfish (tentatively scheduled for first consideration at the November 2003 Council meeting)
- Amendment 16-4: Rebuilding Plans for Boccoacio Rockfish and Pacific Whiting (tentatively scheduled for first consideration at the November 2003 Council meeting or later)

The anticipated schedule for Council activity on Amendment components 16-1 and 16-2 is a two-meeting process, with approval of public review drafts at the April Council meeting, public review between the April and June Council meetings, and final Council action at the June Council meeting. A more detailed workplan timeline for completing rebuilding plans is contained within a groundfish workplanning matrix shown in Attachment 1.

The Council should consider the organization of the Amendment 16 package, the proposed timeline for completing rebuilding plans, and choose a preferred alternative for Issue 1 in the Process and Standards for Rebuilding Plans EA.

Draft rebuilding plans for darkblotched rockfish, POP, lingcod, and canary rockfish are presented to the Council in Attachments 3-6 in this exhibit and are labeled Parts II-V of the Amendment 16-2 package. These draft rebuilding plans are not currently ready for formal public review since they have incomplete or missing elements (e.g., minimal or missing socioeconomic analyses). However, the Council is asked to consider whether the rebuilding plan analyses and other content are appropriate and provide guidance on elements that should be included in the public review draft of this amendment package. It is recommended that the darkblotched rockfish rebuilding plan (Attachment 3) be used as a template in these discussions.

Council staff has prepared two PowerPoint presentations to use at the Council meeting to navigate consideration of the Amendment 16 package and to bring a focus on the elements where the Council should provide guidance.

Council Action:

1. Adopt Amendment 16 Elements for Public Review.

Reference Materials:

1. Proposed Timeline for Completing Groundfish and Annual Specifications NEPA documents and Rebuilding Plans (Exhibit E.5, Attachment 1).
2. Draft Amendment 16-1 to the Pacific Coast Groundfish Fishery Management Plan; Process and Standards for Rebuilding Plans; Including Environmental Assessment and Regulatory Analyses (Exhibit E.5, Attachment 2).
3. Draft Amendment 16-2, Part II to the Pacific Coast Groundfish Fishery Management Plan; Draft Darkblotched Rockfish Rebuilding Plan (Exhibit E.5, Attachment 3).
4. Draft Amendment 16-2, Part III to the Pacific Coast Groundfish Fishery Management Plan; Draft Pacific Ocean Perch Rebuilding Plan (Exhibit E.5, Attachment 4).
5. Draft Amendment 16-2, Part IV to the Pacific Coast Groundfish Fishery Management Plan; Draft Canary Rockfish Rebuilding Plan (Exhibit E.5, Attachment 5).
6. Draft Amendment 16-2, Part V to the Pacific Coast Groundfish Fishery Management Plan; Draft Lingcod Rebuilding Plan (Exhibit E.5, Attachment 6).

Agenda Order:

a. Process and Standards — Kit Dahl
b. Rebuilding Plans — John DeVore
   i. Darkblotched Rockfish
   ii. Pacific Ocean Perch
   iii. Lingcod
   iv. Canary Rockfish
c. Reports and Comments of Advisory Bodies
d. Public Comment
e. **Council Action:** Adopt Amendment 16 Elements for Public Review

PFMC
03/25/03

Work Planning Time Line[1/] for Groundfish Annual Specifications and Rebuilding Plans (as of February 2003)

Product	Jan 2003	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2004 spex if there is a 4 mo. rollover of 03 spex 2/			STAR		GMT (5/5-9)	Council action- prelim. spex (6/17-20); Roll over decision	GMT (7/21-25)	DEIS (8/20)	Council action- final OYs, refine prelim mgt. spex (9/9-12)	DEIS (10/14)	Final Council action (11/4-7)	
2004 spex if there is no 4 mo. rollover of 03 spex			STAR		GMT (5/5-9)	Council action- prelim. spex (6/17-20)	GMT (7/21-25)	DEIS (8/20)	Final Council action (9/9-12)	DEIS to NMFS HQ (10/14); EPA (10/17); NOA in FR (10/24)	ER EA to NMFS HQ (11/21) 3/	Pub. com-ments due (12/8)
2005-06 spex									STAR (week of 9/15)	GMT (10/14-17)	Council action- prelim. spex (11/4-7)	
Amendment 16-1: P&S EA	Draft (1/31)	GMT (2/3-7)	Council Meeting Briefing Book (3/19)	Prelim. Council action (4/8-11)	Pub. Rev. (5/5); Final draft in Council Meeting Briefing Book (5/28)	Final Council action (6/17-20)	NMFS HQ (7/14)					
Amendment 16-2: EIS#1 DB, POP, lingcod, & canary RPs	Draft (DB) (1/31)	GMT (2/3-7)	Initial DEIS wo/ cum. effects anal. (3/19) 4/	Scoping; Prelim. Council action (4/8-11)	Pub. Rev. (5/5); DEIS w/ cum. effects (5/28)	Final Council action (6/17-20)			DEIS to NMFS HQ (9/8); EPA (9/12); NOA in FR (9/19)		Pub. com-ments due (11/3)	FEIS to NMFS HQ (12/5); EPA (12/12); NOA in FR (12/19)
Amendment 16-3: EIS#2 cowcod, YE, widow RPs										DEIS (10/15) 4/	Scoping; Prelim. Council action (11/4-7)	
Amendment 16-4: EIS#3 boc, whiting RPs										The intent will be to follow the EIS#2 schedule if possible. Otherwise, these RPs will follow an April-June, 2004 Council meeting schedule.		

1/ This schedule is contingent on: a) Council budget and staffing levels at full 2002 operational capabilities, and b) no litigation or fishery management emergencies that demand substantial Council staff workload.

2/ Roll over of 2003 spex for the first four months of 2004 assumes no NEPA analysis requirements.

3/ No proposed and final rule notice and comment period on Interim Regulations or Emergency Regulations for Jan-Feb 2004 (as in last two years).

4/ Initial draft of alternatives and analyses.

Work Planning Time Line[1/] for Groundfish Annual Specifications and Rebuilding Plans (as of February 2003)

Product	2004											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2004 spex if there is a 4 mo. rollover of 03 spex 2/	DEIS to NMFS HQ (1/5); EPA (1/9); NOA in FR (1/16)		Pub. com-ments due (3/2); FEIS to NMFS HQ (3/15); EPA (3/19); NOA in FR (3/26)	ROD (4/26)								
2004 spex if there is no 4 mo. rollover of 03 spex	FEIS to NMFS HQ (1/12); EPA (1/16); NOA in FR (1/23)	ROD (2/27)										
2005-06 spex		GMT	DEIS (Apr Briefing Book dead-line)	Council action- final OYs, refine prelim mgt. spex (Apr Council Meeting)	DEIS (Jun Briefing Book dead-line)	Final Council action (Jun Council Meeting)		DEIS to NMFS HQ (8/9); EPA (8/13); NOA in FR (8/20)		Pub. com-ments due (10/4); FEIS to NMFS HQ (10/18); EPA (10/22); NOA in FR (10/29)	ROD (11/29)	
Amendment 16-2: EIS#1 DB, POP, lingcod, & canary RPs	ROD (1/23)											
Amendment 16-3: EIS#2 cowcod, YE, widow RPs			DEIS (April Briefing Book deadline) 4/	Final Council action		DEIS to NMFS HQ (6/14); EPA (6/18); NOA in FR (6/25)		Pub. com-ments due (8/9); FEIS to NMFS HQ (8/23); EPA (8/27)	NOA in FR (9/3)	ROD (10/4)		
Amendment 16-4: EIS#3 boc, whiting RPs	The intent will be to follow the EIS#2 schedule if possible. Otherwise, these RPs will follow an April-June, 2004 Council meeting schedule.											

1/ This schedule is contingent on: a) Council budget and staffing levels at full 2002 operational capabilities, and b) no litigation or fishery management emergencies that demand substantial Council staff workload.

2/ Roll over of 2003 spex for the first four months of 2004 assumes no NEPA analysis requirements.

3/ No proposed and final rule notice and comment period on Interim Regulations or Emergency Regulations for Jan-Feb 2004 (as in last two years).

4/ Initial draft of alternatives and analyses.

Exhibit E.5
Attachment 2
April 2003

DRAFT
AMENDMENT 16-1

TO THE PACIFIC COAST GROUNDFISH FISHERY MANAGEMENT PLAN

PROCESS AND STANDARDS FOR REBUILDING PLANS

INCLUDING ENVIRONMENTAL ASSESSMENT AND REGULATORY ANALYSES

Prepared by the Pacific Fishery Management Council

Pacific Fishery Management Council
7700 NE Ambassador Place, Suite 200
Portland, Oregon 97220-1384
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APRIL 2003

This document prepared by the Pacific Fishery Management Council pursuant to National Oceanic and Atmospheric Administration Award Number NA03NMF4410067.

SUMMARY

TABLE OF CONTENTS

ABBREVIATIONS AND ACRONYMS

ABC	Allowable Biological Catch
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CMC	Center for Marine Conservation
CPS	Coastal Pelagic Species
DTS	Dover sole-Thornyhead-Sablefish
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EO	Executive Order
ESA	Endangered Species Act
FMP	Fishery Management Plan
FWS	U.S. Fish and Wildlife Service
GMT	Groundfish Management Team
IPHC	International Pacific Halibut Commission
kg	kilogram
m	meter
MBTA	Migratory Bird Treaty Act
MMPA	Marine Mammal Protection Act
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MSST	Minimum Stock Size Threshold
MSY	Maximum Sustainable Yield
mt	metric ton
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service, NOAA Fisheries
NOAA	National Oceanographic and Atmospheric Administration
NOAA Fisheries	National Marine Fisheries Service
NRDC	Natural Resources Defense Council
OY	Optimum Yield
RFA	Regulatory Flexibility Act (or Analysis)
RIR	Regulatory Impact Review

SFA	Sustainable Fisheries Act
SSC	Scientific and Statistical Committee
STAR	Stock Assessment Review Panel
STAT	Stock Assessment Team
WOC	Washington-Oregon-California

1.0 Introduction

1.1 How This Amendment is Organized

This document provides background information about and analysis of changes to the Pacific Coast Groundfish Fishery Management Plan incorporated as Amendment 16-1. The actual changes, or amended parts of the plan, appear in appendix A. Appendix B contains the Finding of No Significant Impact (FONSI).

This document is one of a series of amendments numbered Amendments 16-1, 16-2 and 16-3. This amendment establishes a framework for the adoption of rebuilding plans for overfished species. Amendment 16-2 will adopt four rebuilding plans: darkblotched rockfish, Pacific ocean perch, lingcod and canary rockfish. Amendment 16-3 will adopt rebuilding plans for the remaining five overfished species. (If additional species are declared overfished, amendments to adopt rebuilding plans for them will continue this numbering system.)

Fishery management plans (FMPs), and any amendments to them, must conform to the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act, or MSA), the principal legislation governing fishery management within the Exclusive Economic Zone (EEZ), which extends from the outer boundary of the territorial sea to a distance of 200 miles from shore. In addition to addressing Magnuson-Stevens Act mandates, this document is an environmental assessment (EA), pursuant to the National Environmental Policy Act (NEPA). An EA evaluates the proposed action to determine if there are significant environmental impacts, in which case an environmental impact statement (EIS) must be prepared. The document also contains information and analyses relevant to the Regulatory Flexibility Act (RFA) and Executive Order 12866 (Regulatory Impact Review or RIR). These mandates require agencies to evaluate the economic impact of regulatory actions, especially on small entities.

The rest of this chapter discusses the reasons for changing the FMP. 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. One of these alternatives has been chosen by the Pacific Fishery Management Council (hereafter, the Council) as a plan amendment to be recommended to NOAA Fisheries. Chapter 3 describes the affected environment. This information provides the basis for the analysis contained in Chapter 4, which assesses the potential environmental and socioeconomic impacts of the alternatives outlined in Chapter 2. Chapter 5 details how this amendment meets 10 National Standards set forth in the Magnuson-Stevens Act (§301(a)) and Groundfish FMP goals and objectives. Chapter 6 provides information on those laws and Executive Orders, in addition to the Magnuson-Stevens Act and NEPA, that an amendment must be consistent with, and how this amendment has satisfied those mandates.

1.2 Purpose and Need

1.2.1 Need (Problems for Resolution)

As of February 2002 the Secretary of Commerce had declared nine groundfish stocks overfished. These are: bocaccio (*Sebastes paucispinis*), canary rockfish (*S. pinneger*), cowcod (*S. levis*), darkblotched rockfish (*S. crameri*), lingcod (*Ophiodon elongatus*), pacific ocean perch (*S. alutus*), widow rockfish (*S. entomelas*), yelloweye rockfish (*S. ruberrimus*) and Pacific whiting (*Merluccius productus*). These declarations, stemming from Magnuson-Stevens Act requirements, are based on overfishing criteria adopted by the Council under Amendment 11 to the Pacific Coast Groundfish FMP. The Magnuson-Stevens Act (§304(e)(3)) also requires councils to "prepare a fishery management plan, plan amendment, or proposed regulations" in order to prevent overfishing and implement a plan to rebuild the overfished stocks. The Council developed Amendment 12 to specify an effective process for implementing rebuilding plans. This amendment was approved by the Council in April 2000 and approved by NOAA Fisheries on December 7, 2000. However, in Federal Court the Natural Resources Defense Council, an environmental organization, challenged the legality of the provisions in Amendment 12 related to rebuilding plans,[1/] based on the Magnuson-Stevens Act and the National

1/ The amendment also removed FMP provisions that allowed foreign fishing on groundfish stocks. This part of the amendment was not challenged and these changes to the FMP stand.

Environmental Policy Act (NEPA). The judge found that the rebuilding plans created in accordance with Amendment 12 did not comply with the Magnuson-Stevens Act because the plans did not take the form of an FMP, FMP amendment or regulation. Therefore, the Council must specify rebuilding plans as an FMP or regulatory amendment. (Development of new FMP covering overfished groundfish species is not considered.)

Rebuilding plans are mandated when the size of a stock or stock complex falls below a level described in the FMP (the Minimum Stock Size Threshold or MSST). Diminished stock size may be caused or exacerbated by fishing. Regardless of the cause of the decline, fishing mortality needs to be controlled to prevent further deterioration in the condition of the stock, and if the stock has been overfished, to allow it to rebuild.[2/] Amendment 11 to the groundfish FMP established the "status determination criteria" (including MSST) that are used to determine whether overfishing is occurring and whether a stock has reached an overfished state. Rebuilding plans specify how an overfished stock will be rebuilt.

The proposed action is needed because National Standard 1 in the Magnuson-Stevens Act requires conservation and management measures that prevent overfishing. Preventing overfishing also means returning stocks to a size capable of achieving maximum sustainable yield. In order to satisfy this mandate rebuilding plans must be adopted for stocks that have been declared overfished by the Secretary of Commerce. First, a framework describing how rebuilding plans will be adopted and the contents of the plan that will be incorporated into the FMP or regulations must be established. This framework is needed to guide the development and adoption of subsequent rebuilding plans.

1.2.2 Purpose of the Proposed Action

The purpose of this amendment is to establish the process and standards by which the Council will specify rebuilding plans for groundfish stocks declared overfished by the Secretary of Commerce. Both the procedural provisions and the standards established for rebuilding plans must meet the requirements of the Magnuson-Stevens Act (and, in particular, National Standard 1 and §304(e), covering overfishing) and should be consistent with FMP goals and objectives.

1.3 Background

1.3.1 Requirements for Rebuilding Plans

National standard guidelines specify how rebuilding should occur and, in particular, establish constraints on council action (50 CFR660.310(e)). Rebuilding should bring stocks back to a population size that can support MSY (B_{MSY}). A rebuilding plan must specify a target year (T_{TARGET}) based on the time required for the stock to reach B_{MSY}. This target is bounded by a lower limit (T_{MIN}) defined as the time needed for rebuilding in the absence of fishing (i.e., F = 0). Rebuilding plans for stocks with a T_{MIN} less than 10 years must have a target less than or equal to 10 years. If, as is the case with most of the groundfish stocks considered in this amendment, the biology of a particular species dictates a T_{MIN} of 10 years or greater, then the maximum allowable rebuilding time, T_{MAX}, is the rebuilding time in the absence of fishing (T_{MIN}) plus "one mean generation time." Mean generation time is a measure of the time required for a female to produce a reproductively-active female offspring (Pielou 1977; and especially Restrepo *et al.* 1998) calculated as the mean age of the net maternity function (product of survivorship and fecundity at age). Managers should strive to rebuild stocks in the shortest feasible time. However, in most cases, the target year will be greater than the minimum rebuilding time (T_{MIN}) in order to mitigate impacts to fishing communities.

Because of the uncertainty surrounding stock assessments and future population trends (due, for example, to variable recruitment), these limits and the target need to be expressed probabilistically. At the outset of the rebuilding period T_{TARGET} should be set so that there is at least a 50% probability of achieving it within the

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2/ But when environmental changes affect the long-term productive capacity of the stock, one or more components of the status determination criteria may be respecified and the need for a reduction in fishing mortality reevaluated (50 CFR Section 600.310).

specified time period.[3/] (The nature of probabilities associated with T_{MIN}, T_{TARGET} and T_{MAX} are discussed in section 3.3.2.2.)

National standard guidelines identify a "mixed-stock complex" exception to the definition of overfishing (50 CFR 660.310(d)(6)), which is applicable to some overfished groundfish species. Different fish assemblages—some with healthy stocks and some with overfished stocks—can co-occur in a mixed-stock complex, and thus both can be caught simultaneously. An optimum yield (OY) harvest for the healthy stock can result in overfishing the depleted stock. The guidelines allow councils to authorize this type of overfishing if three conditions are met. First, an FMP (or plan amendment) must assess the overall benefits of such a policy in comparison to other measures, such as reducing the OY for the healthy stock (50 CFR 660.315(f)(6)). Second, councils must consider mitigating measures that reduce overfishing by, for example, modifying fishing strategy or gear configuration. The benefits of mitigation must be compared to those determined in the preceding assessment; the measures would only be implemented if they will result in greater benefits. Finally, permitted overfishing cannot result in eventual listing of the species (or evolutionarily significant unit thereof) under the Endangered Species Act. This mixed-stock exception may be considered in formulating rebuilding plans and could allow some modification in the recovery trajectory of overfished stocks.

1.3.2 Summary of the Current Management Regime

Draft rebuilding plans and rebuilding analyses have been used since 2000 to guide the Council in deciding management measures for overfished groundfish stocks. Provisions in Amendments 11 and 12 of the FMP established a framework for their development and implementation, in a way thought to be consistent with the Sustainable Fishing Act (or SFA, which re-authorized the Magnuson-Stevens Act and added new provisions). As specified in these draft rebuilding plans, rebuilding management measures would be adopted through the Council's annual process of setting harvest specifications for the groundfish fishery. In addition to the draft rebuilding plans, rebuilding analyses (which are written by the stock assessment authors) and the EA or EIS for each year's harvest specifications (used in the Council/NOAA Fisheries decision making process) take into account the scientific and legal constraints on harvests imposed by the need to rebuild overfished groundfish fisheries. Although the Council has respected these constraints in its decisions to date, NOAA Fisheries has the authority to reject these decisions because in the regulatory context they only represent recommendations to the Secretary of Commerce.

The Council has typically chosen a risk-averse strategy when deciding on harvest levels for overfished stocks, based on recommendations contained in rebuilding analyses and given by the Council's advisory bodies. Total mortality has been controlled by reducing trip and landing limits for co-occurring species in select target fisheries, gear restrictions (i.e., the small footrope specification for landing shelf rockfish), seasonal closures (i.e., the recreational groundfish fishery seasons adopted in California), and area closures (e.g.., the Rockfish Conservation Area).

The actual discard rate (or bycatch) of fish species that are overfished, which may differ among the various groundfish fishery sectors, is a critical uncertainty that must be addressed if effective measures to control total mortality and thus achieve rebuilding objectives are to be adopted. Limited data have been available to base these estimates. Therefore, bycatch and discard rate assumptions have been contentious and the focus of some recent legal challenges. However, NOAA Fisheries implemented an observer program in August 2001, which allows direct observation of commercial bycatch and discard. Data from this program will promote more informed management decisions and effectively control total mortality of overfished groundfish stocks.

1.3.3 Summary of Litigation over Amendment 12

In January 2000 the Natural Resources Defense Council along with other conservation organizations challenged the adequacy of Amendment 12 (*Natural Resources Defense Council v. Evans*) in Federal District

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3/ The use of a low bound 50% probability is not specified in regulations; it is the result of litigation (*Natural Resources Defense Council v. Daley, April 25, 2000, U.S. Court of Appeals for the District of Columbia Circuit*).

Court. They claimed that rebuilding plans submitted pursuant to Amendment 12 were inadequate for two reasons. First, they did not take the form of fishery management plans, plan amendments, or regulations as required by the Magnuson-Stevens Act. Second, rebuilding plans could allow overfishing under the "mixed-stock exception." The NRDC argued that the overfishing provisions in the SFA demonstrate Congress's intent to eliminate this exception so rebuilding plans should not entertain this exception. The Plaintiffs also argued that the EA accompanying Amendment 12 failed to consider a reasonable range of alternatives as required by NEPA. The Court found for the Plaintiffs on the claim that rebuilding measures must conform to the Magnuson-Stevens Act-mandated format of a plan, amendment, or regulation and the NEPA-related claim of an inadequate range of alternatives. The Court decided that the second Magnuson-Stevens Act-related claim, on the validity of the mixed-stock exception, was not ripe for judicial review because the exception had not yet been applied to Pacific groundfish management. In response to its findings, the Court ordered NOAA Fisheries to revise Amendment 12 so that the rebuilding plan implementation process accords with Magnuson-Stevens Act and NEPA requirements.

1.3.4 Development of Rebuilding Plan Adoption Strategy

Because of the litigation described above, in late 2001 work began on developing a compliant amendment for the rebuilding plan adoption process. The Council and NOAA Fisheries published a Notice of Intent (NOI) to prepare and EIS on April 16, 2002 (67 FR 18576). According to this Notice, the EIS would evaluate two sets of alternatives: one set addressing the framework for rebuilding plan adoption (or the "process and standards") and a second set evaluating different rebuilding strategies that could be adopted as a rebuilding plan. (These strategies are described in terms of targets and limits, such as T_{TARGET}, T_{MIN} and T_{MAX}, harvest control rules satisfying a given target, and potential management measures to constrain fishing mortality to levels determined by the harvest control rule.) Based on internal scoping, Council staff decided in late 2002 that the process and standards alternatives should be analyzed in a separate environmental document. Staff determined that the process and standards proposed action is not likely to have significant environmental impacts and therefore may be analyzed in an EA. This approach allows these alternatives to be evaluated, and the FMP amended on a more accelerated track. In addition to simplifying the adoption of the rebuilding plan framework, preparation of the subsequent amendments that actually adopt the rebuilding plans can be safely prepared in a manner that conforms to the already-adopted framework. Because of this change of strategy, NOAA Fisheries and the Council published a second NOI on March XX 2003 (68 FR XXXX) and identified an additional public scoping opportunity. As described above in section 1.1, at least two related amendments will be prepared subsequent to this EA, adopting the rebuilding plans themselves.

1.4 Scoping Summary

The Council process offers many opportunities to determine the scope of issues and effects relevant to an EIS. The scope includes the extent of the action, the range of alternatives considered and the types of impacts that are analyzed (40 CFR 1508.25). This work is carried out by NOAA Fisheries and Council staff, advisory bodies and at Council meetings, which are open to the public.

1.4.1 Scoping during the Council Process

Scoping began in early 1999 with the approval of Amendment 11 to the Groundfish FMP. This amendment established a new definition for what constituted an overfished stock and three groundfish stocks (lingcod, bocaccio rockfish and Pacific ocean perch) qualified under this definition. This meant that the Council had to begin developing rebuilding plans for these species. As an indication of the extent of scoping, discussion of rebuilding at Council meetings is summarized here.

April 1999. It was noted that the Magnuson-Stevens Act required preparation of rebuilding plans within one year of an overfishing declaration, meaning that management measures would have to be in place before the March 2000 Council meeting. However, annual management measures (which determine harvest levels) are established during the fall Council meetings in the preceding year, meaning that analysis would have to be completed for the 1999 September and November meetings. It was recognized that allocation and bycatch were important rebuilding-related issues. The Council's Ad-Hoc Allocation Committee presented allocation options for lingcod and bocaccio under rebuilding scenarios. Since allowable harvest for these species was already low, allocation decisions were related to the effect of incidental catches on harvest opportunities for other species that are not overfished. Advisory bodies to the Council provided comments, mostly related to procedural issues. Among other things, the Council discussed how changes could be made to the rebuilding plan in the event that a stock recovered more quickly than anticipated.

June 1999. The Council considered procedures for rebuilding plan adoption. Staff recommended that adoption have three components: an FMP amendment that specifies the time period and anticipated allocation issues, a "source document" containing technical analyses, and an environmental assessment analyzing alternative rebuilding strategies. These procedures would apply to each overfished species, although the FMP could contain "generic" rebuilding goals and objectives. Preliminary analyses for lingcod, bocaccio and Pacific ocean perch were presented. Written comments from a fishermen's association and an environmental group focused on the appropriate amount of catch reduction, the problem of accounting for and reducing bycatch of overfished species, and allocation among fishery sectors. Scientific and industry advisory bodies commented on the draft rebuilding plans. Aside from technical comments, these groups recognized the high degree of uncertainty associated with predicting stock rebuilding because of limits on fishery and habitat information. The Council recognized the importance of public participation in formulating rebuilding plans. A representative of the Natural Resources Defense Council spoke during public comment.

September 1999. The Council reviewed the draft plan amendment (Amendment 12) for rebuilding overfished species. The draft amendment described how rebuilding plans would be developed and reviewed but would not include rebuilding measures. These would implemented through the annual management process that sets catch limits for groundfish fisheries. Rebuilding analyses showed that even at high levels of risk (low probability of stock recovery) annual catch levels would have to be substantially reduced. The draft amendment document contained two action alternatives: amending the FMP to adopt each rebuilding plan or creating a framework in the FMP that describes the process for developing and implementing rebuilding plans, but without incorporating the rebuilding plans into the FMP through the amendment process. Rebuilding analyses for overfished species were presented and reviewed. The Council moved to put the draft amendment out for public review, but recommended that the alternative requiring all rebuilding plans be plan amendments be dropped since this would be too burdensome a process. Public hearings were slated for the next Council meeting. Written comments from the Pacific Marine Conservation Council recommended balancing measures to prevent overfishing against impacts to fishing communities, adopting risk averse rebuilding targets, allocating cuts fairly, and using best available science. The California Department of Fish and Game submitted proposals for the management and allocation of depleted species, including the southern bocaccio stock. As part of this process it held two public scoping meetings. The Council also had to consider 2000 management measures that accounted for overfished species. This involved management strategies that would allow harvest of healthy stocks while minimizing impacts to those that were overfished. Public comments were received from six individuals representing environmental groups (Pacific Marine Conservation Council, Pacific Ocean Conservation Network, Natural Resources Defense Council), fishing interests and the Oregon Coastal Zone Management Association.

November 1999. The Council reviewed a revised draft of the amendment EA containing two alternatives, no action and implementation of a framework amendment, but decided to defer adoption until its April 2000 meeting. Rebuilding measures for bocaccio, lingcod and Pacific ocean perch were adopted, however. The Environmental Defense Fund submitted written comments recommending that closed areas be considered for managing overfished stocks. The Habitat Steering Group, a Council advisory body, recommended that habitat information be included in the rebuilding plans and that plans should incorporate management tools based on the habitat requirements of overfished stocks. The Groundfish Advisory Subpanel (GAP) urged the adoption of better data collection and fishery monitoring. It also supported a "phase-in" rebuilding strategy for bocaccio with two dissents advocating lower initial harvest levels. Public comment was heard from nine individuals, including four representing conservation groups (Center for Marine Conservation, Pacific Marine Conservation Council, Natural Resources Defense Council, Environmental Defense Fund); the remainder were fishermen or representatives of fishing organizations.

April 2000. The Council did not take up rebuilding plan measures at its March meeting. The Council approved Amendment 12 (Option 2), which as described above established a process for adopting rebuilding measures as part of the annual management process. The amendment also declares groundfish to be fully utilized, meaning that foreign entities may not harvest or process these resources. The Council moved for modifications to the amendment with respect to the allocation of overfished stocks among fishery sectors. In January 2000 NOAA Fisheries declared two additional groundfish species overfished (cowcod and canary rockfish). Rebuilding plans for these two species would have to be developed and submitted to NOAA Fisheries by the end of 2000. The Council adopted a process for developing rebuilding plans for these species that would allow implementation through 2001 management measures. Public comment was taken from a representative of the Coos Bay Trawler's Association and a commercial fisherman.

June 2000. The Council was advised that the three submitted plans and two draft plans (for cowcod and canary rockfish) would have a substantial impact in terms of reductions in the allowable catch. They were asked to consider whether to incorporate review of rebuilding analyses into the current stock assessment review process or develop an alternative review process. It was noted that the Magnuson-Stevens Act requires Secretarial review at least every two years. NOAA Fisheries outlined a recommended process for technical review and monitoring of rebuilding plans. Advisory bodies made several recommendations for modification of the process and review schedule. The Council also discussed the two draft plans and recommended that the Ad-Hoc Allocation Subcommittee take up consideration of how to deal with the impact of very low allowable catches necessitated by the increased number of overfished species. Incidental catch in fisheries not managed by the Council would be an important consideration. Three individuals gave public testimony, two from environmental groups (Pacific Marine Conservation Council, Center for Marine Conservation) and one from the fishing industry (Oregon Trawl Commission).

September 2000. The Council considered rebuilding schedules and harvest levels for cowcod and canary rockfish. Staff noted that although only the cowcod stock in the Conception management area (Southern California) had been considered in the overfishing assessment, the Monterey portion (Central California) was almost certainly also overfished. The extremely low abundance and productivity of this stock restricts rebuilding options, but the limited distribution of the stock would confine impacts to a discrete geographic area. The California Department of Fish and Game proposed closing two areas in Southern California waters to bottom fishing to reduce cowcod fishing mortality. Canary rockfish are much more widely distributed and management measures would affect several fisheries, including pink shrimp and recreational fisheries. Choosing a rebuilding strategy was made difficult due to uncertainty about the maximum age and survival of female fish. Surveys show few older female fish, but this could be because they avoid capture. If they are indeed scarce (assuming the are not avoiding capture) allowable catches would have to be reduced more and rebuilding would take longer. The Ad-Hoc Allocation Committee met in advance of the September meeting to develop recommendations related to overfished species, which were presented at this Council meeting. Four individuals made public comments, two from environmental groups (Natural Resources Defense Council, Center for Marine Conservation) one from a recreational fishing group (United Anglers of California) and a private citizen.

November 2000. The Council adopted rebuilding plans for canary rockfish and cowcod. Written comment was received from the Natural Resources Defense Council (NRDC), the Center for Marine Conservation (CMC) and two commercial fishermen. The NRDC letter raised a range of concerns, arguing that Amendment 12 and subsequent rebuilding plans did not adequately comply with the Magnuson-Stevens Act and NEPA. These issues also appear in the lawsuit brought against NOAA Fisheries over Amendment 12 by NRDC in early 2000. The CMC letter argued that there was insufficient data on total fishing mortality and that the rebuilding plans did not specify management measures, as required by the Magnuson-Stevens Act. The commercial fishermen argued that scientific assessments of cowcod were inaccurate and suggested various measures, including artificial propagation and the use of decommissioned structures to enhance habitat, to restore stocks. Designation of large closed areas was also suggested. Advisory bodies also commented on the rebuilding plans. Issues of concern included appropriate harvest levels to balance rebuilding against short-term economic losses, enforceability of management measures, allocation (especially between commercial and recreational sectors), and difficulties with monitoring, especially the recreational sector. Twenty-two people gave public comment; two represented conservation organizations (Center for Marine Conservation, Pacific Marine Conservation Council), the remainder were fishers or representatives of fishing organization.

NOAA Fisheries announced the final rule approving Amendment 12 in the Federal Register on December, 29 2000 (65 FR 82947). In approving Amendment 12 NOAA Fisheries revoked prior approval of the lingcod, bocaccio and Pacific ocean perch rebuilding plans because "they do not meet all of the rebuilding requirements described in Amendment 12, and [protection measures] are not adequately explained and analyzed." Groundfish fisheries would continue to operate under the terms of these rebuilding plans however. The Federal Register notice also contains responses to comments received from two parties. The main concern expressed in these comments was that Amendment 12 does not require rebuilding plans to be plan amendments or regulations, and that the plans do not meet all of the requirements of the Magnuson-Stevens Act.

April 2001. Widow rockfish and darkblotched rockfish were declared overfished as a result of assessments completed before this meeting, bringing the total number of overfished species to seven. At this meeting the Council reviewed the form and content of rebuilding plans (or terms of reference for rebuilding plan authors), and procedures for preparation and adoption of plans in 2001. The schedule would allow 2002 management measures, which would be adopted at the November 2001 meeting, to incorporate rebuilding plan targets. Adoption of the canary rockfish cowcod rebuilding plans, revised in light of the issues that caused NOAA Fisheries to revoke approval of the three already-adopted plans, was considered but deferred until the next meeting. The canary rockfish plan was seen as model for all other rebuilding plans and the Council wanted more time to review the plan and more opportunity for public comment. The Habitat Steering Group, among other things, recommended that rebuilding plans identify habitat and habitat impacts, and discuss the feasibility of creating marine reserves to manage the overfished species in question. Council members discussed and generally supported the recommendations without moving to make them a requirement of rebuilding plans. Public comment was heard from representatives of the CMC and the Pacific Marine Conservation Council.

June 2001. The Council again reviewed the seven rebuilding plans in various stages of preparation. Three (cowcod, bocaccio, and canary rockfish) were slated for adoption but the Council deferred and directed staff to further expand various elements in these plans, including bycatch accounting and habitat designation. New analyses were requested for Pacific ocean perch and lingcod, incorporating a new stock assessment for lingcod and using the standardized analytical procedures (terms of reference) approved at the last meeting. Rebuilding alternatives for widow rockfish management were adopted for consideration; these management measures would cut potential harvests by as much as two-thirds in comparison to the current year. The Groundfish Advisory Subpanel, representing fishers, expressed its frustration that inadequate funding resulted in inadequate monitoring and assessment, in turn necessitating substantial reductions to rebuild overfished species. NRDC and the CMC submitted written comments. The NRDC comments again covered the points under litigation, including the fact that rebuilding measures were not incorporated into the FMP; and that the draft plans do not meet the statutory requirements for rebuilding overfished stocks, and adequately account for bycatch or essential fish habitat. The CMC comments focused on the canary rockfish rebuilding plan, arguing the estimates of recruitment were too optimistic and bycatch estimates too low. Public comments came from representatives of the Pacific Marine Conservation Council, NRDC and the CMC.

September 2001. The Council deferred adoption of final rebuilding plans for canary rockfish, cowcod and bocaccio to allow staff to focus on developing 2002 management measures, which they would vote on at the November meeting. They also reviewed analyses for other overfished species. The complaint brought by NRDC in Federal District Court over Amendment 12 (consolidated with a subsequent complaint) was decided in August. The amendment was remanded. The Council briefly discussed the resulting need to develop a new amendment for rebuilding plans. There was no written or oral public comment.

November 2001. Declaration of an eighth overfished groundfish species, yelloweye rockfish, was anticipated at this meeting. This required developing management measures specifically for yelloweye stocks; in the past this species had been managed as part of a multi-species complex. The Council considered guidance on the completion of the rebuilding plans in light of the remand of Amendment 12. The Council also had to incorporate rebuilding plan measures into the 2002 management measures considered at this meeting. The Groundfish Advisory Subpanel recommended that rebuilding plans should consider the socioeconomic impacts of rebuilding measures and be flexible enough to accommodate new information as it become available. There was no written or oral public comment.

March/April 2002. During these two meetings the Council considered the schedule for completion of the revised rebuilding plan amendment (consequent of the Court's remand), numbered Amendment 16 and constituting the document before you. Although the Court directed speedy completion of the Amendment, the likelihood that new stock assessment information would become available in the first half of 2002, which would figure in the substance of the amendment, called for some delay. Ultimately, it was agreed that a draft of Amendment 16 would be brought before the Council in June. The Council was also advised that not all rebuilding plans would be included in the Amendment 16 package; remaining plans would be incorporated in a later amendment. In 2002 Pacific whiting became the ninth groundfish species to be declared overfished. This required a substantial reduction in harvests during 2002. (Whiting are harvested from April to November and the Council sets harvest limits for this species at its March meeting.) NOAA Fisheries overruled the Council's recommendation, instituting a lower harvest level by emergency rule. NOAA Fisheries and the Council published a notice of intent to prepare an EIS for Amendment 16 in the Federal Register on April 16 (67 FR 18576).

June 2002. The Council reviewed a draft of the process and standards component of the amendment. (As discussed in section 1.3.4, at that time both process and standards and some of the rebuilding plans were to be part of a single amendment document.) They adopted a motion that substantially re-structured the alternatives, largely reflected in the alternatives presented in this document.

September/November 2002. The Council was briefed on Amendment 16 at their September meeting but took no further action. At their November meeting the Council identified preliminary preferred alternatives for the four sets of options described herein. (These preferred alternatives are identified in Chapter 2.) However, under Issue 1, covering the form and content of rebuilding plans, they only identified the form, that rebuilding plans should be adopted as regulations, but deferred on what elements (targets, limits, harvest control rules, management measures) should be adopted as regulations.

In late 2002 and early 2003 Council and NOAA Fisheries NWR staff received further internal guidance on possible strategies for the incorporation of rebuilding strategies into the FMP and/or regulations. A fourth option was added to the suite under Issue 1 (see Chapter 2) reflecting these ideas.

1.4.2 Relevant Issues

Scoping has two related purposes: to identify significant environmental issues that deserve study (40 CFR 1500.4(g)) and to eliminate from detailed study those issues that are not significant or have already been analyzed in other documents (40 CFR 1501.7(a)(3)). As the preceding summary reveals, rebuilding of overfished stocks has been on the Council's agenda for two and a half years. Council deliberations, advisory body discussion, and public comment—all of which are part of the Council process—have allowed considerable opportunity to scope rebuilding plan-related issues. NOAA Administrative Order (NAO) 216-6[4/] and Council on Environmental Quality (CEQ) regulations implementing NEPA provide a general framework for organizing issues that have been identified and ensuring that all relevant issues have been considered. Both these sources provide criteria for determining whether the environmental impacts of a proposed action (and its alternatives) are significant. They can thus be used to bound the "universe" of potential issues and actions.

The process and standard alternatives analyzed in this EA are not anticipated to directly affect the human environment. Instead, they will mainly affect the management regime; these effects fall in three general categories: administrative burden, capacity for adaptive management, and public participation. Changes to these characteristics of the management regime could indirectly affect the environment, primarily by influencing the Council's ability to address other issues with direct effects. Significant cumulative effects could occur as a result of the adoption of rebuilding plans, which are "reasonably foreseeable future actions." These cumulative effects are evaluated in the EIS accompanying Amendment 16-2, adopting four of the nine rebuilding plans.

4/ This document provides agency guidance on implementing NEPA.

2.0 PROCESS AND STANDARDS ALTERNATIVES

This Chapter presents alternative formats and procedures for developing rebuilding plans and implementing measures to rebuild overfished stocks. The following section presents four sets of options, organized around relevant issues. This allows the Council to structure a preferred alternative by combining options identified for each of the four issue categories.

This amendment also makes minor technical additions, corrections, and changes to the FMP. These changes are categorically excluded from analysis as described in Section 6.03.a.3(b)(2) of NAO 216-6. They are summarized in section 2.2 and documented in the amendatory language found in Appendix A, along with those substantive changes to the FMP approved under the authority of the Magnuson-Stevens Act. A separate memo to file has been prepared by NOAA Fisheries NWR providing the rationale for categorically excluding these changes to the FMP.

2.1 Issues and Options

Options (alternatives) covering four issues related to the development and adoption of rebuilding plans are considered in this chapter:

- Issue 1: The form and required elements of rebuilding plans
- Issue 2: The process for periodically reviewing rebuilding plans.
- Issue 3: Defining events or standards that would trigger revision of a rebuilding plan.
- Issue 4: The status of rebuilding measures for species subsequently listed under the Endangered Species Act.

2.1.1 Issue 1- The Form and Required Elements of Rebuilding Plans

The Magnuson-Stevens Act requires that Councils or the Secretary take action to end overfishing and rebuild any stock that is overfished or approaching an overfished condition. The standard convention for actions taken to rebuild a stock has been termed the "rebuilding plan." Options under this issue encompass the Magnuson-Stevens Act mandate that rebuilding requirements take the form of an FMP amendment or regulation and the status quo where the rebuilding period was specified solely in policy documents. Three aspects of this issue may be distinguished. First, what rebuilding plan elements and supporting rationale should be incorporated into the FMP and/or regulations? Second, in which venue—the FMP or regulations—should specified rebuilding plan elements or other information appear? Third, if the limits and targets comprising the rebuilding framework can be numerically specified, should these values be included in the FMP or regulations?

From the Magnuson-Stevens Act and National Standard Guidelines (50 CFR 600, Subpart D) it appears that the only specifically identified element of a rebuilding plan that must be set in the FMP or regulation is the rebuilding time (MSA 304(e)(4)(A)).[5/] However, when a stock has been overfished, the FMP must be amended

5/ While only the target rebuilding time must be part of an FMP or regulatory amendment, there are two constraints placed on Council actions to rebuild overfished species. First, remedial actions must fairly and equitably allocate restrictions and recovery benefits among sectors (MSA 304(e)(4)(B)). This appears to be a more specific application of National Standard 6 and not a new requirement to which councils or the Secretary must respond. Second, for fisheries governed under international agreements, the rebuilding action should reflect traditional participation by fishermen of the US relative to those of other countries (MSA 304(e)(4)(C)). None of the West Coast groundfish species are currently governed under international agreements. The groundfish species most likely to be the subject of a future international agreement is Pacific whiting. Halibut and salmon fisheries do come under international agreements and could be affected by the need to substantially restrict groundfish mortality.

or regulations implemented to "end overfishing and to rebuild affected stocks" (MSA Section 304(e)(3)(b)).[6/] Under the FMP as currently written, actions required to "end overfishing and rebuild the affected stock" are implemented by regulations under the annual management process, derived from the rules for specifying and managing for the OY. As specified in the National Standard Guidelines (50 CFR 600.310 (f)(1)), "in the case of an overfished fishery, [OY is constrained to an amount of harvest mortality] that provides for rebuilding to a level consistent with producing MSY in such fishery." The FMP also specifies that OYs will be constrained by rebuilding needs and fishery management regulations established to meet OY. These provisions therefore appear to meet the standards of Section 304(e)(3): that rebuilding measures be described in FMPs or regulations. However, under Amendment 12 to the Groundfish FMP, the Council has set its rebuilding time targets during the annual specification process; these targets are not specified in the FMP or regulations. Thus the Council omitted from its FMP and regulations the elements required to be part of a rebuilding action. In addition, NOAA Fisheries has published ancillary guidance describing a number of other parameters not identified in the Magnuson-Stevens Act that should be included in rebuilding plans (Restrepo *et al.* 1998).

The language in the Magnuson-Stevens Act states that rebuilding measures (and specifically, the "time period for ending overfishing and rebuilding the fishery") may be adopted as an FMP, FMP amendment or regulation. The options described below do not consider developing a new FMP for overfished species. According to these options, rebuilding measures would be described in the existing groundfish FMP, in regulations, or some combination of these two documents. As a general proposition, the FMP describes procedures for managing the fishery and serves as a code obligating the Council and fishery managers to follow these procedures and manage according to specified goals and objectives. Regulations are broader in application, serving as laws governing the behavior of the general public, or in this case that segment of the public utilizing certain fishery resources. The options outlined below also contemplate using regulations to promulgate a relatively narrow subset of a rebuilding strategy: the numerical values for the harvest control rule and target year.

Tables 2.1 and 2.2 illustrate the range of possible elements that may be considered part of a rebuilding plan. The options presented below outline which of these elements would be incorporated in the FMP, regulations or some combination of these two documents. The term "elements" includes narrowly defined parameters and management measures that would be used to achieve rebuilding targets. These parameters are derived from National Standard Guidelines and the rebuilding analysis methodology (detailed in section 3.3.2.2); they provide a general framework for determining how overfished stocks may be rebuilt and numerical values can be determined for these parameters. Which of these parameters to incorporate into the FMP and/or regulations, and how to specify them, has been a subject of considerable deliberation in developing this FMP amendment. As discussed in section 3.3.2.2, the numerical values associated with these parameters are almost certain to change as new stock assessments increase our understanding of the status of overfished stocks. If these values are numerically specified in the FMP/regulations there is a risk of frequent amendments to update these documents each time new values are calculated. This argues for a "flexible" approach which would limit the number of numerically specified parameters; instead, parameters are defined by a formula or algorithm relating the parameter to some other measure. Conversely, there is concern that if these parameters are not specified there will be no fixed guideposts obligating managers to implement rebuilding measures that may entail short-term costs. This concern favors a "fixed" approach where the value of these parameters would be specified in the FMP/regulations. By the same token, management measures could be described generally or specifically. Tables 2.1 and 2.2 give examples of how these elements might be described under a flexible strategy versus a fixed strategy.

Based on these considerations, the following four options have been identified:

Option 1a There is no framework for specifying the form of rebuilding plans (status quo). The FMP as amended by Amendment 12 directs the Council to prepare and adopt rebuilding plans as policy guidance documents as described in FMP Section 5.3.6 (Stock Rebuilding Requirements). However, the Court set aside the relevant parts of Amendment 12 and remanded it (see Section 1.3.3 of this document) without proposing specific changes to FMP language. For the purposes

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6/ CFR 50 Section 600.310 (e)(4)(ii) states that "in cases where overfishing is occurring Council action must be sufficient to end overfishing."

of describing the status quo, the remand can be interpreted to mean that all references in the FMP to rebuilding plans only implemented as part of the annual management process are struck out. Therefore, although the FMP describes the contents of rebuilding plans, it does not describe their form and there is no framework for rebuilding plan adoption. Currently management measures described in section 6.2 of the FMP—including automatic actions, notices, abbreviated rulemaking actions, and full rulemaking actions—are used to implement interim rebuilding plans. Thus, each rebuilding plan would need to comply with the Magnuson-Stevens Act, but without any additional description of the process in the FMP.

Option 1b **Numerically specify P_{MAX}, T_{MIN}, T_{MAX} and T_{TARGET}, describe the harvest control rule, and outline the methods used to calculate B_{MSY} in the FMP.** Current guidelines in the FMP with respect to rebuilding plan goals and objectives and the contents of rebuilding plans (sections 5.3.6.1 and 5.3.6.2 of the FMP[7/]) would be retained as a guide to formulating rebuilding plans. In order to comply with the court order, references to rebuilding plans as policies or principles implemented through annual management would be stricken. Section 5.3.6.2 of the FMP would be amended to state that for each overfished species the numeric value of P_{MAX} (as either a decimal fraction or percent), and T_{MIN}, T_{MAX} and T_{TARGET} (as dates) would be specified in the FMP. (These values could be incorporated in tabular format.) This section would also state that the FMP would describe the harvest control rule (e.g., as a rate, constant catch or some combination thereof) and the methods used to calculate B_{MSY} (including relevant formulas). The numerical value associated with the harvest control rule and for B_{MSY} would not necessarily have to be specified. Rebuilding plan adoption would entail amending the FMP to include these specified values in the FMP. If the harvest control rule for a given overfished species was specified in the FMP, and a new stock assessment showed that the specified harvest rate would result in the stock reaching the target biomass later than the specified T_{TARGET}, then the recomputed harvest rate satisfying T_{TARGET} would apply until the FMP could be amended to correct specified parameter values.

Option 1c **Numerically specify T_{TARGET} and the harvest control rule in federal regulations.** The FMP would be amended to state that for each overfished species the target rebuilding year (T_{TARGET}) would be specified (as a date) and the harvest control rule described (e.g., as a rate, constant catch or some combination thereof) and numerically specified in regulations. FMP language also would be revised to better describe the contents of rebuilding plans, the adoption process, and, as above, to strike any language at variance with the court order. If, after a new stock assessment, computations reveals that the specified harvest control rule would result in the stock reaching its target biomass later than the specified T_{TARGET} the harvest control rule would be re-specified through notice and comment rulemaking. The FMP would also describe the following circumstances under which the target year could be changed: (1) after a new stock assessment, re-computed parameters result in a T_{TARGET} greater than T_{MAX}; (2) due to a change in parameters resulting from a new stock assessment, the corresponding OY for the overfished species would result in substantial negative socioeconomic impacts. This second circumstance would have to be supported by commensurate analysis. (These circumstances are exemplary; the Council could change the target year for other reasons, if justifiable through commensurate analysis.) If the Council recommended such a change in the target year, these changes would also be made through notice and comment rulemaking. All other rebuilding plan elements, and updates to rebuilding plans, would be published in the SAFE document.

[**Note:** In November 2002 the Council chose a preferred option that specified rebuilding elements would be incorporated into regulations, but did not specify which parameters to include in regulations. The harvest control rule target year have been added to the option for the purposes of analysis. Depending on the Council's final decision, a different option may be preferred under this issue.]

7/ As mentioned in section 2.2 and shown in Appendix A, these section numbers would change in the amended FMP.

Option 1d Numerically specify T_{TARGET} and the harvest control rule in federal regulations. In addition, describe the methodology for computing rebuilding parameters and the numerical values for these parameters at the time of rebuilding plan adoption in the FMP. This Option is similar to Option 1c, except that additional information describing the status of the stock would be included in the FMP. This would include estimates at the time the rebuilding plan was adopted of: unfished biomass (B_0) and target biomass (B_{MSY}), the year the stock would be rebuilt in the absence of fishing (T_{MIN}), the year the stock would be rebuilt if the maximum time period permissible under National Standard Guidelines were applied (T_{MAX}) and the year in which the stock would be rebuilt based on the application of stock rebuilding measures (T_{TARGET}). These estimated values serve as management benchmarks. The FMP would not be amended if, as is likely to happen, the values for these parameters change after new stock assessments. This point cannot be over-emphasized because changing these values in the FMP would require frequent amendments. Instead, updated values would be published in the SAFE document. The FMP would also include a description of how these parameters are computed. If the computational method differs for a particular species, then these differences would be described in the FMP. Like Option 1c, both the target rebuilding year (T_{TARGET}) and the harvest control rule would be specified in regulations. As discussed above, notice and comment rulemaking would be used to change the harvest control rule specification if a new stock assessment reveals that the current value would result in the stock reaching its target biomass later than the specified T_{TARGET}. Similarly, the FMP would also describe two circumstances under which the target year could be changed: (1) after a new stock assessment, re-computed parameters result in a T_{TARGET} greater than T_{MAX}; (2) due to a change in parameters resulting from a new stock assessment, the corresponding OY for the overfished species would result in substantial negative socioeconomic impacts. This second circumstance would have to be supported by commensurate analysis. (These circumstances are exemplary; the Council could change the target year for other reasons, if justifiable through commensurate analysis.) If the Council recommended such a change in the target year, these changes would also be made through notice and comment rulemaking.

Currently, rebuilding actions are implemented through the annual process of specifying management measures, as described in Section 6.2.1 of the FMP. Options 1b-1d identify different ways that substantiative elements could be incorporated into the FMP, regulations, or both, in order to obligate the Council and NOAA Fisheries to manage towards identified targets.

When thinking about the various rebuilding parameters describing how a stock will be rebuilt, it is important to recognize that some of the terms introduced and described above represent policy decisions at the national level and the Council ***does not have a choice*** in setting their values. The dates for T_{MIN} and T_{MAX} are determined based on guidelines established at the national level. Mean generation time is a biological characteristic that cannot be chosen by policymakers. Thus, the Fishery Council cannot choose these values and then use them as a basis for management. Defined in national guidelines, T_{MIN} is a consequence of the productivity of the fish stock and is calculated by fishery biologists based on information they get from a particular stock. Similarly, T_{MAX}, which is calculated from T_{MIN}, does not represent a Council choice.

Fundamentally, when developing a management strategy the Fishery Council is able to choose a fishing mortality rate, and corresponding annual level of fishing. This ***does*** represent a Council choice because managers have the means to limit the amount of fish that are caught through the enforcement of management regulations. However, when rebuilding overfished species it is possible to think about how to set these fishing limits in different ways. The Council could base their management strategy on either the value of T_{TARGET}, the probability of reaching target biomass in the maximum permissible period (P_{MAX}), or the fishing mortality rate, keeping in mind that these three values cannot be chosen independently of one another. In other words, the Council may choose one of these values and derive the other two from it, but they cannot choose the values for two of these terms independently of the third. T_{TARGET} must be the management target, given its name and the fact that the Magnuson-Stevens Act states that a time period must be identified. However, it should be apparent that the Council could base their choice of T_{TARGET} on P_{MAX} or the harvest rate since all three of these terms are related to each other. If the Council based their decision on P_{MAX}, for example, the corresponding target year and harvest rate could be easily determined through the rebuilding analysis.

While targets and limits would be described and/or specified under these options, none of the options would require that the specific management measures used to achieve these targets be described in the FMP or regulations. Rebuilding plans (and the FMP) could contain general discussion of the types of management measures that will be used, based on the a revised enumeration of rebuilding plan contents in section 4.5.3.2 of the revised FMP (see Appendix A). Although not required, this discussion could be incorporated into the FMP at the time of rebuilding plan adoption if the Council deemed it warranted.

Although the management process may not change very much if rebuilding plan elements become part of the FMP or regulations (since the Council already adheres to interim rebuilding plans when developing annual management measures), public perceptions about the process could be influenced. If more elements are specified in the FMP or regulations, members of the public that are skeptical that the Council will adhere to policies intended to rebuild stocks may be reassured. In addition, any changes to the rebuilding strategy, would be accompanied by a more extensive process with greater opportunity for public comment.

The administrative cost associated with a more involved process to incorporate rebuilding plan elements and subsequently update them can be measured as the direct value of the time and various expenses associated with the management process. Where administrative resources are limited, the costs can also be evaluated in terms of the lost opportunity for addressing other policy problems in the fishery. For example, the time and resources needed to amend a rebuilding plan may detract from managers' ability to improve capacity controls in the fishery. In this example the opportunity costs of the administrative action may be viewed as the difference in net benefits between the status quo capacity controls and the improved capacity controls that are delayed because of the need to modify a rebuilding plan.

Table 2.1. Parameters that describe the projected growth of the overfished stock towards its rebuilt state.

Parameter	Description	Example of a Fixed Specification	Example of a Flexible Specification
B_0	Unfished stock biomass.	e.g., 1,000 mt	e.g., The product of SPR in an unfished state and the average recruitment during the early years of the fishery
B_{MSY}	Target stock biomass.	e.g., 500 mt	e.g., 40% of B_0 (or $B_{40\%}$)
T_{TARGET}	The target year by which the stock will be rebuilt.	50 years (or 2049)	e.g., the median rebuilding year for a specified probability
T_{MIN}	The time needed to rebuild the stock in the absence of fishing, with a 50% probability	e.g., 41 years (or 2040)	e.g., The time the stock would be rebuilt in the absence of fishing with at least a 50% probability.
T_{MAX}	T_{MIN} plus one mean generation time; the maximum time period allowed to rebuild a stock according to National Standard Guidelines.	e.g., 58 years (or 2057)	e.g., The time needed to rebuild the stock with at least a 50% probability.
Mean Generation Time	A measure of the time needed for a female to replace herself with an equivalently productive female.	e.g., 17 years	e.g., include explicit formula
P_{MAX}	The estimated probability of reaching T_{MAX}, may not be less than 50%.	e.g., 52%	e.g., must remain >50%
Rebuilding Harvest Strategy	The harvest control rule that will be followed to rebuild a stock in for a given P_{MAX} and T_{TARGET} years. A harvest control rule associates a given stock size (or stock size proxy) with a given level of fishing mortality and a given level of potential harvest.	e.g., E = 0.27	e.g., A constant harvest rate sufficient to rebuild by T_{TARGET} with probability P_{TARGET}

Table 2.2. Management measures that could be detailed in rebuilding plans mentioned in the FMP, MSA, and/or identified through scoping.

Element	Description	Example of a Fixed Specification	Example of a Flexible Specification
Allocation	MSA §304(E)(4)(b)); Allocations or allocation priorities for overfished species where specific allocations or allocation priorities have not already been specified under the procedures of the FMP or in the FMP. NOTE: Under other Options 1a-1d specific allocations are specified under existing FMP provisions or the allocation framework and implemented in conjunction with the annual process for setting OY.	e.g., "A specified percentage of the OY will be allocated to limited entry trawl"	e.g., "Limited entry trawl fisheries will be given preference for available OY"
Bycatch	**Include consideration** of the • the **adequacy of information** on bycatch and bycatch mortality. Measures needed to acquire the bycatch information necessary to adequately implement the harvest control rule may be considered as part of the rebuilding plan or in a separate plan pr regulatory amendment. Adopt risk averse harvest levels sufficient to account for uncertainty about bycatch. • the need for management measures to **minimize bycatch** and minimize the mortality of unavoidable bycatch as part of the rebuilding plans. Measures needed to minimize bycatch or the mortality of unavoidable bycatch may be considered as part of the rebuilding plan or in a separate plan or regulatory amendment.	e.g., "Finfish excluders must be used by the shrimp trawl fleet"	e.g., "Bycatch will be minimized through future gear modifications"
Habitat	Include specific habitat protection measures.	e.g., A specified portion of EFH for an overfished species is closed to fishing	e.g., "Measures to minimize impacts to overfished species' habitat will be evaluated"
Closed Areas	Include consideration of the contribution areas closed to groundfish fishing might make to rebuilding the stock (closed areas could range in extent to restricting all fishing, i.e. no-take marine reserves). Include such measures in the plan as appropriate.	e.g., A marine reserve will be created in an identified area	e.g., "Marine reserves will be evaluated as part of a species' rebuilding strategy"

2.1.3 Issue 2- The Process For Periodically Reviewing Rebuilding Plans

Although the Magnuson-Stevens Act requires that the Secretary review rebuilding plans at least every two years (§304(e)(7)), an equivalent obligation is not assigned to the councils. Nonetheless, periodic Council review is advisable because changing environmental conditions and unanticipated events make it unlikely that overfished stocks will rebuild precisely to the trajectory that is forecast at the outset of the rebuilding period. Reviews allow the Council to decide if rebuilding measures need to be modified, which would likely entail an FMP or regulatory amendment, or both, depending on the options chosen above. Issue 3 is closely related to the periodic review process because options for the standards triggering a revision are outlined.

Option 2a **The Council reviews rebuilding plans at least every two years (status quo).** Periodic review is required (with a two-year maximum interval). The Council may propose revisions to existing plans at any time in accordance with the amendment process appropriate for the form of the plan (see Issue 1). Rebuilding plans are reviewed with respect goals 1-5 defined in Section 5.3.6.1 of the current FMP. These goals are: (1) achieve the population size and structure that will support the maximum sustainable yield within the specified time period; (2) minimize, to the extent practicable, the social and economic impacts associated with rebuilding, including adverse impacts on fishing communities; (3) fairly and equitably distribute both the conservation burdens (overfishing restrictions) and recovery benefits among commercial, recreational and charter fishing sectors; (4) protect the quantity and quality of habitat necessary to support the stock at healthy levels in the future; and (5) promote widespread public awareness, understanding and support for the rebuilding program.

Option 2b **(Council-preferred) The Council reviews rebuilding plan goals 2-5 every two years, but goal 1 only with new stock assessments.** As with option 2a, rebuilding plans are reviewed at least every two years to determine the success of the management measures in meeting rebuilding plan goals 2-5 defined in Section 5.3.6.1 of the FMP. New stock assessment data will be used to determine the success of the management measures in meeting the rebuilding plan goal 1. The Council may propose revisions to existing plans at any time, although in general this will be occur only during the annual management process. Any revisions to the rebuilding plan must also be approved by NOAA Fisheries.

Option 2c **The Council reviews rebuilding plan goals 2-5 every two years; goal 1 is reviewed after stock assessments conducted according to a schedule described in the rebuilding plan.** This is the same as Option 2b except that a schedule for stock assessments is specified in the rebuilding plan and driven by the stock dynamics. For example, more frequent reviews and assessments would be conducted for more productive stocks. The schedule is also structured so that stock assessments and rebuilding plan reviews occur more often as T_{TARGET} draws closer.

Option 2d **The Council reviews rebuilding plan goals 2-5 every two years; goal 1 is reviewed after stock assessments conducted according to a pre-specified schedule described in the FMP.** This is the same as the preceding option except that the FMP would specify the following assessment schedule for all overfished stocks: every 4 years when T_{MAX} is 20 years or more away and then every 2 years until the stock is rebuilt.

Option 2e **The Council will defer review to the Secretary.** The Council may propose revisions to existing plans at any time but these must be approved by NOAA Fisheries. Each year the Council will compare actual harvest mortality to the harvest mortality goals identified in the rebuilding plan. They will also evaluate progress in rebuilding the stock biomass to the MSY level after each new stock assessment. This would be described in annual SAFE documents and the ongoing social and economic impacts of harvest policies necessary to rebuild overfished species would be evaluated in aggregate as part of annual specification of harvest regulations, which is supported by a NEPA analysis. The SAFE document should assist the Secretary in conducting Magnuson-Stevens Act-mandated two-year reviews (§304(e)(7)). A draft of any Secretarial review will be provided to the Council so that they can make comments before it is finalized.

For options 2b, 2c, 2d, and 2e the Council's annual SAFE document will provide (1) the most recent information available on the best estimate of total fishing mortality for comparison to target fishing mortality levels described in the rebuilding plan; (2) the most recent assessment of stock size compared to the expected stock size for the rebuilding trajectory; (3) information on allocation and the social and economic status of the fishery. As noted, this information, and the record of Council actions to protect habitat and promote public awareness of rebuilding programs, would also support the Magnuson-Stevens Act-mandated Secretarial review.

New assessments can result in better estimates of biological parameters or fisheries descriptors. Once incorporated into a new rebuilding analysis, this can result in a dramatic change in rebuilding parameters such as the estimated probability that a stock can rebuild in the time specified, in comparison to previous analyses. For example, as a result of the most recent canary rockfish assessment (Methot and Piner 2002) scientists concluded that the stock was less productive (in terms of expected recruitment) than previously thought because of a new estimate of the steepness of the spawner-recruit curve. This in turn increased the estimated value for T_{MIN}, and thus other rebuilding parameters. In addition, a new estimate of selectivity (the size or age classes typically removed by fishing) for a given fishery or the removals allocated to different fisheries with different selectivity patterns can change the estimated rebuilding time even though total catch remains the same. Again citing the most recent canary rockfish assessment, if the estimated proportion of total catch taken by recreational fisheries increases, the target rebuilding year will be delayed because of the generally smaller size (corresponding to younger fish) that recreational fishers take in comparison to commercial fisheries.

The choice between these options will mainly affect administrative burden, and to a certain degree, the distribution of that burden among agencies. Under Options 2a through 2d the Council would formally review rebuilding measures at least every two years; these reviews would provide much of the information needed by the Secretary for his Magnuson-Stevens Act-mandated biennial review. Although the Council would not conduct a formal review under Option 2e, the analyses and information resulting from annual specification process would allow the Council and the Secretary to evaluate rebuilding progress and performance. More frequent review would increase administrative burden; and if such reviews required more extensive revision of the FMP or regulations (depending on the options chosen under Issue 1) this too would result in a heavier workload.

2.1.4 Issue 3- Amending Rebuilding Plans and Adequacy of Progress

Issue 2 contemplates periodic reevaluation of rebuilding measures. It is expected the rebuilding plans would be revised (and necessary FMP or regulatory amendments made) when these periodic reviews reveal a significant discrepancy between current stock status (most likely expressed as the probability of achieving rebuilding within the target time period) and that projected in the original rebuilding plan or in earlier reviews. In most cases the harvest strategy can be adjusted during the annual specification process (or at any other time if necessary) so that rebuilding targets can be met, although this could also require an FMP or regulatory amendment (based on the option chosen under Issue 1). However, there may be times when new information results in a change to some other crucial parameter (B_0 for example), affecting a whole range of other parameters. In these cases the rebuilding plan would be revised, and the FMP and/or regulations amended to change those elements incorporated therein. The options outlined below detail various standards that could be used to decide if such revisions and emendations are necessary.

Option 3a **No standards to evaluate rebuilding progress (status quo).** Currently, the FMP does not describe a standard to evaluate the adequacy of rebuilding measures and determine if rebuilding parameters or management measures need to be changed.

Option 3b **A standard based on a minimum P_{MAX} value.** If the probability of achieving T_{MAX} falls below 50% (the required minimum value), then progress will be considered inadequate and harvest control rule must be adjusted to increase the probability of rebuilding within the maximum time to at least 50%. Other needed changes to rebuilding measures would also be considered. Depending on what options are chosen under Issues 1 and 2, FMP and/or regulatory amendments may be required.

Option 3c **A standard based on the specified P_{MAX} value.** This option is identical to option 3b except that the probability of achieving T_{MAX} established in the rebuilding plan (as modified during previous reviews) is used as the standard. If the measured value is below this value then the procedures identified under option 3b would be implemented.

Option 3d **Rebuilding plans will be revised whenever new information from stock assessments or rebuilding analyses reveals a significant change in rebuilding parameters.** The Council, in consultation with the SSC and GMT, will determine on a case-by-case basis whether there has been a "significant" change in a parameter.

Option 3e **(Council-preferred) A specific standard for determining when progress has been adequate is established for each plan.** No generic standard is identified in the FMP for all overfished species. Instead, the FMP would require that each rebuilding plan identify such a standard from a list of possibilities based on the options outlined above.

Options 3b and 3c bracket a range of other possible policies; for example, a required rebuilding plan revision could be triggered by some other probability value, such as one halfway between the specified value (P_{MAX}) and the minimum value (50%). Generally, a standard that allows the probability to deviate significantly from the specified value risks triggering a sudden, substantial change in the harvest policy with attendant disruptive effects on fisheries. For example, if a specified P_{MAX} of 80% declines over several years to a value below 50%, the required harvest policy change at that point would result in a sudden large reduction in that year's OY, with attendant effects on the fishery. On the other hand, this strategy, by giving relatively wide latitude for changes in P_{MAX}, would lessen the frequency of required revisions to the rebuilding plan (and attendant FMP and regulatory amendments), reducing administrative burden.

Options 3d and 3e would allow relatively more flexibility by giving the Council some control over when and whether to revise rebuilding plans. Option 3e emphasizes a procedural approach that relies on judgements made as part of the Council process. Like the choice of other more flexible components of a rebuilding process and standards framework, there is some risk that the public will not trust these judgements. Option 3e maintains flexibility by allowing standards to better match the characteristics of a particular overfished stock.

Generally, the choices reflected in these options represent tradeoffs between the rebuilding objectives, the social and economic needs of fishing communities, and benefits of the fishery to the nation. In developing rebuilding plans the Council chooses a harvest policy (harvest control rule) that accords with a given rebuilding time and probability. A determination that the rebuilding plan can be allowed to fall behind schedule so long as the probability of rebuilding in T_{MAX} is more than 50%, implies that administrative opportunity costs are sufficiently high and the short-term benefits to the community are likely to be sufficiently important that harvest levels specified in the control rule should be maintained as long as the minimum rebuilding standard is being met. (But as noted above, this approach could result in sudden large and disruptive changes in harvest policy.) In contrast, selection of a more rigid standard would entail frequent rebuilding plan revisions and FMP or regulatory amendments, implying that the administrative opportunity costs of frequent revision and amendment are low enough and potential lost opportunity from not re-evaluating the rebuilding program (in terms of future returns to the fishery for example) are so high that rebuilding measures should be re-evaluated whenever stock increases fall behind schedule.

2.1.5 Issue 4- ESA Listed Species

Option 4a **(Council-preferred) No special provisions (status quo).** There are no special provisions for rebuilding plans for species listed under the Endangered Species Act.

Option 4b **ESA jeopardy standards or recovery plans take precedence if they establish a higher standard.** A jeopardy standard or recovery plan for an overfished stock listed under the ESA will supercede the rebuilding plan only if that standard is more restrictive than what would be required for that species under the Magnuson-Stevens Act. If the species were de-listed, but still not considered recovered under the Magnuson-Stevens Act and the original rebuilding plan, then that plan would again determine harvest policy and other management measures until the stock is fully rebuilt. After de-listing, an the rebuilding plan may need to be revised to take into account the changed status of and new information about the overfished stock.

Under Option 4a (status quo), if a groundfish stock is listed, the Council might have to develop another plan amendment to address the listing and jeopardy standard or recovery plan. Before such an amendment was approved there could also be some uncertainty about how these species should be managed in the event of a listing. Option 4b anticipates the possibility that a groundfish species could be listed under the ESA and establishes a contingency for dealing with such an event. This option is similar to a provision in the Salmon FMP under which escapement goals for a particular stock are automatically replaced by the jeopardy standard or recovery plan when a stock is listed, except that measures under the Magnuson-Stevens Act would take precedence if they establish a higher standard than the ESA. Option 4b would reduce future administrative costs by obviating the aforementioned plan amendment and by clarifying procedures and processes in the event of a listing. This would facilitate quicker reaction by the Council to any requirements of any such jeopardy standard or recovery plan.

2.2 Summary of Minor Technical Additions, Corrections and Changes to the FMP

As noted at the beginning of this chapter, various changes will be made to the FMP as part of this amendment that are not substantiative in the sense of affecting fishery management policies, procedures or measures. They are therefore categorically excluded from analysis based on the criteria established in Section 6.03.a.3(b)(2) of NAO 216-6, and 40 CFR 1500.4(p), 1508.4 and other sections of CEQ regulations. As noted above, NOAA Fisheries has prepared a memo to file providing a rationale for this categorical exclusion. These proposed changes are summarized here and documented in Appendix A, which contains the amendatory language.

The species list in section 3.1. of the FMP, Species Managed by this Fishery Management Plan, is not consistent with the groundfish species list in the annual specification and management measures (FR 67 10490; March 7, 2002) or the list at 50 CFR 660.302. Misspellings are corrected and the following rockfish are specifically identified: chameleon (*Sebastes phillipsi*), dwarf-red (*Sebastes rufianus*), freckled rockfish (*Sebastes lentiginosus*), halfbanded (*Sebastes semicinctus*), pinkrose (*Sebastes simulator*), pygmy (*Sebastes wilsoni*), swordspine (*Sebastes ensifer*), widow (*Sebastes entomelas*), yelloweye (*Sebastes ruberrimus*) yellowmouth (*Sebastes reedi*), and yellowtail (*Sebastes flavidus*).

The terms "maximum fishing mortality threshold" (MFMT) and "minimum stock size threshold" (MSST) are used in the National Standard Guidelines and are intended for use as benchmarks to decide if a stock or stock complex is being overfished or is in an overfished state. The terms used to describe these same thresholds in the FMP are different from those used in the National Standard Guidelines (i.e., MFMT is the same as the F_{MSY} control rule described in the FMP and MSST is the same as the overfished/rebuilding threshold described in the FMP.) To address consistency in terminology, the equivalent terms are defined in Sections 4.1and 4.4 of the FMP.

The National Standard Guidelines suggest that the annual SAFE document contain a description of each stock or stock complex (50 CFR 600.315 (e)(3)). Because the MFMT and MSST are important benchmarks used to determine if overfishing has occurred or if a stock or stock complex is in an overfished state, Section 5.2 of the FMP, will state that the SAFE document list the MFMT and MSST for stocks or stock complexes to be listed in SAFE documents. In addition, the last paragraph of Section 5.2 regarding the SAFE document availability and completion schedule is out of date and does not reflect the SAFE document schedule for 2002 and beyond. This language is changed to reflect the current schedule.

Sections 4.2, 4.3.1, and 4.5.1 of the FMP list, summarize and/or reference the F_{MSY} proxies adopted in 1998. The 1998 values are used throughout these sections as examples in the describing F_{MSY} proxies. In spring 2000, the Council's Scientific and Statistical Committee sponsored a workshop to review the Council's groundfish exploitation rate policy. For 2001 and beyond, the Council adopted the SSC's new recommendations for harvest policies of: F40% for flatfish and whiting, F50% for rockfish (including thornyheads) and F45% for other groundfish such as sablefish and lingcod (66 FR 2338, January 11, 2001). The 1998 F_{MSY} proxy values used as examples in the FMP are updated to reflect the Council's current policy.

References to an at-sea observer program in Sections 4.3.1.3, 4.4.2, and 4.6 indicate that no observer program exists from which data are available to upgrade stock assessments and evaluate overfishing. This text is outdated and is updated to reflect the implementation of an at-sea observer program in 2001.

Chapter 4 contains several references to Council use of the mixed stock exception for setting OYs. These references do not comply or reference the current standards for invoking the mixed stock exception. The text is updated to reflect the standards for invoking the mixed stock exception.

Chapter 5 is designated to cover the annual management process but includes numerous references to the development of rebuilding plans, which will not be on an annual cycle. Additionally, discussion of some topics is spread through numerous sections. The topic for Chapter 4 is OYs. Chapter 4 is a one-page chapter in which OYs are discussed in general terms. The specific considerations and constraints that go into establishing OYs are specified in Chapter 5. A reorganization of Chapters 4 and 5 will: (1) place in Chapter 4 all considerations and constraints that go into establishing OYs, including the process and standards for establishing rebuilding plans; (2) place all provisions related to the annual management process in Chapter 5; and (3) reorganize the sections to construct a more concise document.

The Council may either (1) not approve these changes to the FMP, which would maintain the status quo, or (2) approve any or all of these changes:

a) revise the list of species managed under the FMP;
b) address differences in the use of the terms maximum fishing mortality threshold (MFMT) and the minimum stock size threshold (MSST) and the National Standards Guidelines;
c) change SAFE document Section 5.2 to include a description of the MFMT and MSST;
d) update last paragraph of Section 5.2 regarding the SAFE document availability and completion schedule;
e) update Sections 4.2, 4.3.1, and 4.5.1 of the FMP to include the Council adopted the SSC's new recommendations for harvest policies of: F40% for flatfish and whiting, F50% for rockfish (including thornyheads) and F45% for other groundfish such as sablefish and lingcod ;
f) update the references to an at-sea observer program in sections 4.3.1.3 , 4.4.2 and 4.6; and
g) reorganize Chapters 4 and 5 to produce a more concise document.

3.0 AFFECTED ENVIRONMENT

This chapter describes the affected environment, which is the baseline environmental condition. The baseline represents the status of environmental attributes at a time before the proposed action is implemented, and in Chapter 4 serves as a point of comparison to evaluate possible significant impacts. (The baseline differs from the *Status Quo*, which predicts a future environmental state in the absence of any action alternative.)

An EIS recently prepared by the Council, analyzing the 2003 harvest specifications and management measures for the Pacific Coast groundfish fishery (PFMC 2003) provides a detailed description of the habitat, species, fisheries and fishing communities, and management issues related to groundfish. This material is incorporated by reference and summarized below. (Copies of the final EIS referenced here may be obtained from the Council offices. Refer to the contact information on the cover of this document.)

This chapter is divided into three main sections describing the biological environment, the socioeconomic environment and management issues. The proposed action is procedural; it establishes a framework for adopting rebuilding measures for overfished species. These rebuilding measures, to be adopted in future actions, will affect the human environment to the degree they constrain fishing mortality. Thus this action will not directly affect marine species or ecosystems, although the cumulative effect of "reasonably foreseeable future actions" will have an environmental impact. (These cumulative effects are evaluated in the EIS evaluating the adoption of rebuilding plans, which is being prepared concurrently with this document.) For this reason the baseline description of resources is a broad overview and the impact analysis in chapter 4 focuses on how different options affect the management regime.

3.1 Biological Environment

3.1.1 Overfished Groundfish Species or Stocks

Bocaccio (*Sebastes paucispinis*) was declared overfished in 1999. There are two separate West Coast populations, divided in the vicinity of Cape Mendocino, California. The southern bocaccio stock extends from about Cape Mendocino south as far as Sacramento Reef, Baja California. Bocaccio inhabit depths between 50 and 300 m but most commonly occur over the outer continental shelf at depths are 100 to 150 m. Larvae and small juveniles are pelagic and most often found in shallow coastal waters over rocky bottoms associated with algae. Large juveniles and adults are semi-demersal. Newly settled larvae in central California are first observed associated with the giant kelp canopy, but are also seen throughout the water column. Adults are commonly found in eelgrass beds, or congregated around floating kelp beds. Large adults disappear from traditional commercial fishing grounds during winter spawning and reappear in the spring. Parturition (birthing) occurs during November to March off northern and central California, and October to March off southern California. Male bocaccio mature at 3 to 7 years and females mature at 3 to 8 years. Adult bocaccio eat small fishes associated with kelp beds, including other species of rockfishes, and occasionally small amounts of shellfish. They are in turn prey for sharks, salmon, other rockfishes, lingcod and albacore; sea lions, porpoises, and whales also feed on them. This species directly competes with chilipepper, widow, yellowtail, and shortbelly rockfishes for both food and habitat resources.

Canary Rockfish (*Sebastes pinniger*) were declared overfished in 2000. They commonly inhabit oceanic waters in depths from 91 to 274 m. Historically, this species was fairly abundant throughout its range. Canary rockfish occur from northern Baja California (Mexico), to the western Gulf of Alaska. Adult canary rockfish are primarily restricted along the continental shelf from 457 m, inshore to 46 m. Adults feed on small crustaceans as well as anchovies, sand dabs, and other small fishes. The canary rockfish, like all members of the genus *Sebastes*, produces live young. Female canary rockfish reach sexual maturity at roughly 8 years of age. Canary rockfish off the Pacific Coast have a long spawning period from September through March, probably peaking in December and January off Washington and Oregon. Upon release from the female, larvae are planktonic in the upper 100 m of the water column. Although little is known about the early life history strategies of this rockfish, they are thought to migrate to demersal (bottom) waters during the summer of their first year, and develop into juveniles around nearshore rock reefs, where they may congregate for up to three years. They tend to move to deeper waters as they age. Females generally grow faster and reach slightly larger sizes than males, but it appears males generally live considerably longer than females. Both sexes are capable of reaching nearly 70 years of age, but very few females older than 30 years have been observed Washington and Oregon sample data.

Cowcod (*Sebastes levis*) was declared overfished in 2000. It is one of the largest West Coast rockfish and feeds mainly fishes, octopus, and squid. Juvenile cowcod eat small shrimp and crabs. New age and growth data reveal that cowcod are long-lived, slow growing, and become sexually mature at the relatively old age of 12 years. Their maximum age is estimated to be 75 years. Females give birth to planktonic larvae during the winter, which are free-floating and may be found in shallower water. However, as they grow larger they move to deep water rocky environment. Adults are usually associated with rocky bottoms, particularly where there are sharp, steep drop-offs. They typically inhabit the continental slope and upper continental shelf, from about 150 to 350 m. Larvae and juveniles are planktonic for up to 3 months and are likely to disperse long distances before settling to the bottom.

Darkblotched Rockfish (*Sebastes crameri*) were declared overfished in 2001. This species' range extends from the Bering Sea to near Santa Catalina Island, California, on soft bottom at 29 to 549 m, but usually deeper than 76 m. The population off Washington, Oregon and California is considered a single stock. Darkblotched rockfish migrate to deeper waters with increasing size and age, and males are generally smaller than females at age and in the fishery. Darkblotched rockfish are caught almost entirely with commercial trawl gear as part of a complex of slope rockfish that includes Pacific ocean perch, splitnose rockfish, yellowmouth rockfish, and sharpchin rockfish.

Lingcod (*Ophiodon elongatus*) were declared overfished in 1999. They are top-order predators of the family Hexagrammidae. The species ranges from Baja California to Kodiak Island in the Gulf of Alaska, and its center of abundance is near British Columbia and Washington. The West Coast portion of the species' range is considered to be one continuous population that extends into British Columbia. Lingcod are demersal on the continental shelf, most abundant in waters less than 200 meters deep, and distributed in patches among areas of hard bottom and rocky relief. This species generally does not migrate, although some tagged individuals have moved exceptional distances, and indirect evidence suggests a seasonal onshore movement associated with spawning. According to fishery and survey data males tend to be more abundant than females in shallow water, and the size of both sexes increases with depth. Females are usually larger than males, reaching a mature length of 76 cm at three years old or later. Males, in contrast, mature faster and at a smaller size: about two years and 50 cm. Maximum age is about 20 years.

Pacific Ocean Perch (POP) (*Sebastes alutus*) were declared overfished in 1999. They inhabit the continental slope from Japan and the Bering Sea to southern California. The West Coast stock extends from the U.S.-Canada border to northern California. POP primarily inhabit waters of the upper continental slope and are found along the edge of the continental shelf, ranging as deep as 825 m but usually found at 100 to 450 m. Throughout its range, the species is generally associated with gravel, rocky or boulder type substrate found in and along gullies, canyons, and submarine depressions of the upper continental slope. POP winter and spawn in deeper water (>275 m), then move to feeding grounds in shallower water (180 to 220 m) in the summer (June through August) to allow gonads to ripen. They release their larvae in depths of 360 to 400 m and juveniles stay in shallow water over rough or rocky bottoms, sometimes forming ball-shaped schools near the surface. Adults form large schools 30 m wide, to 80 m deep, and as much as 1,300 m long. Largest size is about 54 cm and 2 kg and their maximum age has been estimated at about 90 years.

Pacific whiting (*Merluccius productus*), also known as hake, were declared overfished in 2002. They are a semi-pelagic roundfish distributed from the Gulf of California to the Gulf of Alaska and east to Asia in depths from 0 to 1000 m (usually in depths <250 m). There are genetic differences between the West Coast whiting population and those found in the larger, semi-enclosed inlets of Puget Sound and the Strait of Georgia; the southern stock off Baja California also differs. The coastal Pacific whiting stock ranges from southern California to Queen Charlotte Sound but only the main coastal population off the Pacific Coast waters of WOC are within Council purview. Spawning occurs off southern California from January to March; the stock then migrates northward to feed in the waters off the continental slope and shelf from northern California to Vancouver Island.

Widow Rockfish (*Sebastes entomelas*) were declared overfished in 2001. These species ranges from southeastern Alaska to northern Baja California, where it frequents rocky banks at depths of 25 to 370 m. In those habitats it feeds on small pelagic crustaceans and fishes. There is no evidence that separate genetic stocks of widow rockfish occur along the Pacific Coast. Female widow rockfish attain a larger size compared to males, and fish in the northern part of the range tend to be larger at age compared to those in the south. Aggregations of this species form at night and disperse at dawn, an atypical pattern for rockfish. Widow rockfish is an important commercial groundfish species

Yelloweye Rockfish (*Sebastes ruberrimus*) were declared overfished in 2002. Yelloweye are distributed along the West Coast from Ensenada, Baja California to the Gulf of Alaska in high relief, rocky habitats at depths between 15 and 550 m. They are large-sized (up to 91 cm), long-lived (up to 118 years), late maturing, and relatively sedentary rockfish. These life history traits make yelloweye particularly susceptible to overfishing. Although they do tend to have a high fidelity to particular areas with little evidence of migration, there is no evidence of genetic stock structure throughout their range. Yelloweye have a varied diet of forage fish, other rockfishes, crustaceans, and have been known to eat lingcod spawn. This species is highly prized in both commercial and recreational fisheries due to their large size and fillet quality, and are readily taken with line gear. They are much less common in bottom trawl catches, which have been further reduced with the small footrope restrictions put in place on the shelf since 2000. Decompression and temperature shock account for high rates of yelloweye mortality.

3.1.2 Other Species Caught in the Groundfish Fishery

The Pacific Coast Groundfish FMP manages over 80 species, including the overfished species described above. Although the majority of these species are rockfish (members of the genus *Sebastes*), flatfish and other roundfish are also part of the management unit. Information on the interactions between the various groundfish species and between groundfish and non-groundfish species varies. While a few species have been intensely studied, there is relatively little information on most. Fewer than 20 of the groundfish species have ever been comprehensively assessed. Only Pacific whiting has been assessed annually.

Since 2000, rockfish species managed under the FMP have been divided into six groups based on habitat (nearshore, shelf, and slope) and latitude (north or south of 40° 10' N latitude). The three northern groups encompass the preexisting U.S./Vancouver, Columbia, and Eureka management areas while the southern groups cover the Monterey and Conception management areas. Rockfish are further divided into those species or stocks that are individually and more rigorously assessed so that stock-specific ABCs and OYs can be developed and less rigorously assessed groups, which usually are also less commonly caught by managed fisheries. The Council employs a precautionary policy for the less rigorously assessed species, which are termed "minor rockfish." The policy assumes that fishing mortality accounts for 75% of total mortality (with natural causes accounting for the remaining quarter). As an added precaution, the OYs for these stocks are set at 75% of ABCs. For species with no stock assessments, where ABCs and OYs are based on historic fisheries landings levels, the Council is even more cautious, setting the OYs at 50% of ABCs.

Aside from rockfish and whiting, Dover sole and sablefish are important commercial species. Sole are mainly caught in a deepwater trawl fishery off of Oregon and Washington as part of the "DTS complex," a shorthand for the main constituents of the catch: Dover sole, thornyheads and sablefish. (Thornyheads are also considered rockfish, but in the genus *Sebastolabus*.) Arrowtooth flounder, English sole and petrale sole are other commercially important flatfish, caught mainly in this fishery, whose stocks have been assessed. In addition to their commercial importance, Dover sole, sablefish and shortspine thornyhead are considered in the "precautionary zone." This refers to the Council's management policy that sets a biomass target that is a proxy for MSY. If stock size is below this level, but not overfished, it is in the precautionary zone and the "40-10 harvest rate policy" adjustment is applied.

Groundfish fisheries also catch a range of species not managed under the Groundfish FMP, although they may be managed under one of the Council's other three FMPs. Similarly, fisheries targeting species outside the management unit catch groundfish incidentally. The principal species taken in groundfish fisheries (primarily the whiting fishery) includes American shad and walleye pollock. Groundfish fisheries may take some coastal pelagic species (CPS) such as northern anchovy (*Engraulis mordax*), Pacific sardine (*Sardinops* *sagax*), Pacific (chub) mackerel (*Scomber japonicus*), jack mackerel (*Trachurus symmetricus*) and market squid (*Decapoda*), which are managed under another Pacific Council FMP. Forage fish, which serve as an important source of food for other fish species, birds and marine mammals, are also taken in small quantities by groundfish trawl vessels. Species include herring (*Clupea harengus pallasi*), smelt (*Osmeridae*), anchovies, and sardine. Other fisheries incidentally catching groundfish include those for Dungeness crab (*Cancer magister*), Pacific pink shrimp (*Pandalus jordani*), Pacific halibut (*Hippoglossus stenolepis*) and ocean salmon troll fisheries. these categories are discussed briefly here.

3.1.3 Habitat Including Essential Fish Habitat (EFH)

3.1.3.1 Coast-wide Marine Habitat Characteristics

In the North Pacific Ocean, the large, clockwise-moving North Pacific Gyre circulates cold, sub-arctic surface water eastward splitting at the North American continent into the northward-moving Alaska Current and the southward-moving California Current. The California Current, a surface current, flows southward along the U.S. west coast and through the U.S. EEZ, the management area for the groundfish FMP. The California Current is known as an eastern boundary current, meaning that it draws ocean water along the eastern edge of an oceanic current gyre. Along the continental margin and beneath the California Current, 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, Point Conception and bathymetric features such as banks, canyons, and other submerged features, often create large-scale current patterns like eddies, jets, and squirts. Currents off Cape Blanco, for example, are known for a current "jet" that drives surface water offshore to be 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 direction just within the Bight. The influence of these lesser current patterns and of the California Current on the physical and biological environment varies seasonally (Lynn and Simpson 1987) and through larger-scale climate variation, such as El Niño-La Niña or Pacific Decadal Oscillation (Longhurst 1998).

Physical topography off 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 common south of Cape Mendocino.

3.1.3.2 Essential Fish Habitat

The 80+ groundfish species managed by the FMP 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 essential fish habitat (EFH) for these species/stages is correspondingly large. On the other hand, the EFH of some species/stages may be comparatively small, such as that of adults of many nearshore rockfishes which show strong affinities to a particular location or type of substrate.

EFH for Pacific coast groundfish is defined as the aquatic habitat necessary to allow for groundfish production to support long-term sustainable fisheries for groundfish and for groundfish contributions to a healthy ecosystem. Descriptions of groundfish fishery EFH for each of the 80+ groundfish species and their life stages result in over 400 EFH identifications. When these EFHs are taken together, the groundfish fishery EFH includes 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.

The FMP groups the various EFH descriptions into seven major habitat types 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. Composite EFH identifications and life history and habitat needs for the species managed under the FMP are described in the EFH appendix to Amendment 11 (also available online at http://www.nwr.noaa.gov/1sustfsh/efhappendix/page1.html).

3.1.5 Protected Species

Protected species fall under three overlapping categories. First are marine mammals protected under the Marine Mammal Protection Act (MMPA) of 1972. The MMPA established a moratorium, with certain exceptions, on the taking of marine mammals in U.S. waters and by U.S. citizens on the high seas, and on the importing of marine mammals and marine mammal products into the United States. Under the MMPA NOAA Fisheries manages West Coast cetaceans and pinnipeds, while the U.S. Fish and Wildlife Service (FWS) manages sea otters. Stock assessments report new information every year for strategic stocks and every three years for non-strategic stocks. Strategic stocks are defined as 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. NOAA Fisheries 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. The WOC groundfish fisheries are in Category III, indicating a remote likelihood of, or no known serious injuries or mortalities, to marine mammals.

Second, species may be given protection under the Endangered Species Act (ESA) of 1973. 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.

Third, 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, (E.O. 13186) directs federal agencies to negotiate Memoranda of Understanding with the U.S. Fish and Wildlife Service that would obligate agencies to evaluate the impact on migratory birds as part of any NEPA process. NOAA is also preparing an National Plan of Action to Reduce the Incidental Take of Seabirds in Longline Fisheries. This document contains guidelines that are applicable to relevant groundfish fisheries and would require seabird incidental catch mitigation if a significant problem is found to exist. The FWS is the primary federal agency responsible for seabird conservation and management. Under the Magnuson-Stevens Act, NOAA Fisheries must ensure fishery management actions comply with other laws designed to protect seabirds. NOAA Fisheries 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. Four bird species are also ESA-listed.

Table 3-1 summarizes information on listed species occurring in the area affected by the proposed action.

TABLE 3-1. Protected species occurring on the West Coast.

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*
Sea turtles listed as endangered under the ESA	
Green turtle	*Chelonia mydas*
Leatherback turtle	*Dermochelys coriacea*
Olive ridely turtle	*Lepidochelys olivacea*
Marine mammals listed as threatened under the ESA	
Steller sea lion- eastern stock	*Eumetopias jubatus*
Guadalupe fur seal	*Arctocephalus townsendi*
Southern sea otter- California stock	*Enhydra lutris*
Marine mammals listed as depleted under the MMPA	
Sperm whale- West Coast stock	*Physeter macrocephalus*
Humpback whale- West Coast and Mexico stock	*Megaptera novaeangliae*
Blue whale- eastern north Pacific stock	*Balaenoptera musculus*
Fin whale- West Coast stock	*Balaenoptera physalus*
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*

3.2 Socioeconomic Environment

3.3.1 West Coast Fisheries

Pacific Coast groundfish support or contribute to a wide range of commercial, recreational and tribal fisheries, which collectively occur year round off all three West Coast states. These include fisheries that target groundfish, which for the most part are regulated under a license limitation program implemented in 1994, and other fisheries that, while targeting other species, may catch groundfish. This latter category is termed open access because it is not license limited. (There are also some small-scale fishers targeting groundfish in the open access sector, as described below.) The Council allocates harvest specifications (OYs) between these two regulatory categories.

Marine recreational fisheries consist of both charter and private vessels. Charter vessels are larger vessels for hire that can typically fish farther offshore than most vessels in the private recreational fleet. Both nearshore and shelf opportunities are important for West Coast recreational groundfish fisheries. Recreational fisheries are detailed in sub-section 3.3.1.3.

In addition to these fisheries, Indian tribes in Washington—primarily the Makah, Quileuete, and Quinault—harvest groundfish in the U.S. 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 NOAA Fisheries.

Of 4,579 vessels active during November 2000 through October 2001 (a period that will be used as a base period in this analysis), 1,341 (37% of the fleet) landed some groundfish (PFMC 2003). This segment of the fleet was responsible for 47% of the value of all West Coast landings (groundfish and nongroundfish species).

3.3.1.1 Limited Entry Fisheries

In 1994, NOAA Fisheries 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 that a permitted vessel may use to participate in the limited entry fishery, and the vessel length associated with the permit. A vessel may only participate in the fishery with the gear designated on its permit(s) and may only be registered to a permit appropriate to the vessel's length. Since 1994, the Council has created further license restrictions for the limited entry fixed gear (longline and fishpot gear) fleet that restrict the number of permits useable in the primary sablefish fishery (Amendment 9) and that allow up to three sablefish-endorsed permits to be used per vessel (Amendment 14.) Most of the Pacific coast non-tribal, commercial groundfish harvest is taken by the limited entry fleet.

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. 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 (PFMC 2003). But limited entry permits may be sold and leased out by their owners, so the distribution of permits between the three states often shifts.

Limited entry fishers focus their efforts on many different species, with the largest landings by volume (other than Pacific whiting) from Dover sole, arrowtooth flounder, petrale sole, sablefish, thornyheads, and yellowtail rockfish. Trawlers—which predominate in fisheries north of Cape Mendocino—take 97% of total groundfish harvest by weight but only 75% by value. This is partly a result of the high-volume, low-value-per-unit whiting fishery, which mainly occurs off Oregon and Washington. Limited entry trawl vessels also use midwater gear to catch yellowtail and widow rockfish. On the continental shelf and slope trawlers use bottom gear to target flatfish species and Dover sole, thornyheads and sablefish (the DTS complex) species in deep water. In contrast, non-trawl limited entry vessels, which mainly target high-value sablefish, took only 2% of the coastwide groundfish harvest by weight, but this accounted for about 25% of the exvessel value. When high-volume but low-value whiting is excluded from the totals, non-trawl landings are in the 10% to 12% range by weight and in the 25% to 27% range by value.

3.3.1.2 Open Access Fisheries

By definition, the open access fishery is not licence-limited, at least pursuant to measures in the Groundfish FMP. (Some state and federally managed fisheries categorized as "open access" in terms of the Groundfish FMP may be separately licence-limited under other regulations.) The commercial open access groundfish fishery consists of vessels that do not necessarily depend on revenue from the fishery as a major source of income. Many vessels that predominately fish for other species inadvertently catch and land groundfish. Or, in times and areas when fisheries for other species are not profitable, some vessels will transition into the groundfish open access fishery for short periods. The commercial open access fishery for groundfish is split between vessels targeting groundfish (the *directed fishery*) and vessels targeting other species (the *incidental fishery*). Incidental groundfish catches occur when targeting other species because of the kind of gear fishers use and the co-occurrence of target and groundfish species in a given area. The number of unique vessels targeting groundfish in the open access fishery between 1995-1998 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). The majority of landings by weight in the open access directed groundfish fishery occur in California, followed by Oregon and then Washington.

An examination of landings in open access fisheries in 1996 and 2001 shows that landings fell during this period; mainly because of sharply-reduced federal open access landings limits. As would be expected, there was a concomitant fall in the exvessel value in these fisheries: directed fishery value decreased from over $7 million in 1996 to under $5 million in 2001 while the incidental fishery shrank by half, from roughly $800,000 in 1996 to roughly $400,000 in 2001 (Goen and Hastie 2002).

3.3.1.3 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, most recreational fishing targeted salmon, but the abundant rockfish often provided a bonus to anglers. Recreational fisheries have contributed substantially to fishing communities, bringing in outside dollars and contributing to tourism in general. This sector may be further subdivided between charter vessels (often referred to as CPFV, or commercial passenger fishing vessels), which take out paying customers, and "private" recreational vessels, operated by individuals on a non-commercial basis.

Overall recreational fishing effort has increased since 1996, but the distribution between subsectors has changed with a fall in charter effort and a parallel increase in private effort (PFMC 2003). 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 before 1996 when salmon seasons were shortened. Groundfish are both targeted and caught incidentally when other species such as salmon, are targeted. The contribution of groundfish catches to the overall incentive to engage in a recreational fishing trip is uncertain. However, it seems likely that the frequency of groundfish catch on a trip adds to overall enjoyment and perceived value. According to 2001 RecFin data, in the charter sector groundfish accounted for 42% of total landings (1,445 mt out of 3,458 mt) in contrast to private vessels where only 20% of landings were groundfish (1,632 mt out of 8,208 mt). There are regional differences in the importance of recreational groundfish landings; in Washington, Oregon and Northern California groundfish account for two-thirds or more of charter landings. For private vessels the proportion does not vary by much from the coastwide value. In Southern California groundfish are a smaller part of both charter and private vessel landings.

3.3.1.5 Tribal 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, that 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 operate off Washington and 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.

3.3.2 Processing and Marketing

3.3.2.1 Commercial Fisheries

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 previous two years. (Unless noted otherwise, figures cited in this section are from DOC 2001). West Coast groundfish accounted for about 3% to this total between 1998 and 2000. 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.

Through 2001, exvessel prices for most species groups were within the range of prices seen over the past five years, except for non-whiting groundfish and California halibut, which were at five-year highs in 2001, and shrimp/prawns and shellfish, which were at five-year lows. 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. Increasing production of farmed salmon is probably at least 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 received for competitive fish protein.

3.3.2.2 Recreational Fishing Experience Markets

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 that 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. However, 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.

3.2.5 Communities

Fishing communities, as defined in the Magnuson-Stevens Act, include not only the people who actually catch the fish, but also those involved in fisheries-dependent services and industries. In commercial fishing this may include boatyards, fish handlers, processors, and ice suppliers. In recreational fishing this 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 are also considered part of fishing communities.

Fishing communities of 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. Each community is characterized by its unique mix of fishery operations, fishing areas, habitat types, seasonal patterns and target species. While each community is unique, there are many similarities.[8/] For example, all face danger, safety issues, dwindling resources, and a multitude of state and federal regulations. They also differ in terms of their cultural makeup, including Native American communities with an interest in the groundfish fisheries. 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.

Limited entry trawl vessels are concentrated in Oregon and Northern California ports. The largest groundfish limited entry trawl fleets are based in Astoria, Charleston, and Newport, Oregon; Crescent City, Fort Bragg, and Fields Landing (near Eureka), California; and Westport, Washington. These vessels mainly engage in shelf and slope fisheries, but many are also engaged nearshore fisheries. There were also 28 vessels operating only in the at-sea whiting fishery. The 178 vessels in the limited entry fixed gear fleet are concentrated in the northern ports of Bellingham, Port Angeles, and Westport, Washington; Newport, Port Orford, and Astoria, Oregon; and Moss Landing, California. This group is dominated by the sablefish fleet operating primarily on the continental shelf and slope. There are 771 open access vessels deriving at least 5% of revenue from groundfish distributed all along the coast. In the north these vessels are more engaged in shelf and slope fisheries. The southern fleet is more engaged in nearshore fisheries. Vessels that catch groundfish incidentally, deriving less than 5% of revenue from this source are almost as numerous: 517 such vessels operate from Newport, and Charleston, Oregon; and Santa Barbara and Garibaldi, California. In the north these operate predominantly on the shelf. The southern fleet is more active nearshore. Altogether there were 1,710 vessels recorded as landing significant quantities of groundfish of the total 4,589 vessels operating in all fisheries coastwide.

3.3 Current Management Regime

The process and standards for adopting rebuilding plans, comprising the proposed action, directly affects the management regime. In chapter 4 effects to the management regime are evaluated in terms of three issues: administrative capacity, flexibility or adaptive management, and public participation. Baseline information related to these three issues is provided here.

3.3.1 Administrative Capacity

Administrative capacity is a measure of the time available to and productivity of the administrators of the management regime. This can be attributed to each element of the management system: Council members, advisory bodies, Council staff, NOAA Fisheries staff and state agency staffs. Capacity is more or less a constant because the Council meets for defined periods of time and staffs have some total amount of work time. (This assumes no significant expansion in the number of staff.) Because capacity is fixed and administrative capacity fully utilized, the time cost of any management measure actually represents a tradeoff: time spent on one task means less time spent on another. Procedural measures can be assessed in terms of complexity; the more complex the task of implementing and "maintaining" the procedure the more organizational capacity will be required. This means that organizational attention and capacity is shifted away from other tasks that may be equally pressing or important. The allocation of resources among different tasks

8/ Supplemental county level economic and demographic information has been compiled for a general baseline description of West Coast fishing communities. This information may be accessed on the Council web site (http://www.pcouncil.org/communities/comdoc.html).

can have difficult-to-predict indirect effects on the environment if the implementation of management measures are delayed or organizations do not have the opportunity to address broad issues strategically.

NOAA Fisheries and the states have researchers and professional staff that participate in the formulation of management measures (for example, by conducting the stock assessments used to determine optimum yields). Council advisory bodies, such as the GMT and GAP also play a central role in identifying management targets and measures, and conducting the necessary supporting analyses. All of these personnel can contribute to the preparation of amendment documents. However, the task of preparing the analytical and informational documents required when amending an FMP and promulgating regulations falls mainly on the professional staff employed by the Council and NOAA Fisheries. (Within NOAA Fisheries, staff at the Northwest Region are responsible for actions related to the Groundfish FMP.) Generally, Council and Northwest Region staffs divide responsibility for preparing of groundfish-related FMP amendment documents, with one or the other office taking the lead. In addition, if a particular action requires the promulgation of regulations, NOAA Fisheries Northwest Region staff are responsible for preparing the supporting documentation.

The Council has two staff officers working on groundfish, who devote essentially 100% of their time to groundfish-related tasks. (Time spent on FMP/regulatory amendments is limited by a range of other responsibilities, such as staffing workshops and advisory body meetings and preparing briefing materials for Council meetings.) Two economists carry out economic analysis in support of a range of Council actions but devote between 35% and 50% of their time to groundfish-related actions. One staff officer ensures that Council processes and documents comply with NEPA-related regulations and also spends about 35%-50% of his time working on groundfish-related matters. Three other professional staff devote a small amount of time to groundfish-related work, with the primary responsibilities elsewhere.

NOAA Fisheries NWR have four staff the spend part or all of their time on groundfish-related administrative tasks. (This excludes fishery scientists working for NOAA Fisheries who conduct stock assessments and related scientific tasks.) While Council staff prepare amendment documents (including required environmental and regulatory analyses) and support the Council decision-making process, NOAA Fisheries staff are responsible for tasks related to the implementation of regulations. They also prepare amendment documents on occasion but less involved in Council decision-making support, for example by staffing Council meetings.

It is very difficult to assess the capacity of these resources, for example in terms of the number of amendments or actions that can be completed in a given time period. In part this is due to the wide variation in the complexity of different management actions and the fact that no one person works full time on a single action; usually several actions are ongoing and other tasks are also part of staff duties. Taking the staff identified above as a whole, at least 20% and possibly as much a third of their time of is directly related to the preparation of the analyses and documentation necessary to implement an amendment or action. (This estimate includes other activities such as rulemaking, including the implementation of seasonal management.) It is also important to note that fishery scientists at NOAA Fisheries and state agencies carry out much of the analyses supporting management decision-making.

One can also evaluate capacity in terms of the time needed to implement a management action. This also varies tremendously, depending on the nature and complexity of the action. Implementation of periodic or seasonal management has to completed in a relatively short time period because of the need for fishing regulations to be in place at the beginning of the season. For this reason a substantial portion of staff resources may be taken up for a relatively short period of time. For example, during the second half of 2002 close to half the staff capacity described above was committed to implementation of groundfish specifications and management measures for 2003. FMP amendments are typically on a more extended schedule, driven in part by Council deliberation and decision-making and also the review requirements within NOAA Fisheries. Generally speaking, it takes at least six to nine months to implement an FMP amendment, although it is not uncommon for a year or more to elapse because of Council deliberations and the availability of staff to do the work. (This amendment offers a good example. Work began in late 2001 and final approval is expected some time in the latter half of 2003. This extended period is due to the need for the Council to deliberate and the fact that for much of the second half of 2002 most staff time was devoted to implementation of 2003 specifications and management measures.)

A fair assessment would be that Council and NOAA Fisheries staff have the capacity to complete one or two Groundfish FMP amendments per year, if they are of moderate complexity. Considering Council and NOAA Fisheries staffs together, groundfish-related action requiring notice and comment rulemaking requires an equivalent amount of staff capacity.

3.3.2 Adaptive Management

The concept of adaptive management was first developed in the 1970s (Holling 1973) and has been applied widely. Adaptive management assumes uncertainty, promotes "learning" strategies, and envisions a cyclical management process in which management measures are refined in response to new information and understanding of the managed system. A review of adaptive management of Columbia River salmon (Lee and Lawrence 1986) describes it as "a policy framework that recognizes biological uncertainty, while accepting the congressional mandate to proceed on the basis of the 'best available scientific knowledge.' An adaptive policy treats the program as a set of experiments designed to test and extend the scientific basis of fish and wildlife management." Gunderson (1999) argues that flexibility in management institutions and system resilience are key determinants of adaptive management success. Managing to rebuild overfished species populations is fraught with uncertainty because of the difficulty in predicting future performance. Stock performance depends on the nature of ecosystem resilience. As first described by Holling (1973), resilience may either be interpreted as a return to some "global" equilibrium following perturbation (such as fishing down one population in the system) or in terms of multiple equilibria where future states are unpredictable. Given that the role environmental regimes play in determining recruitment is at best poorly understood—and thus what is a reasonable estimate of potential unfished biomass—the ability to realistically plan for a future end state (stock recovery) may be limited. Policy makers may be tempted to replace ecosystem uncertainty with "spurious certitude": "Perhaps the most common solution is to replace the uncertainty of resource issues with the certainty of a process, whether that process is a legal vehicle—such as a new policy, regulation, or lawsuit (Rodger 1997)—or a new institution—such as a technical oversight committee or science advisory committee" (Gunderson 1999, p. 2). Given the long time horizons involved in rebuilding some overfished groundfish populations, uncertainty about future stock performance, and uncertainty about ecosystem performance, a flexible, or adaptive, management regime will be important.

Nyberg (1999) outlines six steps in the adaptive management cycle. (Other authors have posited similar steps (c.f. Olsen 1993).). Rebuilding mandates and the institutional structure of federal fisheries management (including the Council system) provide all the "pieces" to construct these steps: problem identification, program design, implementation, monitoring, evaluation, and adjustment of the management regime, which initiates a new round in the cycle of steps just described. Monitoring and evaluation are the key steps differentiating adaptive management; and flexibility—which makes the regime easier to change in response to new information—is a valuable attribute in these steps. The scenarios presented in this analysis all incorporate procedures to update rebuilding plans, and adjust management measures, in response to new information about overfished stocks. For all scenarios flexibility of response is constrained by the range of management tools that are both legal and practical. What varies is the procedural complexity entailed in adapting management measures in response to new data. This is a correlate of administrative cost discussed above. More complex procedures will require more administrative resources. (On the other hand, they may force better problem assessment and redesign as part of the adaptive cycle.) Generally, then, flexibility and administrative cost are inversely correlated.

Groundfish management rests on a framework described in the FMP, which allows management targets (OY levels for managed species) to be specified annually, based on regular stock assessments. A range of management measures are then available, which also can be modified annually, in order to constrain fisheries to these targets. (As discussed below groundfish management is shifting to a two-year cycle.) The adoption of rebuilding plans establish longer term targets for overfished stocks. More generally, the management framework establishes a target biomass, B_{MSY}, and according to the "40-10 rule" even stocks above the overfished threshold but below target biomass are subject to precautionary management. In the rebuilding analyses the P_{MAX} value is used to determine the fishing mortality rate (F) that is estimated to allow the stock to rebuild to the target given that probability and T_{TARGET} defined as the median rebuilding year. This F is then applied to current estimates of stock size to arrive at its OY or current-year management target. This process allows adaptive management over the longer term because annual targets are tied to a probability-based measure of stock recovery.

The management process is subdivided into two components. Stock assessments (and rebuilding analyses) are science driven. They arrive at an estimate of a sustainable yield for a stock (OY) within the management framework. Because of scientific uncertainty, stock assessment results may be presented as a range of values, providing policymakers with an implicit or explicit (as in the case of rebuilding analyses) tradeoff between risk and short-term benefits. The results of this scientifically driven part of the process are then used by the Council in their policymaking capacity. In addition to risk/benefit tradeoffs, the Council also considers the allocation of fishing opportunity and formulates the management measures intended to achieve scientifically-determined targets. (Managers refer to a "wall of science" separating the determination of targets and the formulation of management measures by the Council.) The next three subsections describe stock assessments, rebuilding analyses, and Council decision-making.

3.3.2.1 The Stock Assessment Process

Stock assessments for Pacific Coast groundfish are generally conducted by staff scientists of the 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 Southwest, Northwest, and NOAA Fisheries 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. 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 have the same level of information and precision.

Quantitative and non-quantitative 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 there has been development of similar, but more powerful, models using state-of- the-art software tools. 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 ABCs and OYs to the Council. 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 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 are periodically reassessed as often as every year—currently only the case for Pacific whiting—to every three or four years. However, 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 are 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. Interim ABC values may be established for these stocks based on qualitative information.

3.3.2.2 Rebuilding Analyses

In the case of overfished species, stock assessment results form the basis of a rebuilding analysis, which in turn are 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 developed by Dr. Andre Punt of the University of Washington School of Fisheries and Aquatic Sciences (Punt 2002b). In the analysis the probability that 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}). Based on these limits, and the probability of achieving the target biomass by T_{MAX} (denoted P_{MAX}), the target rebuilding year (T_{TARGET}) is determined. 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 possible variability 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 that 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. Figures 3-1 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 that the stock will rebuild by that year.

Figure 3-2 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 that 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 that the stock has rebuilt or not rebuilt in this year. In all other years it is either more or less likely that 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 3-3 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 10 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 3-3 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 3-4 displays the results of three hypothetical simulations for fishing mortality rates resulting in P_{MAX}s 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 that the stock will recover in this maximum time period increases.

A T_{TARGET} is then computed as the median rebuilding year for each related F and P_{MAX}. The median year is simply the year by which half of all cases have already rebuilt, and is unique for a given F and P_{MAX}. Figure 3-4 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 that 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 3-5, 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 that the true value falls within that range.[9/]

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 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}).[10/] 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 that 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. The choice of time period is complicated because biologists are unsure how important environmental conditions are to survival and growth versus

9/ These assessments demonstrates three important points. First, different modeled species will produce different degrees of variability when comparing Monte Carlo simulatons 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; above a certain run size there are diminishing returns for further increases in the number of cases. 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).

10/ 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 the either y_{decl} or the following year.

spawning population size, which posits 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.) 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. 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 discusses 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. The overfished species being modeled may not exhibit this relationship because of its particular biology and ecology. The SSC recommends determining B_0 based on the density-dependent hypothesis and therefore using earlier data (resulting in relatively large values for B_0). It can be seen that uncertainty about stock dynamics requires scientific judgement. This is not a policy choice (which involve trade-offs between different social values). But these judgements do affect the variables that influence policy choices since other parameters, such as target biomass, are defined in relation to B_0.

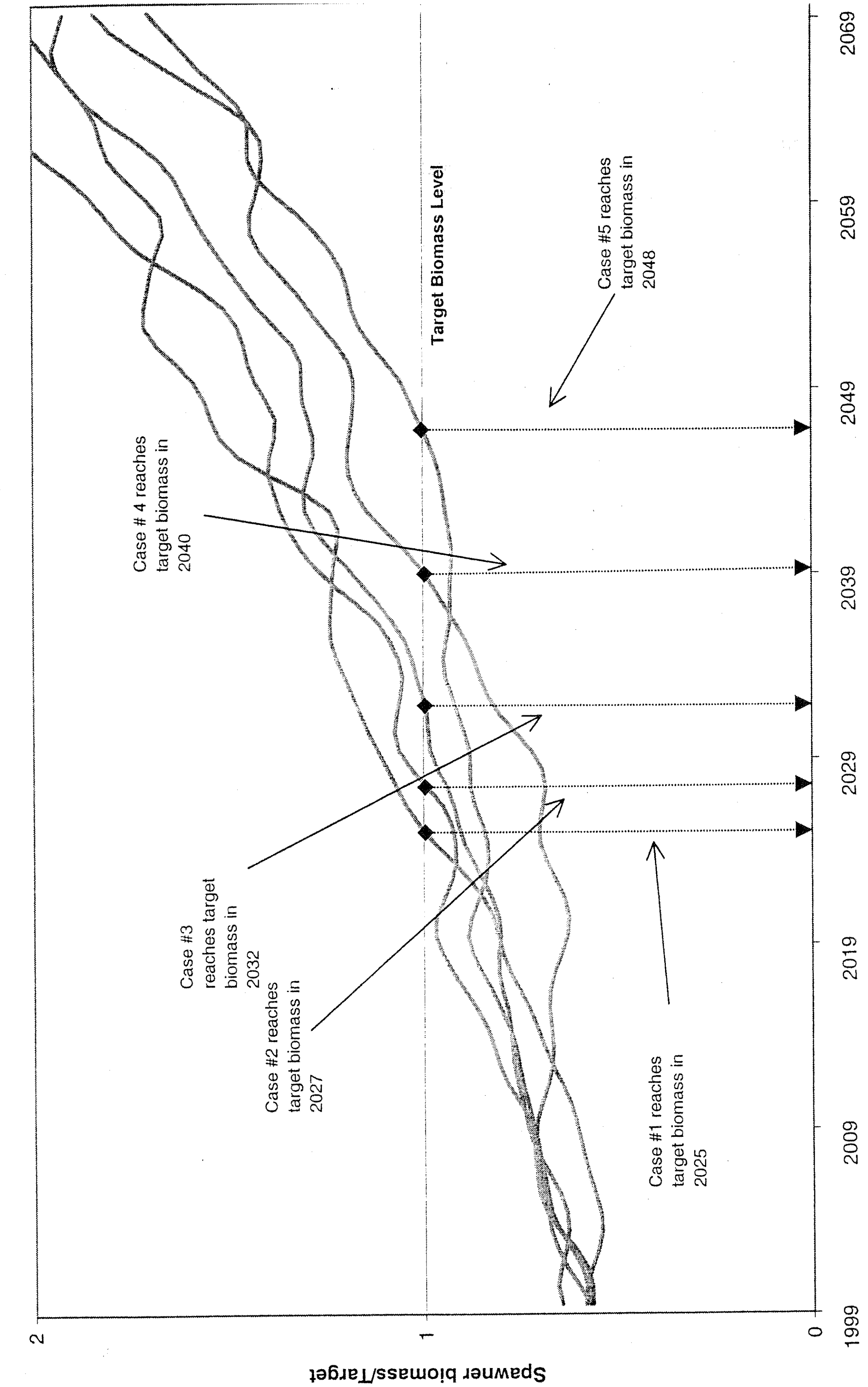

FIGURE 3-1. Example of five cases from a Monte Carlo Simulation.

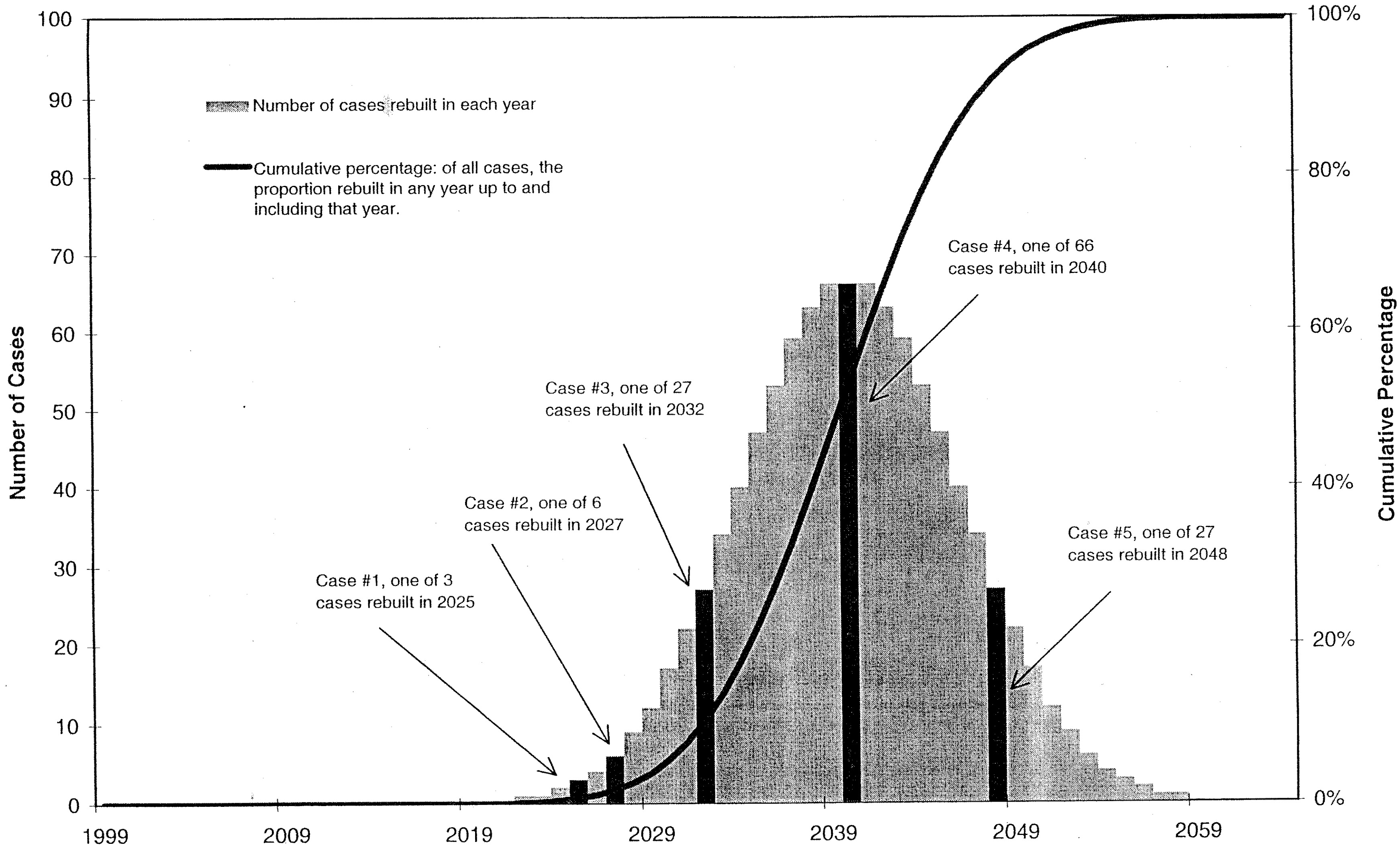

FIGURE 3-2. How cumulative probability is calculated in a Monte Carlo simulation.

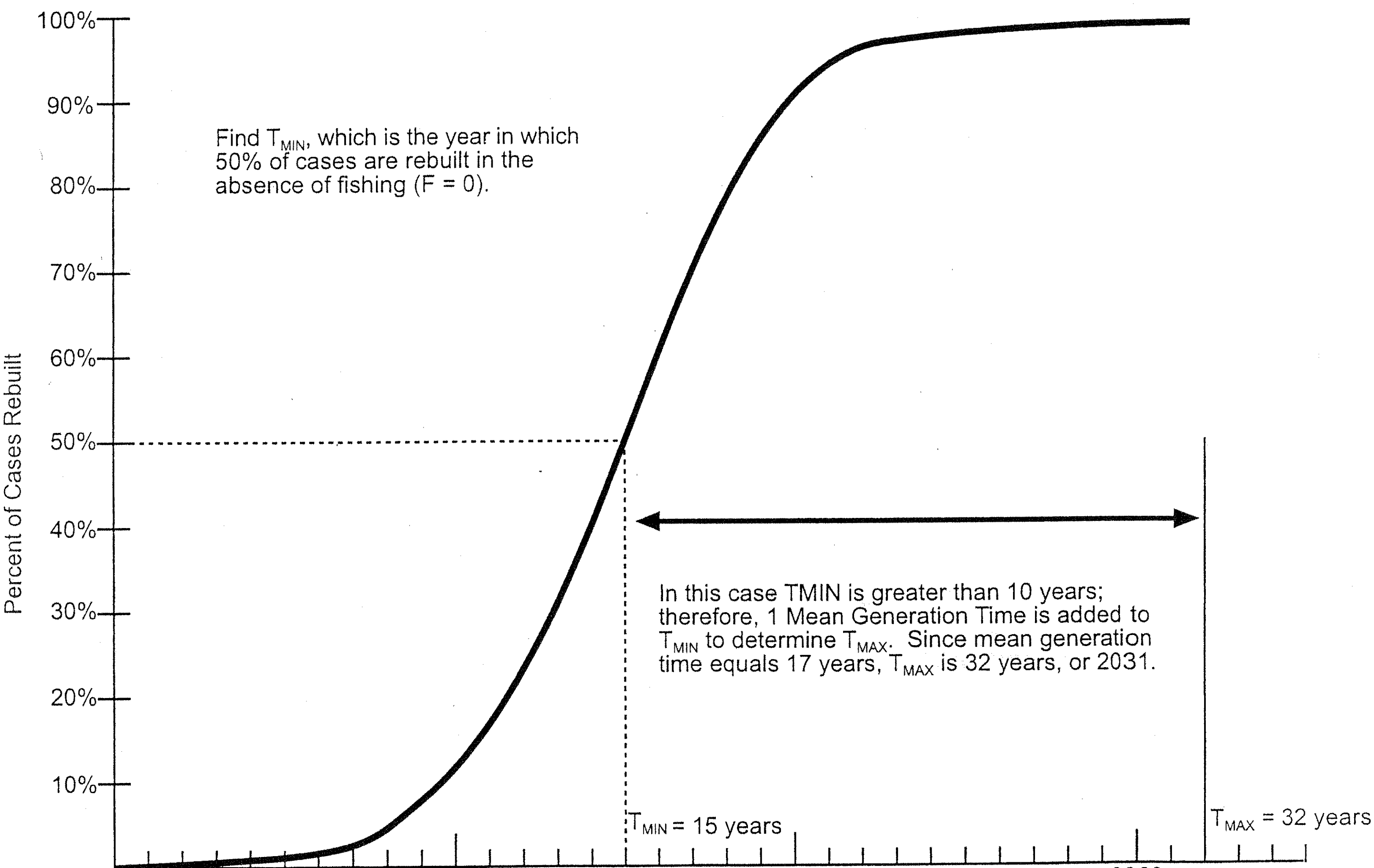

Figure 3-3. Calculation of the minimum rebuilding time, T_{MIN}

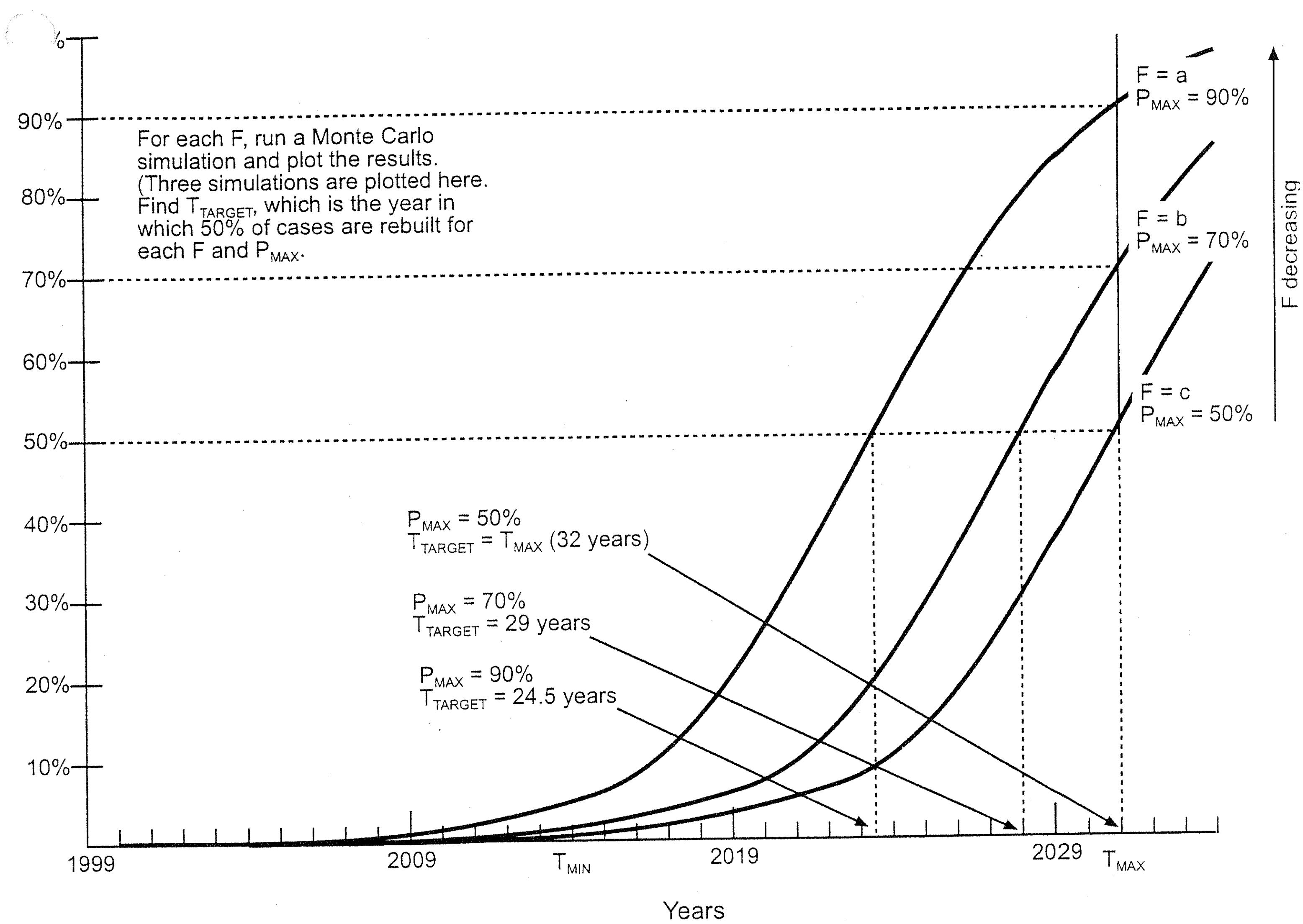

FIGURE 3-4. Computation of the rebuilding probability, P_{MAX} and the median rebuilding year, T_{TARGET}.

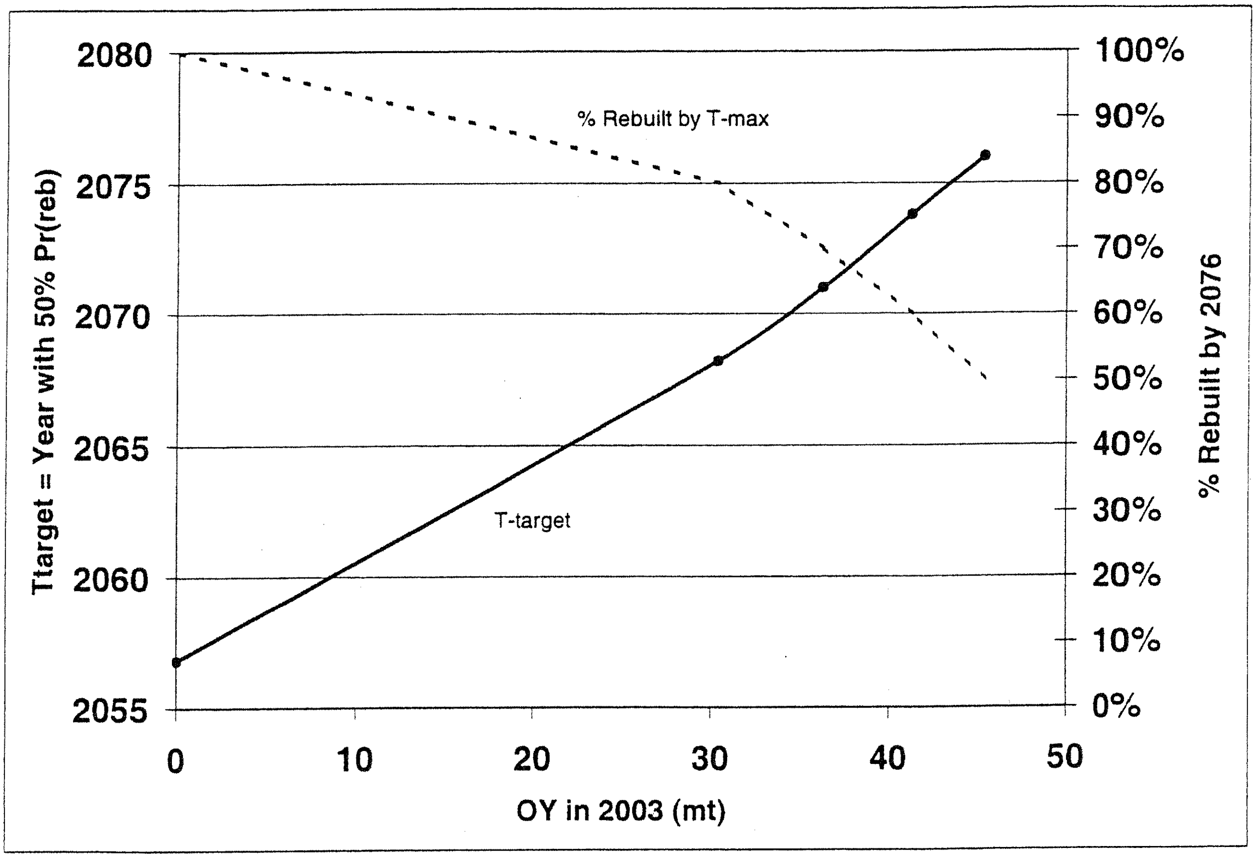

FIGURE 3-5. Trade-off between OY in 2003, T_{TARGET} and T_{MAX} from the canary rockfish rebuilding analysis.

3.3.2.3 Council Decision-making

Periodic Management

Groundfish management is mainly implemented through a framework in the FMP, which allows new fishing regulations to be promulgated by regulations, as long as these measures fall within the range of those described in the FMP. Section 6.2 in the Groundfish FMP describes different procedures for establishing and adjusting management measures. To date this type of "seasonal" management has been implemented through regulations promulgated annually, covering a fishing, which corresponds to the calendar year. This process requires at least two Council meetings followed by notice and comment rulemaking. Notice and comment rulemaking requires publication of a proposed rule in the *Federal Register* followed by a public comment period of at least 45 days, followed by publication of the final rule, with any modifications stemming from public comment. Once this process is completed regulations may come into effect. Rebuilding measures incorporated into regulations would require this full rulemaking process to change. Other actions, such as inseason management changes, can be implemented through more abbreviated processes. But these procedures would not be applicable to rebuilding measures. As noted elsewhere, the same notice and comment rulemaking process used to implement periodic management could be used to change the rebuilding strategy and implement rebuilding measures.

In November 2002 the Council approved Amendment 17 to the Groundfish FMP, changing the process for developing groundfish specifications and management measures so that measures could be established for two years, rather than one year. This will provide more time for the Council and NOAA Fisheries to work on other critical groundfish issues. This schedule also allows enough time for NOAA Fisheries to publish a proposed rule in the Federal Register and take public comment before its final decision on whether to approve the Council recommendations. Because of limited amount of time between a final Council decision and the beginning of the new year, and a lawsuit requiring NOAA Fisheries to use notice and comment rulemaking, the agency had to implement an emergency rule for the first two months of 2003. This allowed the fishing season to commence while comment continued on the final rule for the rest of the fishing season (March-December). Promulgating both rules results in a procedurally complex and administratively burdensome process. The difficulty of an annual process is compounded by the fishing industry's strong desire that the fishing season correspond to 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.

The Council's preferred alternative for Amendment 17 (subject to approval by the Secretary of Commerce) would establish a biennial management cycle for groundfish, beginning with the 2005-2006 fishing years. Under this alternative, a three Council meeting (November-March/April-June) process would be used to prepare biennial management measures. OY values for managed species would be established for each fishing year during this two-year management period. That is, two one-year OYs would be specified for each managed species.

To ensure that 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 multi-year management period. These checkpoints would consider whether new science or assessment information should be used to alter harvest levels. The Council asked the GMT (in consultation with the SSC and GAP) to develop thresholds for determining whether mid-process changes are necessary.

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. (In unusual cases regulations 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 2000). 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. After the third meeting Council staff make any needed non-substantive additions and changes and transmit the document to NOAA Fisheries for review. Given this process, aside from any staff time needed to prepare the analyses and supporting documentation, Council decision-making takes at least four months. This is the minimum time within which three meetings could occur given the Council meeting schedule. If initial consideration occurred at the March meeting, then the April and June meetings could be used to complete the process. Alternatively June, September and November meetings could be used. 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.

3.3.3 Public Participation

An often-cited work on citizen participation (Arnstein 1969) proposes an eight-rung "ladder of participation." The lowest two rungs represent non-participation; public involvement is a means for the organization to persuade or manipulate the public. The next three rungs represent different levels of "tokenism"; an organization may offer opportunities for the public to comment, or express their views on a decision, but there is no guarantee that their concerns will be heeded by decision-makers. The last three rungs represent successively higher degrees of true citizen power, to the degree that they have either delegated decision-making authority or actual control over the process. It is also worth mentioning the large body of literature on common property resource institutions (see Ostrom *et al.* 2002 for a recent review), if for no other reason than Arnstein's typology begs the question of what constitutes the potentially enfranchised public. This literature is concerned with the nature of rights over resources and the structure of institutions that manage these rights. From this perspective "citizen involvement" is more of a question of who controls access to and use of resources not held privately and how rights-managing institutions function.

The range of forums for public participation that the Council process offers can be evaluated in terms of Arnstein's ladder of participation. Council members are the decision-makers, of course, (recognizing NOAA Fisheries's ultimate authority) and its membership is meant to represent a range of stakeholders (although some groups argue that representation is insufficiently diverse). 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 non-members 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 NOAA Fisheries, 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 NOAA Fisheries). 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.

Trust is an important corollary of public participation that can play out in a variety of ways. Interest groups and stakeholders who believe they have some influence over decisions are likely to put greater trust in the process. By reducing conflict, influence can stem controversy. (It should be emphasized that in the policy arena conflict and controversy are not necessarily bad things. They force more careful consideration of an issue from different perspectives. This may result in more equitable decisions.) On the other hand, those groups who believe themselves lacking in influence will seek greater transparency and certitude.

Transparency allows the public to determine what factors (especially those that are explicitly "political") influence decision-making. Certitude reassures those with less influence that decisions are constrained by explicit rules limiting their scope. Constraints may be external—imposed by legal requirements for example—or self-imposed so that a course of action is fully or permanently determined. As implied in the previous discussion of adaptive management, this type of certitude can be an institutional response to uncertainty, and one that runs counter to adaptive response. This is especially the case if interest groups see uncertainty as a means for specific groups with opposing interests to unduly influence decision-making. This may be an important factor in relation to rebuilding measures because of the high degree of uncertainty about stock status in the future. Uncertainty could be seen to enlarge the range of potentially defensible decisions. Similarly, invoking adaptative strategies might be seen as an opportunity to accommodate a given set of interests. This aspect of participation, as it relates to controversy, is also evaluated by assessing "certitude," or the degree to which decisions are constrained by established policies. (These are constraints over and above those established by the Magnuson-Stevens Act an National Standard Guidelines.) This characteristic will also tend to vary inversely with flexibility (adaptability).

The Council process lies somewhere on the upper rungs of what Arnstein labels tokenism or at the lowest rung of citizen power, labeled partnership (citizens can negotiate with power-holders but do not have ultimate authority). It is equally important to ask what citizenry are represented by the Council process. Well organized stakeholders and state and tribal governments are generally well-represented in the process. The federal government, in addition to representation on the Council, of course has ultimate authority. A key question is representation and perceived legitimacy of different kinds of stakeholders. Environmental groups have complained about their ability to effectively participate. (No Council seat, for example, is held by a representative of an environmental organization.) This issue can be put in the context of rights (referring to common property resource literature). Fishers—those directly exploiting the resource—tend to be well-represented because of the perception that their rights are elevated. (The Magnuson-Stevens Act, after all, is primarily concerned with resource exploitation, albeit in a sustainable fashion.) Environmental groups may be said to have a more diffuse interest in that they represent a broader public that has an indirect stake in a more broadly constituted resource (the marine ecosystem and the array of non-extractive or non-monetary benefits derived from it). There is also undoubtedly variation in the degree to which different fishers are represented. The individual, of course, will always have limited power, so this becomes a question of the nature of collective action. Fishers that have the means and willingness to organize, through a trade or sectoral organization, are likely to be collectively more influential.

4.0 ENVIRONMENTAL CONSEQUENCES

The environmental consequences of the proposed action are evaluated in terms of direct, indirect and cumulative impacts. Direct impacts "are caused by the action and occur at the same time and place" while indirect impacts "are caused by the action and are later in time or father removed in distance"(40 CFR 1508.8). Cumulative impacts result from the "incremental impact of the action when added to other past, present, and reasonably foreseeable future actions" including activities of agencies and individuals other than the action agency (which in this case is NOAA Fisheries). The proposed action is procedural in nature: it specifies how rebuilding plans will be adopted and periodically reviewed but does not specify the content of individual rebuilding plans (the value of parameters like P_{MAX}, T_{MAX} and T_{TARGET}, for example). For this reason the proposed action will not have any direct impacts on the human environment. Its effects may be construed as either indirect, since they will occur at a later time and place through the implementation of rebuilding plan measures, or cumulative, since the total impact includes the combined effect of rebuilding plan measures as "reasonably foreseeable future actions."

While not directly affecting the environment, the proposed action will affect the management regime. First, the adopted framework affects how rebuilding strategies will be developed—in terms of the targets and management measures that will be used. Second, the proposed action can be evaluated in terms of the issues discussed in section 3.3: administrative capacity, adaptive management, and public participation. The options described in chapter 2 will have varying effects on workload, the degree to which management can adapt to changed conditions, and how much the public, through the Council process, will have assurances that social goals (e.g., resource conservation versus resource use) will be met. These effects could in turn affect the environment based on what management actions can be undertaken given the distribution of institutional resources. Simply put, fixed administrative capacity represents a zero sum game: the time that participants devote to implementing, reviewing and amending rebuilding plans is time taken away from other management initiatives. This expenditure of administrative capacity and management flexibility represents a tradeoff against the obligation to adhere to targets and the opportunity for periodic review, which allows some public participation through the Council process.

These considerations form the basis of the analytical framework underpinning this chapter. Section 4.1 discusses the potential effects of different strategies (in terms of what rebuilding parameter the strategy is based on) and of uncertainty as affected by future stock assessments. Section 4.2 evaluates each set of options in terms of their effect on the management regime, using the issues outlined in section 3.3. Section 4.3 evaluates indirect impacts to the environment, based on future management priorities identified by the Council and the likelihood that different sets of options will diminish the ability to address these priorities. Section 4.4 provides an overview of the combined effects of rebuilding plan measures and cumulative effects when other external effects are considered.

4.1 Evaluation of Rebuilding Strategies

As discussed in Chapter 2 and section 3.3.2.2, the different parameters used to characterize rebuilding can be assigned to different categories. First, there are biological parameters that describe the underlying characteristics of the stock. Unfished biomass, and by extension the target biomass, and mean generation time fall into this category. Second, there are the two limits—T_{MIN} and T_{MAX}—established by national policy. None of these parameters represent a policy choice available to the Council. Finally, there are the strategic parameters, which, along with any adopted management measures, represent a rebuilding strategy. These parameters are F (or a specified harvest control rule), P_{MAX} and T_{TARGET}. As discussed in Chapter 2, the Council may choose any one of these three values as the basis for their strategy, although T_{TARGET} needs to be specified in order to comply with language in the Magnuson-Stevens Act. At the request of Council Staff, Dr. Andre Punt of the University of Washington School of Fisheries and Aquatic Sciences simulated results of holding any one of these values constant (i.e., using it as the basis for the management strategy) as new stock assessments add new information about recruitment.

The simulation assumes that stock assessment scientists have perfect information about the current age-structure of the population, historical spawning biomass (including the unfished spawning biomass), and historical recruitment. Thus, biological and national policy parameters do not change. Although this is unlikely to be the case, it allows the analysis to focus on the tradeoffs of using different strategic parameters. The simulations assume, however, that the stock assessment scientists do not know the stock-recruitment relationship (and hence future recruitment), and must therefore predict future recruitment by assuming that the ratio of the number of recruits to spawning biomass size is a constant value. It can be said that there are two models. One model represents the true relationship between population size and structure and recruitment, but scientists do not know the parameters for this model. Instead, stock assessment scientists use a model representing their current (and incomplete) understanding of the truth.

Because new recruitment estimates become available to the stock assessment scientists every third year, as part of the typical assessment cycle for Council- management groundfish, new recruitment values are added to the projection every three years. For the simulations where it is held constant, P_{MAX} is set at 60%. T_{TARGET}, the median rebuilding year for this P_{MAX}, is calculated in year 44. (The simulation begins in year 44 of a rebuilding period with a T_{MAX} of 91 years). The F calculated for the initial three years of the simulated period is used to simulate a constant F strategy. In order words, the calculations are based on setting P_{MAX}, T_{TARGET} or F when the first rebuilding analysis is done and not changing the specified value thereafter.

Figures 4-1 through 4-3 display the results of these simulations. Figure 4-1 displays projected population growth under each strategy. Figures 4-2a and 4-2b show the effects of the different strategies on OY and F, respectively. Figures 4-3a and 4-3b show the effects of the different strategies on T_{TARGET} and P_{MAX}. Looking at all of the figures it can be seen that no matter what parameter is held constant the relationship between P_{MAX} and T_{TARGET} does not differ by much. This is reflected in the fact that the lines representing these two parameters (dashed or dot-dashed) substantially overlap. In terms of rebuilding strategy, therefore, the essential tradeoff is between managing to a constant F (putting strategic emphasis on the harvest control rule) or T_{TARGET} (as determined for a given P_{MAX}). As seen in Figure 4-1, holding F constant, based on stock condition at the outset of the simulated period, results in faster rebuilding to the target biomass. Larger increments of the population are not removed by fishing as it reaches the target size; as a result, in this simulation at least, the population reaches its target size well before T_{MAX} and continues growing. A constant T_{TARGET} strategy allows F to increase as population approaches the target biomass, based on the 60% probability of achieving it within 91 years (T_{MAX}).

Figure 4-2a shows the effect on annual OYs. For the same reasons just discussed, OYs increase much more, and are more variable, under a constant T_{TARGET} strategy compared to a constant F strategy. Figure 4-2b is similar, displaying the change in F, rather than OYs. The horizontal sold line in this figure represents the value of F under a constant F strategy. (By definition, a constant value results in a horizontal line.) A T_{TARGET} (or P_{MAX}) strategy allows F to increase so that a larger fraction of the stock is taken, and the rate of population growth slows as the biomass target nears. The stair-step appearance of F under a T_{TARGET} (or P_{MAX}) strategy in this figure simply reflects the fact that the same newly computed F is applied during each year in each successive three-year period after a stock assessment. In both figures it can be seen that F, and the resulting OY, have to be adjusted downward after some assessments due to modeled variability in recruitment.

Figures 4-3a and 4-3b show the same relationships in terms of T_{TARGET} and P_{MAX} respectively. In Figure 4-3a the solid line shows that the estimate of the target year is successively lowered under a constant F strategy. Estimates of T_{TARGET} under a constant P_{MAX} strategy differ little from the initially computed value. In Figure 4-3b the solid line simply shows thatunder a constant F strategy P_{MAX} rapidly reaches 100% because the target biomass is reached much sooner. Again, the relationship between P_{MAX} and T_{TARGET} (represented by the difference between the dot-dashed and dashed lines) varies only slightly due to modifications in recruitment values used in the projections.

As noted above, this simulation assumes perfect information about the input values for the analysis. In some cases stock productivity may be under- or over-estimated, as revealed by subsequent assessments. Obviously, over-estimating productivity for some period of time would have graver consequences than under-estimating it. The current status of bocaccio rockfish offers an instructive, although extreme example of the effect of estimation errors. This species was declared overfished in 1999. In subsequent years recruitment was over-estimated, harvest levels set too high, and these levels exceeded. In addition, a change in the way rebuilding analyses are structured had an important effect. Previously T_{MIN} was recalculated starting from the year in which the rebuilding analysis was conducted. The analysis was revised to fix the starting point for the analysis at the year when the stock was declared overfished (in this case 1999) and account for actual harvests in subsequent years up until the year when the analysis is performed. As a result, a revised 2002 rebuilding analysis (MacCall and He 2002), accounting for the over-harvest in the intervening years, shows that even in the absence of fishing P_{MAX} is less than 50%. This is because the limits (T_{MIN} and T_{MAX}) were calculated based on existing recruitment data while the P_{MAX} calculation accounts for the excessive harvests. A less anomalous situation could arise if T_{MAX} is lowered because new estimates of stock productivity are higher (in other words, productivity was previously under-estimated); a constant T_{TARGET} strategy could result in a target year that is now greater than T_{MAX}. Conversely, the estimate of unfished biomass could be lowered due to new estimates of compensatory effect or other limiting ecological factors. This would also result in a target year greater than T_{MAX} under a constant T_{TARGET} strategy.

Both strategies entail similar risks in cases where stock productivity is over-estimated. A constant F strategy is more conservative in that additional surplus production is not removed as the stock approaches the target biomass. However, any over-estimation of F would apply to the period from the most recent stock assessment. If the over-estimation were small it would have a slight effect during that period and be overtaken by a slightly delayed increase in stock size. If the over-estimation was large overfishing could occur, preventing stock growth. Pursuing a T_{TARGET} strategy would entail similar risks. The most important assumption in any strategy is that regular stock assessments provide a feedback loop allowing more or less continuous adjustment (at the interval of regular stock assessments) of the fishing mortality rate. Under a constant F strategy such an adjustment would only occur if recruitment had been over-estimated in the last assessment, resulting in an F that was too high. However, under a constant F strategy OY would change as additional information allows better estimation of the current age-structure of the population. This isn't apparent in the figures because perfect information about the current state is assumed. Under a T_{TARGET} strategy F would be adjusted after each stock assessment so that the stock rebuilds by the target year; estimation errors could also be compensated for as part of this adjustment.

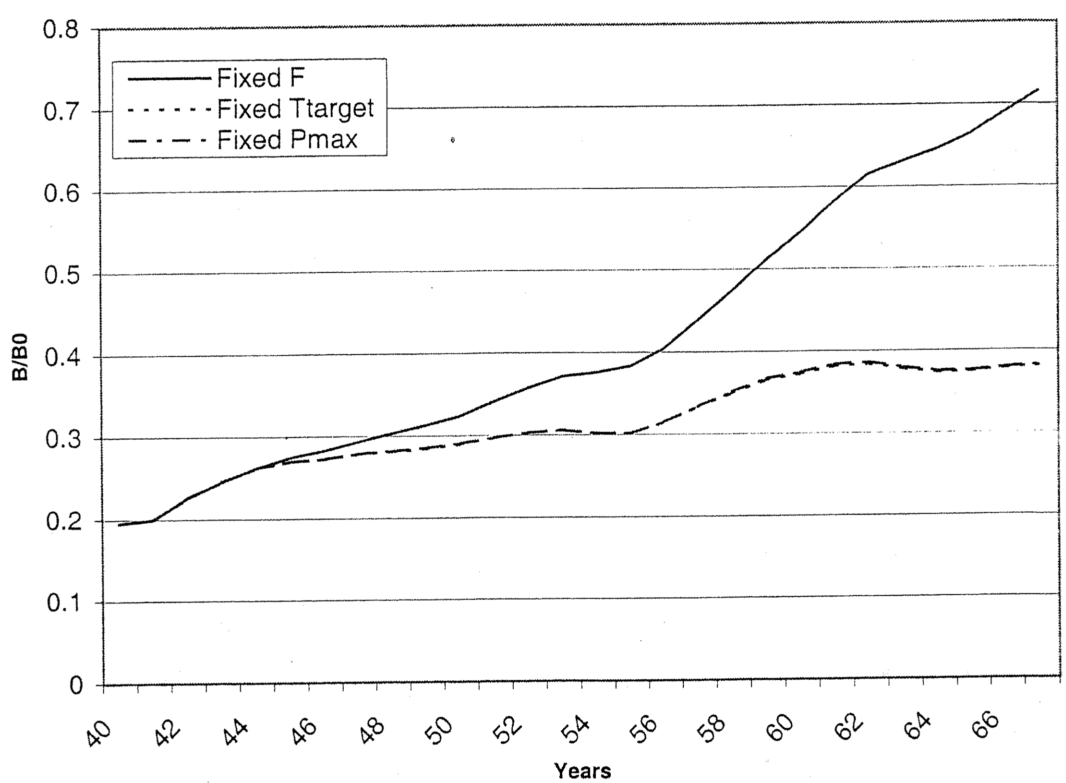

FIGURE 4-1: Biomass trajectories under different strategies.

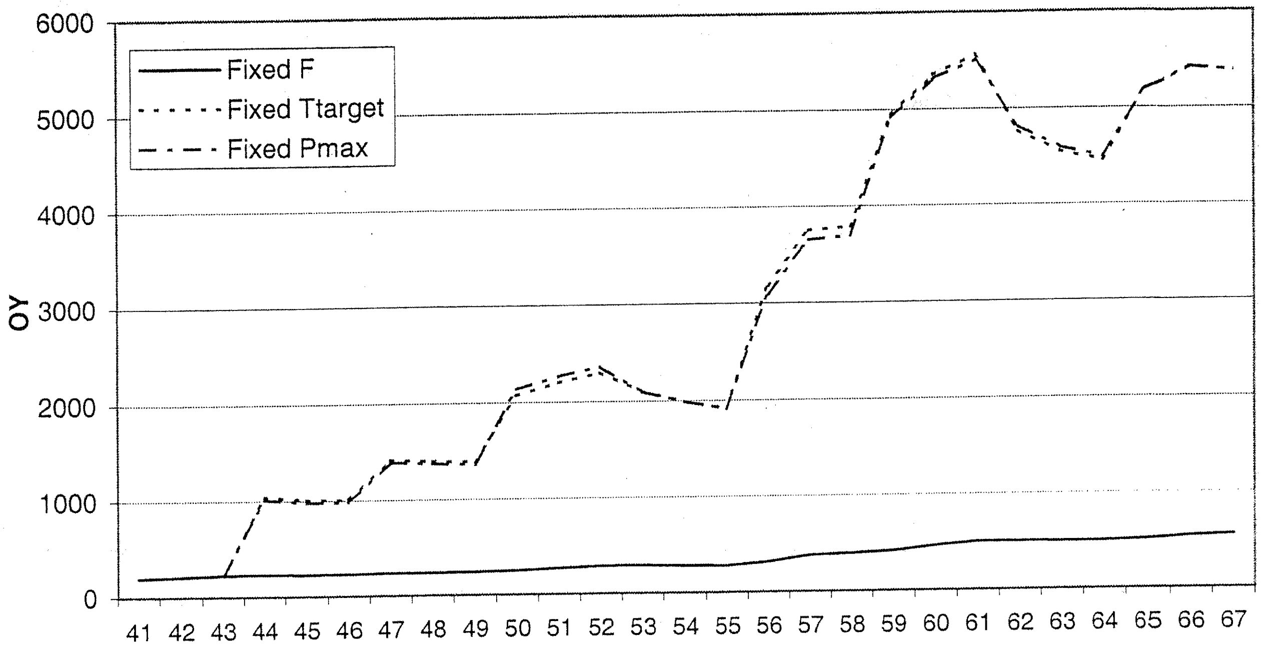

FIGURE 4-2a: Change in catch (OY) over time under different strategies.

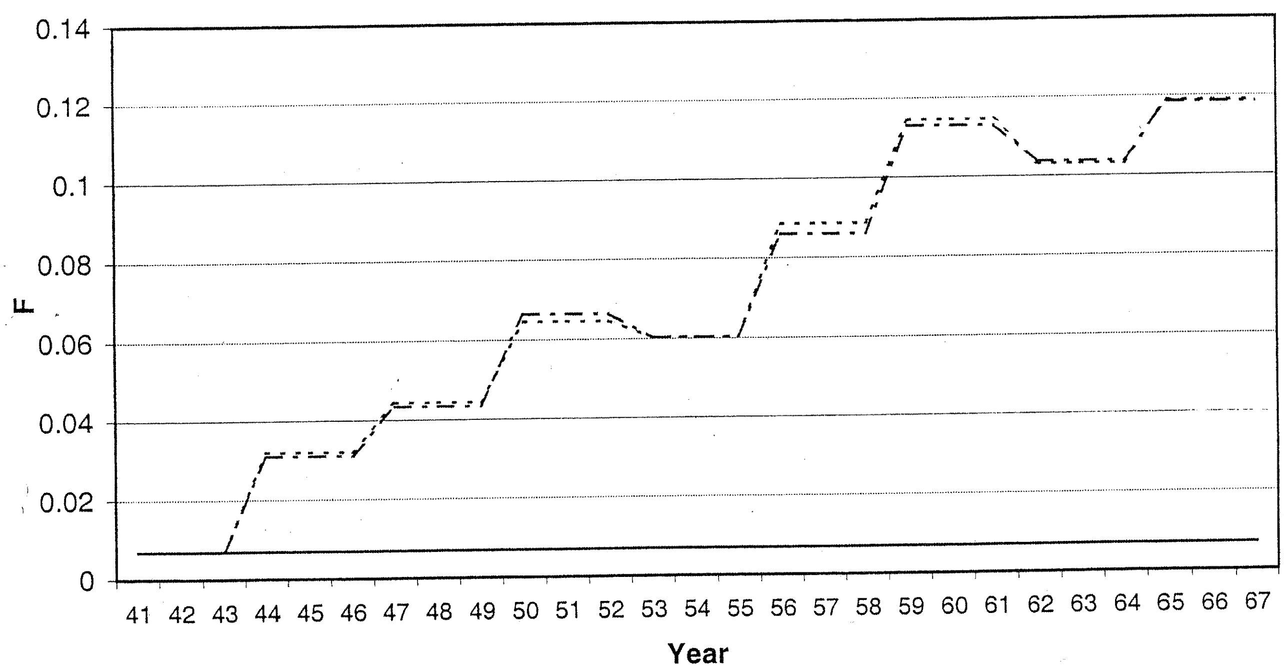

FIGURE 4-2b: Change in the F rate over time under different strategies.

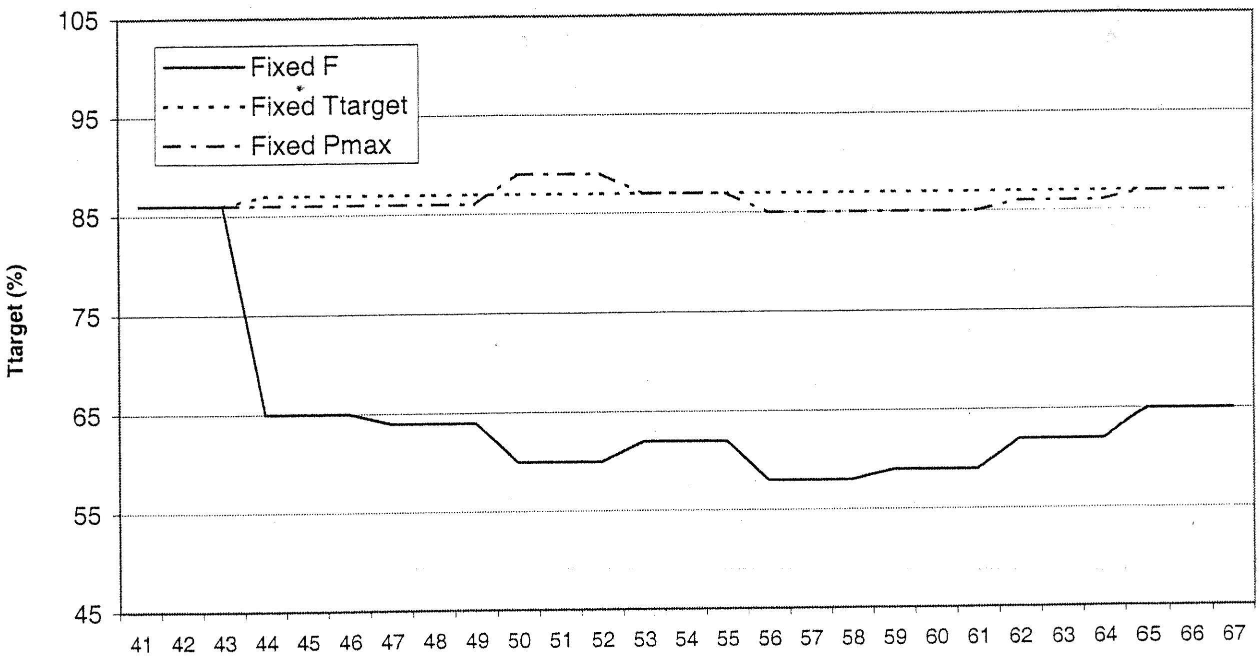

FIGURE 4-3a. Change in Ttarget over time under different strategies.

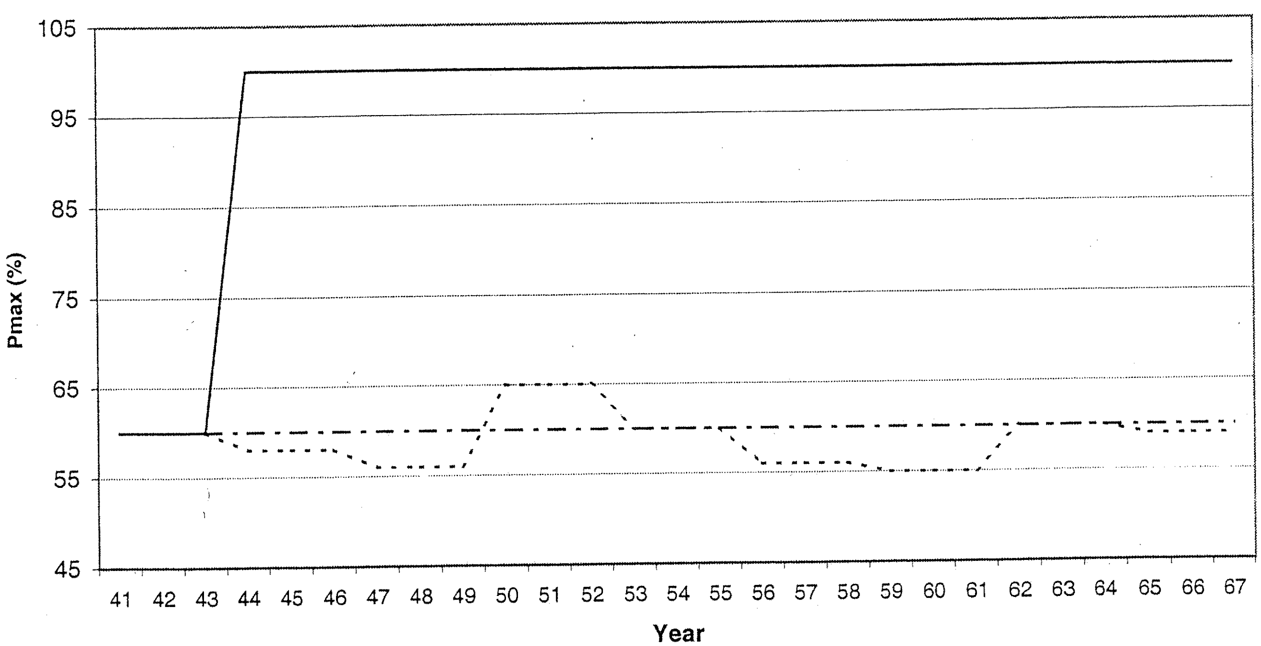

FIGURE 4-3b. Change in Pmax over time under different strategies.

4.2 Effect on Management Regime

4.2.1. Issue 1: The Form and Content of Rebuilding Plans

4.2.1.1 Option 1a (Status Quo)

There is no framework for specifying the form of rebuilding plans.

Administrative Capacity. This option makes the least demands on administrative capacity in that no additional amendments are needed to implement rebuilding plans, which are implemented through periodic (biennial starting in 2005-2006) management. According to the Court, however, this approach violates the Magnuson-Stevens Act.

Adaptive Management. This option offers the most flexibility for the same reason that it is less demanding of administrative capacity. Rebuilding measures would be easier to change in response to new information or changed environmental conditions because the FMP and/or regulations do not contain the specified targets, limits and management measures constituting the rebuilding strategy. However, this option is probably less adaptive overall if rebuilding strategies are easily modified in response to the social costs involved in achieving those targets. For example, if the target year is regularly delayed in order to avoid the costs associated rebuilding by then, the original management goal of rebuilding the stock within a certain time period may not be achieved.

Public Participation. Without FMP amendments or notice and comment rulemaking there is limited opportunity for public comment directly related to a chosen rebuilding strategy. Comments would have to come as part of the biennial specification of harvest levels and associated management measures. In comparison to the other options, this option affords the least opportunity for public participation. As noted above, public skepticism that the Council will stick to rebuilding targets may be higher under the status quo.

4.2.1.2 Option 1b

Numerically specify P_{MAX}, T_{MIN}, T_{MAX} and T_{TARGET}, describe the harvest control rule, and outline the methods used to calculate B_{MSY} in the FMP.

Administrative Capacity. This option would entail the highest administrative cost. Numerically specifying both those parameters specified by national policy (T_{MIN} and T_{MAX}) and more than one of the strategic parameters (F, P_{MAX} and T_{TARGET}) in the FMP would almost guarantee subsequent amendments after every new stock assessment of an overfished species. The values of T_{MIN} and T_{MAX} are likely to change if, for example, new values are added to the pool of recruitment values used in the rebuilding analysis. Furthermore, as discussed in section 3.3.2.2, for any given value of F, P_{MAX} or T_{TARGET}, the other two values are likely to change if the underlying biological information, derived from stock assessments, is updated.

Adaptive Management. This option is less flexible for the same reasons that it adds to administrative cost: it would be more difficult to revise the parameters specified in the FMP. This approach is also the least adaptive, if management had to conform to the parameter values in the FMP, even if they were incorrect but had not yet been updated by amendment. Alternatively, this option could function similarly to Option 1d in practice, if it were recognized that management measures could conform to updated parameters values rather than those in the FMP that had become outdated in the absence of an amendment to correct them. In comparison to the status quo, this option would specify rebuilding strategy parameters (T_{TARGET}, P_{MAX}) and entail a greater obligation to manage to these targets. This could serve adaptive management by establishing fixed benchmarks for monitoring and evaluation.

Public Participation. To the degree that the FMP would have to be amended more frequently in response to changes in specified parameter values, this option would provide more opportunities for public participation than the status quo. Given that parameter values are updated through the rulemaking process under options 1c and 1d, with the attendant opportunity for public comment both during the Council process and rulemaking, there may be little difference between these three options in this regard. It is also unclear that specifying a greater number of parameters aside from the target year (or F), would help to assuage public skepticism any more than specifying the strategic parameters.

4.2.1.3 Option 1c

Numerically specify T_{TARGET} and the harvest control rule in regulations.

Administrative Capacity. Except for the status quo, this option is likely to entail the least administrative cost, although it is difficult to distinguish from Option 1d in this regard. It would specify only the target year the corresponding F or harvest level (as the harvest control rule). Generally, the numerical specification of F would likely have to be changed after new stock assessments, which would be accomplished through the same notice and comment rulemaking process used for biennial management. T_{TARGET} would only be changed in unusual circumstances and thus infrequently, if at all. Combining these changes with rulemaking for biennial management would involve moderately less administrative cost than an FMP amendment in terms of the procedural requirements and supporting analysis.

Adaptive Management. This option and Option 1d generally allow the same level of flexibility. This option would require notice and comment rulemaking to change specified parameters, the same process that would be required under Option 1d. As noted, if resulting OYs in a given year were so low the Council wanted to change them to mitigate socioeconomic impacts T_{TARGET} would have to be re-specified in regulations. If regulations could not be amended in advance or as part of the annual (or biennial) management process, the Council could be obligated to manage according to draconian targets. Generally, this option is very adaptive because it specifies key strategic elements and allows a high degree of flexibility in achieving those targets. In an extreme situation (OYs engendering severe socioeconomic impacts for example) targets could be modified, but not without the deliberations and analysis required as part of rulemaking.

Public Participation. As discussed above under Option 1b, the three action options are likely to afford comparable levels of public participation.

4.2.1.4 Option 1d

Describe computation methods for rebuilding parameters in the FMP and specify initial values. Update harvest control rule and T_{TARGET} through rulemaking.

Administrative Capacity. The key differences between this option and Option 1c are that additional material would be incorporated into the FMP as part of rebuilding plan adoption. Rebuilding plan adoption would involve FMP amendments, with a moderate increase in administrative cost in comparison to Option 1c. As discussed above, by updating these parameters through the same rulemaking process used for biennial management, the additional administrative cost (above that devoted to periodic management) would be moderate. An EIS was prepared for 2003 management measures (PFMC 2003). If this level of analysis is needed in future years, this represents a fairly large "fixed cost" suggesting relatively low "marginal cost" for including parameter updates.

Adaptive Management. This option is also similar to Option 1c in terms of flexibility and adaptive management, except that the management framework is more fully described in the FMP. This added description would support adaptive management because it allows a high degree of flexibility while clearly specifying at a more formal level the governing principles for managing overfished species (in terms of calculation and use of rebuilding parameters). Description of other rebuilding plan elements, such as particular management measures intended to achieve rebuilding targets, could also be described in the FMP and would better fit into the framework implemented under this option than under the other options. Specified parameter values would be "exemplary," allowing both the public and managers to refer to historical benchmarks over the course of the rebuilding period. At the same time, there would be a similar level of flexibility, as discussed above, to modify strategic parameters in response to new data and/or changing conditions.

Public Participation. As discussed above under Option 1b, the three action options are likely to afford comparable levels of public participation.

4.2.2 Issue 2: Periodic Review and Amendment of Rebuilding Plans

In general, a more rigid review schedule is likely to increase administrative opportunity costs. The frequency of reviews increases total workload, and could preclude the management regime from addressing other management issues arising in the future. If managers decided that these issues had to take precedence, departing from a mandated schedule could require an FMP amendment to change the review schedule, adding another impediment to addressing the priority issue that had arisen. Without an amendment more beneficial tasks might have to be set aside in order to conduct reviews.

4.2.2.1 Option 2a (Status Quo)

The Council reviews rebuilding plans every 2 years.

Administrative capacity. Currently the FMP states that the Council will review of rebuilding plans at least every two years but does not specify that rebuilding plan goals should be the basis of such a review (although these are logical criteria for a review). Therefore, the Council could choose to use the goals identified in the FMP but are not obligated to do so. In the absence of any major issues arising in connection with a particular rebuilding plan this would allow the Council to conduct a relatively cursory review. This would be especially desirable if administrative resources would be better committed to some other management task.

Adaptive management. Flexibility in regard to workload prioritization, discussed above, could also make it easier to respond to changing conditions with respect to the fisheries ecosystem as a whole in comparison to Options 2b through 2d. However, the lack of standards based on FMP-specified goals, a feature of those three options, could make consistent evaluation more difficult. Monitoring and evaluation is an important aspect of adaptive management.

Public participation. It is likely that the review task would be carried out by Council advisory bodies (SSC, GMT, GAP) with their recommendations forwarded to the Council for action. All these venues are open to the public and have opportunities for public comment. (Advisory body meetings tend to be more informal and thus afford somewhat greater exchange with non-member participants. Public comment periods on the Council floor allow issues to aired in front of a larger audience.) If two-year reviews indeed addressed all five FMP-specified goals this would allow the most frequent participation across a range of issues.

4.2.2.2 Option 2b (Council-preferred).

The Council reviews progress toward stock rebuilding (goal 1) only when a new stock assessment has been completed. The remaining FMP-specified goals are reviewed every 2 years.

Administrative capacity. This option entails more administrative cost than the status quo because it explicitly links rebuilding plan review to existing FMP-specified goals. Therefore, the Council would be under some obligation to conduct more detailed reviews than under the status quo. To a large extent the evaluation of stock rebuilding (goal 1) would likely be linked to the kind of "adequacy of progress" standard adopted under Issue 3 (below). It is likely that if these standards were met the rebuilding plan review would be relatively cursory.

Adaptive management. This option is the most adaptive because it includes particular standards on which to evaluate rebuilding plans, but ties them to stock assessments that are scheduled according to future determinations of need and available institutional resources.

Public participation. All of the options (except Option 2e) mandate some level of review by the Council every two years, except that under the status quo, this review is presumed, based on the Magnuson-Stevens Act rather than specified in the FMP. However, this option, and options 2c and 2d, do not mandate review of stock rebuilding (goal 1) every two years; instead evaluation is tied to stock assessments. Currently, in principal at least, stock assessments are to be carried out on a three-year rotating schedule for all assessed stocks, although the actual frequency can vary. (Whiting, for example, are assessed annually.) Thus, this option would afford marginally less frequent opportunity for the public to learn about and comment on this central issue (an "average" triennial rather than biennial opportunity).

4.2.2.3 Option 2c

The Council reviews progress toward stock rebuilding (goal 1) only when a new stock assessment has been completed. However, unlike Option 2b each rebuilding plan will describe the stock assessment schedule for that species. The remaining FMP-specified goals are reviewed every 2 years.

Administrative capacity. This option entails more administrative cost than the status quo for the same reasons put forth for Option 2b. It is likely that any stock assessment schedule outlined in a rebuilding plan would not differ substantially from the existing schedule, so there is unlikely to be any meaningful difference in terms of workload when compared to Option 2b.

Adaptive management. This option is somewhat less adaptive than the status quo and Option 2b in that it would require each plan to pre-specify a stock assessment schedule. It would be difficult to anticipate future contingencies, both in terms of stock status and management priorities, that might recommend that assessments be carried out more or less frequently than what was specified.

Public participation. For the reasons discussed under Option 2b, this option might afford marginally less opportunity for public participation than the status quo. However, as just mentioned, it may be that a specified schedule for stock assessments would result in stock as frequently or more frequently than other the status quo. If this were the case, then there were would be no great difference in terms of public opportunity to comment on stock rebuilding in comparison with the status quo.

4.2.2.4 Option 2d

The Council reviews progress toward stock rebuilding (goal 1) only when a new stock assessment has been completed. However, the FMP will describe a stock assessment schedule applying to all overfished species. The remaining FMP-specified goals are reviewed every 2 years.

Administrative capacity. The proposed FMP-specified stock assessment schedule under this option is every four years for the first 20 years of rebuilding and every two years thereafter until the stock is rebuilt. Of currently overfished stocks, all but two will take more than 20 years to rebuild. This suggests slightly less of an administrative cost in comparison to the other alternatives, assuming a one to three year review cycle (based on stock assessments) for those species versus four years under this options for most overfished species for the foreseeable future.

Adaptive management. This option is the least adaptive because it specifies a generic stock assessment schedule for all overfished species. It is very likely that stock assessment priorities for different overfished species will change over time. For example, a stock that is rapidly recovering or for which managers have a high degree of confidence in the assessment may not need to be assessed as frequently as stocks that do not appear to be responding to rebuilding measures or where their status is less certain. Conversely, managers might want to assess stocks that are rebuilding rapidly (as is the case for lingcod) more frequently than every four years. Under this option managers would be constrained in the allocation of institutional resources based on current priorities.

Public participation. To the degree that the mandated four year stock assessment results in less frequent opportunities for the public to evaluate and comment on the efficacy of rebuilding efforts, this option would result in less opportunity for public participation in comparison to all of the options except perhaps Option 2e.

4.2.2.4 Option 2e

The Council defers all rebuilding plan reviews to the Secretary of Commerce.

Administrative capacity. This option places the least burden on Council administrative resources since the review could be deferred to the Secretary of Commerce and would therefore allow other management issues to be more effectively addressed. However, this represents a shifting of the administrative cost, not any reduction in it. (Such a deferral would most likely shift review obligation to staff at NOAA Fisheries NWR, who substantially contribute to Council-related business anyway.)

Adaptive management. In comparison to the other alternatives, this option has a neutral effect on adaptive management. Reviews would likely be conducted (by the Secretary) more frequently than under Options 2b-2e, but no specific criteria (such as FMP-specified goals) would be used in the review. On the other hand, under this option the Council would conduct annual reviews tied to more specific benchmarks (projected harvest mortality and biomass), which would support adaptation of management measures.

Public participation. This option is likely to afford the least opportunity for public participation since the review would be carried out internally by the agency, without direct Council oversight. However, the Council would have the opportunity to comment on the Secretarial review before its publication, allowing some opportunity for public participation through the Council process.

4.2.3 Issue 3: Amending Rebuilding Plans and Adequacy of Progress

4.2.3.1 Option 3a (Status Quo)

The FMP does not describe a standard to evaluate the adequacy of rebuilding measures.

Administrative capacity. A lack of standards results in uncertainty about when targets (e.g., target year, P_{MAX}) need to be adjusted because of differences between the projected and actual rebuilding trajectory. That uncertainty will need to resolved and will be an issue of controversy until standards are established either explicitly or through practice. The development of alternative management policies in an environment where these standards are not well-specified results in a more difficult, complex and contentious process.

Adaptive management. Although the lack of a standard could allow more flexible response to changes in stock status, the lack of benchmarks could make it harder to determine when adaptation is needed. Furthermore, because "adequate progress" is currently unspecified, standards could develop during the rebuilding plan review process. These ad hoc standards could be relatively inflexible in comparison to those deliberately planned in advance. Thus there is considerable uncertainty about the current baseline. This makes it difficult to use status quo as a baseline for comparison; therefore, other options will be compared to Option 3d.

Public participation. Currently there is no definition of adequacy of progress and the specification of such a definition in a public forum does not appear to be required under the Magnuson-Stevens Act, with such a determination left to the Secretary of Commerce. A Council definition of adequacy of progress may not constrain the Secretary; however, Secretarial approval of the Council definition may place some additional justification burden on the Secretary if at some future time the Secretary were to select some other measure of the adequacy of progress.

4.2.3.2 Option 3b

If P_{MAX} falls below 50% the harvest rate strategy must be adjusted.

Administrative capacity. By establishing a single standard in advance, alternative standards will not have to be evaluated in the individual rebuilding plans or during their implementation. On the other hand, if this standard does not perform well in practice the Council will have to devote administrative resources to revising FMP-mandated standards, instead of attending to other management priorities. Using a 50% probability standard could also allow a significant mismatch to develop between the actual harvest rate and the rate needed to achieve the target. This could necessitate a relatively large one-time change in harvest levels (once the 50% threshold is reached), which would be disruptive to the fishery. However, under the framework outlined under Options 1c and 1d F would be re-specified on a fairly regular basis (after a new assessment and as part of biennial management) in order to achieve the rebuilding target. This would make it unlikely that P_{MAX} would fall below 50% unless there were serious estimation errors in past assessments. Although not directly affecting administrative capacity (in comparison to the other options), the controversy resulting from a steep drop in OY could engender greater deliberation, requiring more administrative resources. It is difficult to assess the relative effect in relation to the status quo. However, it is likely that establishing any standard will entail greater administrative costs, despite the possibility of greater uncertainty and controversy under the status quo.

Adaptive management. Compared to Option 3d, there would be less flexibility for developing measures of adequacy that might be more tailored to the conditions and characteristics of a particular species. By setting a "floor" triggering a required response, this option establishes a benchmark for adaptive response. Otherwise, it gives the Council some flexibility to increase the harvest rate above planned levels if the stock is recovering more rapidly than expected. With experience, the degree to which this flexibility to increase harvest rates is advisable could be assessed and limited by future amendment.

Public participation. By setting a single standard, both Option 3b and 3c present a relatively straightforward way for the public to evaluate management performance in terms of stock rebuilding. However, in comparison to the 3d these options provide less opportunity for the public to participate in the evaluation process for the same reason that managers would have less flexibility in how they evaluate rebuilding progress.

4.2.3.3 Option 3c

If P_{MAX} falls below the specified value the harvest rate strategy must be adjusted.

Administrative capacity. This option is similar to Option 3b, but is likely to lead to more frequent adjustment in the harvest strategy because any deviation would have to be addressed, increasing administrative cost. Conversely, these adjustments would be less frequent than under that option, making them easier to implement.

Adaptive management. Although similar to Option 3b, this option is preferable to Option 3b with respect to adaptive management because the harvest rate is continuously adjusted in response to new information. Because harvest rate changes are incremental OYs would like vary less dramatically than under Option 3b where a large adjustment would have to be made once the rebuilding probability falls to 50%.

Public participation. Effects on public participation are the same as under Option 3b, above.

4.2.3.4 Option 3d

The Council in consultation with the SSC and GMT will decide on a case-by-case basis whether a significant change in a rebuilding plan parameter requires the plan to be revised/amended.

Administrative capacity. This option is similar to the status quo in that no standard is identified; instead an evaluation process is mandated. It is likely that these advisory bodies would fall somewhere in between Options 3b and 3c in terms of the frequency with which they would recommend revision. Although this option is more general, allowing the SSC and GMT to weigh in on any change in a parameter, P_{MAX} is likely to be the primary factor in their deliberations. They would likely evaluate the tradeoff between frequent change and disruptive change, choosing some intermediate frequency.

Adaptive management. This option is more flexible than either Option 3b or 3c because an assessment would be made through an expert process, based on current information. However, if no benchmarks are developed through the procedure specified here, the validity of assessments would be difficult to evaluate. Also, as discussed under the status quo and Option 3e, "ad hoc" standards could be less adaptive, or at least less flexible, than those specified in advance.

Public participation. If the process for evaluating rebuilding progress is not transparent with clearly identified benchmarks the public could view the management process with skepticism and mistrust. Conversely, Council processes are very open to public observation and any decision process within the SSC and GMT would be subject to scrutiny and comment. This could give the public a greater hand in the evaluation process.

4.2.3.5 Option 3e (Council-preferred)

The FMP would require that each rebuilding plan identify a standard based on predetermined list of possible standards.

Administrative capacity. Given the variety of ways in which rebuilding harvest control rules might be specified and that the appropriate way of specifying the control rule may vary between stocks, it is possible that establishment of a generic adequacy of progress standard for all rebuilding plans will lead to standards that do not match well with the rebuilding harvest control rule. In such an instance, an amendment to the process and standards portion of the FMP would be required, generating more administrative costs, or there would be inefficiencies resulting from the mismatch between the control rule and adequacy standard. Requiring the specification of an adequacy standard in each rebuilding plan means that there will be some additional administrative costs associated with the development of the individual rebuilding plans, as compared to status quo (where no such standards are established) or as compared to options 3b and 3c (where the standards are established as part of the process and standards section of the amendment). However, over the long term costs could be lower if there is a better match between the characteristic of the stock and the standard established for it.

Adaptive management. On the surface, this option provides less flexibility than Option 3d because the choice of benchmarks or evaluation methods is limited to a pre-specified list. If the list of predetermined standards are more effective than "ad hoc" standards that would be developed under Option 3d, and represent the different characteristics of overfished species (e.g., life span, recruitment variability), this option would be the most adaptive.

Public participation. This option is similar to Option 3b and 3c because standards are determined in advance. This would make it easier for the public to evaluate the management process but limit its influence over it.

4.2.4 Issue 4: ESA Listed Species

4.2.4.1 Option 4a (Status Quo and Council-preferred)

There are no special provisions in the FMP for the listing of overfished species under the Endangered Species Act.

Administrative capacity. The FMP and rebuilding plans will need to be amended if a rebuilding species is listed under the ESA.

Adaptive management. See discussion under Option 4b.

Public participation. There is no difference between Option 4a and 4b except for the timing of public participation. This process and standards amendment provides opportunity for public comment on the approach for handling ESA species. Without this provision, action would need to be taken at some future time if a groundfish species were listed under the ESA and there would likely be similar opportunity at that time for public comment on the proposed provision. The public would also be able to comment as NOAA Fisheries develops jeopardy standards and recovery plans, which are developed outside the Council process.

4.2.4.2 Option 4b

If a stock is listed under the ESA, the rebuilding plan defaults to the jeopardy standard or recovery plan developed under the ESA.

Administrative capacity. FMPs will not need to be amended if a rebuilding species is listed under the ESA. The administrative costs associated with such and FMP amendment would be directed to other management activities to benefit the fishery.

Adaptive management. Addressing the effect of ESA listing on rebuilding plans would reduce any future workload associated with an FMP amendment needed to specify this contingency. This would provide the Council with more flexibility to address other management issues. Overall, there may be little or not effect on adaptive management since both rebuilding requirements and ESA action flow from federal law and managers would have to comply with both.

Public participation. See above.

4.3 Effect on Future Management

As discussed at the beginning of this chapter, the proposed action will have an indirect effect on the environment based on the degree that the management regime must devote resources to procedural tasks related to rebuilding plans. Assuming that administrative capacity is fixed, devoting more time and effort to rebuilding plan tasks will take away from other management activities. This can be evaluated in a general way first by describing a range of outcomes, in terms of the different options chosen, that represent different levels of potential work load. These outcomes, or scenarios, can also be characterized with respect to adaptive management and public participation, which could also have management implications indirectly affecting the environment.

The status quo (represented by options 1a, 2a, 3a, and 4a) imposes the least additional administrative cost, is moderately adaptive and affords the least public participation.

The most administratively demanding set of choices would likely be:

- Option 1b: Numerically specify P_{MAX}, T_{MIN}, T_{MAX} and T_{TARGET}, describe the harvest control rule, and outline the methods used to calculate B_{MSY} in the FMP.
- Option 2d: The Council reviews progress toward stock rebuilding (goal 1) only when a new stock assessment has been completed. However, the FMP will describe a stock assessment schedule applying to all overfished species. The remaining FMP-specified goals are reviewed every 2 years.
- Option 3c: If P_{MAX} falls below the specified value the harvest rate strategy must be adjusted.
- Option 4a: There are no special provisions in the FMP for the listing of overfished species under the Endangered Species Act.

Other sets of choices fall within this range. One that would impose a moderate administrative cost is represented by the following choices:

- Option 1c: Numerically specify T_{TARGET} and P_{MAX} and the harvest control rule in regulations.
- Option 2b: The Council reviews progress toward stock rebuilding (goal 1) only when a new stock assessment has been completed. The remaining FMP-specified goals are reviewed every 2 years.
- Option 3d: The Council in consultation with the SSC and GMT will decide on a case-by-case basis whether a significant change in a rebuilding plan parameter requires the plan to be revised/amended.
- Option 4b: If a stock is listed under the ESA, the rebuilding plan defaults to the jeopardy standard or recovery plan developed under the ESA.

The Council-preferred options are similar to the set of choices just described in terms of their effect on the management regime. In November 2002 the Council chose the following options:

- Option 1c: Numerically specify T_{TARGET} and P_{MAX} the harvest control rule in regulations. [**Note:** the Council did not specify which parameters to include in regulations. These parameters have been added to the option for the purposes of analysis. Depending on the Council's decision, a different option may be preferred under this issue.]
- Option 2b: The Council reviews progress toward stock rebuilding (goal 1) only when a new stock assessment has been completed. The remaining FMP-specified goals are reviewed every 2 years.
- Option 3e: The FMP would require that each rebuilding plan identify a standard based on a predetermined list of possible standards.
- Option 4a: There are no special provisions in the FMP for the listing of overfished species under the Endangered Species Act.

Considering these sets of choices as representative of the range of outcomes, indirect effects on the environment are considered here. These effects are evaluated in terms of management initiatives the Council has identified as part of Council staff workload prioritization brought before the Council in November 2002 and the Groundfish Strategic Plan (Ad-Hoc Pacific Groundfish Fishery Strategic Plan Development Committee 2000). The management initiatives identified in these sources are evaluated in terms of four resource-related categories: ecosystem and habitat (including protected species), groundfish, other Pacific Council FMPs, and the socioeconomic environment.

4.3.1 Ecosystem and Habitat, Including Protected Species

In April 2001 NOAA Fisheries published a Notice of Intent to prepare an EIS to evaluate different ways of designating essential fish habitat (EFH) and minimizing adverse effects to EFH due to fishing, to the extent practicable (66 FR 18586; notice of availability of scoping summary at 67 FR 5963).[11/] The draft EIS is scheduled for publication in August of 2002. Preparation of this EIS is being coordinated by NOAA Fisheries with some work done by outside consultants. However, the Council and Council staff are involved in several respects. Most importantly, the Council is monitoring EIS development and prior to its publication the Council will need to review the document and select its preferred alternative. Because the draft is slated for publication in 2002, it is unlikely that future rebuilding-plan-related workload would affect activities related to this EIS through the draft stage. At this time it is unclear whether any necessary amendments would be developed as part of the EIS process or be implemented at a later time. If any subsequent amendments were necessary, rebuilding plan monitoring and updates could affect the capability of staff to implement them.

The Strategic Plan identifies two habitat-related goals: adopting marine reserves as a management tool and implement measures to reduce fishing gear impacts to essential fish habitat. Although the Strategic Plan describes marine reserves in the context of fishery management, a related effect would be to reduce habitat impacts in areas where fishing was restricted or prohibited. Closed areas implemented in 2002 and 2003 to minimize bycatch of overfished species are defacto marine protected areas (MPAs), which will afford some habitat protection since specified fishing is prohibited in these areas. If the Council were to decide that these areas should be developed as a system of semi-permanent or permanent MPAs considerable staff work would be needed for supporting analyses and likely amendments to Council FMPs. Although these types of changes to the management regime are highly speculative at this time, the EFH EIS discussed above may be the vehicle for implementing habitat-related strategic plan objectives, since tools to identify and assess impacts to EFH could be developed as part of the EIS, and it may contain specific proposals for minimizing fishing gear impacts to EFH.

In summary, although the Council recognizes the need to evaluate and minimize impacts to EFH no specific proposals are pending. Given this context, any added future workload related to the rebuilding plan process is likely to have a moderate effect on future habitat protection efforts.

NOAA Fisheries NWR is working to develop strategies in support of the National Plan of Action to Protect Seabirds. The objectives of the national plan are to reduce seabird bycatch in U.S. longline fisheries, to

11/ This EIS is being prepared pursuant to American Oceans Campaign et al. v Daley et al. (Civil Action No 99-982(GK)).

provide national-level policy guidance on reducing seabird bycatch in U.S. longline fisheries, and to call for an assessment of all U.S. longline fisheries to determine whether a seabird bycatch problem exists. The national plan is part of an international plan developed by the U.N. Food and Agriculture Organization's Committee on Fisheries. If data, collected by the observer program for example, reveals a significant seabird bycatch problem in West Coast longline fisheries managed under the Groundfish FMP amendments may be needed to require gear modifications or changes in fishing strategies. Implementing these measures could be affected by the need for administrative actions related to rebuilding plan changes.

4.3.2 Groundfish, Including Overfished Stocks

Ongoing management under the Groundfish FMP takes up a considerable amount of time within the Council process. It is also the procedural mechanism related to the Council strategic plan goal for harvest policies, which is to establish an allowable level of catch that prevents overfishing while achieving optimum yield based on the best available science. The Council specifies OYs for groundfish species or species complexes and develops management measures intended to constrain harvests to these levels. Through 2003 this was done annually; with the adoption of Amendment 17 the Council will transition to a biennial process, beginning in 2005-2006. (A new decision-making schedule will be phased in during the 2004 transition year.) The development of specifications and management measures for 2003 was a time consuming process, both for the Council and staff at NOAA Fisheries NWR. An EIS was prepared in support of decision-making along with analyses for an emergency rule that had to be promulgated for January and February in order to allow public comment on the regulations for the remainder of the year. Five Council staff and three NOAA Fisheries NWR staff had to devote a substantial part of their time between June and December 2002 to this task. The biennial process will reduce this workload since decision-making, supporting analysis and rulemaking for specifications and management measures will occur every other year. Nonetheless, given that this had become a complex and controversial process, ongoing groundfish management is likely to consume a large proportion of the Council's time. Reviewing and updating rebuilding plans, and amending the FMP and regulations is likely to impinge on the time available to consider specifications and management measures, especially since the same staff would be involved in both issues. There is some possibility, depending on which options are chosen, that rebuilding plan related activities could be combined with the biennial management process. For example, under Option 1d, management targets (e.g., T_{TARGET}, P_{MAX}) would be revised through notice and comment rulemaking. The same rulemaking process used for biennial specifications could be used for these revisions, supported by a single environmental document (EIS or EA). This could reduce the overall administrative burden.

If less time were available to provide supporting analyses and consider decisions related to biennial management there would be greater risk of mis-specification of harvest levels. If harvest levels are set too high, rebuilding could be impeded or stocks not currently overfished could fall below the minimum stock size threshold. Lower harvest levels due to mis-specifications would reduce the environmental risk but would result in socioeconomic impacts due to forgone short-term benefits from harvest.

The Council has been discussing delegating management of nearshore rockfish species occurring in California state waters to that state. California has developed an FMP for nearshore species, including XX federally managed groundfish, pursuant to its Marine Life Management Act. The FMP cannot be implemented until the Council delegates or defers management authority, or removes the relevant species from the Groundfish FMP. To date, the Council has decided that there is insufficient staff time to devote to the process. As an alternative California proposes developing regulations that would be consistent with federal regulations in order to implement its FMP. Increased workload stemming from rebuilding plan requirements would further frustrate the Council's ability to delegate management authority. For the relevant federally managed nearshore species continued delay in implementing the nearshore FMP would only have a negative impact to the degree that state management is more environmentally beneficial than federal management. However, other state-managed species included in the state's FMP would be affected by any delay, assuming more effective management under the state's FMP.

NOAA Fisheries is preparing a programmatic EIS for the Groundfish FMP on the same timeline as the EFH EIS discussed above. Thus, any administrative cost stemming from rebuilding plan revisions is unlikely to affect completion of this document, at least through the draft stage. But this EIS includes a range of alternatives, which represent different management programs including one representing elements in the Groundfish Strategic Plan. Over a longer time period, during which rebuilding plan related activity could have an effect on administrative resources, additional FMP amendments may be needed to implement program. The Programmatic EIS evaluates management at a strategic level, and implementation of a preferred alternative could make groundfish management more effective and thereby reduce environmental impacts associated with fishing. More time spent on amendments to revise rebuilding plans would make it more difficult to implement measures (through FMP amendments for example) stemming from this analysis.

4.3.3 The Socioeconomic Environment

Economic rationalization is the main socioeconomic issue currently facing groundfish fisheries. Rationalization entails matching extractive capacity, or capital and labor, to the available fishery resource. Capacity reduction is ranked as the highest priority in the Groundfish Strategic Plan. Congress recently authorized funding that, along with a loan fund, would establish a vessel buy-back program for groundfish limited entry trawl license-holders. First, however, licence-holders must vote by referendum to approve the program. If approved, program implementation will require an FMP amendment. The Council is also considering several other initiatives for fishery rationalization. Establishing licence limitation (limited entry) programs for remaining open access groundfish fisheries is highest priority, although work is at a preliminary stage. The Council has also expressed an interest in implementing rights-based management in order to promote economic efficiency, including capacity reduction.

Individual fishing quotas (IFQs), where fishers are assigned a property right to harvest a specified proportion of the OY for a given species or species group, have been implemented in a range of fisheries in the U.S. and other countries (Tietenberg 2002). However, these systems have generated controversy because of concerns over equitable distribution of rights. Partly in response to these concerns, Congress established a moratorium on the use of IFQs, which was allowed to expire in late 2002. (Many expect that any reauthorization of the Magnuson-Stevens Act will contain guidelines for how IFQ management can be implemented. In the meantime there are no legal constraints on using this class of management measures.) Expiration of the Congressional ban has renewed the Council's interest in this approach. In the early 1990s the Council planned to implement an IFQ program for groundfish fixed gear fisheries but this effort was stymied by the Congressional ban. Instead, a permit stacking program was implemented, which has many features of a rights-based approached. The Council is pursuing two tracks in this regard. First, it is interested in implementing a trawl permit stacking program, similar to the program in place for fixed gear fisheries. In the long term these programs could be supplanted by IFQs.

In addition to promoting economic efficiency, rationalization can make it easier to manage fisheries for sustainability if less complex management measures are needed. For example, trip limits, which indirectly limit fishing effort and ensure year-round harvest, should not be necessary. On the other hand, "quota-busting," or free riding, can be a problem in administering IFQs. Because bycatch, especially of overfished species, is a major concern, it would have to be accounted for as part of a quota system. Addressing these issues would require an effective, comprehensive at-sea monitoring program. The current observer program only covers a small proportion of all groundfish vessels. Although sufficient to estimate total catch through statistical techniques, a higher level of coverage would likely be needed to administer a quota program.

Although the Council is interested in further rationalization through rights-based management, in the short to medium term staff resources are insufficient to allow work to proceed. Programs of this nature would be complex and controversial (especially given the multi-species nature of groundfish fisheries and the problems presented by bycatch). This would require an extended deliberative process with substantial public involvement, and commensurately detailed analyses in support of any proposed actions. If staff resources were available, these efforts could be a major focus in the future. If the framework for rebuilding plans required a large commitment of staff resources it would be much less likely that rationalization measures could be implemented.

4.3.4 Management Issues

During its November 2002 meeting the Council was briefed on two proposed workshops to (1) evaluate current methods for calculating unfished biomass (B_0) and MSY, and (2) evaluate the current model used to account for bycatch in total catch estimates and consider how observer data might be used to improve model inputs. These issues are directly relevant to managing overfished species since rebuilding strategies are predicated on unfished biomass and MSY estimates (to determine target biomass) and bycatch is the main component of total catch mortality for these species since retention is severely limited or prohibited. On a recommendation from the SSC the bycatch workshop was held in late January 2003 while the scheduling of the B_0/MSY workshop was deferred for an "off year" under the impending multi-year management regime.

Administrative demands stemming from rebuilding plans would likely have minimal effect on these proposals. The bycatch workshop has already been held; efforts are focusing on the integration of observer data into the estimation model. This work is being carried out by science center staff at NOAA Fisheries, who not be directly affected by administrative workload issues. Scheduling of a future B_0/MSY workshop could be affected if off years in the management cycle are mainly taken up with rebuilding plan revisions and amendments. Both of these workshops are related to Strategic Plan goals emphasizing the need for better information to set management reference points (e.g., F_{MSY}) and estimate total fishery removals.

These efforts also have the potential to affect workload related to rebuilding plan revision. As discussed above, new estimates of unfished biomass would result in re-computation of rebuilding parameters. Any parameters specified in the FMP or regulations as ongoing reference points (as opposed to "historical" benchmarks as outlined in Option 1d) would have to be changed by amendment. New bycatch accounting methods, if they revealed that past techniques were under-estimating bycatch, could affect rebuilding probability estimates, with results analogous to the current situation described above for bocaccio.

4.4 Cumulative Impacts

Cumulative effects are the result of "the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions," including those of other agencies, organizations and individuals (40 CFR 1508.7). They are the total effect, or combination of direct and indirect impacts with external factors affecting components of the human environment. In a cumulative effect analysis each affected resource, ecosystem component, and community should be evaluated in terms of its capacity to accommodate additional effects. The rebuilding plans that will be implemented pursuant to this process and standard amendment are connected actions that in combination produce cumulative effects. There are also a range of other external factors that could combine with these actions to produce cumulative effects. Instead of developing a separate analysis, this EA incorporates and summarizes the cumulative effects analysis in the 2003 Groundfish Annual Specifications and Management Measures EIS (PFMC 2003). Management measures for 2003 are largely structured to keep total catch (including bycatch) of overfished species within harvest specifications developed from rebuilding analyses and interim rebuilding plans. Thus, the cumulative effects analysis in the EIS accompanying that action is a good indication of how multiple rebuilding plans, when combined with other, external factors, will affect various resources and human communities.

[As required by 40 CFR 1502.21 the material will be briefly summarized.]

5.0 CONSISTENCY WITH FMP OBJECTIVES AND THE MAGNUSON-STEVENS ACT

5.1 FMP Goals and Objectives

The Groundfish FMP goals and objectives are listed below. They way in which this amendment addresses each objective is briefly described in italics below the relevant statement.

Management Goals.

Goal 1 - Conservation. Prevent overfishing by managing for appropriate harvest levels and prevent 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.

Measures in this amendment will not affect this objective. Procedures for periodically reviewing and changing rebuilding plans will depend on reliable information about resource status.

Objective 2. Adopt harvest specifications and management measures consistent with resource stewardship responsibilities for each groundfish species or species group.

Measures in this amendment will not affect this objective. But specified procedures for the adoption and implementation of rebuilding plans will facilitate effective management of overfished species.

Objective 3. For species or species groups which are below the level necessary to produce maximum sustainable yield (MSY), consider rebuilding the stock to the MSY level and, if necessary, develop a plan to rebuild the stock.

The standards and procedures in this amendment facilitate the adoption and implementation of rebuilding plans and therefore support this objective.

Objective 4. Where conservation problems have been identified for nongroundfish species and the best scientific information shows that the groundfish fishery has a direct impact on the ability of that species to maintain its long-term reproductive health, the Council may consider establishing management measures to control the impacts of groundfish fishing on those species. Management measures may be imposed on the groundfish fishery to reduce fishing mortality of a 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.

Measures in this amendment do not address this objective.

Objective 5. Describe and identify essential fish habitat (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.

Measures in this amendment do not address this objective.

Economics.

Objective 6. Attempt to achieve the greatest possible net economic benefit to the nation from the managed fisheries.

This amendment does not address this objective directly. Rebuilding plan implementation should increase net benefits in the long term.

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.

Measures in this amendment do not address this objective.

Objective 8. Gear restrictions to minimize the necessity for other management measures will be used whenever practicable.

Measures in this amendment do not address this objective.

Utilization.

Objective 9. Develop management measures and policies that foster and encourage full utilization (harvesting and processing) of the Pacific coast groundfish resources by domestic fisheries.

Measures in this amendment do not address this objective.

Objective 10. Recognizing the multispecies nature of the fishery and establish a concept of managing by species and gear or by groups of interrelated species.

Measures in this amendment do not address this objective. Rebuilding plans are species- or stock-specific.

Objective 11. 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.

This amendment does not address this objective directly. The effect of harvest restrictions on bycatch rates could be addressed in rebuilding plans. Rebuilding plans must take into account total fishing mortality and rebuilding measures should also reduce bycatch.

Objective 12. Provide for foreign participation in the fishery, consistent with the other goals to take that portion of the optimum yield (OY) not utilized by domestic fisheries while minimizing conflict with domestic fisheries.

This objective is no longer relevant because the fishery has been declared fully utilized.

Social Factors.

Objective 13. When conservation actions are necessary to protect a stock or stock assemblage, attempt to develop management measures that will affect users equitably.

This amendment does not address this objective directly. Rebuilding plans may discuss allocation among sectors.

Objective 14. Minimize gear conflicts among resource users.

Measures in this amendment do not address this objective.

Objective 15. 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 environment.

This amendment does not address this objective directly. The environmental impact analysis of rebuilding plan measures considers disruption of fishing, marketing and the environment. Some disruption is unavoidable.

Objective 16. Avoid unnecessary adverse impacts on small entities.

This amendment does not address this objective directly. Rebuilding plan measures may entail adverse impacts, but these are necessary to rebuild overfished stocks.

Objective 17. 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.

This amendment does not address this objective directly. The environmental impact analysis of rebuilding plan measures considers impacts to communities.

Objective 18. Promote the safety of human life at sea.

Measures in this amendment do not address this objective although the environmental impact analysis considers safety issues.

Although Amendment 12, the original document specifying rebuilding plan form and content, was remanded in part, the goals and objectives for rebuilding plans enumerated in that document are still relevant. The amendment described five goals, which can be re-cast as objectives falling under the three FMP goals:

Conservation

1. Achieve the population size and structure that will support the maximum sustainable yield within the specified time period.

2. Protect the quantity and quality of habitat necessary to support the stock at healthy levels in the future.

3. Promote widespread public awareness, understanding and support for the rebuilding program.

Economics

4. Minimize, to the extent practicable, the social and economic impacts associated with rebuilding, including adverse impacts on fishing communities.

Utilization

5. Fairly and equitably distribute both the conservation burdens (overfishing restrictions) and recovery benefits among commercial, recreational and charter fishing sectors.

This amendment adheres to these objectives in establishing rebuilding plan elements and plan implementation and review procedures.

5.2 National Standards

An FMP or plan amendment and any pursuant regulations must be consistent with ten national standards contained in the Magnuson-Stevens Act (§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.

This amendment supports National Standard 1 by facilitating the adoption and implementation of rebuilding plans.

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

Rebuilding plans are based on rebuilding analyses that use the most recent stock assessment data and incorporate statistical measures of the likelihood that overfished stocks will recover within a mandated time period. These stock assessments and analyses are conducted by state and federal agency staff scientists with expertise in Pacific groundfish biology, ecology, and fishery science. They employ the best available data.

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.

Pacific groundfish are managed on the basis of known stocks when these can be differentiated from the total range of the species. Overfished species are managed individually in that harvest levels are determined for each stock. But managers recognize that many groundfish stocks share common habitats and ecosystems, and fishers may catch them as part of a multi-species complex. This allows unit management of interrelated stocks.

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 fishermen, such allocation shall be (A) fair and equitable to all such fishermen; (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.

This amendment and consequent rebuilding plans, to the degree that they specify allocation between sectors, will do so in a fair and equitable manner. Allocation decisions may be guided by rebuilding plan objectives and specific policies described in the plans. These decisions are made through the Council process and accordance with its established procedures and policies.

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.

This amendment and resulting rebuilding plans do not address this National Standard directly, except that no measures are intended to allocate groundfish resources solely for the purpose of economic efficiency.

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

This amendment and resulting rebuilding plans recognize the differences between the various groundfish fishery sectors. Different sectors may have different catch levels for overfished species and capacity to avoid or minimize catch of overfished species. Although their primary purpose of measures described in this amendment is to allow overfished stocks to recover, differential impacts were considered when formulating them.

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

Rebuilding plans will be implemented, reviewed and updated in a consistent and specific manner based on the measures in this amendment. Rebuilding plan measures are implemented through the annual specification of management measures developed for the whole groundfish fishery. This approach is intended to minimize cost and duplication.

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

The analyses supporting this amendment and the individual rebuilding plans (organized around NEPA requirements) consider the socioeconomic impacts to fishing communities. Rebuilding plans generally do not employ a policy that would rebuild stocks in the minimum time period, which would very likely require a complete cessation of many fisheries. This is meant to minimize impacts to communities by allowing some level of fishing mortality on overfished stocks while identifying a trajectory that will lead to their eventual recovery.

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.

Most overfished species are no longer targeted and in many cases only constitute bycatch due to regulatory discards. Because rebuilding plans must account for total fishing mortality, strategies must minimize bycatch. Rebuilding plan environmental impact analyses also evaluate the impact of the alternative management measures on bycatch.

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

This amendment does not directly affect safety. Indirect effects of rebuilding plan measures on safety are considered in the environmental analyses.

5.3 Other Applicable Magnuson-Stevens Act Provisions

This amendment and associated rebuilding plans conform to Section 304(e)–Rebuild Overfished Fisheries. The procedural measures described in this EA address the requirement that the Council "shall prepare a fishery management plan, plan amendment, or proposed regulations ... to end overfishing in the fishery and to rebuild affected stocks..." (§304(e)(3)). Pursuant rebuilding plans contain the elements required by Section 304(e)(4) and discussed in National Standard guidelines (50 CFR 600.310).

6.0 CROSS-CUTTING MANDATES

In addition to being prepared in accordance with the requirements of the Magnuson-Stevens Act and the National Environmental Policy Act, this document also addresses requirements of other applicable Federal laws and Executive Orders. These laws and orders are described here and their applicability to this action assessed.

6.1 Other Federal Laws

6.1.1 Coastal Zone Management Act

6.1.2 Data Quality Act

6.1.3 Endangered Species Act

6.1.4 Marine Mammal Protection Act

6.1.5 Migratory Bird Treaty Act

6.1.6 National Marine Sanctuaries Act

6.1.7 Paperwork Reduction Act

6.1.8 Regulatory Flexibility Act

6.2 Executive Orders

6.2.1 EO 12612 (Federalism)

6.2.2 EO 12866 (Regulatory Impact Review)

6.2.3 EO 12898 Environmental Justice

6.2.4 EO 13175 (Consultation and Coordination With Indian Tribal Government)

6.2.5 EO 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds)

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APPENDIX A
Amendments to FMP Language

This appendix documents revisions to the language of the FMP which could result from Council action.

GUIDE TO SECTIONS AFFECTED BY ISSUES CONSIDERED IN THE FMP AMENDMENT

	Issue	Affected Sections
Issue 1	Form & Required Elements of Species Rebuilding Plans	4.5.2 4.5.3 4.5.4
Issue 2	Process for Periodic Review and Rebuilding Plans	4.5.3.5
Issue 3	Events or Standards that Would Trigger Revision of a Rebuilding Plan	4.5.3.5
Issue 4	ESA Listed Species	---
	Housekeeping Measures	All Sections of Chapters 4 and 5

KEY TO AFFECTED FMP LANGUAGE

Underline - inserted text
~~Strikeout~~ - deleted text
Cyan highlight - notes on reorganization
Goldenrod highlight - pending changes from Amendment 17

TABLE OF CONTENTS FOR THE AFFECTED SECTIONS OF THE FMP

3.0 AREAS AND STOCKS INVOLVED

* * *

3.1 Species Managed by this Fishery Management Plan

Table 3-1 is the listing of species managed under this FMP.

TABLE 3-1. Common and scientific names of species included in this FMP.

Common Name	Scientific Name
	SHARKS
Leopard shark	*Triakis semifasciata*
Soupfin shark	*Galeorhinus zyopterus*
Spiny dogfish	*Squalus acanthias*
Big skate	*Raja binoculata*
California skate	*R. inornata*
Longnose skate	*R. rhina*
	RATFISH
Ratfish	*Hydrolagus colliei*
	MORIDS
Finescale codling	*Antimora microlepis*
	GRENADIERS
Pacific rattail	*Coryphaenoides acrolepis*
	ROUNDFISH
Lingcod	*Ophiodon elongatus*
Cabezon	*Scorpaenichthys marmoratus*
Kelp greenling	*Hexagrammos decagrammus*
Pacific cod	*Gadus macrocephalus*
Pacific whiting (hake)	*Merluccius productus*
Sablefish	*Anoplopoma fimbria*
	ROCKFISH [a/]
Aurora rockfish	*Sebastes aurora*
Bank rockfish	*S. rufus*
Black rockfish	*S. melanops*
Black and yellow rockfish	*S. chrysomelas*
Blackgill rockfish	*S. melanostomus*
Blue rockfish	*S. mystinus*
Bocaccio	*S. paucispinis*
~~Bronze spotted~~ Bronzespotted rockfish	*S. gilli*
Brown rockfish	*S. auriculatus*
Calico rockfish	*S. dallii*
California scorpionfish	*Scorpaena gutatta*
Canary rockfish	*Sebastes pinniger*
Chameleon rockfish	*S. phillipsi*
Chilipepper	*S. goodei*
China rockfish	*S. nebulosus*
Copper rockfish	*S. caurinus*
Cowcod	*S. levis*
Darkblotched rockfish	*S. crameri*
Dusky rockfish	*S. ciliatus*
Dwarf-red rockfish	S. rufinanus
Flag rockfish	*S. rubrivinctus*
Freckled rockfish	S. lentiginosus
Gopher rockfish	*S. carnatus*
Grass rockfish	*S. rastrelliger*

TABLE 3-1. Common and scientific names of species included in this FMP.

Common Name	Scientific Name
Greenblotched rockfish	*S. rosenblatti*
Greenspotted rockfish	*S. chlorostictus*
Greenstriped rockfish	*S. elongatus*
Halfbanded rockfish	S. semicinctus
Harlequin rockfish	*S. variegatus*
Honeycomb rockfish	*S. umbrosus*
Kelp rockfish	*S. atrovirens*
Longspine thornyhead	*Sebastolobus altivelis*
Mexican rockfish	*Sebastes macdonaldi*
Olive rockfish	*S. serranoides*
Pink rockfish	*S. eos*
Pinkrose rockfish	*S. simulator*
Pygmy rockfish	*S. wilsoni*
Pacific ocean perch	~~*Sebastes*~~ *S. alutus*
Quillback rockfish	*S. maliger*
Redbanded rockfish	*S. babcocki*
Redstripe rockfish	*S. proriger*
Rosethorn rockfish	*S. helvomaculatus*
Rosy rockfish	*S. rosaceus*
Rougheye rockfish	*S. aleutianus*
Sharpchin rockfish	*S. zacentrus*
Shortbelly rockfish	*S. jordani*
Shortraker rockfish	*S. borealis*
Shortspine thornyhead	*Sebastolobus alascanus*
Silvergray rockfish	*Sebastes brevispinis*
Speckled rockfish	*S. ovalis*
Splitnose rockfish	*S. diploproa*
Squarespot rockfish	*S. hopkinsi*
Starry rockfish	*S. constellatus*
Stripetail rockfish	*S. saxicola*
Swordspine rockfish	*S. ensifer*
Tiger rockfish	*S. nigrocinctus*
Treefish	*S. serriceps*
Vermilion rockfish	*S. miniatus*
Widow rockfish	*S. entomelas*
Yelloweye rockfish	*S. ruberrimus*
Yellowmouth rockfish	*S. reedi*
Yellowtail rockfish	*S. flavidus*
	FLATFISH
Arrowtooth flounder (turbot)	*Atheresthes stomias*
Butter sole	*Isopsetta isolepis*
Curlfin sole	*Pleuronichthys decurrens*
Dover sole	*Microstomus pacificus*
English sole	*Parophrys vetulus*

TABLE 3-1. Common and scientific names of species included in this FMP.

Common Name	Scientific Name
	FLATFISH (continued)
Flathead sole	*Hippoglossoides elassodon*
Pacific sanddab	*Citharichthys sordidus*
Petrale sole	*Eopsetta jordani*
Rex sole	*Glyptocephalus zachirus*
Rock sole	*Lepidopsetta bilineata*
Sand sole	*Psettichthys melanostictus*
Starry flounder	*Platichthys stellatus*

a/ The category "rockfish includes all genera and species of the family ~~Scopaenidae~~ Scorpaenidae, even if not listed, that occur in the Washington, Oregon, and California area. The ~~Scopaenidae~~ Scorpaenidae genera are *Sebastes, ~~Scorpana~~ Scorpaena, Sebastolobus, and ~~Scorp~~ Scorpaenodes*.

* * *

4.0 PREVENTING OVERFISHING AND ACHIEVING OPTIMUM YIELD

National Standard 1 requires that "Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the OY from each fishery for the U.S. fishing industry." (50 CFR Section 600.310(a))

"The determination of OY is a decisional mecahnism for resolving the MSA's multiple purposes and policies, implementing an FMP's objectives and balancing the various interests that comprise the national welfare. OY is based on MSY, or on MSY as it may be reduced . . . [in consideration of social, economic or ecological factors] . . .The most important limitation on the specification of OY is that the choice of OY and the conservation and management measures proposed to achieve it must prevent overfishing." (50 CFR Section 600.310(b))

This chapter addresses the essential considerations suggested for National Standard 1, as identified in the NMFS guidelines on the standard (600.310):

- estimating MSY, estimated the MSY biomass and setting the MSY control rule (50 CFR Section 600.310(c)) [Section 4.2 of this Chapter]
- specifying stock status determination criteria (maximum fishing mortality threshold and minimum stock size threshold, or reasonable proxies thereof) (50 CFR Section 600.310(d)) [Section 4.4 of this Chapter]
- actions for ending overfishing and rebuilding overfished stocks (including the development and adoption of rebuilding plans) (50 CFR Section 600.310(e)) [Section 4.5 of this Chapter]
- setting OY and apportionment of harvest levels (50 CFR Section 600.310(f)) [Section 4.6 of this Chapter]

In establishing OYs for West Coast groundfish, this FMP utilizes the interim step of calculating ABCs for major stocks or management units (groups of species). ABC is the MSY harvest level associated with the current stock abundance. Over the long term, if ABCs are fully harvested, the average of the ABCs would be MSY.

OY is set and apportioned under the procedures outlined in Chapter 5.

4.1 Species Categories

[New section title, previously portions of 5.3, as indicated]

~~ABC,~~ B_{msy}, ABC and overfished/rebuilding stock size threshold cannot be precisely defined for all species, because of the absence of available information for many species managed under the FMP. [Preceding sentence from section 5.3, para 2, first sentence]. For the purpose of setting MSY, ABC, MFMT, MSST, OY and rebuilding standards, ~~T~~three categories of species are identified. [Following was previously section 5.3, para 3] The first are the relatively few species for which a quantitative stock assessment can be conducted on the basis of catch-at-age or other data. ABCs and overfished/rebuilding thresholds can generally be calculated for these species. The second category includes a large number of species for which some biological indicators are available, but a quantitative analysis cannot be conducted. It is difficult to estimate overfished and overfishing thresholds for the second category of species *a priori*, but indicators of long term, potential overfishing can be identified. ABCs for species in this category are typically set at a constant level and some monitoring is necessary to determine if this level of catch is causing a slow decline in stock abundance. The third category includes minor species which are caught, but for which there is, at best, only information on landed biomass. For species in this category, it is impossible to determine MSY, ABC, or an overfished threshold.

4.2 Determination of MSY or MSY Proxy and B_{msy}

[Previously 5.2]

Harvest policies are to be specified according to standard reference points such as MSY (MSY, interpreted as an a maximum average achievable catch under prevailing ecological and environmental conditions over a prolonged period), the long-term average biomass associated with fishing at Fmsy is Bmsy. the biomass that produces MSY (B_{msy}) and the fishing rate (F_{msy}) that tends to hold biomass near B_{msy}. In this FMP, MSY generally refers to a constant F control rule that is assumed to produce the maximum average yield over time while protecting the spawning potential of the stock. Thus the constant F control rule is genearlly the proxy for the MSY control rule. . (Pacific whiting is generally based on a variable F control rule.) Fishing rates above F_{msy} eventually result in biomass smaller than B_{msy} and produce less harvestable fish on a sustainable basis. Accordingly, management should avoid fishing rates that hold biomass below B_{msy} for long periods. The biomass level that produces MSY (i.e., B_{msy}) is generally unknown and assumed to be variable over time due to long-term fluctuations in ocean conditions, so that no single value is appropriate. [Previous sentence moved from below.] This is especially important during periods of unfavorable environment in which resources may be less productive than usual and the risk of stock depletion is greater. During periods of unfavorable environment it is important to account for reduced sustainable yield levels.

The problem with an F_{msy} control rule is that it is tightly linked to an assumed level of density-dependence in recruitment, and there is insufficient information to determine the level of density-dependence in recruitment for many West Coast groundfish stocks. Therefore, the use of approximations or proxies is necessary. Absent a more accurate determination of F_{msy}, the Council will apply default MSY proxies. The current (1998 2001) proxies are: $F_{40\%}$ for flatfish and whiting, $F_{50\%}$ for rockfish (including thornyheads) and $F_{45\%}$ $F_{35\%}$ for all species such as sablefish and lingcod except rockfish and $F_{40\%}$ for rockfish[1/]. However, these values ($F_{35\%}$ $F_{40\%}$, $F_{45\%}$ and $F_{40\%}$ $F_{50\%}$) are provided here as examples only and are expected to be modified from time to time as scientific knowledge improves. If available information is sufficient, values of F_{msy}, B_{msy}, and more appropriate harvest control rules may be developed for any species or species group. For example, the Council generally has applied a variable F control rule for management of Pacific whiting.

At this time, it is generally believed that, for many species, $F_{35\%}$ $F_{45\%}$ strikes a balance between obtaining a large fraction of the MSY if recruitment is highly insensitive to reductions in spawning biomass and preventing a rapid depletion in stock abundance if recruitment is found to be extremely sensitive to reductions in spawning biomass. The long-term expected yield under an $F_{35\%}$ $F_{45\%}$ policy depends upon the (unknown) level of density-dependence in recruitment. The recommended level of harvest will reduce the average lifetime egg production by each female entering the stock to 35% 45% of the lifetime egg production for females that are unfished.

Because the level of recruitment is expected to decline somewhat as a stock is fished at $F_{45\%}$, the expected Bmsy proxy is less than 45% of the unfished biomass. A biomass level of 40% is a reasonable proxy for B_{msy}. The short-term yield under an $F_{35\%}$ $F_{45\%}$ policy will vary as the abundance of the exploitable stock varies. This is true for any fishing policy that is based on a constant exploitation rate. The abundance of the stock will vary, because of the effects of fishing, and because of natural variation in recruitment. When stock abundance is high (i.e., near its average unfished level), short-term annual yields can be approximately two to three times greater than the expected long-term average annual yield. For many of the long-lived groundfish species common on the West Coast, this "fishing down" transition can take decades. Many of the declines in ABC that occurred during the 1980s were the result of this

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1/ In the rest of this document use of $F_{35\%}$ will be taken to mean $F_{40\%}$ in the case of rockfish, and the hybrid fishing mortality rate strategy for Pacific whiting.

transition from a lightly exploited, high abundance stock level to a fully exploited, moderately abundant stock level. *Further declines below the overfished levels in the 1990s were due mostly to much lower than expected recruitment.*

~~Recent work (Clark 1993, Mace 1994, and Ianelli 1995) indicates that $F_{35\%}$ may not be the best approximation of F_{msy}, given more realistic information about recruitment than was initially used by Clark in 1991. In his 1993 publication Clark extended his 1991 results by improving the realism of his simulations and analysis. In particular he (1) modeled stochasticity into the recruitment process, (2) introduced serial correlation into recruitment time series, and (3) performed separate analyses for the Ricker and Beverton-Holt spawner-recruit functions. For rockfish, these changes improved the realism of his spawning biomass per recruit (SPR) harvest policy calculations, because these species are known to have stochastic recruitment and they appear to display serial correlation in recruitments (especially on interdecadal time scales), and because the Beverton-Holt spawner-recruit curve may be biologically the most plausible recruitment model. The effect of each of these changes, in isolation and in aggregate, was to decrease F_{msy}. Consequently, the estimated SPR reduction needed to provide an optimal F_{msy} proxy (defined as that level of fishing which produces the largest assured proportion of MSY), must necessarily be increased. Clark concluded that $F_{40\%}$ is the optimal rate for fish stocks exhibiting recruitment variability similar to Alaska groundfish stocks. Likewise, Mace (1994) recommended the use of $F_{40\%}$ as the target mortality rate when the stock-recruitment relationship is unknown. Lastly, Ianelli (1995) determined that $F_{44\%}$ was a good F_{msy} proxy for Gulf of Alaska Pacific ocean perch, although he subsequently indicated that a recent recruitment to that stock was larger than expected and that $F_{44\%}$ may be too conservative in that case.~~

~~Based on this information and advice by its Groundfish Management Team, in 1997 the Council concluded that $F_{40\%}$ should be used as the proxy for F_{msy} for rockfish in the absence of specific knowledge of recruitment or life history characteristics which would allow a more accurate determination of F_{msy}. This and other proxies may be revised on the basis of further information and experience.~~

In spring 2000, the Council's Scientific and Statistical Committee (SSC) sponsored a workshop to review the Council's groundfish exploitation rate policy. The workshop explored the historic use of different fishing mortality (F) rates, and found that the Council's past practices have generally changed in response to new information from the scientific community. Starting in the early 1990s, the Council used a standard harvest rate of F35%. The SSC's workshop participants reported that new scientific studies in 1998 and 1999 had shown that the $F_{35\%}$ and F_{40}% rates used by the Council had been too aggressive for Pacific coast groundfish stocks, such that some groundfish stocks could not maintain a viable population over time. A 1999 study, "The Meta-Analysis of the Maximum Reproductive Rate for Fish Populations to Estimate Harvest Policy; a Review" (Myers, et al.) showed that Pacific coast groundfish stocks, particularly rockfish, have very low productivity compared to other, similar species worldwide. One prominent theory about the reason for this low productivity is the large-scale, North Pacific climate shifts that are thought to cycle Pacific coast waters through warm and cool phases of 20-30 years duration. Pacific coast waters shifted to a warm phase around 1977-78, with ocean conditions less favorable for Pacific coast groundfish and other fish stocks. Lower harvest rates are necessary to guard against steep declines in abundance during these periods of low productivity (low recruitment). After an intensive review of historic harvest rates, and current scientific literature on harvest rates and stock productivity, the SSC workshop concluded that F40% is too aggressive for many Pacific coast groundfish stocks, particularly for rockfish. For 2001 and beyond, the Council adopted the SSC's new recommendations for harvest policies of: F40% for flatfish and whiting, F50% for rockfish (including thornyheads) and F45% for other groundfish such as sablefish and lingcod.

In the past, F_{msy} ~~these~~ fishing rates were treated by the Council (as intended) as targets. Under the Magnuson-Stevens Act as amended in 1996, these fishing rates are more appropriately considered to be ~~limits~~ thresholds ~~which~~ that should not be exceeded (see Section 4.4).

The Council will consider any new scientific information relating to calculation of MSY or MSY proxies and may adopt new values based on improved understanding of the population dynamics and harvest of any species or group of species.

~~The biomass level that produces MSY (i.e., B_{msy}) is also generally unknown and assumed to be variable over time due to long-term fluctuations in ocean conditions, so that no single value is appropriate. Current scientific thought is that B_{msy} (and/or the natural range of biomass under F_{msy}) usually falls somewhere between 0.3 to 0.5 of the average unfished abundance (mean $B_{unfished}$), and rarely falls below one quarter of that amount, (i.e., B_{msy} > 0.25 mean $B_{unfished}$). Rebuilding, or at least a reduced harvest rate, may be required if abundance falls below these levels.~~

While B_{msy} may be set based on the averaged unfished abundance ($B_{unfished}$) ~~T~~there are many possible approximations and estimates of mean $B_{unfished}$. If the necessary data exist, the following standard methodology is the preferred approach:

$$\text{mean } B_{unfished} = \text{mean } R * SPR(F=0)$$

note: spawning biomass per recruit (SPR)

Where mean R is the average estimated recruitment expected under unfished conditions ~~over all reliable years~~, and SPR(F=0) is the spawning potential per recruit at zero fishing mortality rate. ~~Alternative reference points based on mean R * SP($F_{35\%}$) or reconstruction of mean $B_{unfished}$ from stock-recruitment relationships may also be used.~~ SPR(F=0) is normally available as part of the calculation leading to determination of ~~$F_{35\%}$~~ F45% and is equilavent to F100%.

4.3 Determination of ABC ~~OY, Precautionary Threshold, and (Overfished/Rebuilding Threshold)~~

[Previously 5.3]

~~The Magnuson-Stevens Act as amended in 1996 defines OY as the amount of fish that is prescribed on the basis of MSY from the fishery as reduced by any relevant economic, social, or ecological factors. By this definition, overfishing occurs if a stock is harvested at a level in excess of F_{msy}. Moreover, overfished stocks (i.e., those that have declined to below a specified (overfished/rebuilding threshold)) are to be rebuilt to a level that is consistent with producing MSY.~~ In establishing OYs for West Coast groundfish, this FMP utilizes the interim step of calculating ABCs for major stocks or management units (groups of species). ABC is the MSY harvest level associated with the current stock abundance. Over the long term, if ABCs are fully harvested, the average of the ABCs would be MSY.

~~ABC, B_{msy}, and overfished/rebuilding stock size threshold cannot be precisely defined for all species, because of the absence of available information for many species managed under the FMP.~~ [Previous sentence moved to start of 5.1. Remainder of paragraph moved to 4.4.2.] ~~In this FMP, the term "overfishing" is used to denote situations where catch exceeds or is expected to exceed the established ABC or MSY proxy ($F_{x\%}$). The term "overfished" describes a stock who's abundance is below its overfished/rebuilding threshold). Overfished/rebuilding thresholds in general, are linked to the same productivity assumptions that determine the ABC levels. The default value of this threshold is 25% of the estimated unfished biomass level or 50% of B_{msy}, if known.~~

[Paragraph three of 5.3, on species categories, has been moved to section 4.1. Paragraph four of 5.3, on the precautionary threshold, has been moved to section 4.4.1.

4.3.1 Determination of ABC

[Previously 5.3.1]

4.3.1.1 Stocks with Quantitative Assessments, Category 1

[Previously 5.3.1.1]

The stocks with quantitative assessments are those that have recently been assessed by a catch-at-age analysis. Annual evaluation of the appropriate MSY proxy (e.g., ~~$F_{35\%}$~~ $F_{45\%}$) for species in this category will require some specific information in the SAFE document. Estimated age-specific maturity, growth, and availability to the fishery (with evaluation of changes over time in these characteristics) are sufficient to determine the relationship between fishing mortality and yield-per-recruit and spawning biomass-per-recruit. The estimated time series of recruitment, spawning biomass, fishing mortality are also required to determine whether recent trends indicate a point of concern. In general, ABC will be calculated by applying ~~$F_{35\%}$~~ $F_{45\%}$ (or $F_{40\%}$ or $F_{50\%}$ or other established MSY proxy) to the best estimate of current biomass. This current biomass estimate may be for a single year or the average of the present and several future years. Thus, ABC may be intended to remain constant over a period of three or more years. ~~All ABCs will remain in effect until revised, and, whether revised or not, will be announced at the beginning of the year along with other specifications.~~ [Last sentence moved back to chapter 5.]

4.3.1.2 Stocks with ABC Set by Nonquantitative Assessment, Category 2

[Previously 5.3.1.2]

These stocks with ABC set by nonquantitative 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 rate for Category 2 stocks are unknown. The Council places high priority on improving the information for managing these stocks so that they may be moved to Category 1 status.

4.3.1.3 Stocks Without ABC Values, Category 3

[Previously 5.3.1.3]

Of the 83 groundfish species managed under the FMP, ABC values have been established for only about 25. The remaining species are incidentally landed and usually are not listed separately on fish landing receipts. Information from fishery independent surveys are often lacking for these stocks, because of their low abundance or they are not vulnerable to survey sampling gear. ~~Without an~~ Until sufficient quantities of at-sea observer program data are available or surveys of other fish habitats are conducted, it is unlikely that there ~~a data base~~ will be ~~developed in the future for these stocks to~~ sufficient data to upgrade the assessment ~~capability~~ capabilities or to evaluate their overfishing potential. Interim ABC values may be established for these stocks based on qualitative information, including advice from the Council's advisory entities.

4.4 Precautionary Thresholds and Overfishing Status Determination Criteria

[New section title]

The National Standard Guidelines define two thresholds that are necessary to maintain a stock at levels capable of producing MSY: the maximum fishing mortality threshold (MFMT) and a minimum stock size threshold (MSST). These two limits are intended for use as benchmarks to decide if a stock or stock complex is being overfished or is in an overfished state. *The MFMT and MSST are intrinsically linked through the MSY Control Rule that specifies how fishing mortality or catches could vary as a function of stock biomass in order to achieve yields close to MSY.*

[Preceding was moved from section 4.2.

4.4.1 Determination of Precautionary Thresholds

[Previously 5.3.3]

The precautionary threshold is the biomass level at which point the harvest rate will be reduced to help the stock return to the MSY level (see Section 4.5.1 "Default Precautionary and Interim Rebuilding OY Calculation"). The precautionary biomass threshold is in addition to the overfishing and overfished/rebuilding thresholds required under ths MSA (MFMT and MSST). The precautionary biomass threshold is higher than the overfished biomass (MSST). Because B_{msy} is a longterm average, biomass will by definition be below B_{msy} in some years and above B_{msy} in other years. Thus, even in the absence of overfishing, biomass may decline to levels below B_{msy} due to natural fluctuation. By decreasing harvest rates when biomass is below B_{msy} but maintaining MSY control rule (or proxy control rule) harvest rates for biomass levels above MSY, the precautionary threshold and accompanying response effectively constitute a control rule that manages for harvests lower than MSY and an average biomass above MSY.

The precautionary threshold is established only for category 1 species. The precautionary threshold will be the B_{msy} level, if known. The default precautionary threshold will be 40% of the estimated unfished biomass level. The Council may recommend different precautionary thresholds for any species or species group based on the best scientific information about that species or group. It is expected the threshold will be between 25% and 50% of the estimated unfished biomass level.

~~For category 1 species, in addition to the overfished/rebuilding threshold, a precautionary threshold is established. The default value will be 40% of mean $B_{unfished}$. This level of biomass is expected to be near B_{msy}, and if abundance is between the overfished/rebuilding threshold and the precautionary threshold, a precautionary reduction in harvest will implemented to avoid further declines in abundance.~~

[Preceding paragraph moved from section 5.3, then deleted as being redundant with existing/new text..]

4.4.2 Determination of Overfishing Threshold

[New section]

In this FMP, for Category 1 species, the term "overfishing" is used to denote situations where catch exceeds or is expected to exceed the established ABC or MSY proxy ($F_{x\%}$). This can also be expressed as where catch exceeds or is expected to exceed the MFMT. The term "overfished" describes a stock who's abundance is below its overfished/rebuilding threshold). Overfished/rebuilding thresholds in general, are linked to the same productivity assumptions that determine the ABC levels. The default value of this threshold is 25% of the estimated unfished biomass level or 50% of B_{msy}, if known. [Preceding was moved from section 5.3] The MFMT is simply the value(s) of fishing mortality in the MSY control rule. Technically, eExceeding F_{msy} ~~now~~ constitutes overfishing.

[Preceding was moved from section 5.2]

[The following paragraphs on category 2 and category 3 species were moved from section 5.3.6.2.]

For Category 2 species, the following may be evaluated as potential indicators of overfishing:

catch per effort from logbooks
catch area from logbooks
index of stock abundance from surveys
stock distribution from surveys
mean size of landed fish

If declining trends persist for more than three years, then a focused evaluation of the status of the stock, its ABC, and overfishing threshold will be quantified. If data are available, such an evaluation should be conducted at approximately five year intervals even when negative trends are not apparent. In fact, many stocks are in need of re-evaluation to establish a baseline for monitoring of future trends. Whenever an evaluation indicates the stock may be declining and approaching an overfished state, the Council should:

1. Improve data collection for this species so it can be moved to Category 1.

2. Determine the rebuilding rate that would allow the stock to return to MSY in no longer than ten years.

For Category 3 species, information from fishery independent surveys are often lacking for these species because of their low abundance or they are not vulnerable to survey sampling gear. Without an at-sea observer program, it is unlikely that a data base will be developed in the future for these species to evaluate the risk of overfishing.

4.4.3 Determination of Overfished/Rebuilding Thresholds

[Previously 5.3.4]

The MSST (overfished/rebuilding threshold) is the default value of 25% of the estimated unfished biomass level or 50% of B_{msy}, if known. [Preceding was moved from section 4.2] ~~As described in section 5.3,~~ T~~t~~he overfished/rebuilding threshold (also refered to as $B_{rebuild}$ ~~MSST~~), ~~$B_{rebuild}$~~, is generally in the range of 25% to 40% of $B_{unfished}$, and may also be written as

$$B_{rebuild} = x\% * \text{mean } R * SPR(F=0)$$

The default overfished/rebuilding threshold for category 1 groundfish is $.25B_{unfished}$. The Council may establish different thresholds for any species based on information provided in stock assessments, the SAFE document, or other scientific or groundfish management-related report. For example, if B_{msy} is known, the overfished threshold may be set equal to 50% of that amount. The Council may also specify a lower level of abundance where catch or fishing effort is reduced to zero. This minimum abundance threshold (B_{min}) would correspond to an abundance that severely jeopardizes the stock's ability to recover to B_{msy} in a reasonable length of time; ~~likely values fall between five percent and ten percent of the average unfished level.~~

4.5 Ending Overfishing and Rebuilding

[New Section Title]

4.5.1 Default Precautionary and Interim Rebuilding OY Calculation

[Previously 5.3.5]
[Figure omitted]

The precautionary threshold, defined in Section 4.4.1, is used to trigger a precautionary management approach. If biomass declines to a level that requires rebuilding (below the MSST), the precautionary management approach also provides an interim rebuliding harvest control policy to guide the setting OY until the Council sets a new rebuilding policy specific to the conditions of the stock and fishery. The default OY/rebuilding ~~plan~~ policy can be described as an "ICES-type catch-based approach" that consists of a modification of the catch policy, where catch (C) declines from $C(F_{msy})$ at the precautionary threshold in a straight line to F=0 at the minimum abundance threshold of ten percent of the estimated mean unfished biomass (sometimes called pristine or virgin biomass or reproductive potential). This approach could also be described as an OY based on a variable F_{SPR} that is progressively more conservative at low biomass levels. The abbreviated name for this is the "40-10" default adjustment. In most cases, there is inadequate information to estimate F_{msy}; in such cases, the best proxy for F_{msy} will be used. The default proxy values will be $F_{40\%}$ for flatfish and whiting, $F_{\cancel{40\%}50\%}$ for rockfish in the *Sebastes* complex and $F_{\cancel{35\%}45\%}$ for other species such as sablefish and lingcod. The Council anticipates scientific information about the population dynamics of the various stocks will improve over time and that this information will result in improved estimates of appropriate harvest rates and MSY proxies. Thus, these initial default proxy values will be replaced from time to time. Such changes will not require amendment to the FMP, but the scientific basis for new values must be documented.

The greater amount of catch reduction applied below the precautionary threshold will foster quicker return to the MSY level. If a stock falls below its overfished/rebuilding threshold, this line would be used as the interim rebuilding plan during the year until the Council develops a formal rebuilding plan. The point at which the line intersects the horizontal axis does not necessarily imply zero catch would be allowed, but rather is for determining the slope of the line.

In order to apply this default approach, a minimal amount of information is necessary; only stocks in Category 1 can be managed in this way. For stocks with inadequate information to apply this approach, the Council will consider other methods of ensuring that overfishing will be avoided. The Council will consider the approaches discussed in the National Standard Guidelines in developing such recommendations for stocks in Categories 2 and 3.

4.5.2 Procedures For Calculating Rebuilding Parameters

[New section title]

The Magnuson-Stevens Act and National Standard Guidelines provide a descriptive framework for developing strategies to rebuild overfished stocks. This framework identifies three parameters: a minimum time in which an overfished stock may rebuild to its target biomass (denoted T_{MIN}), a maximum permissible time period for rebuilding the stock to its target biomass (T_{MAX}), and a target year, falling within the time period represented T_{MIN} and T_{MAX} and representing the best of estimate of the year by which the stock will be rebuilt.

[Text below from section 5.3.6.2, but reorganized]

T_{MIN}, ~~T~~the lower limit of the specified time period for rebuilding will be determined by the status and biology of the stock or stock complex and its interactions with other components of the marine ecosystem or environmental conditions and is defined as the amount of time that would be required for rebuilding if fishing mortality were eliminated entirely.

If the lower limit is less than ten years, then the specified time period for rebuilding may be adjusted upward to the extent warranted by the needs of fishing communities and recommendations by international organizations in which the United States participates, except that no such upward adjustment may result in the specified time period exceeding ten years (which would then constitute T_{MAX}), unless management measures under an international agreement in which the United States participates dictate otherwise.

If the lower limit is ten years or greater, then the specified time period for rebuilding may be adjusted upward to the extent warranted by the needs of fishing communities and recommendations by international organizations in which the United States participates, except that no such upward adjustment can exceed the rebuilding period calculated in the absence of fishing mortality, plus one mean generation time or equivalent period based on the species' life-history characteristics. For example, if a stock could be rebuilt within 12 years in the absence of any fishing mortality, and has a mean generation time of eight years, the rebuilding period could be as long as 20 years, which is T_{MAX}.

The Council may consider a number of factors in determining the time period for rebuilding, including:

1. The status and biology of the stock or stock complex.

2. Interactions between the stock or stock complex and other components of the marine ecosystem or environmental conditions.

3. The needs of fishing communities.

4. Recommendations by international organizations in which the United States participates.

5. Management measures under an international agreement in which the United States participates.

Calculating Rebuilding Probabilities

Stock assessment results form the basis of a rebuilding analysis, which in turn is used to develop rebuilding policies and choose the rebuilding parameters identified in each rebuilding plan. The elements of rebuilding analyses are described in the SSC Terms of Reference for Rebuilding Analyses {SSC, 2001 #3}. This guidance has been incorporated into a computer program. In the analysis the probability that the overfished stock will reach its target biomass is determined with respect to T_{MIN}, T_{MAX} and T_{TARGET}.

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 possible variability 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 that the rebuilding analyses use historical values. Because of this variability in a key input value, each simulation will show a different pattern of population growth. As a result, a modeled population may reach the target biomass that defines a rebuilt stock (B_{MSY}) in a different year in each of the simulations.

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. 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}, T_{MAX} is computed as 10 years or by adding the value of one mean generation time to T_{MIN}, if T_{MIN} is greater than or equal to 10 years.

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 TMAX, which is P_{MAX}. 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 fishing mortality is reduced, the likelihood that the stock will recover in this maximum time period increases.

A target year, T_{TARGET}, is then computed as the median rebuilding year for each related F and P_{MAX}. The median year is simply the year by which half of all cases have already rebuilt, and is unique for a given F and P_{MAX}.

When thinking about the various rebuilding parameters describing how a stock will be rebuilt, it is important to recognize that some of the terms introduced and described above represent policy decisions at the national level and the Council ***does not have a choice*** in setting their values. The dates for T_{MIN} and T_{MAX} are determined based on guidelines established at the national level. Mean generation time is a biological characteristic that cannot be chosen by policymakers. Thus, the Council cannot choose these values and then use them as a basis for management. Defined in national guidelines, T_{MIN} is a consequence of the productivity of the fish stock and is calculated by fishery biologists based on information they get from a particular stock. Similarly, T_{MAX}, which is calculated from T_{MIN}, does not represent a Council choice.

Fundamentally, when developing a management strategy the Council is able to choose a fishing mortality rate, and corresponding annual level of fishing. This ***does*** represent a Council choice because managers have the means to limit the amount of fish that are caught through the enforcement of management regulations. However, when rebuilding overfished species it is possible to think about how to set these fishing limits in different ways. The Council could base their management strategy on either the value of T_{TARGET}, P_{MAX}, or the fishing mortality rate, keeping in mind that these three values cannot be chosen independently of one another. In other words, the Council may choose one of these values and derive the other two from it, but they cannot choose the values for two of these terms independently of the third. T_{TARGET} must be the management target, given its name and the fact that the Magnuson-Stevens Act states that a time period must be identified. However, it should be apparent that the Council could base their choice of T_{TARGET} on P_{MAX} or the harvest rate since all three of these terms are related to each other. If the Council based their decision on P_{MAX}, for example, the corresponding target year and harvest rate could be easily determined through the rebuilding analysis.

4.5.3 Stock Rebuilding ~~Requirements~~ Plans

[Previously section 5.3.6]

As required by the Magnuson-Stevens Act within one year of being notified by the Secretary that a stock is overfished or approaching a condition of being overfished, the Council will prepare a recommendation to end the overfished condition and rebuild the stock(s) or to prevent the overfished condition from occurring. For a stock that is overfished, the rebuilding plan will specify a time period for ending the overfished condition and rebuilding the stock. Overfishing restrictions and recovery benefits should be fairly and equitably allocated among sectors of the fishery. ~~A new rebuilding plan or revision to an existing plan proposed by the Council will be submitted to the Secretary along with annual management recommendations as part of the regular annual management process. Once approved by the Secretary, a rebuilding plan will remain in effect for the specified duration of the rebuilding program, or until modified. The Council will make all approved rebuilding plans available in the annual SAFE document or by other means. The Council may recommend the Secretary implement interim measures to reduce overfishing until the Council's program has been developed and implemented.~~

Certain elements of a rebuilding plan developed by the Council, as specified in Section 4.5.3.2 (contents of rebuilding plans), will be submitted to the Secretary as **[Option 1c-** a regulatory amendment] **[Option 1d-** an FMP amendment]. Changes to key rebuilding plan elements will be accomplished through notice and comment rulemaking. Once approved by the Secretary, a rebuilding plan will remain in effect for the specified duration of the rebuilding program, or until modified. The Council will make all approved rebuilding plans available in the annual SAFE document or by other means. The Council may recommend the Secretary implement interim measures to reduce overfishing until the Council's program has been developed and implemented.

The Council intends its stock rebuilding plans to provide targets, checkpoints and guidance for rebuilding overfished stocks to healthy and productive levels. ~~The rebuilding plans themselves will not be regulations but principles and policies.~~ They are intended to provide a clear vision of the intended results and the means to achieve those results. They will provide the strategies and objectives that regulations are intended to achieve, and proposed regulations and results will be measured against the rebuilding plans. It is likely that rebuilding plans will be revised over time to respond to new information, changing conditions and success or lack of success in achieving the rebuilding schedule and other goals. If, in response to these revisions, the Council recommends changes to the management target for a particular stock, such changes will be published through notice and comment rulemaking as described in Section 6.2 of this FMP. As with all Council activities, public participation is critical to the development, implementation and success of management programs.

4.5.3.1 Goals and Objectives of Rebuilding Plans

[Previously 5.3.6.1]

The overall goals of rebuilding programs are to (1) achieve the population size and structure that will support the maximum sustainable yield within the specified time period; (2) minimize, to the extent practicable, the social and economic impacts associated with rebuilding, including adverse impacts on fishing communities; (3) fairly and equitably distribute both the conservation burdens (overfishing restrictions) and recovery benefits among commercial, recreational and charter fishing sectors; (4) protect the quantity and quality of habitat necessary to support the stock at healthy levels in the future; and (5) promote widespread public awareness, understanding and support for the rebuilding program. More specific goals and objectives may be developed in the rebuilding plan for each overfished species.

[Following two paragraphs from 5.3.6.2]

To achieve the rebuilding goals, the Council will strive to (1) explain the status of the overfished stock, pointing out where lack of information and uncertainty may require that conservative assumptions be made in order to maintain a risk-averse management approach; (2) identify present and historical harvesters of the stock; (3) where adequate harvest sharing plans are not already in place develop harvest sharing plans for the rebuilding period and for when rebuilding is completed; (4) set harvest levels that will achieve the specified rebuilding schedule ; (5) implement any necessary measures to allocate the resource in accordance with harvest sharing plans; (6) promote innovative methods to reduce bycatch and bycatch mortality of the overfished stock; (7) monitor fishing mortality ~~and the condition of the stock at least every two years to ensure the goals and objectives are being achieved~~ and use available stock assessment information to evaluate the condition of the stock; (8) identify any critical or important habitat areas and implement measures to ensure their protection; and (9) promote public education regarding these goals, objectives and the measures intended to achieve them.

~~The rebuilding plan will specify any individual goals and objectives including a time period for ending the overfished condition and rebuilding the stock and the target biomass to be achieved. The plan will explain how the rebuilding period was determined, including any calculations that demonstrate the scientific validity of the rebuilding period. The plan will identify potential or likely allocations among sectors, identify the types of management measures that will likely be imposed to ensure rebuilding in the specified period, and provide other information that may be useful to achieve the goals and objectives.~~

4.5.3.2 Contents of Rebuilding Plans

[Previously 5.3.6.2 (corrected from 5.6.3.2)]

~~The Council may consider a number of factors in determining the time period for rebuilding, including:~~

~~1. The status and biology of the stock or stock complex.~~

2. Interactions between the stock or stock complex and other components of the marine ecosystem or environmental conditions.

3. The needs of fishing communities.

4. Recommendations by international organizations in which the United States participates.

5. Management measures under an international agreement in which the United States participates.

The lower limit of the specified time period for rebuilding will be determined by the status and biology of the stock or stock complex and its interactions with other components of the marine ecosystem or environmental conditions and is defined as the amount of time that would be required for rebuilding if fishing mortality were eliminated entirely.

If the lower limit is less than ten years, then the specified time period for rebuilding may be adjusted upward to the extent warranted by the needs of fishing communities and recommendations by international organizations in which the United States participates, except that no such upward adjustment may result in the specified time period exceeding ten years, unless management measures under an international agreement in which the United States participates dictate otherwise.

If the lower limit is ten years or greater, then the specified time period for rebuilding may be adjusted upward to the extent warranted by the needs of fishing communities and recommendations by international organizations in which the United States participates, except that no such upward adjustment can exceed the rebuilding period calculated in the absence of fishing mortality, plus one mean generation time or equivalent period based on the species' life-history characteristics. For example, if a stock could be rebuilt within 12 years in the absence of any fishing mortality, and has a mean generation time of eight years, the rebuilding period could be as long as 20 years.

Generally, rebuilding plans will contain:

1. A description of the biology and status of the overfished stock and fisheries affected by stock rebuilding measures.

2. A description of how rebuilding parameters for the overfished stock were determined (including any calculations that demonstrate the scientific validity of parameters).

3. Estimates of rebuilding parameters (B_0, B_{MSY}, T_{MIN}, T_{MAX} and the probability of reaching target biomass by this date, and T_{TARGET}) at the time of rebuilding plan adoption .

4. A standard that will be used during periodic review to evaluate progress in rebuilding the stock to the target biomass (see Section 4.5.3.5).

5. The types of management measures that will may be used to ensure rebuilding in the specified period (and typically implemented through annual or biennial management), and any or other management measures the Council may wish to specifically describe in the FMP.

6. Any goals and objectives in addition to or different from those listed in the preceding section.

7. Potential or likely allocations among sectors.

8. For fisheries managed under international agreement, a discussion of how the rebuilding plan will reflect traditional participation in the fishery, relative to other nations, by fishermen of the United

States.

9 Any other information that may be useful to achieve the rebuilding plan's goals and objectives.

In general, the Council will also consider the following questions in developing rebuilding plans. The following questions also serve as a guide in developing rebuilding plans:

1. What is the apparent cause of the current condition (historical fishing patterns, a declining abundance or recruitment trend, a change in assessment methodology, or other factors)?

2. Is there a downward trend in recruitment that may indicate insufficient compensation in the spawner-recruitment relationship?

3. Based on an comparison of historical harvest levels (including discards) relative to recommended ABC levels, has there been chronic over-harvest?

4. Is human-induced environmental degradation implicated in the current stock condition? Have natural environmental changes been observed that may be affecting growth, reproduction, and/or survival?

5. Would reduction in fishing mortality be likely to improve the condition of the stock?

6. Is the particular species caught incidentally with other species? Is it a major or minor component in a mixed-stock complex?

7. What types of management measures are anticipated and/or appropriate to achieve the biological, social, economic and community goals and objectives of the rebuilding plan?

Rebuilding plan documents are distinct from the analytical documents required by the National Environmental Policy Act and other legal mandates, although they will reflect the contents of those analyses in a much briefer form. **[Option 1d-** Rebuilding plan elements incorporated into the FMP (in Section 4.5.4) summarize the contents enumerated in this section.] Rebuilding plans as a whole will be published in the next annual SAFE document after their approval.

Any new rebuilding program will commence as soon as the first measures to rebuild the stock or stock complex are implemented. [Sentence moved from section 4.6 (formerly 5.3.2).]

4.5.3.3 Process for Development and Approval of Rebuilding Plans

[Formerly section 5.3.6.3.]

Upon receiving notification that a stock is overfished, the Council will identify one or more individuals to draft the rebuilding plan. If possible, the Council will schedule review and adoption of the proposed rebuilding plan to coincide with the annual management process. A draft of the plan will be reviewed and preliminary action taken (tentative adoption or identification of preferred alternatives), followed by final adoption at a subsequent meeting. The tentative plan or alternatives will be made available to the public and considered by the Council at a minimum of two meetings unless stock conditions suggest more immediate action is warranted. Upon completing its final recommendations, the Council will submit the proposed rebuilding plan or revision to an existing plan to NMFS for concurrence. In most cases, this will be concurrent with its recommendations for annual management measures. In addition, any proposed regulations to implement theA rebuilding plan will be developed in accordance with the framework procedures of this FMP. The Council may designate a state or states to take the lead in working with its citizens to develop management proposals to achieve the rebuilding. Allocation proposals require consideration at a minimum of three Council meetings, as specified in the allocation framework. Rebuilding plans will be reviewed periodically, at least every 2 years, and the Council may propose revisions to existing plans at any time, although in general this will be occur only during the annual management process.

NMFS will review the Council's recommendations and supporting information upon receipt and may approve, disapprove, or partially approve each rebuilding plan. The Council will be notified in writing of the NMFS decision. If NMFS does not concur with the Council's recommendation, reasons for the disapproval will be included in the notification. Once approved, a rebuilding plan will remain in effect for the length of the specified rebuilding period or until revised. Any revisions to a rebuilding plan must also be approved by NMFS.following the standard procedures for considering and implementing an FMP amendment under the Magnuson-Stevens Act and other applicable law.

[Option 1d-

The following elements in each rebuilding plan will be incorporated into the FMP in Section 4.5.4:

1. A brief description of the status of the stock and fisheries affected by stock rebuilding measures at the time the rebuilding plan was prepared.

2. The methods used to calculate stock rebuilding parameters, if substantially different from those described in Section 4.5.2.

2. The estimate at the time the rebuilding plan was prepared of:
   unfished biomass (B_0) and target biomass (B_{MSY}).
   the year the stock would be rebuilt in the absence of fishing (T_{MIN});
   the year the stock would be rebuilt if the maximum time period permissible under National Standard Guidelines were applied (T_{MAX}) and the estimated probability that the stock would be rebuilt by this date based on the application of stock rebuilding measures;
   the year in which the stock would be rebuilt based on the application of stock rebuilding measures (T_{TARGET}).

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

It is likely that over time the parameters listed above will change. It must be emphasized that the values enumerated in the FMP represent estimates at the time the rebuilding plan is prepared. Therefore, the FMP need not be amended if new estimates of these values are calculated. The values for these parameters found in the FMP are for reference, so that managers and the public may track changes in the strategy used to rebuild an overfished stock.

In addition to an initial specification in the FMP, the target year (T_{TARGET}) and the harvest control rule (type and numerical value) will also be specified in regulations. If new information indicates a need to change the value of either of these two parameters, such a change will be accomplished through full (notice and comment) rulemaking as described in Section 6.2 of this FMP. Generally, the target year should only be changed in unusual circumstances. Two such circumstances would be if, based on new information, it is determined that the existing target year is later than the recomputed maximum rebuilding time (T_{MAX}) or if a recomputed harvest control rule would result in such a low optimum yield as to cause substantial socioeconomic impacts. Any change to the target year must be supported by commensurate analysis.

-end Option 1d]

[Option 1c- The target year (T_{TARGET}) and the harvest control rule (type and numerical value) will be specified in regulations. If new information indicates a need to change the value of either of these two parameters, such a change will be accomplished through full (notice and comment) rulemaking as described in Section 6.2 of this FMP. Generally, the target year should only be changed in unusual circumstances. Two such circumstances would be if, based on new information, it is determined that the existing target year is later than the recomputed maximum rebuilding time (T_{MAX}) or if a recomputed harvest control rule would result in such a low optimum yield as to cause substantial socioeconomic impacts. Any change to the target year must be supported by commensurate analysis. -end Option 1c]

[The following sections on Category 2 and 3 were moved to section 4.4.2.]

~~For Category 2 species, the following may be evaluated as potential indicators of overfishing:~~

- ~~catch per effort from logbooks~~
- ~~catch area from logbooks~~
- ~~index of stock abundance from surveys~~
- ~~stock distribution from surveys~~
- ~~mean size of landed fish~~

~~If declining trends persist for more than three years, then a focused evaluation of the status of the stock, its ABC, and overfishing threshold will be quantified. If data are available, such an evaluation should be conducted at approximately five year intervals even when negative trends are not apparent. In fact, many stocks are in need of re-evaluation to establish a baseline for monitoring of future trends. Whenever an evaluation indicates the stock may be declining and approaching an overfished state, the Council should:~~

1. ~~Improve data collection for this species so it can be moved to Category 1.~~

2. ~~Determine the rebuilding rate that would allow the stock to return to MSY in no longer than ten years.~~

~~For Category 3 species, information from fishery independent surveys are often lacking for these species because of their low abundance or they are not vulnerable to survey sampling gear. Without an at-sea observer program, it is unlikely that a data base will be developed in the future for these species to evaluate the risk of overfishing.~~

4.5.3.4 Implementation of Actions Required Under the Rebuilding Plan

[New heading, some text from section 5.3.6.3]

Once a rebuilding plan is adopted, certain measures required in the rebuilding plan may need to be implemented through authorities and processes already described in the FMP. Management actions to achieve OY harvest, and objectives related to rebuilding requirements of the Magnuson-Stevems Act and goals and objectives of the FMP (each of which may require a slightly different process) include: automatic actions, notices, abbreviated rulemaking actions, and full rulemaking actions (these actions are detailed at in Section 4.6, Chapter 5 and Section 6.2). Allocation proposals require consideration at a minimum of three Council meetings, as specified in the allocation framework. Any proposed regulations to implement the rebuilding plan will be developed in accordance with the framework procedures of this FMP.

Any rebuilding management measures that are not already authorized under the framework of the existing FMP, or specified in the FMP consequent of rebuilding plan adoption, will be implemented by further FMP amendments. These plan amendments may establish the needed measures or expand the framework to allow the implementation of the needed measures under framework procedures.

The Council may designate a state or states to take the lead in working with its citizens to develop management proposals to achieve stock rebuilding.

4.5.3.5 Periodic Review of Rebuilding Plans

[New heading, text based on section 5.3.6.3]

Rebuilding plans will be reviewed periodically, but at least every two years, although the Council may propose revisions to an adopted rebuilding plan at any time. These reviews will take into account the goals and objectives listed in Section 4.5.3.1, recognizing that progress towards the first goal, to achieve the population size and structure that will support MSY within the specified time period, will only be evaluated on receipt of new information from the most recent stock assessment. In evaluating progress towards achieving target biomass the Council will use the standard identified in the rebuilding plan. When drafting a rebuilding plan one of the following standards may chosen, although rebuilding plan authors are not limited to a choice of one of these standards:

- If the probability of achieving the target biomass within the maximum permissible time period (T_{MAX}) falls below 50% (the required minimum value), then progress will be considered inadequate.
- If the probability of achieving the target biomass within the maximum permissible time period (T_{MAX}) falls below the value identified in the rebuilding plan, then progress will be considered inadequate.
- The Council, in consultation with the SSC and GMT, will determine on a case-by-case basis whether there has been a significant change in a parameter such that the chosen management target must be revised.

If, based on this review, the Council decides that the harvest control rule or target year must be changed, the procedures outlined in Section 4.5.3.3 will be followed.

[Option 1d-

4.5.4 Summary of Rebuilding Plan Contents

[New heading]

[Reserved]

-end Option 1d]

4.6 Determination of OY

[Previously 5.3.2. The following five paragraphs comprised the entirety of Chapter 4]

Optimum yield (OY) is defined in the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) as the amount of fish which will provide the greatest overall benefit to the Nation. The Magnuson-Stevens Act also specifies that OY is based on maximum sustainable yield (MSY), and may be equal to or less than MSY. The fishery management plan (FMP) authorizes establishment of a numerical or non-numerical OY for any groundfish species or species group and lays out the procedures the Council will follow in determining appropriate numerical OY values. An OY may be specified for the fishery management area as a whole or for specific subareas. Numerical OYs will be specified annually, based on acceptable biological catches (ABCs) for major species or species groups, which are in turn based on quantitative or qualitative stock assessments. "Control rules" for determining the numerical values of OYs ensure they will not exceed the ABCs except under tightly limited conditions.

Most of the 83 species managed by the FMP have never been assessed in either a quantitative or qualitative manner. In some cases even basic catch statistics are unavailable, because many species (rockfish, for example) are not sorted unless specifically required by regulation. Species of this type have generally not been subject to numerical harvest limits, but rather harvest is limited by gear restrictions and market demand. Other management measures which determine the total amount of harvest each year include trip landing and frequency limits. Those species without a specified OY and not included in a multi-species OY will be included in a non-numerical OY, which is defined as all the fish that can be taken under the regulations, specifications, and management measures authorized by the FMP and promulgated by the U.S. Secretary of Commerce. This non-numerical OY is not a predetermined numerical value, but rather the harvest that results from regulations, specifications, and management measures as they are changed in response to changes in the resource and the fishery. In many cases, the absence of a numerical specification reflects the absence of basic management information, such as abundance estimates and catch statistics. The non-numerical OY concept allows for a variable amount of groundfish to be harvested annually, limited by such constraints as gear restrictions, management measures for other species, and/or absence of consumer acceptance or demand.

The close spatial relationship of many groundfish species throughout the management area results in commercial and recreational catches often consisting of mixtures of several species. This is especially the case in the trawl fishery where fishermen may target on one species, but unavoidable harvest several other species. In such cases, the optimum harvest strategy often is to target on a group (complex or assemblage) of groundfish species. ~~The grouping of groundfish species into multispecies numerical and non-numerical OYs provides the flexibility to manage to obtain the optimum public benefit from the groundfish fishery as a whole rather than the maximum yield from each species. In other cases, single species management may be necessary to provide adequate resource protection, bycatch controls, or equitable allocation. In such cases, the Council may determine it more appropriate to use individual species management by means of quotas, harvest guidelines, allocations by gear type, and other management measures.~~

~~Managing multiple species complexes for OY from the complex as a whole necessarily may result in some degree of overfishing or failure to allow recovery to the MSY level for some individual stocks.~~ The Council will ~~strive, to the extent practicable, to~~ avoid overfishing individual stocks and control harvest mortality to allow overfished stocks to rebuild ~~or preventing a stock from recovering~~ to the MSY level. In the event the Council determines that greater long-term benefits will be gained from the groundfish fishery by overfishing individual stocks or by preventing a stock from recovering to its MSY level, it will justify the action in writing in accordance with the procedures and standards identified in this section and Section 600.310 of the National Standard Guidelines. ~~in Section 5.3.6 (Stock Rebuilding) or in Section 5.5 (Annual Implementation Procedures for Specifications and Apportionments).~~ Conversely, the Council may determine that greater benefits will accrue from protecting an individual stock by constraining the multiple species complex or specific components of that complex.

Prior to implementation of the FMP in 1982, the states of Washington, Oregon, and California managed the groundfish fishery without the use of quotas. State regulations since the mid-1940s took the form of area closures (such as San Francisco Bay), legal gear definitions, minimum codend mesh regulations, size limits, bag limits, and other nonquota management measures. Implementation of the FMP built upon those historical management practices by increasing the level of catch monitoring, improving the assessment of stock conditions, and establishing other mechanisms for responding to management needs. It provides for continuation of the historical fishery on traditionally harvested groundfish species while allowing for the development of new fisheries for underutilized species. The FMP, as amended, provides for the establishment of resource conservation measures such as harvest guidelines or quotas through the annual specification procedure and annual and inseason management measures through the "points of concern" and socioeconomic framework mechanisms.

[The remainder of this section previously comprised the entirety of section 5.3.2, except as noted.]

Reduction in catches or fishing rates for either precautionary or rebuilding purposes is an important component of converting values of ABC to values of OY. This relationship is specified by the harvest control rule. All OYs will remain in effect until revised, and, whether revised or not, will be announced at the beginning of the year along with other specifications (see Chapter 5).

Groundfish stock assessments generally provide the following information to aid in determination of ABC and OY.

1. Current biomass (~~or~~ and reproductive potential) estimate.

2. F_{msy} or proxy, translated into exploitation rate.

3. Estimate of MSY biomass (B_{msy}), or proxy, unfished biomass (based on average recruitment), precautionary threshold, and/or overfished/rebuilding threshold.

4. Precision estimate (e.g., confidence interval) for current biomass estimate.

Determination of Numerical OYs If Stock Assessment Information Is Available (Category 1)

The Council will follow these steps in determining numerical OYs. The recommended numerical OY values will include any necessary adjustments to harvest mortality needed ~~actions~~ to rebuild any stock determined to be below its overfished/rebuilding threshold and may include adjustments to address uncertainty in the status of the stock.

1. ABC: Multiply the current fishable biomass estimate times the F_{msy} exploitation rate or its proxy to get ABC.

2. Precautionary adjustment: If the abundance is above the specified precautionary threshold, OY may be equal to or less than ABC. If current biomass estimate is less than the precautionary threshold (Section 4.4.1), the harvest rate will be reduced according to the harvest control rule specified in Section 4.5.1 in order to accelerate a return of abundance to optimal levels. If the abundance falls below the overfished/rebuilding threshold (Section 4.4.2), the harvest control rule will generally specify a greater reduction in exploitation as an interim management response toward rebuilding the stock while a formal rebuilding plan is being developed. The rebuilding plan will include a specific harvest control rule designed to rebuild the stock, and that control rule will be used in this stage of the determination of OY.
3. Uncertainty adjustments: In cases where there is a high degree of uncertainty about the biomass estimate and other parameters, OY may be further reduced accordingly.

4. Other adjustments to OY: Adjustments to OY for ~~O~~other social, economic, or ecological considerations may be made. There will be, ~~including~~ reductions for anticipated bycatch mortality (i.e. mortality of discarded fish)~~, may be made~~. Amounts of fish harvested as compensation for private vessels participating in NMFS resource survey activities will also be deducted from ABC prior to setting OY.

5. OY recommendations will be consistent with established rebuilding plans and achievement of their goals and objectives unless otherwise adjusted in accordance with section 6 below.
   (a) In cases where overfishing is occurring, Council action will be sufficient to end overfishing.
   (b) In cases where a stock or stock complex is overfished, Council action will specify OY in

a manner that complies with rebuilding plans developed in accordance with Section 4.5.2. [The following is eliminated because it duplicates provisions of section 4.5.3.] ~~a time period for rebuilding the stock or stock complex that satisfies the requirements of section 304(e)(4)(A) of the Magnuson-Stevens Act.~~

~~(i) The Council will consider a number of factors in determining the time period for rebuilding:~~

~~(1) The status and biology of the stock or stock complex.~~

~~(2) Interactions between the stock or stock complex and other components of the marine ecosystem (also referred to as "other environmental conditions").~~

~~(3) The needs of fishing communities.~~

~~(4) Recommendations by international organizations in which the United States participates.~~

~~(5) Management measures under an international agreement in which the United States participates.~~

~~(ii) These factors enter into the specification of the time period for rebuilding as follows:~~

~~(1) The lower limit of the specified time period for rebuilding is determined by the status and biology of the stock or stock complex and its interactions with other components of the marine ecosystem and is defined as the amount of time that would be required for rebuilding if fishing mortality were eliminated entirely.~~

~~(2) If the lower limit is less than ten years, then the specified time period for rebuilding may be adjusted upward to the extent warranted by the needs of fishing communities and recommendations by international organizations in which the United States participates, except that no such upward adjustment can result in the specified time period exceeding ten years, unless management measures under an international agreement in which the United States participates dictate otherwise.~~

~~(3) If the lower limit is ten years or greater, then the specified time period for rebuilding may be adjusted upward to the extent warranted by the needs of fishing communities and recommendations by international organizations in which the United States participates, except that no such upward adjustment can exceed the rebuilding period calculated in the absence of fishing mortality, plus one mean generation time or equivalent period based on the species' life-history characteristics. For example, suppose a stock could be rebuilt within twelve years in the absence of any fishing mortality, and has a mean generation time of eight years. The rebuilding period, in this case, could be as long as 20 years.~~

[Paragraph (iii) was moved to section 4.5.3.2.]

~~(iii) Any new rebuilding program will commence as soon as the first measures to rebuild the stock or stock complex are implemented.~~

[Paragraph (iv) is eliminated because there are no pre-existing rebuilding plans.]

~~(iv) Any pre-existing rebuilding plans will be reviewed to determine whether they are in compliance with all requirements of the Magnuson-Stevens Act. (Note: Only Pacific ocean perch falls into this category.)~~

(c) For fisheries managed under an international agreement, Council action must reflect traditional participation in the fishery, relative to other nations, by fishermen of the United States.

(d) For any stock that has been declared overfished, the open access/limited entry allocation shares may be temporarily revised for the duration of the rebuilding period by amendment to the regulations in accordance with the normal allocation process described in this FMP. However, the Council may at any time recommend the shares specified in chapter 12 of this FMP be reinstated without requiring further analysis. Once reinstated, any change may be made only through the allocation process.

(e) For any stock that has been declared overfished, any vessel with a limited entry permit may be prohibited from operating in the open access fishery when the limited entry fishery has been closed.

6. Adjustments to OY could include increasing OY above the default value up to the overfishing level as long as the management still allows achievement of established rebuilding goals and objectives. In limited circumstances, these adjustments could include increasing OY above the overfishing level as long as the harvest meets the standards of the mixed stock exception in the National Standard Guidelines:
   (a) The Council demonstrates by analysis that such action will result in long-term net benefits to the Nation.
   (b) The Council demonstrates by analysis that mitigating measures have been considered and that a similar level of long-term net benefits cannot be achieved by modifying fleet behavior, gear selection/ configuration, or other technical characteristic in a manner such that no overfishing would occur.
   (c) The resulting rate or level of fishing mortality will not cause any species or evolutionarily significant unit thereof to require protection under the Endangered Species Act.

7. For species complexes (such as Sebastes complex), the OY will generally be set equal to the sum of the individual component ABCs, HGs, and/or OYs, as appropriate.

<u>Determination of a Numerical OY If ABC Is Based on Nonquantitative Assessment (Category 2)</u>

1. ABC may be based on average of past landings, previous nonquantitative assessment, or other qualitative information.

2. Precautionary adjustments, if any, would be based on relevant information. In general, the Council will follow a risk-averse approach and may recommend an OY below ABC if there is a perception the stock is below its MSY biomass level. If a declining trend persists for more than three years, then a focused evaluation of the status of the stock, its ABC, and the overfishing parameters will be quantified. If data are available, such an evaluation should be conducted at approximately five-year intervals even when negative trends are not apparent. In fact, many stocks are in need of re-evaluation to establish a baseline for monitoring of future trends. Whenever an evaluation indicates the stock may be declining and approaching an overfished state, then the Council should:
   a. Recommend improved data collection for this species.
   b. Determine the rebuilding rate that would increase the multispecies value of the fishery.

3. Uncertainty adjustment: In cases where there is a high degree of uncertainty about the condition of the stock or stocks, OY may be reduced accordingly.

4. Amounts of fish harvested as compensation for industry research activities will also be deducted.

5. These adjustments could include increasing OY above the default value as indicated for Category 1 stocks, items 5 and 6 above.

<u>Non-numerical OY for Stocks with No ABC Values (Category 3)</u>

Fish of these species are incidentally landed and usually are not listed separately in fish landing receipts.

Information from fishery-independent surveys are often lacking for these stocks, because of their low abundance or they are not vulnerable to survey sampling gear. Until sufficient quantities of ~~Without an~~ at-sea observer program data are available or surveys of other fish habitats are conducted and/or requirements that landings of all species be recorded separately, it is unlikely that there ~~a data base~~ will be ~~developed in the future for these stocks to~~ sufficient data to upgrade the assessment ~~capability~~ *capabilities* or to evaluate their overfishing potential.

These species typically may be included in a non-numerical OY that is defined as all the fish that can be taken under the regulations, specifications, and management measures authorized by the FMP and promulgated by the Secretary. Such an OY may not be a predetermined numerical value, but rather that harvest that results from regulations, specifications, and management measures as they are changed in response to changes in the resource and the fishery. Nothing in this FMP prevents inclusion of these species in a numerical OY if the Council believes that is more appropriate.

5.0 ANNUAL SPECIFICATION AND APPORTIONMENT OF HARVEST LEVELS

The ability to establish and adjust harvest levels is the first major tool at the Council's disposal to exercise its resource stewardship responsibilities. Each biennial fishing period, the Council will assess the biological, social, and economic condition of the Pacific coast groundfish fishery and update maximum sustainable yield (MSY) estimates or proxies for specific stocks (management units) where new information on the population dynamics is available. The Council will make this information available to the public in the form of the *Stock Assessment and Fishery Evaluation (SAFE)* document described in Section 5.1. Based upon the best scientific information available, the Council will evaluate the current level of fishing relative to the MSY level for stocks where sufficient data are available. Estimates of the acceptable biological catch (ABC) for major stocks will be developed, and the Council will identify those species or species groups which it proposes to be managed by the establishment of numerical harvest levels (optimum yields [OYs], harvest guidelines [HGs], or quotas). For those stocks judged to be below their overfished/rebuilding threshold, the Council will develop a stock rebuilding management strategy.

The process for specification of numerical harvest levels includes the estimation of ABC, the establishment of OYs for various stocks, calculation of specified allocations between harvest sectors, and the apportionment of numerical specifications to domestic annual processing (DAP), joint venture processing (JVP), total allowable level of foreign fishing (TALFF), and the reserve. The specification of numerical harvest levels described in this chapter is the process of designating and adjusting overall numerical limits for a stock either throughout the entire fishery management area or throughout specified subareas. The process normally occurs annually between November and June, but can occur, under specified circumstances, at other times of the fishing year. The Council will identify those OYs which should be designated for allocation between limited entry and open access sectors of the commercial industry. Other numerical limits which allocate the resource or which apply to one segment of the fishery and not another are imposed through the socioeconomic framework process described in Chapter 6 rather than the specification process.

The National Marine Fisheries Service (NMFS) Regional Administrator will review the Council's recommendations, supporting rationale, public comments, and other relevant information; and, if it is approved, will undertake the appropriate method of implementation. Rejection of a recommendation will be explained in writing.

The procedures specified in this chapter do not affect the authority of the U.S. Secretary of Commerce (Secretary) to take emergency regulatory action as provided for in Section 305(c) of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) if an emergency exists involving any groundfish resource or to take such other regulatory action as may be necessary to discharge the Secretary's responsibilities under Section 305(d) of the Magnuson-Stevens Act.

This chapter describes the steps in this process.

5.1 General Overview of Annual Specifications Process

[New heading, text moved from introduction to Chapter 5]

The specifications and management process, in general terms, occurs as follows:

1. The Council will determine the MSY or MSY proxy and ABC for each major stock. Typically, the MSY proxy will be in terms of a fishing mortality rate ($F_{x\%}$,) and ABC will be the $F_{x\%}$ applied to the current biomass estimate. The MSY is the maximum long-term average yield expected from annual application of the MSY (or proxy) harvest policy under prevailing ecological and environmental conditions.

2. Every species will either have its own designated OY or be included in a multispecies OY. Species which are included in a multispecies OY may also have individual OYs, have individual HGs, or be included in a HG for a subgroup of the multispecies OY. Stocks without quantitative or qualitative assessment information may be included in a numerical or non-numerical OY.

3. To determine the OY for each stock, the Council will determine the best estimate of current abundance and its relation to its precautionary and overfished thresholds. If the abundance is above the precautionary threshold, OY will be equal to or less than ABC. If abundance falls below the precautionary threshold, OY will be reduced according to the harvest control rule for that stock. If abundance falls below the overfished/rebuilding threshold, OY will be set according to the interim rebuilding rule until the Council develops a formal rebuilding plan for that species.

4. For any stock or stock complex where the Secretary identifies that overfishing is occuring the Council will take remedial action to end overfishing. For any stock or stock complex the Secretary has identified as approaching the overfished condition the Council will take remedial action to prevent the stock or stock complex from falling below the minimum stock size threshold or from fishing For any stock the Secretary has declared overfished or approaching the overfished condition, or for any stock the Council determines is in need of rebuilding, the Council will implement such periodic management measures as are necessary to rebuild the stock through of control harvest mortality, habitat impacts or other effects of fishing activities that are subject to regulation under this biennial process. ~~the Council will develop a rebuilding plan and submit it in the same manner as recommendations of the annual management process. Once approved, a rebuilding plan will remain in effect for the specified duration or until the Council recommends and the Secretary approves revision.~~

5. The Council may reserve and deduct a portion of the ABC of any stock to provide for compensation for vessels conducting scientific research authorized by NMFS. Prior to the research activities, the Council will authorize amounts to be made available to a research reserve. However, the deduction from the ABC will be made in the year after the "compensation fishing"; the amounts deducted from the ABC will reflect the actual catch during compensation fishing activities.

6. The Council will identify stocks which are likely to be fully harvested (i.e., the ABC, OY, or HG achieved) in the absence of specific management measures and for which allocation between limited entry and open access sectors of the fishery is appropriate.

7. The groundfish resource is fully utilized by U.S. fishing vessels and seafood processors. The Council may entertain applications for foreign or joint venture fishing or processing at any time, but fishing opportunities may be established only through amendment to this FMP. This section supercedes other provisions of this FMP relating to foreign and joint venture fishing.

5.2 SAFE Document

[Previously 5.1]

For the purpose of providing the best available scientific information to the Council for evaluating the status of the fisheries relative to the MSY and overfishing definition, developing ABCs, determining the need for individual species or species group management, setting and adjusting numerical harvest levels, assessing social and economic conditions in the fishery, and updating the appendices of this fishery management plan (FMP); a SAFE document is prepared annually. Not all species and species groups can be reevaluated every year due to limited state and federal resources. However, the SAFE document will in general contain the following information:

1. A report on the current status of Washington, Oregon, and California groundfish resources by major species or species group.

2. Specify and update estimates of harvest control rule parameters for those species or species groups for which information is available. (The Council anticipates scientific information about the population dynamics of the various stocks will improve over time and that this information will result in improved estimates of appropriate harvest rates and MSY proxies. Thus, initial default proxy values will be replaced from time to time. Such changes will not require amendment to the FMP, but the scientific basis for new values must be documented.) [Copied from 4.5.]

3. Estimates of MSY and ABC for major species or species groups.

4. Catch statistics (landings and value) for commercial, recreational, and charter sectors.

5. Recommendations of species or species groups for individual management by OYs.

6. A brief history of the harvesting sector of the fishery, including recreational sectors.

7. A brief history of regional groundfish management.

8. A summary of the most recent economic information available, including number of vessels and economic characteristics by gear type.

9. Other relevant biological, social, economic, ecological, and essential fish habitat information which may be useful to the Council.

10. A description of the maximum fishing mortality threshold (MFMT) and the minimum stock size threshold (MSST) for each stock or stock complex, along with other information the Council may use to determine whether overfishing is occurring or a stock or stock complex is overfished. (The default overfished/rebuilding threshold for category 1 groundfish is $.25B_{unfished}$. The Council may establish different thresholds for any species based on information provided in stock assessments, the SAFE document, or other scientific or groundfish management-related report.) [The previous two sentences were copied from 4.4.2.]

11. A description of any rebuilding plans currently in effect, a summary of the information relevant to the rebuilding plans, and any management measures proposed or currently in effect to achieve the rebuilding plan goals and objectives.

12. A list of annual specifications and management measures that have been designated as routine under processes described in the FMP at Section 6.2.

Under a biennial specifications and management measures process, elements 2, 5, 6, 7, and 11 would not need to be included in a SAFE document in years when the Council is not setting specifications and management measures for an upcoming biennial fishing period. The ~~preliminary~~ stock assessment section of the SAFE document is normally completed ~~late in the year, generally late October,~~ when the most current stock assessment and fisheries performance information is available and prior to the meeting at which the Council approves its final management recommendations for the upcoming biennial fishing period. The Council will make the ~~preliminary~~ stock assessment ~~and fishery evaluation section~~ of the SAFE document available to the public by such means as mailing lists or newsletters and will provide copies upon request. ~~A final~~ The fishery evaluation section of the SAFE may be prepared after the Council has made its final recommendations for the upcoming biennial fishing period and will include the final recommendations, an estimate of the previous year's catch, and ~~including~~ summaries of ~~proposed and pre-existing~~ rebuilding plans. ~~The final SAFE document, if prepared, will also~~ It will be made available upon request.

5.3 Authorization and Accounting for Fish Taken as Compensation for Authorized Scientific Research Activities.

[Previously 5.4, sections 5.2 and 5.3 moved to chapter 4.]

At a Council meeting, NMFS will advise the Council of upcoming resource surveys that would be conducted using private vessels with groundfish as whole or partial compensation. For each proposal, NMFS will identify the maximum number of vessels expected or needed to conduct the survey, an estimate of the species and amounts of compensation fish likely to be needed to compensate vessels for conducting the survey, when the fish would be taken, and when the fish would be deducted from the ABC in determining the OY/harvest guideline. NMFS will initiate a competitive solicitation to select vessels to conduct resource surveys. NMFS will consult with the Council regarding the amounts and types of groundfish species to be used to support the surveys. If the Council approves NMFS' proposal, NMFS may proceed with awarding the contracts, taking into account any modifications requested by the Council. If the Council does not approve the proposal to use fish as compensation to pay for resource surveys, NMFS will not use fish as compensation.

Because the species and amounts of fish used as compensation will not be determined until the contract is awarded, it may not be possible to deduct the amount of compensation fish from the ABC or harvest guideline in the year that the fish are caught. Therefore, the compensation fish will be deducted from the ABC the biennial fishing period after the fish are harvested. During the annual specification process, NMFS will announce the total amount of fish caught during the biennial fishing period as compensation for conducting a resource survey, which then will be deducted from the following year's ABCs in setting the OYs.

[Section 5.5, Determination of DAH, DAV, JVP and TALFF deleted.]

5.4 Biennial Implementation Procedures for Specifications and Management Measures

[Previously 5.6]

Biennially, the Council will develop recommendations for the specification of ABCs, OYs, any HGs or quotas, ~~and apportionments to DAH, DAP, JVP, and TALFF and the reserve~~ over the span of three Council meetings. In addition during this process, the Council may recommend establishment of HGs and quotas for species or species groups within an OY.

The Council will develop preliminary recommendations at the first of three meetings (usually in November) based upon the best stock assessment information available to the Council at the time and consideration of public comment. After the first meeting, the Council will provide a summary of its preliminary recommendations and their basis to the public through its mailing list as well as providing copies of the information at the Council office and to the public upon request. The Council will notify the public of its intent to develop final recommendations at its third meeting (usually in June) and solicit public comment both before and at its second meeting.

At its second meeting, the Council will again consider the best available stock assessment information which should be contained in the recently completed SAFE report and consider public testimony before adopting final recommendations to the Secretary. Following the second/third meeting, the Council will submit its recommendations along with the rationale and supporting information to the Secretary for review and implementation.

Upon receipt of the Council's recommendations supporting rationale and information, the Secretary will review the submission, and, if approved, publish a notice in the *Federal Register* making the Council's recommendations avaialable for public comment and agency review. Following the public comment period on the proposed rule, the Secretary will review the proposed rule, taking into account any comments or additional information received, and will publish a final rule in the Federal Register, possibly modified from the proposed rule in accordance with the Secretary's consideration of the proposed rule. All ABCs, OYs, and any HGs or quotas will remain in effect until revised, and, whether revised or not, will be announced at the beginning of the year along with other specifications. [Previous sentence moved from 5.3.1.1.]

In the event that the Secretary disapproves one or more of the Council's recommendations, he may implement those portions approved and notify the Council in writing of the disapproved portions along with the reasons for disapproval. The Council may either provide additional rationale or information to support its original recommendation, if required, or may submit alternative recommendations with supporting rationale. In the absence of an approved recommendation at the beginning of the biennial fishing period, the current specifications in effect at the end of the previous biennial fishing period will remain in effect until modified, superseded, or rescinded.

5.5 Inseason Procedures for Establishing or Adjusting Specifications and Management Measures

[Previously 5.7]

5.5.1 Inseason Adjustments to ABCs

Occasionally, new stock assessment information may become available inseason that supports a determination that an ABC no longer accurately describes the status of a particular species or species group. However, adjustments will only be made during the biennial specifications process and a revised ABC announced at the beginning of the next biennial fishing period. The only exception is in the case where the ABC announced at the beginning of the biennial fishing period is found to have resulted from incorrect data or from computational errors. If the Council finds that such an error has occurred, it may recommend the Secretary publish a notice in the *Federal Register* revising the ABC at the earliest possible date.

5.5.2 Inseason Establishment and Adjustment of OYs, HGs, and Quotas

OYs and HGs may be established and adjusted inseason (1) for resource conservation through the "points of concern" framework described in Chapter 6; (2) in response to a technical correction to ABC described above; or, (3) under the socioeconomic framework described in Chapter 6.

Quotas~~, except for apportionments to DAH, DAP, JVP, TALFF,~~ and reserve, may be established and adjusted inseason only for resource conservation or in response to a technical correction to ABC.

Exhibit E.5
Attachment 3
April 2003

DRAFT DARKBLOTCHED ROCKFISH REBUILDING PLAN

PART II TO AMENDMENT 16-2 OF THE PACIFIC COAST GROUNDFISH FISHERY MANAGEMENT PLAN

INCLUDING DRAFT ENVIRONMENTAL IMPACT STATEMENT AND REGULATORY ANALYSES

PREPARED BY THE PACIFIC FISHERY MANAGEMENT COUNCIL

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1.0 PURPOSE AND NEED FOR REBUILDING DARKBLOTCHED ROCKFISH

1.1 Purpose and Need

The darkblotched rockfish (*Sebastes crameri*) stock in the northeast Pacific was one of the principal north slope rockfish species caught in trawl fisheries operating on the continental slope within the PFMC management area of the west coast EEZ bounded by the international borders with Mexico and Canada (herein referred to as the "west coast"). The north-south management line for slope rockfish is currently in the vicinity of Point Reyes, California at 38° N. lat with the darkblotched population distribution largely occurring north of that latitude. Most darkblotched rockfish catch has occurred north of Cape Mendocino in the Eureka and Columbia INPFC areas (Figure 1-1) which is consistent with the estimated geographic center of biomass distribution occurring in slope areas off Oregon (Rogers *et al.* 2000). Darkblotched rockfish were often caught in association with Pacific ocean perch and likely experienced similar large removals by foreign trawlers during 1966-1975, although species composition of historical catches is uncertain (Part III: Draft Pacific Ocean Perch Rebuilding Plan). Continued exploitation by the domestic trawl fleet was probably over the maximum fishing mortality threshold now used as a proxy MSY harvest rate for darkblotched ($F_{50\%}$).

Adoption of Amendments 11 and 12 of the Pacific Coast Groundfish Fishery Management Plan (FMP) incorporated the legal rebuilding mandates of the Sustainable Fishery Act and established an overfishing threshold (Minimum Stock Size Threshold; MSST) of 25% of the estimated unfished spawning biomass for groundfish stocks. Rogers et al. {2000 #470} estimated the 1999 abundance of the darkblotched rockfish stock in U.S. waters to be at 22% of its unfished biomass. Therefore, the National Marine Fisheries Service (NMFS) declared the stock overfished in January 2001.

Under the terms of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) and the FMP, the Council must prepare a rebuilding plan to increase darkblotched rockfish stock abundance to a level that supports maximum sustainable yield (MSY; 40% of its unfished biomass). The purpose of this rebuilding plan and Environmental Impact Statement (EIS) is to evaluate alternative strategies designed to rebuild darkblotched rockfish in a time less than or equal to the maximum allowable (T_{MAX}) under the National Standard Guidelines interpreting the MSA.

1.2 Rebuilding Plan Overview

The Draft Darkblotched Rockfish Rebuilding Plan (Part II, April 2003 draft) is organized to address the requirements of the MSA, National Environmental Policy Act, Executive Order 12866, the Regulatory Flexibility Act, and other applicable laws. This document conforms to a National Environmental Policy Act (NEPA) structure and format with a purpose and need statement (section 1.1), a reasonable range of rebuilding alternatives presented in Chapter 2, a description of the affected environment (physical (habitat), biological (darkblotched and other affected species), and socioeconomic (affected fisheries, fishing industry, and fishing communities)) in Chapter 3, and an analysis of rebuilding consequences expected for affected environments in Chapter 4. Subsequent chapters document references cited, how the rebuilding plan and alternatives conform to legal mandates, and individuals contributing to preparation of the rebuilding plan. Appendix A-1 is the rebuilding analysis prepared for this rebuilding plan and Appendix A-2, the FMP Amendment language for darkblotched rebuilding. The modular design of the rebuilding plan framework (each species rebuilding plan is stratified in Parts) is to allow each part/plan to stand alone as a decision-making document for rebuilding overfished groundfish species within the Council's jurisdiction (Figure 1-1). This April 2003 draft adopts a ***bold italic font for items of particular emphasis (especially to the Council and other decision-makers)*** and *italic font for names of rebuilding alternatives and scientific species names.*

The overarching objective of this rebuilding plan is to increase darkblotched stock spawning biomass to a level that supports MSY within a target time set by the Council (T_{TARGET}). For darkblotched rockfish, the Council-approved proxy for this level of abundance is 40% of its estimated unfished biomass ($B_{40\%}$). Estimation of unfished biomass (B_0) is especially critical since it forms the basis for declaring a stock's biological and legal status. There is uncertainty about the estimate of B_0 and this value can be expected to change with improved understanding of the stock and when new stock assessments are conducted.

Rebuilding parameters specified in a rebuilding plan must include at least T_{TARGET} and may be required to include other parameters listed in Table 1-1 depending on decisions made in Rebuilding Process and Standards part of this amendment package (Part I of the Amendment 16 package). The values adopted for these parameters are determined by the best available science, Council/NMFS policies, and legal mandates (including the MSA and the National Standard Guidelines for interpreting the MSA). The time to rebuild is constrained on the high end ($T_{MAX} = T_{MIN} + 1$ mean generation; 1 mean generation = the mean time period for a spawning female to replace herself in the population) (Restrepo *et al.* 1998) and on the low end (T_{MIN} = time to rebuild in the absence of fishing; F=0) by biological limits imposed by our understanding of the stock's potential productivity (50 CFR §600.310 (e)(4)(ii)(B)). The mean generation time for darkblotched is (age x survival x spawn) summed for all ages / (survival x spawn) summed for all ages (Methot and Rogers 2001). The National Standard Guidelines specify that the Council must manage to rebuild in no more than ten years if T_{MIN} is estimated to be less than or equal to ten years.

Scientific and management uncertainty exists for every aspect of rebuilding and thus influences success and failure of rebuilding. Uncertainty surrounds the estimation of parameters that define rebuilding targets and objectives, assessments of stock status and structure, projections of future recruitment and biomass, evaluation of how well management measures meet rebuilding objectives, and estimation of total fishing mortality. All alternatives in this rebuilding plan assume the best available science. Ensuring the best available science is incorporated in Council decision-making is the role of the Council's Scientific and Statistical Committee (SSC) and therefore not analyzed specifically as a policy choice. However, recommendations for mitigating risk associated with scientific uncertainties are explored throughout this rebuilding plan.

This rebuilding plan generally analyzes alternative strategies and explores management measures for achieving rebuilding targets and objectives. Specifically, this plan analyzes the tradeoffs (physical, biological, and socioeconomic) associated with alternative total fishing-related mortality limits (total catch OYs) and the management specifications (harvest controls and measures) to achieve these limits.

Area closures are considered in this rebuilding plan. Currently depth-based closures are in place to move the fishery off darkblotched areas to reduce the total mortality of adult fish. Additionally, the Council and NMFS are developing a policy for habitat-based management that may result in modification to existing closures, or other management measures intended to protect habitat deemed important to groundfish production. At issue in the development of this policy is the integration of habitat-based management with the harvest control management strategies that have historically been the foundation for Council actions. Alternative policies are being analyzed in a Programmatic EIS (contact Mr. Jim Glock, NMFS, (503) 231-2178). The policies adopted through the Programmatic EIS will be implemented through subsequent decisions such as implementation of the EFH provisions of the Magnuson-Stevens Act or the annual management process and may be utilized to achieve the mortality goals for darkblotched rockfish established in the rebuilding plan. Implementation of the EFH provisions is underway through another EIS that tiers off the Programmatic EIS. Publication of the draft action-specific EFH EIS is anticipated for August 2003 (contact Mr. Steve Copps, NMFS, (206) 526-6187).

2.0 DARKBLOTCHED ROCKFISH REBUILDING PLAN ALTERNATIVES

Darkblotched rockfish rebuilding alternatives within MSA, FMP, and other legal constraints are analyzed in this rebuilding plan. The most risk-averse alternative (*Maximum Conservation*), most risk-prone alternative (*Maximum Harvest*), and an alternative with intermediate risk (*Council Interim*) are compared with a *No Action* alternative. All rebuilding alternatives except *No Action* consider the best available science for determining risk-neutral bycatch and discard rates[1]. The best available science for determining discard mortality rates is anticipated to be direct observations of bycatch and discard in west coast groundfish fisheries. However, until these data are available to account for all sources of fishing-related mortality, the best available science is considered to be a bycatch/discard model developed by the Northwest Fisheries Science Center of the National Marine Fisheries Service (Hastie 2001). Assumed bycatch rates of darkblotched rockfish in trawl fisheries targeting other species would be at the mid-point of the range estimated from log books and Enhanced Data Collection Program (EDCP) data (Hastie 2001) for all alternatives except *No Action*. Rebuilding parameter estimates and probabilities for all alternatives (Table 2-1) are derived in the most recent stock assessment (Rogers *et al.* 2000) and rebuilding analysis {Methot, 2001 #423; Appendix A-1}. The median year when darkblotched spawning biomass is projected to reach B_{MSY} (T_{TARGET}) under each alternative is noted in Table 2-1. The choice of T_{TARGET} is constrained to fall between T_{MIN} and T_{MAX}. The probability of the stock attaining B_{MSY} in the maximum allowable time (T_{MAX}) is denoted as P_{MAX}. These estimated rebuilding parameters under each alternative are summarized in Table 2-1. Relative risk and probability of rebuilding alternatives meeting rebuilding objectives is sensitive to our current state of knowledge and the harvest control rule (i.e., harvest rate) adopted as a rebuilding target and strategy. The harvest control rule varies between rebuilding alternatives analyzed in this rebuilding plan, the best available science informing decisions and our current state of knowledge does not.

2.1 The *No Action* Alternative

Under the *No Action* alternative darkblotched would be managed with specified trip limits and Council-adopted precautionary management measures. The harvest level would be based on the Council's default $F_{50\%}$ MSY proxy harvest rate and the precautionary "40-10" adjustment of the ABC to calculate a total catch OY. The total catch OY would be calculated using a fishing mortality rate of 0.0XXX. A 16% discard rate (of landed catch) would be assumed for controlling bycatch mortality. The probability of achieving B_{MSY} by T_{MAX} is X%. The median year of reaching B_{MSY} is projected to be 20XX.

The choice of the *No Action* alternative for darkblotched rockfish was considered in terms of providing the most informative analysis of the consequences and tradeoffs of rebuilding the stock. The choice of 1998 for the *No Action* alternative was based on the desire to compare rebuilding alternatives to a time prior to any stocks being declared overfished under the mandates of the Sustainable Fisheries Act. Technically, a *No Action* alternative would be the action that would be taken in the absence of an approved rebuilding plan (or status quo). Under the strict context of that definition, the *Council Interim* alternative might be considered to represent status quo. Since the *Council Interim* alternative is also analyzed, this rebuilding plan follows strict NEPA requirements.

2.2 The *Maximum Conservation* Alternative

Under the *Maximum Conservation* alternative rebuilding would occur in the shortest time possible by setting the fishing mortality rate to zero (F = 0) for all fisheries in the EEZ that take darkblotched. The tradeoff is the greatest adverse socioeconomic impact occurs to fisheries and fishing-dependent communities on the west coast during the course of rebuilding. Bottom trawl fisheries (and any other fisheries that demonstrate a bycatch of darkblotched rockfish) operating on the shelf and slope would be closed or modified to the point where targeted and incidental catch of darkblotched rockfish did not occur. While darkblotched rockfish is a slope species, juveniles are found in shallower depths on the shelf. Therefore, the *Maximum*

[1] In this rebuilding plan bycatch rate is defined as the rate of co-occurrence of non-targeted species during fishing while discard rate refers to the rate of those non-targeted species caught and thrown overboard prior to landing. The discard mortality rate of darkblotched is assumed to be 100%. Differentiation of bycatch and discard in this rebuilding plan is noted since the MSA defines bycatch as discard in marine fisheries.

Conservation alternative would analyze restrictions on fisheries with a potential take of juvenile darkblotched. The analysis of this alternative assumes restrictions on trawl and fixed gear line fisheries operating in the west coast EEZ in depths 50-250 fm. The target rebuilding period (T_{TARGET}) would be the minimum rebuilding time to achieve B_{MSY} (T_{MIN}) which is estimated to be 2014. There would be no bycatch of darkblotched rockfish since there is no fishing-related mortality. Potential habitat impacts would be minimized by eliminating fishing effort. A subsequent decision-making process to implement the EFH provisions of the MSA would be utilized to determine if additional habitat based management measures were necessary to enhance productivity of the stock. The *Maximum Conservation* alternative has a 100% probability of rebuilding within T_{MAX}.

2.3 The *Maximum Harvest* Alternative

Under the *Maximum Harvest* alternative rebuilding would occur in the maximum allowable time (T_{MAX}), thereby allowing the maximum allowable harvest under rebuilding. A minimal impact would be expected on existing slope and shelf fisheries and dependent fishing communities, but at a cost of the slowest legal rebuilding schedule allowed by the FMP, MSA, and the National Standard Guidelines. The target rebuilding period (T_{TARGET}) would be T_{MAX} with the median year of reaching B_{MSY} projected to be 2047. The *Maximum Harvest* alternative has a 50% probability of rebuilding within T_{MAX}. The total catch OY would be calculated using a fishing mortality rate of 0.033. Depth-based or other area fishing restrictions would not be required under the *Maximum Harvest* alternative. It is also assumed that small footrope restrictions on bottom trawls would not be needed.

2.4 The *Council Interim* Alternative

Under the *Council Interim* alternative there would be an 80% probability of rebuilding within T_{MAX}. This alternative was the one the Council selected in September 2002 when setting the 2003 groundfish annual harvest specifications and management measures as its preferred alternative for rebuilding darkblotched rockfish. The target rebuilding year (T_{TARGET}) would be 2030 under this alternative. The total catch OY would be calculated using a fishing mortality rate of 0.027. Depth-based restrictions and mandatory use of small footropes in bottom trawls operating in primary darkblotched habitats, such as adopted for 2003 management, are measures anticipated to be needed to manage darkblotched under harvest levels associated with the *Council Interim* alternative.

2.5 Alternatives Considered But Rejected

Any alternatives 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 (*Natural Resources Defense Council v. Daley, April 25, 2000, U.S. Court of Appeals for the District of Columbia Circuit*). Such alternatives are not analyzed in this rebuilding plan. The *No Action* alternative has a probability of rebuilding to B_{MSY} of less than 50%, but is still analyzed as per NEPA requirements.

A Mixed Stock Exception alternative was initially considered for darkblotched rockfish. The Mixed Stock Exception is a provision in National Standard Guideline 1 allowing an increased OY above the overfishing level as long as the harvest meets certain standards. Harvesting one species of a mixed-stock complex at its optimum level may result in the overfishing of another stock component in the complex. The Council may decide to permit this type of overfishing only if all of the following conditions are satisfied:

(a) The Council demonstrates by analysis that such action will result in long-term net benefits to the Nation.
(b) The Council demonstrates by analysis that mitigating measures have been considered and that a similar level of long-term net benefits cannot be achieved by modifying fleet behavior, gear selection/ configuration, or other technical characteristic in a manner such that no overfishing would occur.
(c) The resulting rate or level of fishing mortality will not cause any species or evolutionarily significant unit thereof to require protection under the Endangered Species Act.

Since the west coast darkblotched rockfish stock is the most binding constraint to slope fisheries north of Pt. Reyes, California at 38° N. lat., darkblotched may be considered to meet the standards of the Mixed Stock Exception provision. However, at its June 2002 meeting, the Council explicitly rejected a Mixed

Stock Exception alternative for final analysis in this rebuilding plan.

3.0 AFFECTED ENVIRONMENT

3.1 Physical Environment

3.1.1 Darkblotched Rockfish Habitat

The distribution of darkblotched rockfish extends from the Bering Sea to Santa Catalina Island, California (Allen and Smith 1988). Based on the location of commercial landings and NMFS triennial survey data, darkblotched rockfish are frequently encountered along the central Pacific Coast (Oregon and northern California). They can be found at depths ranging from 29-549 m (Rogers *et al.* 2000), usually deeper than 76 m, and are classified as a middle shelf-mesobenthal species.

Darkblotched rockfish move into deeper water as they increase in size and age. Older larvae and pelagic juveniles are found closer to the surface than many other rockfish species (Love *et al.* 2002). Off Oregon, benthic juveniles are taken at depths of 55-200 m. Adults have been found in water as shallow as 29 m, but are most abundant in the deeper portion of their range. In 1999, NMFS triennial survey data indicated that 91% of the estimated darkblotched rockfish biomass was found at depths between 180-360 m, with the remaining 9% found between 360-540 m (Rogers *et al.* 2000).

Darkblotched rockfish are associated with mud and rock habitats throughout their range (Eschmeyer *et al.* 1983). However, Rogers et al. {2000 #470} disputes a darkblotched association with soft slope substrates and cited submersible observations (W. Wakefield, NMFS, pers. comm.). The greatest numbers of darkblotched larvae and pelagic juveniles are found 83-93 km offshore; juvenile darkblotched can be taken as far offshore as 194 km. Off central California, young darkblotched rockfish recruit to soft substrate and low relief habitats. Demersal juveniles are often found perched on the highest structure in the benthic habitat (Love *et al.* 2002). Adults are typically observed resting on mud, near cobble and boulders and do not often rise above the bottom (Love *et al.* 2002). In Soquel Canyon, California, adults were most frequently associated with mud boulder, mud rock, rock mud, and mud cobble habitats (Yoklavich *et al.* 1999). Darkblotched rockfish make limited migrations once they recruit to the adult stock. *[Describe extent and pattern of migrations: offshore? latitudinal?]*

3.1.2 Human Effects on Rockfish Habitat

Potential fishing-related impacts to rockfish habitat are incurred from direct disturbance of the seafloor from contact by actively-fished, lost, or discarded fishing gear. The most common bottom fishing gears associated with seafloor disturbance on the west coast are trawl nets, longlines, and fish traps. Auster and Langton {1999 #576} 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; National Research Council 2002). High resolution sidescan sonar images on the shelf and slope off Eureka, California, 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 were also investigated in the Gulf of Alaska where 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 #578} study revealed that *Sebastes* species use cobble-boulder and epifaunal invertebrates for cover. When boulders are displaced they can still provide cover, but the number and complexity of crevices is reduced (Freese *et al.* 1999).

Limited qualitative observations of fish traps, longlines, and gill nets dragged across the seafloor during set and retrieval were similar to observations of bottom trawling gear, in 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 other direct and indirect effects on fish habitat. While non-fishing human impacts have not been directly assessed on darkblotched rockfish habitat, a study of flatfish in Puget Sound, Washington indicted 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 disposal (Wilbur and Pentony 1999).

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 U.S. - Mexico border at depths of 10 to 200 m and anthropogenic debris occurred on approximately 14 percent 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.

As more information is gathered about the effects of fishing and non-fishing human activities on darkblotched rockfish habitat, additional management measures may be taken.

3.2 Biological Environment

3.2.1 Affected Stocks

3.2.1.1 Darkblotched Rockfish Life History

Darkblotched have a low potential productivity and a long mean generation time of 33 years. There is no evidence of genetic stock structuring in the darkblotched population. Rogers *et al.* {2000 #470} observed this was consistent with the smooth cline in age, size, and relative abundance indices of the coastwide population with no obvious breaks within the species range. Larger fish are generally found in deeper water {>200 fm; /Nichol, 1990 #607}. Lenarz {1993 #290} reported evidence from the 1977-1992 NMFS triennial surveys of a higher proportion of larger fish in southern areas. The center of biomass distribution on the west coast is off Oregon (Rogers *et al.* 2000), which comports with the majority of landings in the Columbia INPFC area.

Darkblotched, like many *Sebastes* species, are long-lived, slow growing, and late to mature. Females grow faster than males and attain a larger mean size (Table 3.2-1). The maximum reported age for darkblotched is 66 years.

The age at 50% maturity for males is estimated to be 5.1 years and 8.4 years for females (Nichol and Pikitch 1994). The estimated length at 50% maturity is 29.6 cm and 36.5 cm for males and females, respectively. Westrheim {1975 #503} reported a smaller size at 50% maturity for darkblotched in Alaska and British Columbia waters than Nichol {1990 #607} did for the stock off Oregon. Nichol and Pikitch {1994 #432} report darkblotched fecundities ranging from 19,815 oocytes (565.0 g) for a 32.5 cm female to 489,064 oocytes (1,724.0 g) for a 47.0 cm female.

Darkblotched reproduce via internal fertilization and are viviparous (live-bearers). Spawning occurs from December through March off Oregon (Nichol and Pikitch 1994). Wourms {1991 #603} describes one clear seasonal peak of spawning annually. Darkblotched larvae are planktonic and are distributed from southern California to the Bering Sea (Matarese *et al.* 1989). A long planktonic life stage would likely contribute to the apparent lack of genetic structuring in the west coast population.

3.2.1.2 Darkblotched Rockfish Stock Status

Darkblotched rockfish were managed as part of a coastwide *Sebastes* complex which was later segregated into north and south management units divided at 40°30' N. lat. The first assessment of darkblotched estimated the proxy MSY harvest rate and overfishing rate for the stock (Lenarz 1993). Lenarz {1993 #290} estimated a range of likely natural mortalities (M = 0.025-0.05) for darkblotched based on a range of maximum ages (60-105 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 $F_{35\%}$ (the target MSY proxy harvest rate at that time) and $F_{20\%}$ (the overfishing harvest rate) relative to fecundity per recruit. He estimated the range of likely harvest rates (F) at the MSY target ($F_{35\%}$) was 0.04-0.06 and the overfishing harvest rate ($F_{20\%}$) ranged between 0.07 and 0.11. While Lenarz {1993 #3} did not calculate an ABC for darkblotched, 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 from the length composition data he evaluated.

The next informative assessment for darkblotched addressed all west coast *Sebastes* without individual ABCs (Rogers *et al.* 1996). Two methodologies were explored for estimating an ABC for darkblotched: 1) fishing-related mortality was assumed to equal natural mortality (F=M) to estimate an $F_{35\%}$ harvest rate, and 2) estimation of $F_{35\%}$ using a simple stock synthesis model. In the F=M approach, a proxy 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 since the survey swept most of the depth range of darkblotched 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 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 #470} 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 2000a) 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 of 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.

Methot and Rogers {2001 #423; Appendix A-1} 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 #470} assessment. The mean recruitment in the 1983-1996 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).

A new expedited update of the Rogers et al. {2000 #470} assessment is scheduled for 2003. Expedited assessments are designed to update previous assessment models with new catch, survey and other input data. Expedited assessments are reviewed by the Groundfish Subcommittee of the SSC before being recommended to the Council for use in management. It is anticipated that allocation of darkblotched in historical foreign catches from retrospective analysis (Rogers In prep) will address some of the uncertainty in the previous assessment. Species composition information of historical foreign catch is sparse. Foreign catches of west coast rockfish species were typically reported as "Pacific ocean perch", "rockfish", or "other rockfish". Rogers {In prep #640} compiled the available information on species composition from limited sampling of trawl landings from the domestic fleet, research surveys, and observations of the areal deployment of foreign vessels. She applied these data to reported foreign catches to allocate the tonnage of slope and shelf rockfish species catch by INPFC area (Table 3.2-1). While these data were not incorporated in the most recent darkblotched assessment, they are anticipated to be used in the 2003 assessment update. The updated darkblotched assessment is scheduled to be available to the Council in June 2003 for use in setting 2004 groundfish specifications and management measures.

3.2.1.3 Species Co-occurring With Darkblotched Rockfish

Darkblotched rockfish are part of the northern slope rockfish complex (Table 3.2-3a) and are primarily associated with these rockfish species. The north-south slope rockfish management line near Cape Mendocino at 40°10' N. lat. used prior to 2003 did not conform perfectly with the estimated distribution of darkblotched biomass (Rogers *et al.* 2000); there are some landings in fisheries targeting the southern slope rockfish complex (Table 3.2-3b). Therefore, starting in 2003, the slope management line was moved south to Point Reyes at 38° N. lat. The deep-water trawl fishery targeting Dover sole (*Microstomus pacificus*), shortspine and longspine thornyheads (*Sebastolobus alascanus* and *S. altivelis*, respectively), and sablefish (*Anoplopoma fimbria*; collectively referred to as the DTS complex) incidentally catch darkblotched. There are also strong seasonal associations with other deepwater flatfishes caught in bottom trawl fisheries that incidentally catch darkblotched, such as petrale sole (*Eopsetta jordani*) in the winter and rex sole (*Errex zachirus*), and, to a lesser extent, English sole (*Pleuronectes vetulus*). The latitudinal and depth distributions of west coast groundfish species are depicted in Table 3.2-4.

3.3 Socioeconomic Environment

3.3.1 Management Regime

3.3.1.1 Management History

Slope rockfish are exclusively caught in commercial fisheries with darkblotched primarily harvested by trawls (about 96% of 1981-2002 landings). A relatively small domestic fleet harvested slope rockfish prior to 1965. The primary target species was Pacific ocean perch with most of the effort in the Columbia and Vancouver INPFC areas (see Part III - Draft Pacific Ocean Perch Rebuilding Plan). Exploitation of darkblotched rockfish and the other commercially important slope rockfish species intensified during 1966-1975 when foreign Soviet and Japanese trawlers targeted slope and shelf rockfish off the west coast (mostly in the Columbia and Vancouver INPFC areas). The foreign fishery ended in 1977 after passage of the MSA and the transition to a domestic fishery.

Darkblotched were historically managed as part of a coastwide *Sebastes* complex until 2001 when an individual ABC and OY were specified for darkblotched, thus excluding them from the complex. Rogers et al. {1996 #466} calculated a species-specific ABC for darkblotched and other rockfish in the *Sebastes* complex. However, these ABCs were summed to determine the management target for the complex in entirety. Therefore, the complex limit could be taken from any member species of the complex. The *Sebastes* complex historically included about 50 species of rockfish except widow, shortbelly, and Pacific ocean perch (in the Columbia and U.S.-Vancouver INPFC areas only). In 1999 splitnose rockfish were excluded from the *Sebastes* complex in the south (south of the Eureka-Columbia INPFC boundary) and, in August of that year, yellowtail and canary rockfish were excluded from the complex limit in the north. The fishing mortality rate target commonly accepted for shelf and slope rockfish was $F_{35\%}$, but changed on the advice of the SSC to an $F_{50\%}$ harvest rate in 2001 (PFMC 2000b).

Rogers et al. {2000 #470} estimated the abundance of darkblotched in 2000 to be at 22% of its unfished biomass, below the minimum stock size threshold of $B_{25\%}$. In response, NMFS declared darkblotched overfished in January 2001. The assessment (Rogers *et al.* 2000) indicated the stock could be rebuilt within ten years; therefore, there was a legal mandate to do so[2]. The GMT recommended a range of OYs in 2001 to reflect a range of 10% darkblotched in the historical foreign catch and 0%. The lower OY (95 mt) was based on a constant annual catch that would rebuild the stock in 10 years and the 10% foreign catch assumption. The upper OY (159 mt) was based on a constant catch to rebuild in 10 years, assuming 0% of darkblotched in foreign catches. However, the GMT did not believe the latter assumption of 0% foreign darkblotched catch to be plausible. The Council chose an intermediate value (130 mt) given this uncertainty. This became the harvest guideline for darkblotched and represented the first year the stock was managed with its own OY. Commercial fishing regulations required sorting of darkblotched in 2001; previously darkblotched were landed in combination with other species in the *Sebastes* complex. Darkblotched harvest was tracked separately in 2001 using Quota Species Monitoring (see QSM discussion in section 3.3.1.2).

The change in outlook of darkblotched stock status with the advent of the rebuilding analysis was the conclusion that the stock could not be rebuilt within ten years (Methot and Rogers 2001). In November 2001, the Council chose a darkblotched rebuilding strategy which was estimated to achieve B_{MSY} by T_{MAX} with a 70% probability. The expected year to rebuild the stock under this P_{MAX} (0.7) is 2034 (Table 2-1). This resulted in a 2002 OY of 168 mt. In April 2002, the Natural Resources Defense Council (NRDC) and other defendants filed a complaint in the U.S. District Court for the Northern District of California (NRDC et al. v. Evans et al., case # C02 1650 BZ) challenging the 2002 annual groundfish specifications. Among other 2002 specifications, NRDC et al. challenged the increased darkblotched OY in 2002 and the extended rebuilding period predicted in the Methot and Rogers {2001 #423} rebuilding analysis. Plaintiffs claimed that the MSA requires the shortest possible rebuilding period should be prescribed and the difference in the 2002 OY relative to the 2001 OY did not comport with this legal mandate. NMFS argued that the change in understanding of stock status prompted the change in management and the MSA allows extended rebuilding is such cases. The MSA (§304(e)(4)(A)(i)&(ii)) allows the stock's biology to dictate the rebuilding period as well as the "needs of fishing communities". A ruling in this case is pending; plaintiffs and defendants are in settlement negotiations.

The Council adopted a more conservative groundfish management regime for 2003 largely in response to new, more pessimistic assessments for bocaccio (south of Cape Mendocino, California), canary rockfish (see Part IV - Draft Canary Rockfish Rebuilding Plan), and yelloweye rockfish. The centerpiece of the new management regime is a strategy of seasonal depth-based area closures that are designed to reduce mortality of overfished groundfish species. The Council also adopted a more conservative rebuilding strategy for darkblotched that has an 80% probability of rebuilding by T_{MAX} and a rebuilding period four years shorter than the previous strategy (T_{TARGET} = 2030; Table 2-1). [This is the basis for structuring the *Council Interim* rebuilding strategy in this rebuilding plan]. While the 2003 darkblotched OY of 172 mt is slightly higher than the 2002 OY of 168 mt, it is based on a more conservative rebuilding strategy and harvest control rule (F; Table 2-1). Both the 70% and 80% P_{MAX} strategies are based on the assessment and rebuilding analysis projections of increasing biomass. Under the constant harvest rate strategy for rebuilding darkblotched, rebuilding OYs increase steadily over time until the stock is rebuilt. The 2003 OY under the 70% P_{MAX} strategy is 184 mt (see Section 4.3.1.4). Also in 2003, the Council recommended the slope management line be moved further south from 40°10' N. lat. at Cape Mendocino, California to 38° N. lat. at Point Reyes, California. This was due to the realization of higher darkblotched catches south of Cape Mendocino than previously assumed or modeled. There are differential depth-based management lines and prescribed landing limits for slope species north and south of the slope management line. These differential management measures are designed according to the conservation need to rebuild darkblotched and Pacific ocean perch. NMFS approved these management measures which are currently in place.

3.3.1.2 Data Systems

[2] The MSA specifies in §304(e)(4)(A)(ii), "For a fishery that is overfished, any fishery management plan, amendment, or proposed regulations ...shall specify a time period for ending overfishing and rebuilding the fishery that ... shall not exceed 10 years, except in cases where the biology of the stock of fish, other environmental conditions, or management measures under an international agreement in which the United States participates dictate otherwise".

Catch Monitoring

Various state/federal 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. Since darkblotched are caught exclusively in commercial fisheries, recreational catch monitoring is not addressed in this rebuilding plan. 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 manage commercial fisheries that harvest darkblotched follows.

Monitoring Commercial Landings

Sorting requirements are now in place for darkblotched rockfish. This requires accounting for the weight of landed darkblotched rockfish when catches are hailed at sea or landed. Limited entry groundfish trawl fishermen are also required to maintain logbooks that record the start location, 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. Fish tickets 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 fish tickets. 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 and full retention of catch is allowed in the whiting fishery (by FMP Amendment 10 and an annual Exempted Fishing Permit (EFP) in the Shoreside Whiting sector). The at-sea whiting fishery has 100% on-board observer coverage, while the shoreside whiting sector brings 100% of their catch to port for sampling. Landings, logbook data, and state port sampling data are reported in-season 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 in-season management measures to the Council to attain, but not exceed total catch OYs of QSM species. Stock and complex landing limits are modified in-season to control total fishing-related mortality; QSM reports and landed catch forecasts are used to control the landed catch component.

Discard Estimation

Limiting discards (defined as bycatch in the MSA) to the extent practicable is an MSA mandate. 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. Bycatch rates of darkblotched rockfish in west coast trawl (and non-trawl) fisheries are uncertain. NMFS first implemented the West Coast Groundfish Fishery Observer Program 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 rates of darkblotched rockfish bycatch. The Council and NMFS are currently in transition regarding the best approach to model bycatch and discard. There may be a period when a combination of observer program data and the best currently available methods for estimating bycatch are used to estimate bycatch. A preliminary report and summary analysis of the first year of observer program data was released in January 2003. The report is available on the Northwest Fisheries Science Center website at: http://www.nwfsc.noaa.gov/fram/Observer/datareport.htm.

The West Coast Groundfish Fishery Observer Program is designed to provide estimates of fleet-wide discards in commercial fisheries; fish tickets are the mandated landings accounting mechanism. All vessels that participate in the west coast groundfish fishery are required to carry NMFS-trained observers when notified to do so by NMFS or its designated agent. In the initial phase of the observer program, about

20 observers were deployed. The program has since expanded to 40 observers stationed along the coast from Bellingham, Washington to Santa Barbara, California. Logbook data needs to be available to fully utilize observer data because observers initially record hail weights and logbook data for retained catch and these values need to be adjusted by fish ticket information to achieve total catch estimates. One difficulty currently unresolved in the observer program data is the ability to reconcile all observer records with fish tickets (Han-Lin Lai, NMFS NWFSC, pers. comm.). Another difficulty is there needs to be a statistically significant number of observations of discard across all strata to determine representative bycatch rates for these strata. Implementation of depth-based management (as an emergency action in September of 2002) further exacerbated the data-sparseness of observations since areas where many observations occurred in the first year of the observer program are now closed to fishing. The Council sponsored a Bycatch Workshop in January 2003 whose participants hailed from the ranks of the SSC, GMT, GAP, and the Council of Independent Experts to begin resolving these technical issues. The SSC and other Council advisors will further deliberate these issues this year before a decision on how and when to use observer data in management is made. It is anticipated that observer-based bycatch rates will be used for deciding 2004 management measures (either in September or November 2003) and may be available for 2003 inseason management decisions sometime this year.

Currently, the best available science (in the absence of useable observer data) that informs managers of bycatch and discard rates of darkblotched in the groundfish non-whiting trawl fishery is a model that uses logbook and Enhanced Data Collection Program (EDCP) data to estimate coincident catch rates in target trawl efforts for other species (Hastie 2001). The Hastie model estimates bycatch rates (defined as coincident catch rates in this context) of darkblotched in two-month blocks. The seasonality of bycatch is an important management consideration. Target opportunities for healthy flatfish and Dover sole/thornyhead spp./sablefish (DTS) species vary seasonally and geographically. It is reasonable to expect bycatch rates of darkblotched to vary in accordance with the concurrence of target species and darkblotched. In November 2001, the Council adopted the Hastie model to use for bycatch accounting and control starting in 2002. The Council selected and NMFS approved the use of the mid range of considered darkblotched rockfish bycatch rates to seasonally adjust landing limits to limit bycatch of darkblotched starting in 2002. The choice of bycatch rates to use for darkblotched bycatch control was uncertain at best given the lack of sorting requirements for darkblotched prior to 2001. The high range was not considered plausible because accepting it would assume that vessels discarded significant quantities of darkblotched before they reached their north slope rockfish trip limits (Hastie 2001). This was considered unlikely since darkblotched are generally larger and more valued than other species in the minor north slope rockfish complex. The low range was considered riskier than the mid range; therefore, the choice of the mid range was adopted. The extent that this bycatch rate is a reasonable proxy for darkblotched in lieu of direct (contemporary) observations of fishery interceptions is unknown. In this analysis, the mid range of bycatch rates is considered the most plausible and risk neutral. In 2002, Hastie restratified the bycatch rates used in the model 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 Hastie model are applied to landed weight of the target species in the target fisheries depicted in Table 3.3-1 to estimate seasonal bycatch of darkblotched.

The Stock Assessment Process

Stock assessments for Pacific Coast groundfish are generally conducted by staff scientists of the 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 Southwest, Northwest, and NMFS Alaska Fisheries Science Centers. These assessments describe the condition or status of a particular stock and reports 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. 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 have the same level of information and precision.

Quantitative and non-quantitative assessments are used for groundfish stocks. Stocks 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. During the 1990s, most West Coast groundfish assessments were conducted using the stock synthesis model. Recently there has been development of similar, but more powerful, models using state-of- the-art software tools. 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 see 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 ABCs and OYs to the Council. 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 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 are periodically reassessed as often as every year—currently only the case for Pacific whiting—to every three or four years. However 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 are 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 are expected to be available for use in the near future to upgrade the assessment capability or evaluate overfishing potential of these stocks. Interim ABC values may be established for these stocks based on qualitative information.

The accuracy and reliability of various data used in assessments and the scientific assumptions on which they are based need to be further evaluated to improve the quality of forecasts. Uncertainty associated with fishery logbook data, calibration of surveys, and accuracy of aging techniques also need more evaluation when considering survey reliability. Finally, a better understanding of ecosystem change and its influence on groundfish abundance will also improve stock assessments. The Council and NMFS have identified a range of projects that will help to improve stock assessments:

- develop models to better quantify uncertainty and thus better specify precautionary management measures;
- develop models to specifically for species with limited data;

- make assessment methods more standardized and conduct a formal review of these methods in order to shorten subsequent review of each species' assessment, which could allow more assessments to be reviewed each year;
- develop models to better represent spatially-structured populations, such as populations with low rates of internal mixing or populations with ontogenetic patterns spanning a range of habitats.

Research Fisheries

Research fisheries, or resource surveys, are an essential part of the management process. Two important issues arise in connection with these surveys. First, 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 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, a second issue stems from the fact that 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. 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 is conducted triennially (1977-2001) 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 near annual in mid-autumn, covering bottom depths of 100 fm to 700 fm. Survey was started in 1998 and 1999.
- Nearshore survey: These are SCUBA and hook-and-line surveys for various nearshore rockfish off California and are conducted by CDFG.
- Mark-recapture survey: This effort targets black rockfish and lingcod by WDFW.
- 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.

Additional surveys would increase the accuracy and reliability of management specifications. Increasing the number of surveys and geographic scope would provide information about distribution, abundance, and age structure of many groundfish populations while new types of survey could provide a better index of spawning biomass. A variety of other initiatives are needed to test the accuracy of existing techniques and develop new methods. Because catches of overfished species has become a critical concern, survey methods that do not involve capture need to be developed. For example, submersible surveys, where fish are counted and basic measurements taken through photography are being developed and tested. These may be especially appropriate for depleted rockfish species that occur in discrete habitats such as reefs and rock piles.

3.3.1.3 Enforcement

Traditional fishery enforcement techniques include air and surface craft surveillance, declaration requirements, landing inspections, and analysis of catch records and logbooks. Current assets for patrolling offshore areas include helicopter and fixed wing aircraft deployed by the U.S. Coast Guard and state enforcement entities, 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 offshore closed areas. The availability of Coast Guard assets may be challenged by other missions such as Homeland Security and search and rescue. State enforcement assets may be compromised by pessimistic budget outlooks for next year that threaten to reduce these assets as state programs are rationalized under an increasingly more conservative fiscal environment.

Depth-based restrictions are a new management tool in Council-managed fisheries and were used on a large scale for the first time in 2003. The ability to monitor vessels' locations related to depth-based closed areas is considered essential to effective management and requires consideration for substantially increasing an at-sea enforcement presence coupled with a Vessel Monitoring System (VMS) that remotely tracks vessels using satellites and transponders. Vessel monitoring systems (VMS) can provide this information to enforcement agencies through the use of a specialized transmitter on subject fishing vessels, which transmits position information via satellite. 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 coordination of VMS with traditional enforcement techniques. As a new monitoring tool for West Coast groundfish fisheries, VMS will dramatically enhance rather than replace traditional techniques.

In response to enforcement complexities of the depth-based closures in 2003, the Council formed the Ad Hoc VMS Committee comprised of fishing industry representatives and Enforcement Consultant participants to further investigate VMS and other enforcement issues relative to depth-based management. NMFS, in consultation with the Council and the Ad Hoc VMS Committee, has prepared a proposed rule and an associated Environmental Assessment/ Regulatory Impact Statement/ Initial Regulatory Flexibility Analysis (RIR/IRFA) for a pilot VMS program for 2003. The RIR/IRFA provides a description of the range of fishery monitoring alternatives considered, including their associated costs, as well as an analysis of their impacts.

The burden of covering the costs associated with VMS is a significant issue and federal funds have not been identified for these expenditures. The Council has recommended that VMS units be installed on the limited entry trawl and limited entry fixed gear fleets (over 400 vessels) and that NMFS fully fund all VMS requirements if funding becomes available. Currently, the estimated costs of a VMS transmitting unit ranges from $1,800 to $5,800 with transmission costs of $1.00 to $5.00 per day. In the absence of federal funding the costs may be bourne entirely by the vessel owners. NMFS is revising its type-approval process and will be testing emerging VMS technologies in time to notify the public of a list of approved VMS equipment before implementation of the final rule. The price of some of these new technologies is expected to be generally lower that those quoted above.

Declarations of fishing intentions have been required in the past to increase the efficiency of at-sea patrols and improve enforcement, particularly in areas closed to certain gear types or fishing strategies. State enforced declaration requirements are being replaced by a larger more comprehensive federal declaration system to be used in conjunction with VMS and traditional patrols in 2003. Under the federal declaration program, legal incursions into closed areas must be reported to enforcement authorities prior to fishing. This requirement is generally reserved for vessels that would otherwise appear to be fishing illegally when viewed from an at-sea patrol craft.

Shoreside enforcement activities complement at-sea monitoring and declaration requirements by inspecting recreational and commercial vessels for compliance with landing limits, gear restrictions, and seasonal fishery closures. State agencies are increasingly using dockside sampling as a means of assessing groundfish catch in recreational fisheries, which when combined with state and federal enforcement patrols at boat launches and marinas, provides a means of ensuring compliance with bag limits and fishery closures. Commercial landings are routinely investigated upon landing or delivering to buying stations or processing plants and can be tracked through fish ticket and logbook records.

3.3.1.4 Darkblotched Constraint Over Time

The degree to which darkblotched is the constraining factor which shapes fishery regulations may vary through time. Since darkblotched rockfish are taken in mixed stock fisheries, if during a period of time the regulations necessary to protect other species provide sufficient protection to darkblotched, then target harvest mortality levels for darkblotched will not affect the regulatory regime. On the other hand, if regulations necessary to protect other species provide inadequate protection for darkblotched then the need to protect darkblotched may be a driving factor which shapes the regulatory regime. The degree to which darkblotched is a constraint is largely a function of darkblotched productivity (Sections 3.2.1 and 3.2.2) relative to other stocks in complex and the ratio in which darkblotched is taken relative to other stocks in the complex (Section 3.2.1.3 and 3.3.1.5). The complexes in which darkblotched are taken are discussed in the following section.

3.3.1.5 Complex Values and Allocation Among Sectors Over Time

List the complexes in which darkblotched is taken.
Provide data on the economic value per pound of darkblotched in each complex.
Provide total values of the complexes in 1998 and 200?.

<u>Distribution Among Commercial Sectors</u>

<u>Groundfish Complexes in Which Darkblotched Rockfish are Harvested</u>

<u>Directed - Trawl DTS</u>

<u>Directed - Trawl Flatfish</u>

<u>Incidental - Trawl Whiting</u>

<u>Incidental - Fixed Gear</u>

<u>Incidental - Pink Shrimp</u>

<u>Unit Value of Harvest Complexes</u>

- on a value per mt of darkblotched basis (marginal value)
- valid only over the range within which other constraints are not encountered

<u>Total Value of Harvest Complexes (1998, 2001,2002)</u>

3.3.1.6 Managing with Risk and Uncertainty

Fishery managers are constantly confronted with uncertainty, and the environmental consequences of decision making is often a product of this uncertainty. Resource characteristics make this more of an issue in fisheries than in most other resource systems, because populations are widely dispersed in an inaccessible environment. In fact, the range of harvest level alternatives evaluated in this EIS is largely a product of uncertainty; given perfect knowledge (and perfect agreement about social objectives) it would be possible to precisely specify the optimal harvest level.[3] Walters {1986 #538} classifies uncertainty in

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[3]Traditionally, MSY has been viewed as an OY or target harvest level; but for populations below MSY, harvest levels 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. Even if the biological system were perfectly specified, society may value resources in complex ways, for example, by attaching non-consumptive value to some proportion of the resource. Finally, the precautionary approach and National Standards Guidelines treat MSY as a limit rather than a

three broad categories; Mace and Sissenwine {2002 #573} 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) suffers from all of these sources of uncertainty.

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.

Resources users' and the public's skepticism of the validity of science highlights the significance of uncertainty and risk. The following sources of uncertainty can be identified in relation to specifying 2003 management measures:

- Changes in the environmental regime (natural variability). Meso-scale climate variability influences stock productivity.

- The effect of human activity on population productivity. Although fishing and non-fishing impacts to habitat are demonstrably damaging, 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.

- 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 observes allows partial coverage to be representative of what occurs in a fishery as a whole, but some, albeit quantifiable, level of uncertainty exists.

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target. In summary, annual specification is ongoing, and in a world without uncertainty these variables would have to be correctly identified each year for future yields to achieve MSY.

- Model error is unavoidable and not always transparent. For this reason the STAR process described above, involves several stages of review by a range of experts and interested parties. This 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 those species. In contrast to a point estimate bounded by a confidence interval, a rebuilding analysis can specify the risk (in terms of the probability of the stock rebuilding with a given time period) for any value within a range. 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 exceeded harvest specifications, largely for this reason.

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). 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.

3.3.2 Aggregate Commercial Catch and Recreational Effort for First Year of Management–Coastwide

3.3.3 Primary Producers - Commercial Vessels

All along the West Coast, a majority of the vessels with limited entry trawl or fixed gear permits landing slope species also landed shelf species (Table 3.3-2). The bulk of these vessels were located from the Eureka port area North. However this is not the case for vessels operating in the open access groundfish fisheries. The bulk of these vessels were landing shelf species and nearshore species only, and berthed from the Brookings port area South. Table 3.3-2 shows the number of vessels in different fishery categories making landings by primary West coast port areas during 2000-2001.

Coastwide a majority of vessels operating in limited entry trawl fisheries on the slope and shelf were at least 60 ft in length. Table 3.3-3 shows the number of vessels by length operating in different fisheries operating in West coast INPFC areas. The vast majority of the larger vessels and limited entry trawlers were operating from the Eureka INPFC area North. Trawl vessels landing nearshore species, and the vast majority of vessels in the limited entry fixed gear and open access fisheries tended to be under 60 ft. Most of these smaller vessels were primarily operating from the Monterey INPFC area South.

While many limited entry vessels shown in tables 3.3-2 and 3.3-3 appear to be landing both shelf and slope species, slope species are a fairly minor component of total revenue for most vessels except limited entry trawlers. In this category the share of revenue from slope species tends to increase with vessel size, so larger vessels tend to be more invested in slope fisheries than smaller ones. Table 3.3-4 shows the share of total exvessel revenue derived from landings of the designated species group by INPFC area for vessels in Table 3.3-3. Smaller trawlers tend to rely on nearshore rockfish for a substantially greater portion of their revenue than did larger trawlers.

3.3.4 Commercial Distribution Chain

3.3.4.1 Buyers and Processors

Buyers and processors are an important value added component of regional fisheries. Table 3.3-5 shows the number of processors and buyers by primary port area buying different species groups from different categories of fishing vessel. The table shows that a majority of the 70 buyers buying slope species from limited entry trawl vessels (excluding at-sea only purchases) were north of the Eureka port area. However most of the 78 total buyers purchasing slope species from limited entry fixed gear and open access vessels were located south of the Eureka port area.

A relatively large share, 38% (492), of the total number of West coast buyers had less than $5,000 in gross ex-vessel purchases, and well over 50% of total buyers had gross purchases less than $20,000. Table 3.3-6 shows the size distribution of buyers as measured by ex-vessel value of purchases recorded on West Coast fish tickets.

Processors may buy fish caught from outside the area local to their primary port of landings. For example, there are relatively few large processors with their primary buying locations in ports of the Columbia INPFC catch area (LIST PORT AREAS) (Table 3.3-5), however, many large processors buy fish caught in that area (Table 3.3-7). For groundfish caught in the Vancouver, Columbia, and Eureka INPFC areas, most buyers tend to be large, purchasing in excess of $1,000,000 of groundfish a year. In the Monterey and Conception INPFC areas, there is an increased frequency of middle size buyers for the groundfish limited entry fleet ($20,000 to $100,000), as compared to the northern areas; and for open access groundfish vessels the number of small buyers ($100,000 and under) increases substantially, as compared to the northern areas. Also of note is the large number of small buyers in the halibut, crab, salmon and HMS fisheries, particularly in the more southern areas.

For large buyers of trawl caught groundfish, nearshore species are relatively unimportant, comprising one percent or less of their total purchases (Table 3.3-8). Trawl caught nearshore species stand out as being somewhat more important for medium size buyers in the Columbia and substantially more important in Monterey INPFC area (nearly 20% of all purchases for buyers purchasing between $100,000 and $300,000 of fish products).

For large buyers that buy groundfish caught by vessels other than trawlers, those nontrawl purchases compose 2% or less of their total purchases, with the exception of sablefish (Table 3.3-8). For most groundfish categories bought from nontrawl vessels by large processors, the purchases comprise less than one half of one percent of all their purchases. For small and medium size buyers, nontrawl vessels are a more important source of groundfish product than trawl vessels and the nearshore species a more important component of their purchases than shelf and slope species (Table 3.3-8). As with large buyers, sablefish are the primary exception to this pattern.

3.3.4.2 Markets

Darkblotched rockfish are valued for high quality fillets, a feature common to many west coast rockfish species. Their larger size and high quality made them an important target among the minor north slope rockfish complex. Darkblotched rockfish fillets compete generically in regional markets with similar products originating from West coast fisheries, other domestic fisheries and abroad. West coast rockfish products tend to be marketed in the region rather than exported, and are generically known as red snapper or Pacific snapper.

3.3.5 Recreational Fishery - Charter and Private Vessel Sectors

Measures implemented to aid rebuilding of darkblotched rockfish are not expected to have significant effects on West coast recreational fisheries. Therefore, background information on these fisheries is not provided as part of this segment of the EIS.

3.3.6 Tribal Fishery

Tribal vessels engaged in slope groundfish fishery and landing slope groundfish species operate out of the Northwest Olympic Peninsula and Central Washington Coast port areas. This fishery is characterized by relatively small vessels operating from small ports.

3.3.7 Communities

Table 3.3-9 shows the distribution of income among port groups resulting from West coast fisheries in 1998. This year was chosen to represent the fishery before restrictions to protect and rebuild overfished groundfish species began to go into effect. Table 3.3-10 shows the distribution of exvessel revenue and income in the 2001 base period (used to model the 2003 Groundfish Annual Specs) as well as estimates of exvessel revenue and income in 2003.

For this section, total income impacts include direct, indirect, and induced effects, composed of the wages and salaries paid to primary producers, processors, and suppliers, and the additional income generated when those wages and salaries are spent in the local economy. Income impacts were generated using the Fisheries Economic Assessment Model (FEAM) (Jensen 1996). FEAM uses historical landings data, information on industry cost and margin structure (vessels and processors), and income multipliers generated by IMPLAN (MIG 2000) to produce estimates of local income impact. Income multipliers measure the income received by participants in the local economy, not gross sales or "turnover." These multipliers assume changes in the stock of durable assets are annualized, so the impact of purchasing or replacing vessels, gear, buildings, plant, etc. are amortized as a series of annual payments rather than treated as a lump sum purchase in any one year.

Table 3.3-9 shows that in 1998, about $159 million of a total $620 million West coast fisheries-generated income was derived from groundfish harvesting and processing. Although more than half the total fisheries-related income was realized by California ports, the California total included less than one quarter of total coastwide groundfish income. Ports particularly dependent on groundfish-related income were concentrated along the Oregon coast and Northern Washington coast.

Table 3.3-10 shows a similar pattern in 2001: about $157 million income from groundfish out of a total $635 million fisheries-related income coastwide. Many Oregon and Northern Washington port areas appeared even more invested in groundfish as a share of total fisheries-related income in 2001 than in 1998. The table also shows that in 2003, under the depth-based management regime adopted to rebuild overfished stocks, many west coast port areas will see significant declines in total fisheries-related income. This is particularly true in the Oregon and Northern Washington ports due to their dependence on groundfish.

3.3.8Net Economic Benefits- Cost Benefit Analysis

Net economic benefits from commercial groundfish fisheries consist of producer surplus and consumer surplus. On an individual vessel basis, producer surplus is the difference between gross exvessel revenues and all fishing costs, including payments to captain and crew and a return to the vessel owner. At the industry or fishery level, producer surplus is the economic rent accruing to owners of the relatively fixed factors of production (e.g. vessels, permits, fishing rights, entrepreneurial capacity). Producer surplus can increase through a reduction in unit harvesting costs (improved economic efficiency) or an increase in exvessel prices received.

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.

If the inputs used to harvest fish and the resulting landings are traded in competitive markets, then theoretically, consumer and producer surplus can be estimated from market demand and supply curves.

In practice producer surplus and consumer surplus are very difficult to measure. In the long run given perfectly competitive markets where all factors are considered variable, there is no producer surplus in any industry. Hence the existence of producer surplus is attributable either to a limited supply of entrepreneurial capacity or to barriers that prevent additional vessels from entering the fishery and dissipating the economic rent. The latter condition may hold to varying degrees in the limited entry groundfish fisheries, but not in the open access fisheries. Also the amount of producer surplus is dependent on ex-vessel price, which history shows can vary significantly by species harvested, gear used and over time. The current state of overcapitalization in the West coast limited entry groundfish fishery has probably also helped to dissipate any historical producer surplus in the fishery.

Consumer surplus has not been calculated for the West coast groundfish fishery. However since groundfish form only a small portion of the entire consumer budget, change in consumer surplus in response to change in the supply of West coast groundfish is expected to be minimal. Imported products are an extremely close if not perfect substitute for domestic groundfish supplies. Imports are readily available through the well-developed trade from many sources of supply. Therefore, although reduction in domestic groundfish harvest would reduce domestic supplies, imports probably would increase to minimize changes in overall levels of consumption and consumer surplus. An Increase in domestic supplies would, in turn, displace some imports in U.S. markets, but again the net change in consumption and consumer surplus probably would be small.

4.0 ENVIRONMENTAL CONSEQUENCES

This rebuilding plan EIS analyzes the effects of alternative strategies for rebuilding darkblotched rockfish on the probability of successful stock rebuilding, co-occurring species, affected habitat, and the socioeconomic environment (Table 4-1).

NOTE: Some of the biological and economic analyses anticipated for this rebuilding plan are not currently available. The cumulative effects analyses are not included in this draft, but will be incorporated in the final draft. There may be some additional rebuilding plan analysis and relevant data available as supplemental information at the April Council meeting.

4.1 Affected Darkblotched Rockfish Habitat Including Essential Fish Habitat

Alternative rebuilding strategies have varying effects on the rocky bottom habitats of the continental slope where darkblotched rockfish reside, primarily due to the temporal and spatial extent fishing activities are affected (i.e., seasonal and depth-based restrictions). Since bottom trawl operations account for over 96% of recent (1981-2002) darkblotched landings, it is assumed that differential bottom trawl fishing opportunities within darkblotched habitats will determine the relative potential adverse habitat effects among alternatives. To the extent that fixed gear and other potential fishery impacts to darkblotched rockfish habitat can be avoided or mitigated, a modest benefit could also be anticipated. The relative fishing intensity of darkblotched rockfish rebuilding alternatives is assumed to be correlated with potential negative habitat effects. The ranking of darkblotched rockfish rebuilding alternatives by their assumed relative effect on these habitats (Table 4-1) is on this basis.

Small footrope and chafing gear restrictions are believed to reduce potentially harmful effects of bottom trawls in rocky habitat since trawl nets so equipped are destroyed if they make significant bottom contact in high relief areas (National Research Council 2002). The *No Action* alternative does not mandate these precautionary bottom trawl gear restrictions; such management measures were first imposed on portions of the directed groundfish trawl fishery in 2000. Trawl fisheries operated in primary darkblotched habitats prior to September 2002 using large footrope trawls. This resulted in significantly more trawl gear bottom contact in slope rockfish habitats. The displacement of trawl fisheries since September 2002 in the depth zones where darkblotched primarily occur will certainly reduce the amount of potential habitat disruption where darkblotched reside. This may be considered the relative impact of the *Council Interim* alternative in this plan which would be expected to have intermediate effects relative to the maximum alternatives. The higher darkblotched OYs and the lack of small footrope restrictions under the *Maximum Harvest* alternative relative to the other rebuilding alternatives and *No Action* allows the highest trip limits and bottom trawl fishing effort. Conversely, the *Maximum Conservation* alternative would have no habitat impact since it eliminates fisheries that target or incidentally catch darkblotched and therefore eliminates potential fishing-related habitat impacts.

Population productivity could be enhanced by protecting these habitats through the use of MPAs. This may be true globally for rockfish and other west coast groundfish species. Programmatic measures designed to identify, protect, and minimize potential fishing impacts on west coast rockfish EFH will be analyzed in the Supplemental EIS (EFH SEIS) in preparation by NMFS. Any habitat protection measures identified in the EFH SEIS that can be applied to encourage rebuilding darkblotched rockfish either through reducing total mortality or enhancing population productivity should be seriously considered as an adjunct to other harvest control measures analyzed in this plan. One consideration in whether MPAs should be incorporated in darkblotched rebuilding, is the relative productivity and extinction/depletion risk. If risks are high due to extremely low potential productivity, then MPAs should be considered more seriously as a mitigation of those risks.

4.2 Affected Biological Environment

Since darkblotched are the binding constraint for slope fisheries, all co-occurring species on the slope will be affected by darkblotched rebuilding. Pacific ocean perch are overfished and should recover faster with the fishery constraints imposed by measures implemented to rebuild darkblotched. The exploitation rates that caused overfishing for darkblotched and Pacific ocean perch are likely to have caused overfishing for some of the other slope rockfish species as well. Of the west coast slope rockfish species listed in Tables 3.2-3a&b, only darkblotched, Pacific ocean perch, and blackgill have been assessed. Blackgill is a principle species in the south and a secondary species in the north (Tables 3.2-3a&b). It may be that the slope rockfish species with a more northern distribution (Table 3.2-3a) were more vulnerable to overfishing given the concentration of foreign and domestic trawl efforts to the north. The latitudinal distribution could account for the relative status of these three rockfish species.

4.3 Affected Socioeconomic Environment

The vast majority of the biomass and catch of darkblotched rockfish are located north of the Cape Mendocino management line for the minor slope rockfish complexes at 40°10' N. lat. Although fishing communities in this northern area are not heavily dependent on revenue from darkblotched rockfish directly, they have a strong dependence on revenue from species which co-occur with darkblotched.

4.3.1 Controlling Fishing-Related Mortality of Darkblotched Rockfish

Successful stock rebuilding depends on the ability of management/rebuilding measures to effectively control all sources of fishing-related mortality, including landed catch and bycatch. All rebuilding alternatives analyzed in this EIS has a calculated total catch OY to accommodate landings of unavoidable incidental catch of darkblotched rockfish (except the *Maximum Conservation* alternative which has a total catch OY of 0 mt). The effectiveness of all rebuilding strategies (given the probabilistic trajectories of future increases in biomass relative to B_{MSY}) depends on managing darkblotched fishing-related mortality within prescribed total catch OYs. Landed catch allowances for all overfished species are designed to minimize target opportunities on these species while allowing landings of unavoidable bycatch that would otherwise be discarded dead at sea. Management measures consistent with rebuilding should have harvest control rules that are enforceable and effectively stay within total catch targets. Harvest control rules and management measures commensurate with alternative rebuilding strategies are analyzed qualitatively in this rebuilding plan EIS. Potential management measures that are likely to reduce sources of fishing-related mortality are also discussed.

4.3.1.1 Landed Catch Accounting and Control

Commercial landed catch accounting and control methods are considered relatively effective. There have been some violations of the fish ticket reporting system in the past. To the extent that landed catch is not properly monitored and reported, there will be repercussions for inseason management of overfished stocks including darkblotched, as well as fishery-dependent data inputs in future stock assessments and the logbook-fish ticket reconciliation process that is done to help determine total catch. If this results in underestimates of total catch of darkblotched and/or other overfished stocks, then rebuilding strategies could be compromised resulting in an underachievement of rebuilding progress.

4.3.1.2 Bycatch Accounting and Control

All rebuilding plan alternatives except *No Action* and *Maximum Conservation* use the mid range of bycatch rates estimated in the Hastie model to estimate darkblotched bycatch (Table 3.3-1). The *No Action* alternative assumes a 20% bycatch/discard rate for darkblotched. This is a proxy for darkblotched that is based on bycatch estimates for widow rockfish from trawl observations in the mid-1980s (Pikitch *et al.* 1988). While the Pikitch study estimated a 16% discard rate for widow rockfish, the Council elected to assume a more conservative 20% discard rate for darkblotched after the stock was declared overfished. The *Maximum Conservation* does not rely on modeled bycatch or any other bycatch accounting mechanism since all fishing-related mortality is eliminated.

Rebuilding strategies are sensitive to the actual bycatch rate since successful rebuilding requires accurate accounting of total catch. These rates, applied to weight of landed catch of target species in the trawl fishery, may or may not be realistic. If bycatch rates are overestimated in the Hastie model, then there will be negative socioeconomic consequences of lower trip limits and/or early fishery closures. If they are underestimated, rebuilding progress will be compromised. It is anticipated that all rebuilding alternatives will benefit from direct observations of bycatch. Bycatch accounting and control has been one of the weaker elements in groundfish management. With the low OYs specified under rebuilding, improving bycatch accounting and control is critical. Therefore, rebuilding strategies should always use the best available estimates of bycatch and managers should always seek to improve bycatch accounting and control mechanisms.

Such measures as full retention of bycatch and/or bycatch caps could significantly reduce fishing-related mortality of darkblotched and other overfished groundfish species. The NMFS Observer Program 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 on the slope to increase accuracy in estimating total catch. This could ensure rebuilding total catch OYs are not exceeded while attempting to access harvestable groundfish species on the slope such as DTS and deep-water flatfish. 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. However, 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%. 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 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. There might also be a higher costs associated with a full retention program, especially when unmarketable species are retained and delivered. Such added costs to the industry might include disposal and/or processing costs; an economic burden imposed on an already strapped industry.

4.3.1.3 Potential Rebuilding Measures to Consider

Measures that would effectively displace fisheries (in time and/or area) with a relatively high incidence of darkblotched catch or other fishery/gear modifications should be considered to reduce fishing-related mortality. These measures would affect rebuilding through reducing risk of considered rebuilding alternatives in terms of achieving target fishing harvest rate (F) and the specified total catch OY. Avoidance measures through gear modification or fishing techniques should be investigated.

Approach to Analysis and Modeling Assumptions

Models used to develop regulations for the 2003 fishery were used to project harvest regulations in the first year of management under the different rebuilding options. Using the depth management regime recommended by the Council for the 2003 fishery and assuming that all other overfished species had been rebuilt, an analysis was conducted to evaluate the degree to which the fishery would be constrained by each particular overfished species under each rebuilding option for that species. Assuming average conditions and response to reduction in harvest mortality, the firs year of the rebuilding plan should be the year that is most constrained.

A number of assumptions have been made in order to project the regulatory the framework. For example, some of the analyses that follow assume that all other presently overfished stocks, with the exception of the subject stock, are rebuilt and are being harvested at a long-term, sustainable level. Proxy values for F_{MSY} and B_{MSY} were generally used to determine proxy estimates of "MSY" for these analyses. The proxy F_{MSY} for overfished rockfish species is generally $F_{50\%}$, i.e. the harvest rate that corresponds to the spawning output being reduced to 50% of its unfished equilibrium level (B_0) assuming recruitment is independent of spawning output. Because some decline in recruitment is expected as the spawning stock declines, the equilibrium spawning biomass that will result from a $F_{50\%}$ harvest rate will be probably be somewhat less than $B_{50\%}$, and presumably near $B_{40\%}$, the rebuilding target and generally considered a reasonable proxy for B_{MSY}.

$F_{45\%}$ was used to define harvest rates for calculating proxy MSY levels for lingcod and Pacific whiting. These proxy MSY harvest rates were recommended by participants in the West Coast Groundfish Harvest Rate Policy Workshop that was sponsored by the SSC, and adopted by Council action in 2000 (PFMC 2000b). Considered risk-neutral, these harvest rates were substantially lower than those previously used to manage groundfish stocks. They are considered to meet the MSA mandate to "...achieve and maintain, on a continuing basis, the optimal yield from each fishery...".

MSY proxies used in the following economic analyses were derived by simply calculating the yield that corresponds to applying the proxy F_{MSY} to $B_{40\%}$, the proxy B_{MSY}. An exception to the use of proxy estimates is the approach used to estimate F_{MSY} rates and MSY for canary rockfish and yelloweye rockfish. For these species, F_{MSY} was estimated by fitting a spawner-recruit curve and finding the fishing mortality rate at which yield is maximized. Converted to units of $F_{x\%}$, the estimates of F_{MSY} for canary rockfish and yelloweye rockfish are $F_{73\%}$ and $F_{57\%}$ respectively (Methot and Piner 2002; Methot *et al.* 2002). These F_{MSY} rates for canary and yelloweye were applied to the $B_{40\%}$ biomass level because that is the target biomass level for rebuilding, and the calculated B_{MSY} levels were near $B_{40\%}$.

Note: These MSY estimates should be interpreted with great caution. While these proxy MSY estimates were developed for informing the rebuilding plan economic analyses, they should not to be applied to consideration of long-term management options for West coast groundfish. Evidence of low productivity for many of the overfished rockfish stocks suggests that the proxy F_{MSY} rates may overestimate true F_{MSY} as well as MSY. For instance, the 2002 bocaccio assessment (MacCall 2002) indicated that the productivity of the bocaccio stock in waters off southern and central California was so low that rebuilding could not occur according to the National Standard Guidelines (i.e., P_{MAX} was less than 50%, even with no harvest, over more than 100 years). Clearly, a harvest rate of $F_{50\%}$ is too aggressive for such an unproductive stock, just as it is too aggressive for canary rockfish and yelloweye rockfish that had F_{MSY} estimates lower than $F_{50\%}$. In other words, the current information on the productivity of bocaccio indicates that the stock would decline if fished at $F_{50\%}$ after it is rebuilt to the $B_{40\%}$ level. Unlike canary rockfish and yelloweye rockfish, the fit of a stock-recruit curve to the spawner-recruit data for bocaccio was inadequate to allow F_{MSY} to be estimated directly. Therefore, the proxy F_{MSY} rate for boccacio is not considered to be realistic, nor is there a straightforward way to estimate a more appropriate value. This qualification may also be true for other overfished rockfish stocks.

Depth-Based Restrictions

Depth-based restrictions and/or incentives to fish in deeper waters outside the depth range of greatest darkblotched density would likely reduce risk in controlling fishing-related mortality through avoidance. This was a precautionary measure adopted for 2003 groundfish management on the advice of the GMT and other Council advisors. Given the great uncertainty in bycatch accounting and control mechanisms and the low OYs associated with rebuilding overfished groundfish stocks, this is a significantly risk-averse measure that should be considered. This areal displacement is especially important if gear modifications are unable to reduce the targetability or catchability of overfished stocks. For example, in the absence of useable observer data (the current situation), there are no logbook requirements or other data systems available to inform managers of potential bycatch of overfished species in fixed gear fisheries. While historical landings of darkblotched and Pacific ocean perch indicate little interaction of these species with line gears, overfished shelf species such as bocaccio, canary rockfish (see Part IV -Draft Canary Rockfish Rebuilding Plan), cowcod, lingcod (see Part V - Draft Lingcod Rebuilding Plan), and yelloweye rockfish are easily targeted in the high relief habitats where they are found by line gears. Therefore, managers may need to rely more on depth-based restrictions or other area closures to protect these species rather than gear restrictions. Darkblotched and Pacific ocean perch rebuilding measures should consider depth-based restrictions (and/or other area closures) and gear modifications to reduce fishing-related mortality.

Allowing fishing in waters deeper than most darkblotched are found could be done with a vessel monitoring system (VMS; see Section 3.3.1.3). Depth-based restrictions without safeguard controls like VMS raise enforcement concerns. An on the water presence is more difficult in the deeper offshore areas where the slope fishery would need to be displaced to effectively reduce darkblotched bycatch. Without remote tracking of distant water vessels or effective enforcement, depth-based restrictions may not reliably reduce potential fishing pressure on darkblotched rockfish. VMS is already used in the management of some west coast marine fisheries such as the commercial albacore fishery. Some groundfish fisheries in the Aleutian Islands and Bering Sea currently use VMS to restrict the fishery to certain areas or depths. The cost of installing VMS to manage the deep-water trawl fleet needs to be considered. Such systems are expensive to set up, maintain, and operate. However, relative to the foregone benefits of prosecuting fisheries, this cost may be rationalized. To the extent that incentives to fish outside the depth range of darkblotched could be structured, some or all of the costs associated with implementing a VMS system for the west coast groundfish fishery could be borne by the industry. For instance, higher landing limits for deeper water species that are considered healthy, such as longspine thornyhead (*Sebastolobus altivelis*) or any of the other DTS species could be considered with a depth-based restriction. Revenue from these higher landing limits could help offset the costs of implementing VMS.

Displacement of vessels to deeper and more distant offshore locations also raises a general safety concern. When vessels are displaced further offshore, there is a higher likelihood of accident and loss of life while conducting fishing operations. Such displacement also increases fuel and operating expenses which tend to decrease net economic benefits from the fishery. It may be that displacement of vessels further offshore will have fleet distributional effects that are not proportionally shared by all vessels. Smaller vessels may suffer a disproportionate loss of fishing opportunity. They generally have less fuel and gear capacity and are less stable working platforms in rougher offshore waters. Smaller trawl vessels may especially be negatively impacted. A greater amount of wire and other fishing gear is required to deploy bottom trawls in deeper waters. Even if a smaller vessel were to accommodate the amount of gear onboard to fish deeper waters, they would be less stable and more prone to safety risks with a higher center of gravity. What benefit may accrue to vessels fishing deeper, in terms of higher landing limits or other fishing opportunities, may not be shared by smaller vessels.

<u>Seasonal Restrictions</u>

Seasonal fishing restrictions should be considered when developing rebuilding strategies. The Hastie trawl bycatch model (Hastie 2001) indicates a seasonality in the bycatch of overfished species. This result is derived from the logbook and EDCP observations that are used to estimate bycatch rates in the model. The latitudinal and onshore-offshore movements of many groundfish species are well documented (Beamish and McFarlane 1988; Dorn 1995; Eschmeyer *et al.* 1983; Gunderson 1977; Gunderson 1996; Hagerman 1952; Hart 1988; Jagielo 1990; Jow 1969; Love 1981; Love *et al.* 1990; Love *et al.* 2002; Mathews and LaRiviere 1987; Matthews 1992; Matthews *et al.* 1986; Miller and Lea 1972; Pearcy 1992; Pedersen 1975; Rickey 1995; Shimada and Kimura 1994; Stanley *et al.* 1994; Westrheim and Morgan 1963). Differential seasonal movements could account for seasonal differences in groundfish assemblages; a dynamic that would lead to seasonality in co-occurrence and bycatch rates. Therefore, seasonal fishing restrictions could be imposed during times and in areas when and where co-occurrence of target and overfished species is highest.

While seasonal restrictions have the potential of realizing higher landing limits of target species (more fish from healthy stocks can be caught with a lesser "cost" of bycatch of overfished species), there are some significant socioeconomic costs to consider. The Council has previously considered seasonal restrictions for the groundfish fishery (PFMC 2001) but continues to rely on other management measures due to the potential disruption in the processing/marketing sector. Filleters and other skilled personnel in the processing sector are difficult to keep employed when there are seasonal disruptions in the delivery of fish. Market gluts which drive price down also negatively impact the industry. Seasonal restrictions tend to increase the supply of fish during open seasons to the point where market glut and overall value of the fishery declines. This often leads to increased market-driven discard of fish (discard that occurs even when trip and/or cumulative landing limits are not attained due to market reasons). Such fluctuations in product (fish) availability have driven some buyers and processors out of business.

Despite the socioeconomic consequences of seasonal restrictions, the Council and west coast state and tribal managers have adopted seasonal closures for portions of the commercial, recreational, and tribal groundfish fisheries. Seasonal restrictions were considered preferable over some of the other management measures considered such as (greater) limit reduction or area closures. However, there is the stated desire by many participants in the fishery and associated fishing industries to try to maintain year-round fishing opportunities.

<u>Trip Limit Management</u>

The west coast groundfish fishery has been managed using some form of trip limit management since the early 1980s (see Part III - Draft Pacific Ocean Perch Rebuilding Plan). Trip and cumulative landing limits are designed to limit the harvest of groundfish and manage for long term sustainable yield (total catch OY) and prevent overfishing (Gunderson 1979; Pikitch *et al.* 1988; Richards 1994; Tagart *et al.* 1980). It has been increasingly used since the first groundfish stocks were declared overfished under the terms of the Sustainable Fisheries Act (since 1999) to limit the bycatch of overfished species. Trip limits for overfished species are designed to allow landings of these species which would otherwise be discarded dead at sea. Allowing a limit large enough to minimize discarding and account for this bycatch, but not so large as to encourage targeting of overfished species has been the conceptual objective in west coast groundfish trip limit management. Trip limits are also used to prevent early OY attainment and early fishery closure. Trip limits have also been designed for healthy, co-occurring target stocks to reduce the bycatch of overfished species. Reliance on trip limit management often results in the inability to harvest the OY of healthier target stocks due to the constraints imposed by measures designed to rebuild overfished stocks or prevent overfishing. However, as OYs for overfished stocks are further reduced, the potential for discarding increases. This becomes a counter-productive measure once a critical threshold of overfishing occurs. This is why the Council was compelled to consider and eventually adopt more precautionary measures like depth-based management. Trip limit management may still be an effective strategy for harvest control, but other measures need to be considered as well when stock abundance declines to a critical point. The use of observer data should provide more definitive accounting of bycatch of overfished species which could lead to more effective trip limits.

Gear Modifications

Gear modifications should be considered that might be more effective in targeting healthy species while minimizing bycatch of overfished species such as darkblotched. The small footrope restriction (trawl footropes ≤ 8 inches in diameter; no anti-chafing gear) has been used on the west coast to minimize bycatch of overfished shelf rockfish species such as canary and yelloweye rockfish. Trawls under the small footrope restriction cannot effectively fish on the bottom in rocky habitats. Shelf rockfish landings by trawls under the small footrope restriction have been significantly reduced. Some assurance is gained by the fact that landings of shelf rockfish on a per vessel basis have been generally less than allowable trip limits. A similar small footrope restriction in slope trawl fisheries to land any slope rockfish may reduce fishing-related mortality of darkblotched and other slope rockfish. However, some slope trawl fisheries would be compromised if small footrope restrictions were imposed to land all groundfish species. Larger footropes are required to effectively fish abundant flatfish species (i.e., Dover sole, petrale sole in the winter) on the silty mud bottoms of the abyssal plain on the outer slope. Small footropes dig into these soft substrates which are softer than the sandier, more compact depositional shelf bottoms outside rocky reefs. Larger footropes tend to "float" on the mud and more effectively catch target flatfish species. If these gears could be effectively restricted to softer mud bottom habitats on the slope, darkblotched and other slope rockfish could be avoided. Spatial mapping of these habitat types does not currently exist on any reasonable scale to consider such measures.

Other gear modifications that may more cleanly target harvestable shelf species include trawls with reduced mouths (smaller height and width dimensions) and cutback headropes. The ODFW has experimented with such trawls designed to target flatfish (M. Saelens, ODFW, pers. comm.). Initial results from comparative research tows with these experimental bottom trawls (29 paired tows with experimental and conventional trawls) on the shelf off Oregon were promising (+60% Dover sole in experimental nets, -76% canary rockfish in experimental nets, and -72% redstripe rockfish in experimental nets). These preliminary results suggest this gear more efficiently catches flatfish while reducing bycatch of shelf rockfish. Further evaluation of this gear is planned in deeper water during the summer of 2002. An additional 150 hours of effort on the slope is planned with an expected catch of 0.16 mt of darkblotched rockfish. Effectiveness of this gear in catching abundant flatfish on the slope while avoiding slope rockfish will clearly benefit darkblotched rebuilding.

Gear modifications designed to target harvestable groundfish and non-groundfish species and avoid slope rockfish should be investigated further. Exempted Fishing Permits (EFPs) could be used to investigate the efficiency of such gears as the experimental flatfish trawl being tested in waters off Oregon. Effective avoidance of overfished shelf and slope rockfish through the use of modified gears would reduce fishing-related mortality of darkblotched rockfish.

Cooperative International Management

All of the overfished groundfish stocks on the west coast are distributed across international boundaries. While the Council process is designed to provide good coordination of state and federal management systems, Council jurisdiction and authorities are limited to the EEZ of the U.S. Cooperative international management could therefore be an avenue worth exploring to aid in the rebuilding of overfished stocks. There is such an active front being pursued with Canada at the Council, NMFS, and State Department levels to improve Pacific whiting assessment and management. All groundfish stocks under rebuilding would potentially benefit if management were coordinated with our international neighbors to the north and south.

Darkblotched rockfish on the west coast south of the U.S. - Canadian border are part of a larger stock assemblage, some of which is managed outside of Council jurisdiction in Canada. British Columbia annual darkblotched landings have averaged about X mt annually during 19XX-XXXX, or about X% of average annual landings from U.S. waters for the same period. *[table of Canadian db catch (foreign and domestic?; and exports to U.S.?)]* It is unclear whether the cumulative fishing-related mortality across the stock's range is consistent with that mandated under MSA, FMP, NMFS National Guidelines, and U.S. legal authorities. The relative biomass of darkblotched across the multiple management jurisdictions in the northeast Pacific is also unknown. Coordinated and consistent assessment and management should be explored with the Canadian Department of Fisheries and Oceans. Cooperative management could benefit darkblotched rockfish rebuilding in waters off the west coast of the U.S. as well as in foreign waters.

4.3.1.4 Darkblotched Constraint Over Time

Table 4.3-2 shows projected total catch optimum yields (OYs) over time under different probabilities of rebuilding within T_{MAX}. Note that the OY levels in the table revert to the proxy MSY harvest level once the median rebuilding year under each scenario has been reached (i.e. in years following T_{TARGET}). The table also shows sums of these OYs over varying periods of time.

Table 4.3-3 shows the present value of the projected OY harvests in Table 4.3-2, assuming a 5% annual discount rate and a constant $0.50/lb average exvessel price for rockfish. The table also shows sums of the present value revenue streams over the time periods tabulated in Table 4.3-2.

Projected darkblotched harvests under the *Maximum Conservation* alternative are zero until the median rebuilding year 2014 ($T_{TARGET} = T_{MIN}$) is reached. Although likely to recover most quickly under this alternative, the relatively low productivity of this stock assures that aggregate harvest does not catch up with the other alternatives over any time period (Table 4.3-2). Ranked in terms of relative impact, the *Maximum Conservation* alternative is most restrictive, followed by *"40-10"*, *Council Interim*, and *Maximum Harvest*, respectively. The tables also show rebuilding trajectories and revenue streams associated with two intermediate rebuilding scenarios. These represent 60% and 70% probabilities of rebuilding within T_{max}, respectively.

These patterns also hold when exvessel revenues are compared and a discount factor is applied (Table 4.3-3). Discounting diminishes the present value of revenues received in the future. The low productivity of most West coast rockfish stocks means that conservation in the present in order to rebuild darkblotched stocks in the future does not increase the commercial present value of the resource. This effect is exacerbated when present value is calculated, discounting revenues received in the distant future (Table 4.3-3). Note that this analysis doesn't include possible nonmarket values such as any existence value of darkblotched rockfish, or the economic effect of possible interactions (positive or adverse) between darkblotched and other ocean resources (e.g alterations in ecological balances).

4.3.1.5 Complex Values and Allocation Among Sectors Over Time

- Discuss how the marginal value of darkblotched varies between complexes and identify the total value of the complexes if harvested at a rate allowed by the next most constraining nonoverfished species.
- Point out that the Council will likely vary the allocation between different fisheries over the period of the rebuilding plan based on changing information about bycatch rates and changing marginal values and changes in limiting species that affect the amount of the complex available.
- Discuss how the Council might take equity, geographic and other social factors into account so that a fishery that consumes darkblotched at a high rate may not be totally shut down.

4.3.1.6 Uncertainty

Rebuilding analyses are stochastic by nature. Harvest rate management variables are derived from hundreds of simulations which together indicate the probablility of rebuilding an overfished stock within a fixed time period and harvest regime. Characterizing these stochastic indicators as deterministic biomass and OY trajectories implies a level of certainty that is not supported by the rebuilding analysis.

4.3.2 Aggregate Commercial Catch and Recreational Effort for First Year of Management-Coastwide

4.3.3 Primary Producers - Commercial Vessels

4.3.4 Commercial Distribution Chain

4.3.4.1 Buyers and Processors

4.3.4.2 Markets

4.3.5 Recreational Fishery

There is no recreational fishery where darkblotched rockfish is either targeted or taken incidentally.

4.3.6 Tribal fishery

4.3.7 Communities

4.3.8 Cost Benefit Summary

Include nonmarket, existence and other social values in the summary. Largely qualitative, illustrating tradeoffs.

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Appendix A-1 Rebuilding Analysis for Darkblotched Rockfish

Rebuilding Analysis for Darkblotched Rockfish

November, 2001

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The west coast stock of darkblotched rockfish was assessed in 2000 using data through 1999 (Rogers et al. 2000). The assessment used the length-based stock synthesis model (Methot 2000) to analyze fishery size and age composition data and trends in abundance from the shelf and slope trawl surveys. The assessment determined that abundance of darkblotched rockfish had declined below the overfished threshold, 25% of the estimated unfished level of abundance, which triggered initiation of a rebuilding plan to restore this stock to its MSY level of abundance, which is provisionally set at 40% of the unfished level. The rebuilding analysis documented here is intended to provide information for use by the PFMC and NMFS in designing a rebuilding plan for this stock.

A slope trawl survey was conducted in the fall of 2000, after completion of the darkblotched rockfish stock assessment but prior to the rebuilding analyses. The SSC recommended in June 2001 that the darkblotched rebuilding analysis should be based on an assessment update that included that 2000 survey data, and recruitments during the more recent era should be the basis for the rebuilding rate. This document provides the recommended analyses. Rebuilding projections are presented based upon two scenarios for estimating the virgin recruitment level and, for each of these scenarios, two scenarios for estimating future recruitment levels. Here, the term "virgin" represents the average stock condition that would occur in the absence of fishing. Of these four scenarios, the recommended result is based upon virgin recruitment estimated from the entire time series and future recruitment estimated from the more recent portion of the time series. Analyses utilize the methodology developed by Punt (2001).

The 2000 survey biomass estimate was similar to the 1997 slope survey biomass estimate and lower than the 1999 slope survey biomass estimate. Updating the assessment model with the 2000 data results in a downward revision in the estimated recruitment and abundance throughout the time series (Figures 1-3, Table 1). The major change is in the level of recruitment since the mid-1980s (Table 2). In the original assessment model, the mean level of recruitment was similar in the early (1963-1982) and late (1983-1996) eras of the time series. With the updated model, the mean recruitment in 1983-1996 is only 67% of the earlier level. This decline in recruitment results in the estimated level of spawn output projected to the beginning of 2002 to be only 12-14% of the virgin level, depending upon whether the virgin level is taken from the initial conditions of the assessment or from the mean level of recruitment during 1963-1996, respectively.

The rebuilding time frame is determined by assuming fishing mortality for darkblotched rockfish can be stopped as of 2002. If the median time to rebuild the spawn to 40% of the unfished level is less than 10 years with no fishing then the maximum allowable rebuilding time is ten years. If it is at least 10 years without fishing, then it is the time to rebuild plus one generation time. A generation time is: (age x survival x spawn) summed for all ages/(survival x spawn) summed for all ages.

The updated assessment model has the same basic life history parameters as the original model (Table 3). With these parameters, F50% is 0.0321; generation time is 33 years; and the unfished level of spawn output per recruit is 18.42.

This rebuilding analysis uses recruitments from 1983-1996 for the forecast. The addition of 2000 survey data makes it reasonable to include recruitments through 1996 since these fish are well represented in the survey. The early year began in 1983 to delineate the shift from higher to lower recruitment level. Although the updated assessment provides abundance estimates through 2001, the recruitments for the last few years are not precisely estimated. The 1997-1999 values are based on few data, and the 2000-2001 recruitment values are simply set at an assumed level for the assessment. Therefore, for the rebuilding analysis the calculations start with the estimated numbers at age in 1998, generate recruitments with a random pattern beginning in 1999, and use the observed or extrapolated catch level for 1999, 2000, and 2001.

There are three plausible alternatives for generating estimates of future recruitment from recent (1983-1996) recruitments. One is to simply resample from the estimated recruitments in 1983-1996, second is to resample from the recruits per spawner then multiply by the projected future spawner level, third is to resample deviations from an estimated spawner-recruitment curve. The third option is not yet available because a spawner-recruitment curve has not yet been developed for this stock. Table 2 illustrates that recent recruitment has been lower than historical recruitment, and that recent recruits per spawner have been higher than in the past. Projections here will be based upon resampling directly from recruitments which exhibits no apparent trend over the 1983-1996 time period (Figure 2), whereas the recruits per spawner (Figure 3) shows an upward trend with strong spikes in recent years.

Table 1. Time series for darkblotched rockfish in 2001 updated assessment.

YEAR	SPAWN	RECRUIT	EXPLOIT	CATCH	R/S
VIRGIN	34355	1865	0.000	0	
INIT EQ	28036	1865	0.007	200	0.054
63	28036	4143	0.012	315	0.148
64	27908	10	0.009	246	0.000
65	27858	10	0.018	474	0.000
66	27552	10	0.090	2405	0.000
67	25090	3965	0.151	3659	0.144
68	21287	330	0.095	1982	0.013
69	19389	6646	0.029	560	0.312
70	19053	45	0.030	573	0.002
71	18654	10	0.034	639	0.001
72	18125	2996	0.032	603	0.161
73	17634	240	0.020	374	0.013
74	17467	3514	0.025	469	0.199
75	17329	1035	0.015	285	0.059
76	17489	838	0.025	459	0.048
77	17503	928	0.010	195	0.053
78	17786	1226	0.014	254	0.070
79	17998	2095	0.045	851	0.118
80	17581	3678	0.026	471	0.204
81	17549	3008	0.030	543	0.171
82	17408	1731	0.066	1217	0.099
83	16486	555	0.049	872	0.032
84	15888	499	0.074	1286	0.030
85	14873	728	0.108	1787	0.046
86	13447	913	0.084	1277	0.061
87	12659	1841	0.166	2375	0.137
88	10860	1418	0.138	1692	0.112
89	9681	1480	0.118	1295	0.136
90	8802	375	0.142	1427	0.039
91	7704	755	0.133	1189	0.086
92	6799	1208	0.084	680	0.157
93	6407	1155	0.153	1199	0.170
94	5563	650	0.123	860	0.101
95	5066	3830	0.109	721	0.688
96	4703	1749	0.111	707	0.345
97	4346	370	0.127	797	0.079
98	3910	2677	0.146	890	0.616
99	3417	218	0.055	326	0.056
100	3455	1171	0.038	239	0.343
101	3661	1171	0.020	130	0.339

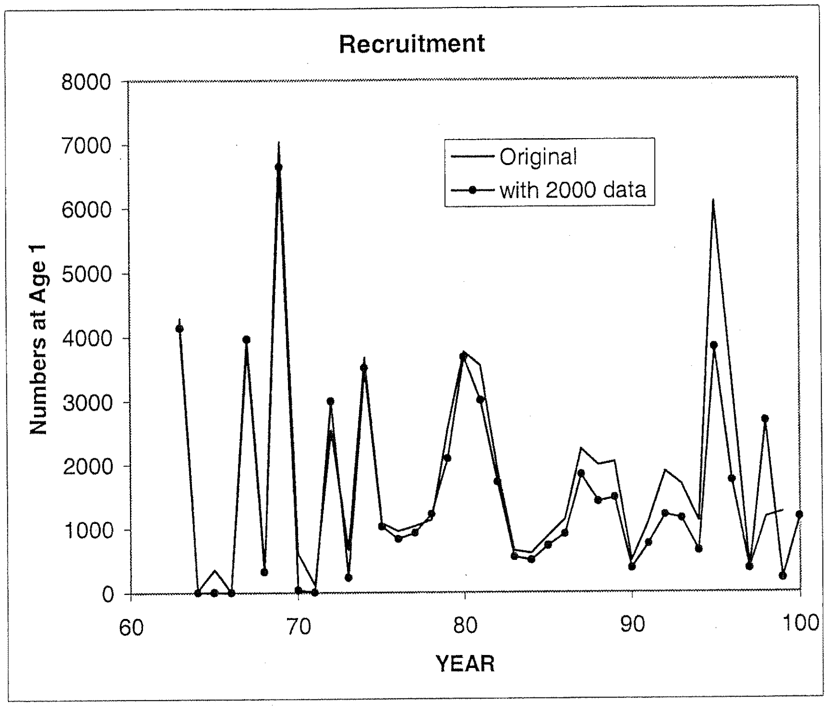

Figure 1. Time series of recruitment in the original (2000) and updated (2001) assessment model for darkblotched rockfish.

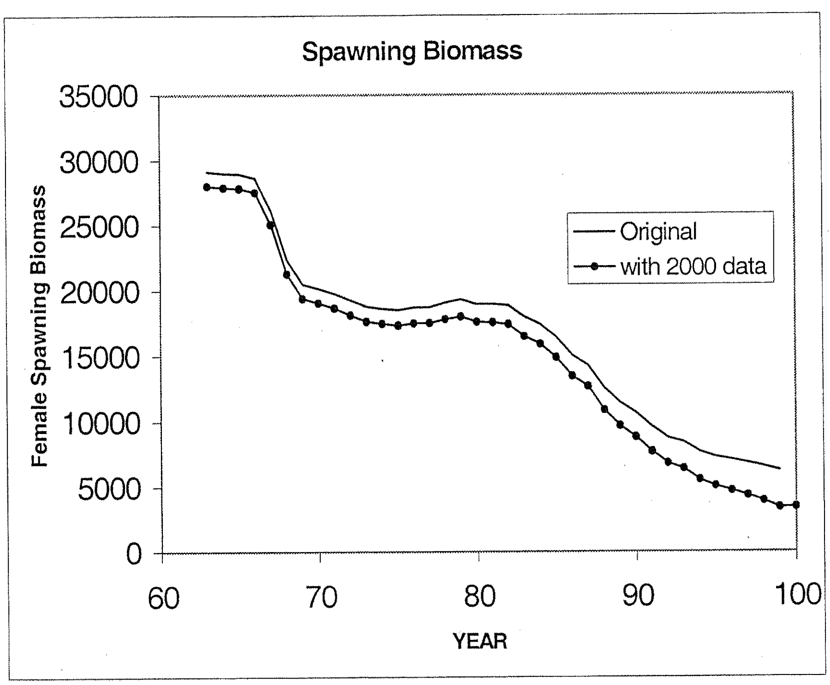

Figure 2. Time series of spawn output and recruitment for original and updated assessment model.

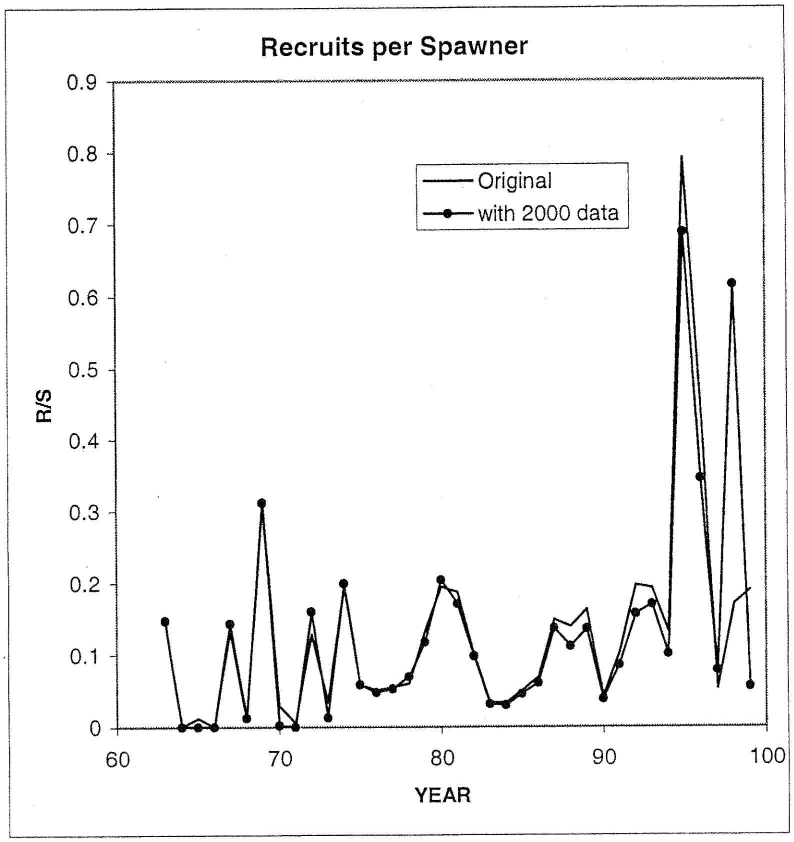

Figure 3. Time series of recruits per spawner for original and updated assessment model.

Table 2. Mean recruitment in early and late eras of the original and updated assessment models.

	Original			with 2000 data	
Year	Recruit	R/S		Recruit	R/S
Initial	1925	--		1865	--
63-82	1972	0.093		1823	0.091
63-96	1903	0.130		1577	0.116
83-96	1806	0.183		1225	0.153

The downward shift in recruitment beginning in the mid 1980s is probably due to an combination of two factors: decreased abundance of spawners and shifts in ocean conditions. It is probable that both have some impact on the decline in recruitment, but the relative magnitude of these two factors cannot be unambiguously determined from available data. In order to examine the potential consequences of these two hypotheses, four rebuilding scenarios were constructed.

A1 - Environment hypothesis: Virgin recruitment determined from the long-term average (1963-1996) which spans good and poor environmental conditions. Recruitments during rebuilding are taken only from the recent (1983-1996) era with poor recruitments in recognition of the uncertain time at which mean recruitment will again shift.

A2 - Virgin recruitment as in A1, but recruitment during rebuilding is taken from the entire time series (1963-1996) in recognition of the possibility that future recruitments will be better represented by the entire historical period. This is an optimistic scenario that is supported only by the moderately strong recruitment in 1995 and 1996.

B1 - Stock-Recruitment hypothesis: Virgin recruitment determined from the model initial conditions in recognition of the historical abundance of the stock. Recruitments during rebuilding are taken from the recent era. This is a pessimistic scenario because it does not account for increased recruitment even as the stock rebuilds.

B2 - Virgin recruitment from initial conditions and rebuilding recruitments from the entire time series.

The results of the rebuilding analyses for the four scenarios is summarized in Table 4 and Figures 4-5. Scenario A1 is considered to be a reasonable basis for forecasting the rebuilding of darkblotched rockfish. It provides for short-term harvest (181 mt in 2002 for a 60% probability of rebuilding) that is similar to the 1999-2001 catch level and to the F50% ABC level, and is intermediate between scenarios A2 and B1. A table of the rebuilding trajectory for scenario A1 is presented in Table 5 and the input parameter file is in the appendix.

Characteristics of some alternatives are worth noting. Faster initial rebuilding (Figure 4) would occur under application of the 40:10 OY adjustment because the 2002 OY would be very low due to the projected spawning biomass in 2002 being at only 14% of the virgin level. Some of the rebuilding scenarios produce short-term catch levels that would exceed the F50% ABC level. Presumably, these would be capped at the F50% ABC level to stay within the overfishing limit.

All four scenarios are based upon the updated assessment model which estimates current stock abundance to be low and implies that the catchability for the shelf and slope trawl surveys is near 1.0. If the actual catchability is less than 1.0, then the current biomass is being underestimated. Improved estimates of catchability and current biomass will be obtained as the survey time series gets longer and as new analyses of survey data are conducted. Meanwhile, the high estimated catchability implies a degree of precaution in these projected levels of catch during rebuilding.

Table 3. Age-specific population characteristics. The mean generation time is 33 years: (age x survival x spawn) summed for all ages/(survival x spawn) summed for all ages.

Both		Females				Males		
AGE	Natural Mortality	spawn (eggs x 100000)	fishery weight (kg)	fishery % selected	Population numbers in 1998	fishery weight (kg)	fishery % selected	Population numbers in 1998
1	0.05	0	0.052	0.001	586	0.043	0.001	586
2	0.05	0	0.136	0.002	179	0.117	0.002	179
3	0.05	0	0.263	0.018	1512	0.227	0.012	1512
4	0.05	0	0.377	0.108	2615	0.333	0.076	2617
5	0.05	0.006	0.472	0.323	451	0.423	0.259	453
6	0.05	0.039	0.56	0.573	627	0.502	0.51	634
7	0.05	0.139	0.645	0.759	630	0.574	0.716	641
8	0.05	0.323	0.729	0.868	323	0.642	0.841	329
9	0.05	0.574	0.809	0.927	126	0.702	0.907	129
10	0.05	0.858	0.885	0.958	449	0.754	0.942	462
11	0.05	1.149	0.955	0.974	375	0.798	0.961	386
12	0.05	1.428	1.018	0.984	359	0.836	0:972	371
13	0.05	1.687	1.075	0.989	154	0.867	0.979	160
14	0.05	1.923	1.125	0.992	100	0.894	0.984	104
15	0.05	2.134	1.169	0.995	58	0.916	0.987	60
16	0.05	2.321	1.207	0.996	51	0.934	0.989	54
17	0.05	2.486	1.24	0.997	126	0.948	0.991	132
18	0.05	2.63	1.269	0.997	198	0.96	0.992	206
19	0.05	2.756	1.293	0.998	180	0.97	0.993	186
20	0.05	2.865	1.315	0.998	106	0.978	0.993	110
21	0.05	2.959	1.333	0.998	41	0.985	0.994	43
22	0.05	3.041	1.349	0.999	34	0.99	0.994	35
23	0.05	3.111	1.362	0.999	28	0.995	0.994	29
24	0.05	3.171	1.374	0.999	29	0.998	0.995	30
25	0.05	3.223	1.383	0.999	91	1.001	0.995	93
26	0.05	3.267	1.392	0.999	15	1.003	0.995	16
27	0.05	3.305	1.399	0.999	54	1.005	0.995	55
28	0.05	3.337	1.405	0.999	2	1.007	0.995	2
29	0.05	3.364	1.41	0.999	11	1.008	0.995	12
30	0.05	3.388	1.414	0.999	121	1.009	0.995	123
31	0.05	3.408	1.418	0.999	4	1.01	0.995	5
32	0.05	3.425	1.421	0.999	56	1.011	0.995	57
33	0.05	3.439	1.424	0.999	0	1.011	0.995	0
34	0.05	3.452	1.426	0.999	4	1.012	0.995	4
35	0.05	3.462	1.428	0.999	0	1.012	0.995	0
36	0.05	3.471	1.43	0.999	41	1.012	0.995	43
37	0.05	3.478	1.431	0.999	16	1.012	0.995	17
38	0.05	3.485	1.432	0.999	14	1.013	0.995	15
39	0.05	3.49	1.433	0.999	13	1.013	0.996	13
40	0.05	3.514	1.438	0.999	203	1.013	0.996	206

Table 4. Summary results for four rebuilding scenarios as described in the text.

Scenario	A1	A2	B1	B2
Virgin Years	63-96	63-96	init	init
Virgin Recr.	1577	1577	1865	1865
Virgin Spawn	29044	29044	34348	34348
Target (40%) Spawn	11618	11618	13739	13739
Spawn 2002/Virgin	0.140	0.140	0.118	0.118
Resample from:	83-96	63-96	83-96	63-96
Rebuild year with F=0	2014	2013	2018	2015
Max allowed rebuild year	2047	2046	2051	2048
Pr(rebuild)	0.5	0.5	0.5	0.5
F	0.033	0.051	0.023	0.039
median rebuild year	2047	2046	2051	2048
OY in 2002	190	295	135	229
Pr(rebuild)	0.6	0.6	0.6	0.6
F	0.031	0.048	0.021	0.036
median rebuild year	2040	2039	2044	2041
OY in 2002	181	277	125	211
Pr(rebuild)	0.7	0.7	0.7	0.7
F	0.029	0.045	0.02	0.034
median rebuild year	2034	2033	2038	2036
OY in 2002	168	260	115	196
Pr(rebuild)	0.8	0.8	0.8	0.8
F	0.027	0.041	0.018	0.031
median rebuild year	2030	2028	2034	2031
OY in 2002	157	238	105	179
2002 ABC at F50%	187	187	187	187

Table 5. Expected time series of rebuilding under scenario A1 and with a 60% probability of rebuilding by 2047.

Year	Median Catch	Median Spawn	Spawn/ Target	Pr(rebuilt)
2002	181	4060	0.350	0.000
2003	198	4506	0.388	0.000
2004	213	5000	0.430	0.000
2005	225	5514	0.475	0.000
2006	235	6023	0.518	0.000
2007	244	6502	0.560	0.000
2008	252	6940	0.597	0.000
2009	260	7327	0.631	0.000
2010	267	7687	0.662	0.000
2011	272	8009	0.689	0.000
2012	279	8307	0.715	0.000
2013	284	8589	0.739	0.000
2014	289	8828	0.760	0.002
2015	293	9052	0.779	0.005
2016	296	9255	0.797	0.018
2017	299	9438	0.812	0.036
2018	303	9595	0.826	0.060
2019	306	9744	0.839	0.076
2020	309	9877	0.850	0.095
2021	313	9995	0.860	0.116
2022	316	10120	0.871	0.153
2023	318	10237	0.881	0.171
2024	319	10355	0.891	0.187
2025	321	10476	0.902	0.211
2026	322	10550	0.908	0.224
2027	324	10636	0.916	0.254
2028	324	10685	0.920	0.280
2029	326	10737	0.924	0.299
2030	327	10789	0.929	0.323
2031	329	10852	0.934	0.343
2032	330	10901	0.938	0.366
2033	330	10963	0.944	0.388
2034	331	11003	0.947	0.401
2035	332	11039	0.950	0.418
2036	332	11084	0.954	0.443
2037	333	11082	0.954	0.458
2038	333	11120	0.957	0.473
2039	334	11156	0.960	0.493
2040	334	11164	0.961	0.502
2041	334	11171	0.962	0.517
2042	335	11194	0.964	0.530
2043	335	11227	0.966	0.545
2044	333	11239	0.967	0.562
2045	335	11232	0.967	0.575
2046	335	11236	0.967	0.585
2047	336	11241	0.968	0.600

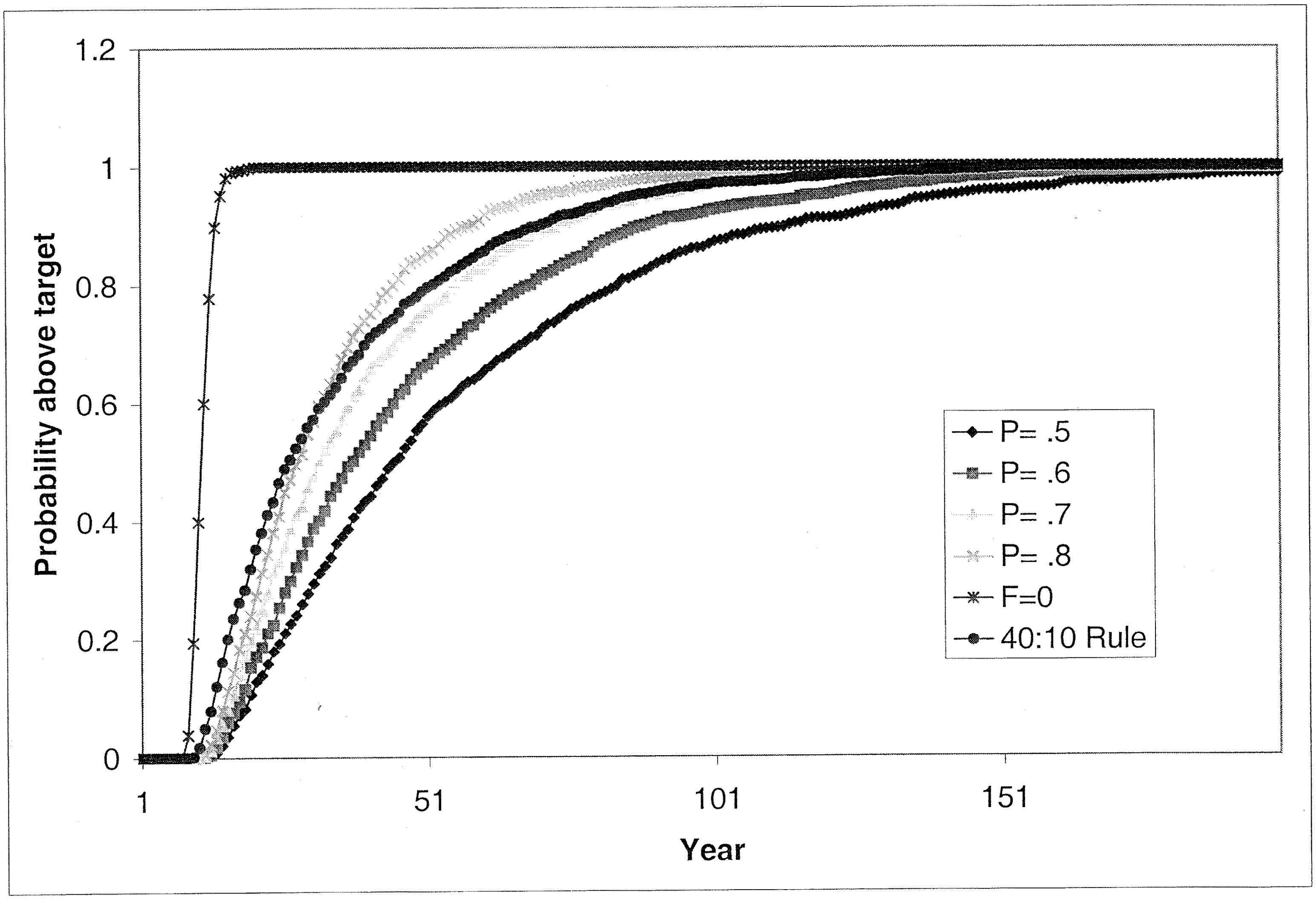

Figure 4. Probability that spawning biomass will be above the target level in each year according to Scenario A1 and six different harvest schedules. Harvest schedules P=0.5 to P=0.8 refer to probability of being rebuilt by 2047.

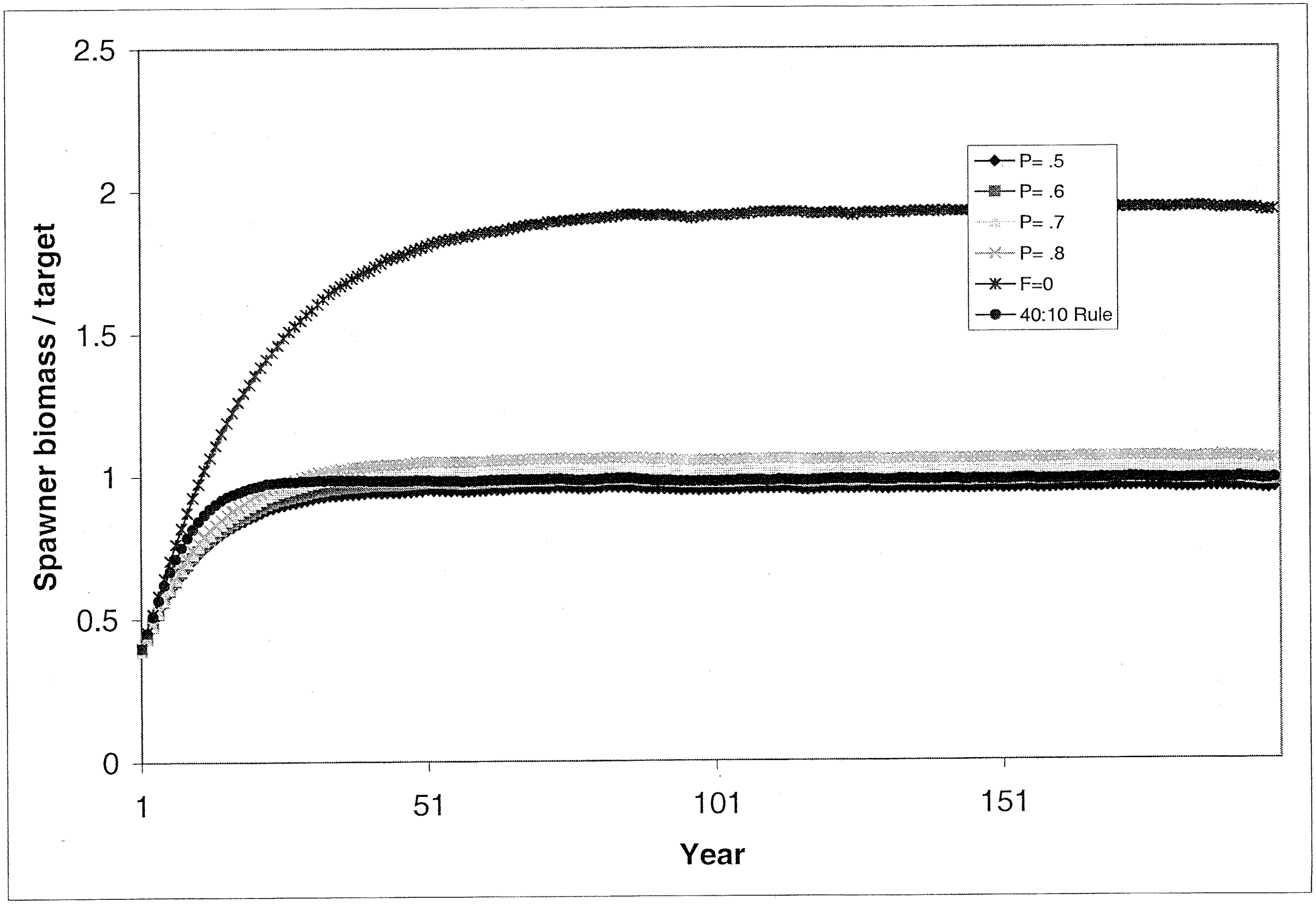

Figure 5. Time series of the ratio of spawner biomass to the target (40%) spawner biomass according to scenario A1 and six harvest schedules.

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Punt, A.E. 2001. SSC default rebuilding analysis. Technical specifications and user manual. version 1.0 12 p.

Rogers, J.B. R.D. Methot, T.L. Builder, K. Piner, and M. Wilkins. 2000. Status of the darkblotched rockfish (*Sebastes crameri*) resource in 2000. Appendix to Status of the Pacific coast groundfish fishery through 2000 and recommended acceptable biological catches for 2001. PFMC, 2130 SW Fifth Avenue Suite 224, Portland, OR 97201.

STAR. 2000. Darkblotched rockfish STAR panel meeting report. In: Status of the Pacific coast groundfish fishery through 2000 and recommended acceptable biological catches for 2001. PFMC, 2130 SW Fifth Avenue Suite 224, Portland, OR 97201.

Appendix. Input file for rebuilding analysis with Scenario A1

#Title,,
Darkblotched - with 2000; virgin=63-96; resamp=83-96
Number of sexes,,
2,,
Age range to consider (minimum age; maximum age),,
1,40,
First year of projection,,
1998,,
Is the maximum age a plus-group (1=Yes;2=No),,
1,,
Generate future recruitments using historical recruitments (1), historical recruits/spawner (2), or a stock-recruitment (3)
1,,
Constant fishing mortality (1) or constant Catch (2) projections,,
1,,
Pre-specify the year of recovery (or -1) to ignore,,
-1
Fecundity-at-age,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
#
1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40
0,0,0,0.0005,0.0059,0.0386,0.1386,0.3234,0.5741,0.8582,1.1487,1.4279,1.6874,1.9228,2.1336,2.321,2.4857,2.63,2.7557,2.8648,2.9591,3.0406,3.111,3.1712,3.2228,3.2669,3.3047,3.3369,3.3644,3.3878,3.4078,3.4248,3.4393,3.4516,3.462,3.4709,3.4785,3.4849,3.4904,3.5136
Age specific information (Females then males) M; body wt; selex; Numbers,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
Females,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
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0.0518,0.1358,0.2632,0.3774,0.4724,0.5598,0.6453,0.729,0.8095,0.8852,0.955,1.0182,1.0746,1.1246,1.1685,1.2068,1.24,1.2687,1.2935,1.3148,1.333,1.3487,1.3621,1.3736,1.3833,1.3917,1.3987,1.4048,1.4099,1.4143,1.418,1.4212,1.4239,1.4261,1.4281,1.4297,1.4311,1.4323,1.4333,1.4375
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1338.4,176.1,790.9,1642.5,260.3,417.4,379.6,201.2,83.3,271.3,214,228.2,92.5,60.2,33.5,30.2,77.2,111.4,115.1,56.4,28.9,19.4,15.8,17.7,55.1,3.5,40.2,0.1,0.5,71.3,3.3,36.2,0.1,0.1,0.1,24.6,9.6,8.4,7.6,119
Male,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05,0.05
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0.001,0.0018,0.0118,0.0758,0.2592,0.5105,0.7156,0.8405,0.9073,0.9422,0.9612,0.9724,0.9794,0.9839,0.987,0.9892,0.9908,0.9919,0.9927,0.9933,0.9938,0.9942,0.9944,0.9947,0.9948,0.995,0.9951,0.9952,0.9952,0.9953,0.9953,0.9954,0.9954,0.9954,0.9955,0.9955,0.9955,0.9955,0.9955,0.9955
1338.4,176.1,791,1644.3,262,424.4,389.4,207.6,86.3,282.2,222.8,238.3,96.9,63.1,35.2,31.8,81,116.6,120,58.6,29.9,20,16.2,18.2,56.4,3.5,41,0.1,0.5,72.7,3.3,36.9,0.1,0.1,0.1,25.5,9.9,8.7,7.8,120.9
Number of simulations,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
1000,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
recruitment and biomass,,,,,
Number of historical assessment years ,,,,,
37,,,,,
Historical data,,,,,
year,recruitment,spawner,in B0,in R project,in R/S project
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1966,10,27552,0,0,0
1967,3965,25090,0,0,0
1968,330,21287,0,0,0
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1970,45,19053,0,0,0
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1975,1035,17329,0,0,0
1976,838,17489,0,0,0
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1978,1226,17786,0,0,0
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1981,3008,17549,0,0,0
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1983,555,16486,0,1,1
1984,499,15888,0,1,1
1985,728,14873,0,1,1
1986,913,13447,0,1,1
1987,1841,12659,0,1,1
1988,1418,10860,0,1,1
1989,1480,9681,0,1,1
1990,375,8802,0,1,1
1991,755,7704,0,1,1
1992,1208,6799,0,1,1
1993,1155,6407,0,1,1
1994,650,5563,0,1,1
1995,3830,5066,0,1,1
1996,1749,4703,0,1,1
1997,370,4346,0,0,0
1998,2677,3910,0,0,0
Number of years with pre-specified catches,,,,,
4
catches for years with pre-specified catches,,,,,
1998,889
1999,326
2000,236
2001,130
Number of future recruitments to override,,
0,,
Process for overiding (-1 for average otherwise index in data list),,
Which probability to product detailed results for (1=0.5; 2=0.6; etc.),,
1,,
Steepness,sigma-R,
0.5,0.5,
Target SPR information: Use (1=Yes), target SPR rate,power
0,0.5,1
Discount rate (for cumulative catch),,
0.1,,
Truncate the series when 0.4B0 is reached (1=Yes),,
0,,
Set F to FMSY once 0.4B0 is reached (1=Yes),,
0,,
Percentage of FMSY which defines Ftarget
0.9
Conduct MacCall transition policy (1=Yes)

0
Definition of recovery (1=now only;2=now or before)
2
Produce the risk-reward plots (1=Yes)
0

Appendix A-2 FMP Amendment Language

[to be completed before public review]

TABLES

TABLE 1-1. Current parameter/target estimates specified for rebuilding darkblotched rockfish. Data from Rogers *et al.* (2000) and Methot and Rogers (2001).

Rebuilding Parameter/Target	Estimate or proxy
T_0 (year declared overfished)	2000
T_{MIN} (minimum time to achieve B_{MSY} = mean time to rebuild at F = 0)	2014
Mean generation time	33 years
T_{MAX} (maximum time to achieve B_{MSY} = T_{MIN} + 1 mean generation time)	2047
P_{MAX} (P to achieve B_{MSY} by T_{MAX}) [1/]	80%
Most recent stock assessment	Rogers *et al.* 2000
Most recent rebuilding analysis	Methot and Rogers 2001
B_0 (estimated unfished biomass)	29,044 mt
$B_{CURRENT}$ (current estimated biomass)	4,067 mt in 2002
% Unfished Biomass	14% in 2002
MSST (minimum stock size threshold = 25% of B_0)	7,261 mt
B_{MSY} (rebuilding biomass target = 40% of B_0)	11,618 mt
MFMT (maximum fishing mortality threshold = F_{MSY})	$F_{50\%}$
Harvest Control [1/]	F = 0.027
T_{TARGET} [1/]	2030

[1/] Under *Council Interim* rebuilding measures.

TABLE 2-1. Rebuilding parameters associated with darkblotched rockfish rebuilding alternatives.

Alternative	F rate	P_{MAX} Probability of rebuilding within T_{MAX}	T_{TARGET} Median year of reaching B_{MSY}
No Action	0.0XX	X%	20XX
Maximum Conservation	0.000	100%	2014
Maximum Harvest	0.033	50%	2047
60%[1/]	0.031	60%	2040
70%[1/]	0.029	70%	2034
Council Interim	0.027	80%	2030

[1]/ *While this intermediate level of harvest is not a structured alternative, associated rebuilding parameters are displayed to understand the relative difference of intermediate rebuilding scenarios.*

TABLE 3.2-1. Biological reference points for darkblotched rockfish.

Biological Reference Point	Value
Maximum age	66 yrs
Maximum length	58 cm *[by gender?]*
Maximum weight	*X kg; [by gender?]*
Age at 50% maturity	8.4 yrs females; 5.1 yrs male
Length at 50% maturity	36.5 cm females; 29.6 cm males
Natural mortality rate (M)	0.05

[Should other biological reference points be included in Table 3.2-1?]

TABLE 3.2-2. Allocation of darkblotched rockfish in the reported foreign rockfish catch (mt) off Washington, Oregon, and California in 1966-1976 by INPFC area and year. Data from Rogers (In prep).

INPFC Area	Year											
	66	67	68	69	70	71	72	73	74	75	76	Total
US-Van	101	93	52	2	2	73	61	78	144	0	0	606
Col	3,654	2,550	1,280	147	146	205	298	610	190	254	87	9,421
Eur	0	22	927	3	1	0	14	50	9	26	16	1,068
Mon	52	41	29	1	0	0	1	30	3	13	15	185

TABLE 3.2-3a. Rockfish species found on the U.S. west coast continental slope north of Cape Mendocino, California.

Common name	Scientific name	Common name	Scientific name
Principal Species		Secondary Species	
Aurora rockfish	*Sebastes aurora*	Bank rockfish	*Sebastes rufus*
Darkblotched rockfish	*Sebastes crameri*	Blackgill rockfish	*Sebastes melanostomus*
Pacific ocean perch	*Sebastes alutus*		
Redbanded rockfish	*Sebastes babcocki*		
Rougheye rockfish	*Sebastes aleutianus*		
Sharpchin rockfish	*Sebastes zacentrus*		
Shortraker rockfish	*Sebastes borealis*		
Splitnose rockfish	*Sebastes diploproa*		
Yellowmouth rockfish	*Sebastes reedi*		

TABLE 3.2-3b. Rockfish species found on the U.S. west coast continental slope south of Cape Mendocino, California.

Common name	Scientific name	Common name	Scientific name
Principal Species		Secondary Species	
Aurora rockfish	*Sebastes aurora*	Darkblotched rockfish	*Sebastes crameri*
Bank rockfish	*Sebastes rufus*	Pacific ocean perch	*Sebastes alutus*
Blackgill rockfish	*Sebastes melanostomus*	Sharpchin rockfish	*Sebastes zacentrus*
Redbanded rockfish	*Sebastes babcocki*	Shortraker rockfish	*Sebastes borealis*
Rougheye rockfish	*Sebastes aleutianus*	Yellowmouth rockfish	*Sebastes reedi*
Splitnose rockfish	*Sebastes diploproa*		

TABLE 3.2-4. Latitudinal and depth distributions of groundfish species (adults) managed under the Pacific Coast Groundfish Fishery Management Plan. 1/

Common name	Scientific name	Latitudinal Distribution Overall	Latitudinal Distribution Highest Density	Depth Distribution (fm) Overall	Depth Distribution (fm) 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	80-420	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 2/	*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	*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 3/	*Sebastes ciliatus*	N. 55° N.lat.	N. 55° N.lat.	0-150	0-150
Dwarf-Red rockfish 4/	*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.lat.	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 5/	*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
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.lat.	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

TABLE 3.2-4. Latitudinal and depth distributions of groundfish species (adults) managed under the Pacific Coast Groundfish Fishery Management Plan. [1/]

Common name	Scientific name	Latitudinal Distribution		Depth Distribution (fm)	
		Overall	Highest Density	Overall	Highest Density
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
Pacific rattail	*Coryphaenoides acrolepis*	Coastwide	N. 38° N.lat.	85-1,350	500-1,350
Ratfish	*Hydrolagus colliei*	Coastwide	Coastwide	0-499	55-82

[1/] 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.
[2/] Only the southern stock of bocaccio south of 40°10' N. lat. is listed as overfished.
[3/] Dusky rockfish do not occur on the U.S. West Coast south of 49° N. lat. The species needs to be removed from the FMP.
[4/] 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., CA in 1970; Eschmeyer et al. 1983). The species is not in the FMP.
[5/] Only 2 occurrences of harlequin rockfish south of 51° N. lat. (off Newport, OR and La Push, WA; Casillas et al. 1998).

TABLE 3.3-1. Bycatch rates used in modeling trawl fishery bycatch of darkblotched rockfish for the 2003 season.

2-mo per.	Target fishery	All depths	In depths shallower than: 50 fm	75 fm	100 fm	125 fm	In depths deeper than: 150 fm	180 fm	200 fm	250 fm
North of Cape Mendocino										
1	DTS	0.656%	0.000%	0.000%	0.000%	2.000%	1.127%	1.028%	0.896%	0.000%
2	DTS	0.564%	0.000%	0.000%	0.000%	20.000 %	1.047%	1.036%	0.974%	0.000%
3	DTS	2.374%	0.000%	0.000%	0.000%	6.890%	1.930%	1.728%	1.452%	0.000%
4	DTS	1.570%	0.000%	0.000%	0.000%	6.286%	1.139%	0.915%	0.683%	0.000%
5	DTS	0.825%	0.000%	0.000%	0.000%	2.442%	1.325%	1.202%	1.153%	0.000%
6	DTS	0.408%	0.000%	0.000%	0.000%	0.000%	2.483%	2.484%	2.330%	0.000%
1	Flatfish	1.804%	0.000%	0.000%	0.500%	10.279 %	1.764%	1.721%		
2	Flatfish	1.983%	0.000%	0.000%	0.500%	2.621%	1.909%	1.432%		
3	Flatfish	3.170%	0.000%	0.000%	0.500%	2.809%	3.006%	2.510%		
4	Flatfish	3.701%	0.000%	0.000%	0.500%	4.074%	3.258%	2.617%		
5	Flatfish	3.264%	0.000%	0.000%	0.500%	5.791%	2.149%	1.207%		
6	Flatfish	1.141%	0.000%	0.000%	0.500%	6.183%	0.973%	0.955%		
1	Arrowtooth	0.180%					0.180%	0.180%		
2	Arrowtooth	0.537%					0.533%	0.551%		
6	Arrowtooth	0.500%					0.500%	0.500%		
1	Petrale	3.940%					4.020%	4.317%		
2	Petrale	5.456%					5.164%	4.587%		
6	Petrale	3.037%					3.072%	2.870%		
1	Midwater W/Yt	0.030%								
2	Midwater W/Yt	0.030%								
3	Midwater W/Yt	0.030%								
4	Midwater W/Yt	0.030%								
5	Midwater W/Yt	0.030%								
6	Midwater W/Yt	0.030%								
1	Other	5.250%	0.000%	0.525%	1.050%	2.100%	3.150%	0.788%	0.525%	0.000%
2	Other	3.500%	0.000%	0.350%	0.700%	1.400%	2.100%	0.525%	0.350%	0.000%
3	Other	3.500%	0.000%	0.350%	0.700%	1.400%	2.100%	0.525%	0.350%	0.000%
4	Other	3.000%	0.000%	0.300%	0.600%	1.200%	1.800%	0.450%	0.300%	0.000%
5	Other	2.250%	0.000%	0.225%	0.450%	0.900%	1.350%	0.338%	0.225%	0.000%
6	Other	4.250%	0.000%	0.425%	0.850%	1.700%	2.550%	0.638%	0.425%	0.000%
South of Cape Mendocino										
1	Petrale						11.487	11.402		
2	Petrale						8.399%	13.075		
6	Petrale						7.161%	6.725%		
1	Flatfish						1.426%			
2	Flatfish						1.055%			
3	Flatfish						2.058%			
4	Flatfish						1.089%			
5	Flatfish						1.833%			
6	Flatfish						3.187%			

TABLE 3.3-1. Bycatch rates used in modeling trawl fishery bycatch of darkblotched rockfish for the 2003 season.

2-mo per.	Target fishery	All depths	In depths shallower than:				In depths deeper than:			
			50 fm	75 fm	100 fm	125 fm	150 fm	180 fm	200 fm	250 fm
1	DTS	0.567%					0.280%	0.280%		0.000%
2	DTS	0.596%					0.298%	0.298%		0.000%
3	DTS	1.483%					0.717%	0.649%		0.000%
4	DTS	0.563%					0.279%	0.222%		0.000%
5	DTS	1.168%					0.584%	0.557%		0.000%
6	DTS	0.731%					0.365%	0.350%		0.000%
1	Other	3.675%	0.000%	0.184%	0.184%	0.368%	2.205%	0.551%	0.368%	0.000%
2	Other	2.450%	0.000%	0.123%	0.123%	0.245%	1.470%	0.368%	0.245%	0.000%
3	Other	2.450%	0.000%	0.123%	0.123%	0.245%	1.470%	0.368%	0.245%	0.000%
4	Other	2.100%	0.000%	0.105%	0.105%	0.210%	1.260%	0.315%	0.210%	0.000%
5	Other	1.575%	0.000%	0.079%	0.079%	0.158%	0.945%	0.236%	0.158%	0.000%
6	Other	2.975%	0.000%	0.149%	0.149%	0.298%	1.785%	0.446%	0.298%	0.000%

TABLE 3.3-2. Number of vessels by vessel primary port and species group for the base period (November 2000 through October 2001).

	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					Total for All Groundfish	Vessels Participating in Other Fisheries							
	Whiting	Sablefish	Nearshore Spp	Shelf Spp	Slope Spp	Total	Sablefish	Nearshore Spp	Shelf Spp	Slope Spp	Total	Sablefish	Nearshore Spp	Shelf Spp	Slope Spp	Total	Sablefish	Nearshore Spp	Shelf Spp	Slope Spp	Total		Halibut (Pac & CA)	Shrimp/Prawns	Crabs	Salmon	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
NW Olympic Peninsula 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**
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**

TABLE 3.3-2. Number of vessels by vessel primary port and species group for the base period (November 2000 through October 2001).

	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							
	Whiting	Sablefish	Nearshore Spp	Shelf Spp	Slope Spp	Total	Sablefish	Nearshore Spp	Shelf Spp	Slope Spp	Total	Sablefish	Nearshore Spp	Shelf Spp	Slope Spp	Total	Sablefish	Nearshore Spp	Shelf Spp	Slope Spp	Total	Total for All Groundfish	Halibut (Pac & CA)	Shrimp/Prawns	Crabs	Salmon	HMS	CPS	Other	Total
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**
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
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	**1**	**12**	**14**	**14**	**13**	**14**	**11**	**10**	**12**	**11**	**14**	**20**	**93**	**93**	**33**	**113**	**4**	**19**	**32**	**5**	**41**	**182**	**108**	**6**	**155**	**304**	**85**	**14**	**230**	**593**
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

TABLE 3.3-2. Number of vessels by vessel primary port and species group for the base period (November 2000 through October 2001).

	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					Total for All Groundfish	Vessels Participating in Other Fisheries							
	Whiting	Sablefish	Nearshore Spp	Shelf Spp	Slope Spp	Total	Sablefish	Nearshore Spp	Shelf Spp	Slope Spp	Total	Sablefish	Nearshore Spp	Shelf Spp	Slope Spp	Total	Sablefish	Nearshore Spp	Shelf Spp	Slope Spp	Total		Halibut (Pac & CA)	Shrimp/Prawns	Crabs	Salmon	HMS	CPS	Other	Total
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
San	**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**
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.

TABLE 3.3-3. Number of vessels by length class and fisheries category making landings of different species groups caught in different INPFC areas during November 2000 through October 2001.

Gear and Species	<40'	40'-50'	Vessel Length Category 50'-60'	60'-70'	70'-150'	>150'	Unspecified	Total
			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	26	0	0	0	0	0	0	26
Shelf Species	0	5	0	0	0	0	1	6
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
Shelf Species	2	11	3	1	1	0	0	18
Slope Species	0	1	0	0	0	0	0	1
Nongroundfish Fisheries								
Halibut	13	26	7	0	3	0	0	49
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 3.3-3. Number of vessels by length class and fisheries category making landings of different species groups caught in different INPFC areas during November 2000 through October 2001.

Gear and Species	<40'	40'-50'	50'-60'	60'-70'	70'-150'	>150'	Unspecified	Total
			Vessel Length Category					
			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 3.3-3. Number of vessels by length class and fisheries category making landings of different species groups caught in different INPFC areas during November 2000 through October 2001.

	Vessel Length Category							
Gear and Species	<40'	40'-50'	50'-60'	60'-70'	70'-150'	>150'	Unspecified	Total
			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
Nongroundfish Fisheries								
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

TABLE 3.3-4. Share of total exvessel revenue derived from landings of the designated species group caught in different INPFC areas for vessels in Table 3.3-3 during November 2000 through October 2001.

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	-	-	0.90	0	0.55	-	-	0.44
Sablefish	0.23	0.29	0.18	0	0.13	-	-	0.17
Nearshore Species	0.08	0.01	0.01	0	0.01	-	-	0.01
Shelf Species	0.49	0.60	0.53	0	0.30	-	-	0.35
Slope Species	0.20	0.09	0.13	0	0.26	-	-	0.28
Limited Entry Fixed Gear								
Sablefish	0.94	0.84	0.82	1	0.95	-	-	0.87
Nearshore Species	0.00	0.00	0.00	-	-	-	-	0.00
Shelf Species	0.03	0.07	0.16	-	0.01	-	-	0.09
Slope Species	0.01	0	0.01	0	0.01	-	-	0.01
Open Access >5% Revenue from Groundfish								
Sablefish	0.96	0.27	1.00	-	-	-	0.20	0.58
Nearshore Species	0.04	-	-	-	-	-	-	0.04
Shelf Species	-	0.01	-	-	-	-	0.09	0.03
Slope Species	0.01	0.00	-	-	-	-	0.71	0.09
Open Access <5% Revenue from Groundfish								
Sablefish	-	0.02	0.03	0	0.01	-	-	0.01
Shelf Species	0.05	0.03	0.01	0	0.01	-	-	0.01
Slope Species	-	0.01	-	-	-	-	-	0.01
Nongroundfish Fisheries								
Halibut	0.06	0.05	0.03	-	0.01	-	-	0.04
Shrimps and Prawns	-	-	0.51	0	0.51	-	-	0.24
Crabs	1.00	0.70	0.99	1	0.60	-	-	0.82
Salmon	0.85	0.48	0.05	0	0.00	-	-	0.09
HMS	0.19	1.00	1.00	0	1.00	-	-	0.60
CPS	-	0.03	0.01	0	0.01	-	-	0.01
Other	0.00	0.01	0.02	0	0.03	-	-	0.02
			Columbia INPFC Area					
Limited Entry Trawl								
Whiting	-	0.01	0.35	0	0.71	-	0.83	0.60
Sablefish	0.08	0.20	0.28	0	0.10	-	0.00	0.15
Nearshore Species	0.28	0.02	0.02	0	0.01	-	-	0.01
Shelf Species	0.22	0.25	0.18	0	0.12	-	0.17	0.16
Slope Species	0.02	0.20	0.28	0	0.15	-	0.00	0.19
Limited Entry Fixed Gear								
Sablefish	0.37	0.38	0.36	0	0.57	-	1.00	0.40
Nearshore Species	0.01	0.08	0.00	-	-	-	-	0.04
Shelf Species	0.01	0.00	0.00	0	-	-	-	0.00
Slope Species	0.01	0.00	0.00	0	0.00	-	-	0.00
Open Access >5% Revenue from Groundfish								
Sablefish	0.12	0.18	0.23	0	0.71	-	0.32	0.15
Nearshore Species	0.29	0.00	0.02	-	-	-	-	0.12
Shelf Species	0.02	0.00	0.02	0	-	-	0.09	0.02
Slope Species	0.00	0.00	0.00	0	-	-	0.59	0.04
Open Access <5% Revenue from Groundfish								
Sablefish	0.02	0.01	0.01	0	0.01	-	-	0.01
Nearshore Species	0.00	0.00	0.00	0	0.00	-	-	0.00
Shelf Species	0.00	0.00	0.00	0	0.01	-	-	0.01
Slope Species	0.00	0.00	0.00	0	0.00	-	-	0.00
Nongroundfish Fisheries								
Halibut	0	0	0.05	0	0.01	-	0.00	0.03
Shrimps and Prawns	-	0.23	0.35	0	0.51	-	-	0.46
Crabs	0.84	0.72	0.62	0	0.33	-	-	0.61
Salmon	0.57	0.25	0.08	0	0.00	-	0.00	0.20
HMS	0.32	0.43	0.39	0	0.18	-	0.59	0.34
CPS	0.00	0.74	0.40	0	0.11	-	0.00	0.18
Other	0.31	0.02	0.01	0	0.01	-	0.03	0

TABLE 3.3-4. Share of total exvessel revenue derived from landings of the designated species group caught in different INPFC areas for vessels in Table 3.3-3 during November 2000 through October 2001.

	Vessel Length Category							
Gear and Species	<40'	40'-50'	50'-60'	60'-70'	70'-150'	>150'	Unspecified	Total
			Eureka INPFC Area					
Limited Entry Trawl								
Whiting	-	0.00	-	0.50	0.31	-	-	0.23
Sablefish	0.12	0.13	0.19	0.23	0.21	-	-	0.20
Nearshore Species	0.33	0.08	0.03	0.00	0.02	-	-	0.03
Shelf Species	0.46	0.23	0.16	0.15	0.14	-	-	0.16
Slope Species	0.05	0.20	0.35	0.44	0.34	-	-	0.35
Limited Entry Fixed Gear								
Sablefish	0	0	0.30	-	-	-	-	0.32
Nearshore Species	0.25	0.18	0.90	-	-	-	-	0.26
Shelf Species	0.04	0.04	0.02	-	-	-	-	0.04
Slope Species	0.00	0.00	0.00	-	-	-	-	0.00
Open Access >5% Revenue from Groundfish								
Sablefish	0.21	0.62	-	-	-	-	-	0.24
Nearshore Species	0.41	0.15	0.88	-	-	-	0.84	0.40
Shelf Species	0.06	0.02	0.09	-	-	-	-	0.06
Slope Species	0.01	0.01	-	-	-	-	-	0.01
Open Access <5% Revenue from Groundfish								
Sablefish	0.00	0.02	-	-	-	-	-	0.01
Nearshore Species	0.01	0.00	0.00	-	0.00	-	-	0.00
Shelf Species	0.01	0.00	0.02	0.00	0.00	-	-	0.00
Slope Species	0.00	-	-	0.00	0.00	-	-	0.00
Nongroundfish Fisheries								
Halibut	0.02	0.00	0.01	0.00	0.00	-	-	0.01
Shrimps and Prawns	0.00	0.03	0.09	0.31	0.29	-	-	0.21
Crabs	0.68	0.69	0.45	0.50	0.35	-	-	0.58
Salmon	0.17	0.15	1.00	-	0.01	-	-	0.15
HMS	0.08	0.28	0.32	0.40	0.27	1.00	-	0.26
CPS	0.16	-	0.00	0.00	0.00	-	-	0.01
Other	0.18	0.06	0.03	0.02	0.01	-	0.16	0.07
			Monterey INPFC Area					
Limited Entry Trawl								
Whiting	-	-	-	0.00	0.00	-	-	0.00
Sablefish	0.02	0.04	0.16	0.14	0.14	-	-	0.14
Nearshore Species	0.41	0.14	0.07	0.19	0.17	-	-	0.14
Shelf Species	0.13	0.16	0.22	0.23	0.25	-	-	0.22
Slope Species	0.02	0.05	0.33	0.36	0.35	-	-	0.32
Limited Entry Fixed Gear								
Sablefish	0.40	0.46	0.58	0.91	-	-	-	0.47
Nearshore Species	0.22	0.06	0.10	-	-	-	-	0.17
Shelf Species	0.08	0.04	0.01	-	-	-	-	0.05
Slope Species	0.12	0.19	0.04	0.09	-	-	-	0.11
Open Access >5% Revenue from Groundfish								
Sablefish	0.40	0.59	0	-	-	-	-	0.47
Nearshore Species	0.56	0.28	0.04	0.00	-	-	0.90	0.52
Shelf Species	0.10	0.11	0.24	1.00	-	-	0.08	0.11
Slope Species	0.01	0.03	0.03	-	-	-	-	0.02
Open Access <5% Revenue from Groundfish								
Sablefish	0.02	0.01	-	-	-	-	0.02	0.02
Nearshore Species	0.01	0.00	-	-	-	-	-	0
Shelf Species	0.00	0.00	-	0.00	-	-	-	0.00
Slope Species	0.00	0.00	0.00	0.00	-	-	-	0.00
Nongroundfish Fisheries								
Halibut	0.16	0.13	0.11	0.40	0.16	-	-	0.17
Shrimps and Prawns	0.91	0.00	0.31	0.98	0.41	-	-	0.48
Crabs	0.60	0.77	0.48	0.27	0.26	-	-	0.58
Salmon	0.47	0.43	0.22	1.00	-	-	-	0.43
HMS	0.10	0.28	0.18	0.57	0.43	-	-	0.24
CPS	0.08	0.60	0.65	0.46	0.80	-	0.01	0.63
Other	0.68	0.08	0.01	0.01	0.01	-	0.22	0

TABLE 3.3-4. Share of total exvessel revenue derived from landings of the designated species group caught in different INPFC areas for vessels in Table 3.3-3 during November 2000 through October 2001.

	Vessel Length Category							
Gear and Species	<40'	40'-50'	50'-60'	60'-70'	70'-150'	>150'	Unspecified	Total
			Conception INPFC Area					
Limited Entry Trawl								
Whiting	-	-	-	-	0.00	-	-	0.00
Sablefish	-	-	0.02	0.16	0.21	-	-	0.09
Nearshore Species	-	-	0.01	0.00	-	-	-	0.01
Shelf Species	-	-	0.26	0.26	0.23	-	-	0.25
Slope Species	-	-	0.09	0.47	0.43	-	-	0.26
Limited Entry Fixed Gear								
Sablefish	0.39	0.11	-	-	-	-	-	0.32
Nearshore Species	0.04	0.07	0.99	-	-	-	-	0.05
Shelf Species	0.06	0.05	0.01	-	-	-	-	0.06
Slope Species	0.55	0.48	-	-	-	-	-	0.53
Open Access >5% Revenue from Groundfish								
Sablefish	0.55	0.11	-	-	-	-	-	0.18
Nearshore Species	0.53	0.18	0.07	0.06	-	-	0.99	0.44
Shelf Species	0.04	0.01	1.00	0.01	0.03	-	-	0.04
Slope Species	0.02	0.06	-	0.01	0.05	-	-	0.03
Open Access <5% Revenue from Groundfish								
Sablefish	0.01	0.00	0.00	-	-	-	-	0.00
Nearshore Species	0.01	0.01	0.00	-	-	-	-	0.01
Shelf Species	0.01	0.00	0.02	0.01	0.00	-	-	0.01
Slope Species	0.00	0	0.00	0.00	0.00	-	-	0.00
Nongroundfish Fisheries								
Halibut	0.06	0.15	0.11	0.43	-	-	-	0.10
Shrimps and Prawns	0.51	0.52	0.70	0.95	0.71	-	-	0.58
Crabs	0.56	0.30	0.07	0.10	0.00	-	-	0.47
HMS	0.20	0.60	0.48	0.23	0.66	-	-	0.50
CPS	0.18	0.80	0.93	0.97	0.94	-	-	0.86
Other	0.56	0.24	0.04	0.01	0.01	-	0.01	0.33
			All Ocean Areas (Council Managed 0-200 Miles)					
Limited Entry Trawl								
Whiting	-	0.01	0.58	0.18	0.63	-	0.83	0.52
Sablefish	0.07	0.16	0.20	0.19	0.12	-	0.00	0.16
Nearshore Species	0.32	0.06	0.03	0.03	0.03	-	-	0.03
Shelf Species	0.21	0.27	0.21	0.22	0.17	-	0.17	0.20
Slope Species	0.03	0.16	0.29	0.33	0.20	-	0.00	0.25
Limited Entry Fixed Gear								
Sablefish	0.40	0.43	0.44	0.51	0.64	-	1.00	0.44
Nearshore Species	0.18	0.08	0.07	-	-	-	-	0.13
Shelf Species	0.04	0.02	0.03	0.00	0.01	-	-	0.03
Slope Species	0	0	0.01	0.00	0.01	-	-	0.06
Open Access >5% Revenue from Groundfish								
Sablefish	0.27	0.29	0.33	0.07	0.71	-	0.28	0.28
Nearshore Species	0.48	0.15	0.03	0.06	-	-	0.91	0.41
Shelf Species	0.06	0.03	0.14	0.03	0.03	-	0.09	0.05
Slope Species	0.01	0.03	0.02	0.00	0.05	-	0.62	0.02
Open Access <5% Revenue from Groundfish								
Sablefish	0.02	0.01	0.01	0.01	0.01	-	0.02	0.01
Nearshore Species	0.01	0.01	0.00	0.00	0.00	-	-	0.00
Shelf Species	0.01	0.00	0.01	0.01	0.01	-	-	0.01
Slope Species	0.00	0.00	0.00	0.00	0.00	-	-	0.00
Nongroundfish Fisheries								
Halibut	0.06	0.05	0.05	0.10	0.02	-	0.00	0.05
Shrimps and Prawns	0.55	0.30	0.32	0.36	0.44	-	-	0.39
Crabs	0.65	0.64	0.54	0.42	0.29	-	-	0.55
Salmon	0.42	0.24	0.09	0.03	0.00	-	0.00	0.22
HMS	0.20	0.39	0.34	0.27	0.48	1.00	0.59	0.35
CPS	0.17	0.75	0.77	0.61	0.48	-	0.00	0.59
Other	1	0.10	0.02	0.01	0.01	-	0.04	0

TABLE 3.3-5. Number of processors/buyers by primary port for the base period (November 2000 through October 2001).

	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							
	Whiting	Sablefish	Nearshore Spp	Shelf Spp	Slope Spp	Total	Sablefish	Nearshore Spp	Shelf Spp	Slope Spp	Total	Sablefish	Nearshore Spp	Shelf Spp	Slope Spp	Total	Sablefish	Nearshore Spp	Shelf Spp	Slope Spp	Total	Total for All Groundfish	Halibut (Pac & CA)	Shrimp/Prawns	Crabs	Salmon	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
NW Olympic Peninsula 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**
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

TABLE 3.3-5. Number of processors/buyers by primary port for the base period (November 2000 through October 2001).

	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							
	Whiting	Sablefish	Nearshore Spp	Shelf Spp	Slope Spp	Total	Sablefish	Nearshore Spp	Shelf Spp	Slope Spp	Total	Sablefish	Nearshore Spp	Shelf Spp	Slope Spp	Total	Sablefish	Nearshore Spp	Shelf Spp	Slope Spp	Total	Total for All Groundfish	Halibut (Pac & CA)	Shrimp/Prawns	Crabs	Salmon	HMS	CPS	Other	Total
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**
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
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**	**10**	**12**	**12**	**12**	**14**	**5**	**19**	**22**	**10**	**26**	**11**	**56**	**57**	**26**	**70**	**3**	**18**	**20**	**6**	**30**	**96**	**44**	**11**	**67**	**91**	**42**	**11**	**86**	**200**

TABLE 3.3-5. Number of processors/buyers by primary port for the base period (November 2000 through October 2001).

	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							
	Whiting	Sablefish	Nearshore Spp	Shelf Spp	Slope Spp	Total	Sablefish	Nearshore Spp	Shelf Spp	Slope Spp	Total	Sablefish	Nearshore Spp	Shelf Spp	Slope Spp	Total	Sablefish	Nearshore Spp	Shelf Spp	Slope Spp	Total	Total for All Groundfish	Halibut (Pac & CA)	Shrimp/Prawns	Crabs	Salmon	HMS	CPS	Other	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
San Luis Obispo 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**
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.

TABLE 3.3-6 . Number of buyers/processors in each port area[1] by purchase value of raw product (exvessel value) for the base period (November 2000 through October 2001).

	Total Exvessel Value of Purchases						
	<$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
NW Olympic Peninsula	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	*	*	74
Brookings	4	3	6	1	*	*	18
Crescent City	11	11	1	1	3	4	31
Eureka	17	9	3	3	0	0	32
Fort Bragg	16	6	4	*	*	*	30
San Francisco	104	39	28	13	13	3	200
Monterey	40	12	8	6	2	2	70
San Luis Obispo	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	*	*	47
At-Sea Only	*	-	-	*	*	*	13
Total	492	254	223	100	76	60	1,283

Notes:
[1] Processors were assigned to the primary port area where more of its West coast purchases were made than any other West coast port area. Total purchases include value of all species landed in any area, including Alaska, Puget Sound and Columbia River.
* Values omitted to preseve confidentiality.

TABLE 3.3-7. Number of buyers buying fish caught by the indicated fleet segment from the indicated INPFC area, by species groups and processor's total purchases.

	Level of Puchases in Exvessel Value (All Fish Product Landed on West Coast Fishtickets)						
Gear and Species	<$5,000	$5,000-$20,000	$20,000-$100,000	$100,000-$300,000	$300,000-$1,000,000	$>1,000,000	Total

Vancouver INPFC Area

Limited Entry Trawl							
Whiting	0	0	0	0	1	5	6
Sablefish	0	0	3	3	3	11	20
Nearshore Species	0	0	4	2	1	6	13
Shelf Species	1	1	5	2	3	14	26
Slope Species	0	1	4	2	3	10	20
Limited Entry Fixed Gear							
Sablefish	0	0	0	1	2	7	10
Nearshore Species	0	0	0	0	0	2	2
Shelf Species	0	0	0	1	0	6	7
Slope Species	0	0	0	1	2	6	9
Open Access >5% Revenue from Groundfish							
Sablefish	0	0	0	1	0	4	5
Nearshore Species	0	0	0	0	0	1	1
Shelf Species	0	0	0	0	2	2	4
Slope Species	0	0	0	0	0	2	2
Open Access <5% Revenue from Groundfish							0
Sablefish	0	0	0	0	0	2	2
Shelf Species	0	0	0	0	1	4	5
Slope Species	0	0	0	0	0	2	2
Nongroundfish Fisheries							
Halibut	1	1	1	1	4	8	16
Shrimps and Prawns	0	0	0	0	0	2	2
Crabs	1	1	6	1	7	9	25
Salmon	1	4	4	2	4	7	22
HMS	2	3	4	2	1	4	16
CPS	0	0	0	1	3	4	8
Other	0	0	4	2	2	11	19

Columbia INPFC Area

Limited Entry Trawl							
Whiting	0	0	0	2	10	11	23
Sablefish	0	0	2	3	12	18	35
Nearshore Species	1	1	1	1	3	12	19
Shelf Species	0	0	3	4	13	19	39
Slope Species	0	0	3	5	13	17	38
Limited Entry Fixed Gear							
Sablefish	1	1	4	1	2	15	24
Nearshore Species	2	1	2	0	1	3	9
Shelf Species	2	2	2	3	1	12	22
Slope Species	1	0	0	0	0	15	16
Open Access >5% Revenue from Groundfish							
Sablefish	0	0	1	1	1	9	12
Nearshore Species	3	2	10	2	4	5	26
Shelf Species	3	7	10	2	5	11	38
Slope Species	0	0	0	1	0	6	7
Open Access <5% Revenue from Groundfish							
Sablefish	0	1	0	2	5	11	19
Nearshore Species	1	0	6	3	4	7	21
Shelf Species	7	4	14	6	7	16	54
Slope Species	0	1	1	1	2	10	15
Nongroundfish Fisheries							
Halibut	10	18	20	5	12	21	86
Shrimps and Prawns	0	0	0	1	4	11	16
Crabs	34	28	29	7	18	24	140
Salmon	49	26	31	10	17	21	154
HMS	33	43	27	8	9	16	136
CPS	1	0	1	4	15	12	33
Other	13	6	11	7	19	18	74

Eureka INPFC Area

Limited Entry Trawl							
Whiting	0	0	0	0	1	5	6
Sablefish	0	0	0	2	3	9	14
Nearshore Species	0	0	0	0	2	7	9
Shelf Species	0	0	3	3	5	11	22
Slope Species	0	0	1	2	4	9	16
Limited Entry Fixed Gear							
Sablefish	0	0	1	2	2	9	14
Nearshore Species	0	0	4	5	3	5	17
Shelf Species	0	0	3	6	3	8	20
Slope Species	0	0	0	2	1	9	12
Open Access >5% Revenue from Groundfish							
Sablefish	0	0	0	2	2	7	11
Nearshore Species	8	5	8	4	4	6	35
Shelf Species	7	4	8	5	5	7	36
Slope Species	1	0	4	3	3	7	18
Open Access <5% Revenue from Groundfish							
Sablefish	0	1	0	0	1	1	3
Nearshore Species	0	1	2	1	3	4	11
Shelf Species	0	2	3	1	3	7	16
Slope Species	0	0	1	0	2	4	7
Nongroundfish Fisheries							
Halibut	1	1	3	1	1	6	13
Shrimps and Prawns	0	2	1	1	2	5	11
Crabs	14	10	10	6	8	10	58
Salmon	9	6	10	3	4	8	40
HMS	11	13	6	2	1	11	44
CPS	0	1	0	0	2	4	7
Other	2	1	7	7	10	13	40

Monterey INPFC Area

Limited Entry Trawl							
Whiting	0	0	0	2	0	0	2
Sablefish	0	1	3	6	6	8	24
Nearshore Species	1	1	5	7	6	6	26
Shelf Species	1	1	4	9	8	7	30
Slope Species	2	1	4	7	7	9	30
Limited Entry Fixed Gear							
Sablefish	1	0	2	6	2	5	16
Nearshore Species	3	4	12	7	6	0	32
Shelf Species	4	4	9	7	8	6	38
Slope Species	4	1	5	7	5	5	27
Open Access >5% Revenue from Groundfish							
Sablefish	3	2	3	8	5	6	27
Nearshore Species	45	23	19	9	9	6	111
Shelf Species	43	20	21	10	7	7	108
Slope Species	12	6	12	9	6	4	49
Open Access <5% Revenue from Groundfish							
Sablefish	3	2	0	2	1	1	9
Nearshore Species	6	6	7	5	7	1	32
Shelf Species	3	7	5	7	7	5	34
Slope Species	2	2	1	3	2	1	11
Nongroundfish Fisheries							
Halibut	17	14	16	9	8	6	70
Shrimps and Prawns	2	0	4	5	8	6	25
Crabs	26	23	18	12	14	5	98
Salmon	74	35	27	11	13	9	169
HMS	27	23	16	5	11	13	95
CPS	2	2	6	4	4	5	23
Other	33	26	25	21	21	12	138

			Conception INPFC Area				
Limited Entry Trawl							
Whiting	0	0	0	0	0	1	1
Sablefish	0	0	1	3	1	2	7
Nearshore Species	0	0	1	3	0	2	6
Shelf Species	0	1	2	3	1	2	9
Slope Species	0	0	2	1	1	2	6
Limited Entry Fixed Gear							
Sablefish	1	1	5	7	4	2	20
Nearshore Species	2	2	11	7	3	2	27
Shelf Species	3	1	13	6	2	2	27
Slope Species	1	1	5	8	4	2	21
Open Access >5% Revenue from Groundfish							
Sablefish	0	0	4	6	0	2	12
Nearshore Species	16	16	23	21	8	7	91
Shelf Species	12	10	18	17	7	6	70
Slope Species	2	6	15	16	5	5	49
Open Access <5% Revenue from Groundfish							
Sablefish	2	1	2	4	2	0	11
Nearshore Species	7	10	24	23	9	6	79
Shelf Species	6	9	20	12	9	9	65
Slope Species	4	6	14	10	6	3	43
Nongroundfish Fisheries							
Halibut	15	12	30	25	5	4	91
Shrimps and Prawns	8	6	21	17	8	4	64
Crabs	40	31	40	31	14	5	161
HMS	27	22	31	24	11	15	130
CPS	8	13	18	16	9	13	77
Other	41	30	53	35	22	20	201
			All Ocean Areas (Council Managed 0-200 Miles)				
Limited Entry Trawl							
Whiting	0	0	0	4	10	16	30
Sablefish	0	1	9	15	21	28	74
Nearshore Species	2	2	10	12	10	23	59
Shelf Species	2	3	15	18	23	31	92
Slope Species	2	2	12	16	22	28	82
Limited Entry Fixed Gear							
Sablefish	3	2	12	14	12	26	69
Nearshore Species	6	7	20	15	12	11	71
Shelf Species	8	7	19	19	13	24	90
Slope Species	6	2	10	14	11	25	68
Open Access >5% Revenue from Groundfish							
Sablefish	3	2	8	16	7	21	57
Nearshore Species	70	42	54	34	19	19	238
Shelf Species	64	37	53	31	20	25	230
Slope Species	15	12	31	27	13	20	118
Open Access <5% Revenue from Groundfish							
Sablefish	5	5	2	8	9	14	43
Nearshore Species	14	17	38	32	22	16	139
Shelf Species	16	22	40	26	24	34	162
Slope Species	6	9	17	14	12	20	78
Nongroundfish Fisheries							
Halibut	44	46	66	40	29	35	260
Shrimps and Prawns	10	8	24	23	20	22	107
Crabs	114	94	101	54	48	37	448
Salmon	130	70	61	24	34	35	354
HMS	100	100	79	39	30	40	388
CPS	11	16	25	25	28	29	134
Other	91	62	99	67	57	48	424

TABLE 3.3-8. For buyers of the indicated size (based on purchases) buying the indicated species from the indicated fleet, the percent of those buyers total revenue from the indicated INPFC area, during November 2000 through October 2001.

	Level of Puchases in Exvessel Value (All Fish Product Landed on West Coast Fishtickets)						
Gear and Species	<$5,000	$5,000-$20,000	$20,000-$100,000	$100,000-$300,000	$300,000-$1,000,000	$>1,000,000	Total
			Vancouver INPFC Area				
Limited Entry Trawl							

TABLE 3.3-8. For buyers of the indicated size (based on purchases) buying the indicated species from the indicated fleet, the percent of those buyers total revenue from the indicated INPFC area, during November 2000 through October 2001.

	Level of Puchases in Exvessel Value (All Fish Product Landed on West Coast Fishtickets)						
Gear and Species	<$5,000	$5,000-$20,000	$20,000-$100,000	$100,000-$300,000	$300,000-$1,000,000	$>1,000,000	Total
Whiting	-	-	-	-	0.81	0.23	0.24
Sablefish	-	-	0.25	0.07	0.19	0.22	0.21
Nearshore Species	-	-	0.00	0.01	0.00	0.00	0.00
Shelf Species	1.00	0.83	0.61	0.63	0.30	0.17	0.20
Slope Species	-	0.18	0.08	0.28	0.05	0.16	0.15
Limited Entry Fixed Gear							
Sablefish	-	-	-	0.71	0.07	0.19	0.19
Nearshore Species	-	-	-	-	-	0.00	0.00
Shelf Species	-	-	-	0.01	-	0.02	0.02
Slope Species	-	-	-	0.01	0.00	0.00	0.00
Open Access >5% Revenue from Groundfish							
Sablefish	-	-	-	0.00	-	0.02	0.02
Nearshore Species	-	-	-	-	-	0.00	0.00
Shelf Species	-	-	-	-	0.00	0.00	0.00
Slope Species	-	-	-	-	-	0.00	0.00
Open Access <5% Revenue from Groundfish							
Sablefish	-	-	-	-	-	0.00	0.00
Shelf Species	-	-	-	-	0.01	0.00	0.00
Slope Species	-	-	-	-	-	0.00	0.00
Nongroundfish Fisheries							
Halibut	1.00	0.17	0.00	0.05	0.19	0.06	0.08
Shrimps and Prawns	-	-	-	-	-	0.08	0.08
Crabs	1.00	1.00	1.00	1.00	0.76	0.29	0.32
Salmon	1.00	0.98	0.11	0.25	0.20	0.06	0.09
HMS	1.00	0.72	0.87	1.00	0.29	0.01	0.14
CPS	-	-	-	1.00	0.06	0.00	0.01
Other	-	-	0.01	0.02	0.02	0.01	0.01
			Columbia INPFC Area				
Limited Entry Trawl							
Whiting	-	-	-	0.99	0.90	0.16	0.23
Sablefish	-	-	0.08	0.00	0.01	0.07	0.06
Nearshore Species	0.00	0.04	0.00	0.00	0.05	0.00	0.00
Shelf Species	-	-	0.28	0.00	0.04	0.06	0.06
Slope Species	-	-	0.08	0.00	0.03	0.07	0.07
Limited Entry Fixed Gear							
Sablefish	1.00	0.01	0.04	0.46	0.02	0.06	0.06
Nearshore Species	0.03	0.02	0.18	-	0.00	0.00	0.00
Shelf Species	0.01	0.02	0.02	0.00	0.00	0.00	0.00
Slope Species	0.01	-	-	-	-	0.00	0.00
Open Access >5% Revenue from Groundfish							
Sablefish	-	-	0.01	0.00	0.00	0.00	0.00
Nearshore Species	0.43	0.38	0.06	0.04	0.00	0.00	0.00
Shelf Species	0.08	0.05	0.01	0.02	0.00	0.00	0.00
Slope Species	-	-	-	0.00	-	0.00	0.00
Open Access <5% Revenue from Groundfish							
Sablefish	-	0.00	-	0.00	0.00	0.00	0.00
Nearshore Species	0.01	-	0.00	0.00	0.00	0.00	0.00
Shelf Species	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Slope Species	-	0.00	0.00	0.00	0.00	0.00	0.00
Nongroundfish Fisheries							
Halibut	0.75	0.33	0.13	0.04	0.01	0.01	0.01
Shrimps and Prawns	-	-	-	0.59	0.18	0.14	0.14
Crabs	0.79	0.75	0.61	0.58	0.69	0.34	0.38
Salmon	0.70	0.33	0.35	0.25	0.06	0.05	0.06
HMS	0.68	0.79	0.28	0.16	0.04	0.19	0.19
CPS	0.52	-	1.00	0.58	0.23	0.02	0.04
Other	0.92	0.17	0.08	0.04	0.04	0.01	0.01

TABLE 3.3-8. For buyers of the indicated size (based on purchases) buying the indicated species from the indicated fleet, the percent of those buyers total revenue from the indicated INPFC area, during November 2000 through October 2001.

	Level of Puchases in Exvessel Value (All Fish Product Landed on West Coast Fishtickets)						
Gear and Species	<$5,000	$5,000-$20,000	$20,000-$100,000	$100,000-$300,000	$300,000-$1,000,000	$>1,000,000	Total
			Eureka INPFC Area				
Limited Entry Trawl							
Whiting	-	-	-	-	0.99	0.02	0.02
Sablefish	-	-	-	0.00	0.07	0.12	0.11
Nearshore Species	-	-	-	-	0.00	0.01	0.01
Shelf Species	-	-	0.00	0.01	0.07	0.09	0.08
Slope Species	-	-	0.17	0.00	0.13	0.21	0.20
Limited Entry Fixed Gear							
Sablefish	-	-	0.01	0.01	0.00	0.05	0.05
Nearshore Species	-	-	0.22	0.10	0.06	0.02	0.03
Shelf Species	-	-	0.02	0.00	0.01	0.00	0.00
Slope Species	-	-	-	0.00	0.00	0.00	0.00
Open Access >5% Revenue from Groundfish							
Sablefish	-	-	-	0.01	0.00	0.01	0.01
Nearshore Species	0.31	0.48	0.20	0.30	0.24	0.02	0.07
Shelf Species	0.11	0.15	0.03	0.03	0.04	0.00	0.01
Slope Species	0.02	-	0.04	0.00	0.00	0.00	0.00
Open Access <5% Revenue from Groundfish							
Sablefish	-	0	-	-	0.00	0.00	0.00
Nearshore Species	-	0.00	0.00	0.00	0.00	0.00	0.00
Shelf Species	-	0.05	0.01	0.00	0.00	0.00	0.00
Slope Species	-	-	0.00	-	0.00	0.00	0.00
Nongroundfish Fisheries							
Halibut	1.00	0.41	0.21	1.00	0.00	0.00	0.00
Shrimps and Prawns	-	0.57	0.00	0.11	0.06	0.09	0.08
Crabs	0.82	0.57	0.66	0.59	0.63	0.38	0.44
Salmon	0.64	0.41	0.18	0.13	0.03	0.01	0.02
HMS	0.82	0.87	0.25	0.04	1.00	0.09	0.10
CPS	-	1.00	-	-	0.00	0.00	0.00
Other	0.05	0.00	0.15	0.01	0.06	0.05	0.05
			Monterey INPFC Area				
Limited Entry Trawl							
Whiting	-	-	-	0.00	-	-	0.00
Sablefish	-	0.05	0.02	0.02	0.01	0.08	0.06
Nearshore Species	0.00	0.10	0.07	0.19	0.06	0.01	0.04
Shelf Species	0.20	0.24	0.14	0.10	0.06	0.11	0.10
Slope Species	0.14	0.05	0.11	0.09	0.03	0.18	0.13
Limited Entry Fixed Gear							
Sablefish	0.97	-	0.01	0.10	0.05	0.08	0.07
Nearshore Species	0.64	0.54	0.12	0.07	0.01	-	0.04
Shelf Species	0.21	0.12	0.05	0.03	0.00	0.00	0.00
Slope Species	0.11	0.03	0.06	0.01	0.06	0.01	0.02
Open Access >5% Revenue from Groundfish							
Sablefish	0.12	0.12	0.03	0.07	0.01	0.06	0.05
Nearshore Species	0.33	0.42	0.25	0.20	0.14	0.01	0.08
Shelf Species	0.34	0.11	0.08	0.03	0.02	0.01	0.02
Slope Species	0.19	0.00	0.01	0.00	0.00	0.00	0.00
Open Access <5% Revenue from Groundfish							
Sablefish	0.02	0.01	-	0.02	0.00	0.00	0.00
Nearshore Species	0.01	0.01	0.00	0.01	0.00	0.00	0.00
Shelf Species	0.01	0.01	0.00	0.00	0.00	0.00	0.00
Slope Species	0.04	0.00	0.00	0.00	0.00	0.00	0.00
Nongroundfish Fisheries							
Halibut	0.19	0.32	0.18	0.09	0.07	0.01	0.04
Shrimps and Prawns	0.75	-	0.28	0.58	0.05	0.04	0.08
Crabs	0.77	0.66	0.59	0.38	0.48	0.23	0.37
Salmon	0.70	0.49	0.42	0.25	0.28	0.11	0.18
HMS	0.46	0.41	0.21	0.07	0.02	0.10	0.09
CPS	0.75	0.00	0.02	0.00	0.07	0.33	0.26
Other	0.41	0.10	0.15	0.28	0.34	0.21	0.25

TABLE 3.3-8. For buyers of the indicated size (based on purchases) buying the indicated species from the indicated fleet, the percent of those buyers total revenue from the indicated INPFC area, during November 2000 through October 2001.

Gear and Species	<$5,000	$5,000-$20,000	$20,000-$100,000	$100,000-$300,000	$300,000-$1,000,000	$>1,000,000	Total
	Level of Puchases in Exvessel Value (All Fish Product Landed on West Coast Fishtickets)						
			Conception INPFC Area				
Limited Entry Trawl							
Whiting	-	-	-	-	-	0.00	0.00
Sablefish	-	-	0.00	0.00	0.00	0.02	0.02
Nearshore Species	-	-	0.00	0.02	-	0.00	0.00
Shelf Species	-	0.00	0.06	0.28	0.01	0.03	0.05
Slope Species	-	-	0.03	0.03	0.00	0.06	0.05
Limited Entry Fixed Gear							
Sablefish	0.03	0.00	0.13	0.13	0.00	0.04	0.04
Nearshore Species	0.21	0.19	0.06	0.01	0.00	0.00	0.01
Shelf Species	0.35	0.01	0.06	0.03	0.00	0.00	0.01
Slope Species	1.00	0.01	0.15	0.19	0.03	0.06	0.07
Open Access >5% Revenue from Groundfish							
Sablefish	-	-	0.09	0.05	-	0.00	0.02
Nearshore Species	0.24	0.27	0.07	0.13	0.19	0.05	0.08
Shelf Species	0.29	0.12	0.01	0.01	0.02	0.00	0.01
Slope Species	0.09	0.01	0.03	0.01	0.00	0.00	0.00
Open Access <5% Revenue from Groundfish							
Sablefish	0.06	0	0.00	0.00	0.00	-	0.00
Nearshore Species	0.03	0.02	0.01	0.00	0.00	0.00	0.00
Shelf Species	0.08	0.03	0.01	0.00	0.00	0.00	0.00
Slope Species	0.04	0.01	0.00	0.00	0.00	0.00	0.00
Nongroundfish Fisheries							
Halibut	0.24	0.11	0.06	0.12	0.00	0.00	0.04
Shrimps and Prawns	0.63	0.53	0.39	0.24	0.25	0.24	0.25
Crabs	0.85	0.62	0.47	0.31	0.37	0.11	0.28
HMS	0.62	0.56	0.35	0.16	0.50	0.31	0.32
CPS	0.06	0.33	0.14	0.27	0.36	0.67	0.60
Other	0.34	0.22	0.25	0.34	0.40	0.13	0.20
			All Ocean Areas (Council Managed 0-200 Miles)				
Limited Entry Trawl							
Whiting	-	-	-	0.36	0.90	0.12	0.17
Sablefish	-	0.05	0.11	0.02	0.04	0.09	0.08
Nearshore Species	0.00	0.06	0.04	0.11	0.05	0.00	0.01
Shelf Species	0.75	0.10	0.24	0.13	0.07	0.08	0.08
Slope Species	0.14	0.06	0.08	0.07	0.04	0.10	0.10
Limited Entry Fixed Gear							
Sablefish	0.53	0.01	0.07	0.13	0.02	0.06	0.06
Nearshore Species	0.33	0.16	0.11	0.05	0.02	0.00	0.01
Shelf Species	0.21	0.03	0.05	0.02	0.00	0.00	0.00
Slope Species	0.15	0.02	0.11	0.09	0.03	0.00	0.01
Open Access >5% Revenue from Groundfish							
Sablefish	0.11	0.12	0.05	0.04	0.00	0.01	0.01
Nearshore Species	0.30	0.36	0.14	0.15	0.15	0.01	0.04
Shelf Species	0.29	0.10	0.04	0.01	0.01	0.00	0.00
Slope Species	0.18	0.01	0.02	0.00	0.00	0.00	0.00
Open Access <5% Revenue from Groundfish							
Sablefish	0.04	0.01	0.00	0.01	0.00	0.00	0.00
Nearshore Species	0.02	0.01	0.01	0.00	0.00	0.00	0.00
Shelf Species	0.04	0.02	0.01	0.00	0.00	0.00	0.00
Slope Species	0.04	0.01	0.00	0.00	0.00	0.00	0.00
Nongroundfish Fisheries							
Halibut	0.37	0.26	0.10	0.10	0.04	0.01	0.02
Shrimps and Prawns	0.64	0.54	0.34	0.31	0.11	0.11	0.12
Crabs	0.80	0.67	0.53	0.39	0.53	0.29	0.34
Salmon	0.69	0.42	0.30	0.22	0.15	0.05	0.07
HMS	0.61	0.63	0.31	0.18	0.19	0.19	0.19
CPS	0.26	0.30	0.16	0.26	0.24	0.23	0.23
Other	0.45	0.16	0.19	0.25	0.24	0.07	0.11

TABLE 3.3-9. Local income impacts associated with commercial fishery landings by major port area for 1998 ($1,000). (p. 1 of 2)

	WASHINGTON						OREGON				
Species Group	Puget Sound	NW Olympic Peninsula	Central WA Coast	South WA Coast	Unsp. Wa	WA TOTAL	Astoria-Tillamook	Newport	Coos Bay	Brookings	OR TOTAL
Whiting	0	0	6,573	724	0	7,297	7,923	12,560	1,244	0	21,727
Sablefish	2,642	3,712	1,151	222	1,174	8,901	4,824	4,054	3,606	1,311	13,795
Shortspine Thornyhead	90	34	40	9	0	172	388	286	318	117	1,108
Longspine Thornyhead	23	0	27	3	0	54	949	514	927	309	2,698
Slope Rockfish	97	47	33	11	8	196	405	115	101	26	647
Dover Sole	685	143	275	105	0	1,208	3,305	1,051	1,967	488	6,811
Rex Sole	19	13	7	7	0	46	228	69	227	47	571
Petrale Sole	796	113	144	36	0	1,089	1,120	874	892	103	2,990
Arrowtooth Flounder	1,245	61	88	18	0	1,411	673	175	122	4	973
Other Slope Groundfish	0	0	0	0	0	0	9	15	66	14	104
Widow Rockfish	251	76	144	83	0	554	949	798	351	244	2,342
Chilipepper Rockfish	0	0	0	0	0	0	0	0	1	0	1
Yellowtail Rockfish	603	487	225	84	0	1,399	1,595	493	108	60	2,255
Shelf Rockfish	106	53	12	3	5	179	85	56	46	85	272
English Sole, Flathead Sole	140	62	21	12	0	235	253	90	213	36	592
Sandabs	1	2	1	0	0	4	49	5	84	4	142
Other ShelfGroundfish	1,043	216	17	4	0	1,280	137	57	43	110	347
Nearshore Rockfish	0	1	0	0	0	1	60	19	18	645	742
Other Flatfish	29	9	1	1	0	40	90	6	52	4	152
Other Groundfish	0	0	0	0	0	0	45	1	21	294	361
Groundfish Total	7,771	5,028	8,759	1,322	1,187	24,066	23,085	21,238	10,407	3,899	58,629
Pink Shrimp Trawl	0	0	2,500	1,377	0	3,877	7,024	4,126	5,219	554	16,924
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	104	974	25	72	276	1,452	181	450	119	27	778
CA Halibut (except Gillnet)	0	0	0	0	0	0	0	0	0	0	0
Salmon	164	1,355	402	99	34	2,054	1,133	4,745	336	2	6,215
Sea Cucumber	0	0	0	0	0	0	0	0	0	0	0
CA Sheephead	0	0	0	0	0	0	0	0	0	0	0
Gillnet Complex	0	0	0	0	0	0	0	0	0	0	0
Squid	0	0	0	0	0	0	0	0	0	0	0
Other CPS	0	0	60	0	0	60	0	0	0	0	0
HMS	1,225	52	3,267	10,353	4	14,900	3,578	7,110	3,483	241	14,412
Dungeness Crab	3,873	929	14,868	6,962	2,082	28,714	9,823	6,069	4,238	3,161	23,290
Other Crustaceans	236	0	775	60	0	1,070	69	98	111	78	356
Other Species	0	0	18	124	0	142	136	638	68	631	1,472

Total	13,372	8,338	30,673	20,369	3,583	76,334	45,029	44,473	23,981	8,594	122,077

TABLE3.3-9. Local income impacts associated with commercial fishery landings by major port area for 1998 ($1,000). (p. 2 of 2)

	CALIFORNIA												
Species Group	Crescent City	Eureka	Fort Bragg	San Francisco	Monterey	San Luis Obispo	Santa Barbara	Los Angeles	San Diego	Unsp. CA	CA TOTAL	At Sea Sector	W - O - C TOTAL
Whiting	1,225	181	0	0	0	0	0	0	0	0	1,407	38,708	69,139
Sablefish	1,436	2,247	2,502	1,105	1,823	170	154	418	309	0	10,163	60	32,919
Shortspine Thornyhead	209	427	359	150	385	102	189	236	158	0	2,215	0	3,495
Longspine Thornyhead	731	963	695	150	664	139	418	188	52	0	4,001	0	6,753
Slope Rockfish	24	32	245	147	123	80	77	56	5	0	788	10	1,641
Dover Sole	711	1,563	1,420	548	948	258	a/	0	0	0	5,448	2	13,469
Rex Sole	132	182	136	56	37	27	a/	0	0	0	571	23	1,211
Petrale Sole	162	990	132	714	219	194	a/	1	0	0	2,432	0	6,510
Arrowtooth Flounder	7	4	0	0	0	0	a/	0	0	0	11	2	2,397
Other Slope Groundfish	14	58	39	6	105	2	0	0	0	0	224	0	328
Widow Rockfish	91	278	96	59	22	5	0	4	0	0	555	77	3,528
Chilipepper Rockfish	3	6	194	438	151	10	0	4	1	0	807	1	810
Yellowtail Rockfish	34	32	1	10	1	0	0	0	0	0	79	216	3,948
Shelf Rockfish	64	75	47	180	98	107	63	48	12	0	693	27	1,170
English Sole, Flathead Sole	136	257	72	220	67	42	a/	0	0	0	799	0	1,626
Sandabs	69	182	2	1,420	55	6	a/	83	0	0	1,821	0	1,967
Other ShelfGroundfish	84	45	37	87	25	53	49	49	44	0	473	0	2,101
Nearshore Rockfish	581	274	142	433	419	746	323	81	38	1	3,040	0	3,783
Other Flatfish	89	58	0	244	29	11	24	28	0	0	484	0	676
Other Groundfish	69	25	157	52	181	538	218	23	22	0	1,287	0	1,647
Groundfish Total	5,872	7,881	6,276	6,020	5,350	2,491	1,546	1,219	641	2	37,299	39,126	159,120
Pink Shrimp Trawl	0	0	0	0	0	0	0	0	0	0	0	0	20,801
Spot Prawn Trawl	0	19	125	895	152	1,107	695	29	0	0	3,022	0	3,022
Spot Prawn Pot	0	0	47	3	625	54	1,092	1,098	779	0	3,698	0	3,698
Ridgeback Prawn Trawl	0	0	0	0	0	0	1,896	368	0	0	2,263	0	2,263
Pacific Halibut	0	0	3	0	0	0	0	0	0	0	3	0	2,232
CA Halibut (except Gillnet)	3	8	0	1,543	189	221	803	297	14	1	3,078	0	3,078
Salmon	64	344	1,433	8,438	0	1,672	0	0	0	0	11,951	0	20,220
Sea Cucumber	0	0	0	2	0	4	1,198	525	4	4	1,737	0	1,737
CA Sheephead	0	0	0	0	1	6	275	212	222	0	716	0	716
Gillnet Complex	0	0	0	0	4	127	1,233	1,103	371	0	2,839	0	2,839
Squid	0	0	0	12	8,666	59	68,705	55,058	50	0	132,550	0	132,550
Other CPS	0	0	0	18	16,191	0	7,342	45,657	9	0	69,216	0	69,276
HMS	890	1,720	285	1,298	2,679	4,023	966	27,884	5,165	0	44,910	0	74,222
Dungeness Crab	8,217	3,900	1,193	9,149	139	58	0	0	0	0	22,656	0	74,660
Other Crustaceans	3,296	31	6	1,924	10	357	5,379	3,771	4,258	391	19,423	0	20,849
Other Species	14	10	6,296	944	0	16	6,905	11,096	1,784	10	27,076	0	28,690
Total	18,355	13,913	15,663	30,246	34,005	10,195	98,033	148,318	13,298	407	382,434	39,126	619,971

a/ Values omitted to preserve confidentiality. Totals include the value.

TABLE 3.3-10. Estimated ex-vessel revenue and income* from commercial fishing by major port area in 2001 base period and 2003. (p. 1 of 2)

	WASHINGTON					OREGON				
2001 Revenue Estimate ($,000)	Puget Sound	NW Olympic Peninsula	Central WA Coast	South WA Coast	WA TOTAL	Astoria-Tillamook	Newport	Coos Bay	Brookings	OR TOTAL
Total West Coast (All Ocean Fisheries, 0-200 miles)	7,402	5,282	16,662	12,784	44,621	24,531	21,294	12,629	5,800	64,255
Groundfish (including at-sea, excluding tribes)	4,116	3,200	2,432	583	10,338	9,921	7,659	5,076	2,448	25,104
Limited Entry Trawl Groundfish	2,980	803	1,841	468	6,093	8,765	6,234	4,081	1,162	20,242
All Other Groundfish Gear	1,136	2,397	591	115	4,245	1,156	1,425	995	1,286	4,861
2003 Revenue Estimate ($,000)										
Total West Coast (All Ocean Fisheries, 0-200 miles)	6,044	4,817	15,928	12,595	41,812	22,341	19,492	12,123	5,420	59,376
Groundfish (including at-sea, excluding tribes)	2,758	2,734	1,698	394	7,589	7,730	5,857	4,570	2,068	20,225
Limited Entry Trawl Groundfish	1,892	613	1,211	305	4,022	6,793	4,687	3,759	1,135	16,375
All Other Groundfish Gear	865	2,121	487	89	3,568	937	1,170	810	933	3,850
% Change in Revenue: 2003-2001										
Total West Coast (All Ocean Fisheries, 0-200 miles)	-18%	-9%	-4%	-1%	-6%	-9%	-8%	-4%	-7%	-8%
Groundfish (including at-sea, excluding tribes)	-33%	-15%	-30%	-32%	-27%	-22%	-24%	-10%	-16%	-19%
Limited Entry Trawl Groundfish	-36%	-24%	-34%	-35%	-34%	-22%	-25%	-8%	-2%	-19%
All Other Groundfish Gear	-24%	-12%	-18%	-22%	-16%	-19%	-18%	-19%	-27%	-21%
2001 Income Estimate ($,000)										
Total West Coast (All Ocean Fisheries, 0-200 miles)	14,344	8,262	29,858	21,053	77,099	46,402	45,709	23,476	8,792	124,378
Groundfish (including at-sea, excluding tribes)	8,694	4,865	7,442	1,557	22,569	24,122	22,122	9,266	3,754	59,264
Limited Entry Trawl Groundfish	6,558	1,318	6,558	1,377	15,811	22,338	19,991	7,718	1,985	52,032
All Other Groundfish Gear	2,136	3,547	885	180	6,758	1,784	2,132	1,548	1,769	7,233
2003 Income Estimate ($,000)										
Total West Coast (All Ocean Fisheries, 0-200 miles)	11,228	7,540	27,361	20,562	70,183	40,762	39,415	22,237	8,276	110,689
Groundfish (including at-sea, excluding tribes)	5,578	4,142	4,946	1,066	15,741	18,482	15,828	8,027	3,238	45,575
Limited Entry Trawl Groundfish	4,025	1,002	4,217	928	10,172	17,033	14,077	6,764	1,947	39,822
All Other Groundfish Gear	1,553	3,140	729	139	5,569	1,449	1,751	1,263	1,291	5,753
% Change in Income: 2003-2001										
Total West Coast (All Ocean Fisheries, 0-200 miles)	-22%	-9%	-8%	-2%	-9%	-12%	-14%	-5%	-6%	-11%
Groundfish (including at-sea, excluding tribes)	-36%	-15%	-34%	-31%	-30%	-23%	-28%	-13%	-14%	-23%
Limited Entry Trawl Groundfish	-39%	-24%	-36%	-33%	-36%	-24%	-30%	-12%	-2%	-23%
All Other Groundfish Gear	-27%	-11%	-18%	-23%	-18%	-19%	-18%	-18%	-27%	-20%

* Includes total income impacts (wages and salaries paid to primary producers, processors and suppliers, and the additional income generated when wages and salaries are spent).

Note: Includes impacts of all commercial ocean fisheries based on PFMC FEAM (9/02).

TABLE 3.3-10. Estimated ex-vessel revenue and income* from commercial fishing by major port area in 2001 base period and 2003. (p. 2 of 2)

	CALIFORNIA											
2001 Revenue Estimate ($,000)	Crescent City	Eureka	Fort Bragg	San Fran-cisco	Monterey	San Luis Obispo	Santa Barbara	Los Angeles	San Diego	CA TOTAL	At Sea Sector	Grand Total
Total West Coast (All Ocean Fisheries, 0-200 miles)	9,204	7,302	8,372	17,436	7,736	5,598	22,421	35,733	5,917	119,872	7,850	236,598
Groundfish (including at-sea, excluding tribes)	2,518	3,714	3,147	2,641	2,720	1,832	927	570	303	18,373	7,839	61,653
Limited Entry Trawl Groundfish	1,627	3,039	2,111	1,712	1,167	518	4	0	2	10,181	7,839	44,355
All Other Groundfish Gear	892	674	1,035	929	1,553	1,314	922	569	301	8,191	0	17,298
2003 Revenue Estimate ($,000)												
Total West Coast (All Ocean Fisheries, 0-200 miles)	8,625	7,012	7,877	16,469	7,285	5,099	22,276	35,902	6,090	116,788	5,806	223,782
Groundfish (including at-sea, excluding tribes)	1,940	3,423	2,651	1,674	2,269	1,334	782	739	476	15,289	5,798	48,901
Limited Entry Trawl Groundfish	1,583	3,039	1,861	1,231	1,172	537	4	1	2	9,430	5,798	35,624
All Other Groundfish Gear	357	384	790	443	1,097	797	778	738	474	5,858	0	13,277
% Change in Revenue: 2003-2001												
Total West Coast (All Ocean Fisheries, 0-200 miles)	-6%	-4%	-6%	-6%	-6%	-9%	-1%	0%	3%	-3%	-26%	-5%
Groundfish (including at-sea, excluding tribes)	-23%	-8%	-16%	-37%	-17%	-27%	-16%	30%	57%	-17%	-26%	-21%
Limited Entry Trawl Groundfish	-3%	0%	-12%	-28%	0%	3%	-8%	146%	0%	-7%	-26%	-20%
All Other Groundfish Gear	-60%	-43%	-24%	-52%	-29%	-39%	-16%	30%	57%	-28%		-23%
2001 Income Estimate ($,000)												
Total West Coast (All Ocean Fisheries, 0-200 miles)	19,111	14,729	15,740	39,330	34,174	10,348	98,377	149,075	13,431	394,726	39,126	635,329
Groundfish (including at-sea, excluding tribes)	6,246	7,501	6,183	5,744	5,091	2,482	1,396	1,148	625	36,418	39,126	157,377
Limited Entry Trawl Groundfish	5,019	6,437	4,503	4,176	2,579	1,095	9	1	4	23,821	39,126	130,790
All Other Groundfish Gear	1,227	1,064	1,680	1,569	2,512	1,388	1,387	1,147	621	12,597	0	26,587
2003 Income Estimate ($,000)												
Total West Coast (All Ocean Fisheries, 0-200 miles)	17,598	14,393	15,030	37,694	33,663	9,868	98,290	149,507	13,821	390,274	28,939	600,085
Groundfish (including at-sea, excluding tribes)	4,733	7,166	5,473	4,109	4,579	2,002	1,309	1,581	1,015	31,967	28,939	122,222
Limited Entry Trawl Groundfish	4,162	6,485	4,156	3,261	2,690	1,178	9	3	4	21,948	28,939	100,881
All Other Groundfish Gear	571	681	1,316	848	1,890	824	1,300	1,579	1,010	10,019	0	21,341
% Change in Income: 2003-2001												
Total West Coast (All Ocean Fisheries, 0-200 miles)	-8%	-2%	-5%	-4%	-1%	-5%	0%	0%	3%	-1%	-26%	-6%
Groundfish (including at-sea, excluding tribes)	-24%	-4%	-11%	-28%	-10%	-19%	-6%	38%	62%	-12%	-26%	-22%
Limited Entry Trawl Groundfish	-17%	1%	-8%	-22%	4%	8%	4%	146%	0%	-8%	-26%	-23%
All Other Groundfish Gear	-53%	-36%	-22%	-46%	-25%	-41%	-6%	38%	63%	-20%		-20%

* Includes total income impacts (wages and salaries paid to primary producers, processors and suppliers, and the additional income generated when wages and salaries are spent).

Note: Includes impacts of all commercial ocean fisheries based on PFMC FEAM (9/02).

TABLE 4-1. Ranked relative effects of alternative darkblotched rockfish rebuilding strategies of potential negative habitat impacts, the probability of rebuilding by T_{MAX}, and short term economic costs (1 is highest rank, 4 is lowest rank).

Alternative	Potential Adverse Habitat Effects	Probability of Rebuilding by T_{MAX}	Short Term Economic Costs
No Action	1	4	4
Maximum Conservation	4	1	1
Maximum Harvest	2	3	3
Council Interim	3	2	2

TABLE 4.3-1. Estimated mortality (mt) of overfished West Coast groundfish species by fishery in 2003 under the *Council OY* alternative.

Fishery	Bocaccio [1]	Canary	Cowcod	Dark-blotched	Lingcod	POP	Whiting	Widow	Yelloweye
Limited Entry Groundfish									
Trawl- Non-whiting [2]	3.0	12.3	UR	86.7	63.1	96.5	1,800	11.8	1.5
Trawl- at-sea whiting	NA	3.0	NA	5.0	0.3	9.0	70,300	182.0	0.0
Trawl- shoreside whiting	NA	0.4	NA	1.5	0.2	0.2	50,900	30.0	TR
Fixed Gear	0.1	0.5	0.1	TR	20.0	TR	TR	TR	1.0
Recreational Groundfish									
WA	NA	1.5	NA	NA	35.0	NA	UR	TR	3.5
OR	NA	10.0	NA	NA	105.0	NA	UR	4.0	3.7
CA (N)	NA	0.5	NA	NA	195.0	NA	UR	1.0	0.1
CA (S)	5.0	3.0	UR	NA	20.0	NA	UR	0.0	0.4
Tribal									
Midwater Trawl	NA	1.1	NA	0.0	0.9	0.0	25,000	45.0	0.0
Bottom Trawl	NA		NA	0.0		0.0	UR		
Troll	NA	0.5	NA	0.0	0.9	0.0	UR	UR	0.1
Fixed gear	NA	0.7	NA	0.0	3.4	0.0	UR	0.0	3.0
Open Access									
Groundfish directed	0.2	0.3	0.02	TR	50.0	TR	UR	TR	0.5
CA Halibut	0.5	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1
CA Gillnet [3]	0.5	UR	UR	UR	UR	UR	UR	UR	UR
CA Sheepshead [3]	TR	UR	UR	UR	UR	UR	UR	UR	UR
CPS- wetfish [3]	0.5	UR	UR	UR	UR	UR	UR	UR	UR
CPS- squid [4/ 5]	TR	UR	UR	UR	UR	UR	UR	UR	UR
Dungeness crab [3]	TR	NA	TR	0.0	UR	NA	NA	NA	TR
HMS [3]	TR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pacific Halibut [3]	0.0	0.02	NA	0.0	UR	0.0	0.0	0.0	0.5

TABLE 4.3-1. Estimated mortality (mt) of overfished West Coast groundfish species by fishery in 2003 under the *Council OY* alternative.

Fishery	Bocaccio [1/]	Canary	Cowcod	Dark-blotched	Lingcod	POP	Whiting	Widow	Yelloweye
Pink shrimp	0.03	0.5	UR	0.02	0.5	0.0	1.0	0.1	0.1
Ridgeback prawn	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Salmon troll	0.2	1.6	UR	UR	0.3	UR	UR	0.0	0.2
Sea Cucumber	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spot Prawn (trawl)	Prohibited in 2003 or prohibited within the California Rockfish Conservation Area								
Spot Prawn (trap)	UR	UR	UR	UR	UR	UR	UR	UR	UR
Research: Based on two most recent NMFS trawl shelf and slope surveys with expanded estimates for south of Pt. Conception									
	0.2	1.0	UR	1.6	3.0	3.0	200.0	1.5	0.6
EFPs [6/]									
CA: NS FF trawl	1.6	1.5	1.5	NA	NA	NA	NA	NA	1.5
OR: selective FF trawl	NA	4.0	NA	3.1	13.0	TR	UR	1.0	1.7
WA: AT trawl	NA	0.3	NA	1.0	2.0	1.0	UR	NA	0.0
WA: MW YT trawl	NA	1.0	NA	0.0	0.0	0.0	UR	12.0	0.0
WA: dogfish LL	NA	1.0	NA	0.0	0.2	0.0	0.0	0.0	1.0
WA: pollock	NA	0.0	NA	0.0	0.0	0.0	50.0	1.0	0.0
TOTAL	**11.9**	**44 [6/]**	**1.7**	**98.9**	**512.8**	**109.7**	**148,251**	**289.4**	**19.5**

NA- Not applicable; TR- Trace amount (<0.01 mt); UR- Not reported in available data sources.
1/ South of 40°10' N. lat.
2/ Based on the refined trawl bycatch model (Hastie 2001), except yelloweye bycatch which was extrapolated on the expected change in landings.
3/ Mortality estimates are not hard numbers, based on their GMT's best professional judgement.
4/ 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.
5/ Expected landed catch only. Discard/total mortality estimates not available.
6/ The Council capped the 2003 canary rockfish set-aside for all the EFPs in combination at 6.5 mt to derive an expected total catch of 44 mt of canary rockfish in 2003.

TABLE 4.3-2. **Projected total catch optimum yields (mt) for darkblotched rockfish under different rebuilding probabilities and the default "40-10" policy. Actual catches shown for 1998-2001. (Note: Harvest levels assumed to revert to the estimated long-term level (360 mt) at the median rebuilding year under each scenario.)**

Year	"40-10"	*Max. Harvest* 50%	60%*	70%*	*Council Interim* 80%	*Max. Conservation* 100%	Year	"40-10"	*Max. Harvest* 50%	60%*	70%*	*Council Interim* 80%	*Max. Conservation* 100%
1998	*875*	*875*	*875*	*875*	*875*	*0*	2024	338	330	319	304	290	360
1999	*326*	*326*	*326*	*326*	*326*	*0*	2025	339	332	321	306	292	360
2000	*236*	*236*	*236*	*236*	*236*	*0*	2026	340	333	322	307	293	360
2001	*130*	*130*	*130*	*130*	*130*	*0*	2027	340	335	324	309	295	360
2002	20	190	181	169	158	0	2028	341	335	324	310	296	360
2003	42	208	198	184	172	0	2029	342	337	326	311	297	360
2004	62	223	213	198	186	0	2030	344	338	327	312	360	360
2005	86	236	225	210	198	0	2031	344	339	329	314	360	360
2006	111	246	235	220	207	0	2032	*360*	340	330	315	360	360
2007	136	256	244	229	216	0	2033	360	341	330	316	360	360
2008	161	263	252	237	223	0	2034	360	342	331	360	360	360
2009	184	271	260	245	231	0	2035	360	343	332	360	360	360
2010	206	279	267	252	238	0	2036	360	343	332	360	360	360
2011	225	284	272	257	243	0	2037	360	343	333	360	360	360
2012	243	290	279	263	249	0	2038	360	344	333	360	360	360
2013	259	295	284	268	254	0	2039	360	345	334	360	360	360
2014	273	300	289	273	259	360	2040	360	344	360	360	360	360
2015	284	304	293	277	263	360	2041	360	345	360	360	360	360
2016	295	307	296	281	266	360	2042	360	345	360	360	360	360
2017	302	311	299	284	270	360	2043	360	345	360	360	360	360
2018	308	314	303	287	273	360	2044	360	343	360	360	360	360
2019	315	317	306	291	277	360	2045	360	345	360	360	360	360
2020	321	321	309	294	280	360	2046	360	345	360	360	360	360
2021	325	324	313	298	284	360	2047	360	360	360	360	360	360
2022	329	327	316	301	286	360	2028	360	360	360	360	360	360
2023	334	329	318	303	289	360	2049	360	360	360	360	360	360
							2002-2007	458	1,359	1,295	1,211	1,136	0
							2002-2014	2,009	3,342	3,198	3,006	2,834	360
							2002-2024	5,161	6,526	6,270	5,925	5,611	3,960
							2002-2034	8,632	9,899	9,536	9,086	8,885	7,560
							2002-2049	14,032	15,106	14,800	14,486	14,285	12,960

* While not treated as structured alternatives, these intermediate harvest levels are provided for comparison purposes.

TABLE 4.3-3. Present values of projected darkblotched rockfish OYs under different rebuilding probabilities and the default "40-10" policy assuming a 5% annual discount rate and a constant 50¢ per lb average exvessel price for rockfish. ($,000) (Note: Harvest levels assumed to revert to the estimated long-term level (360 mt) at the median rebuilding year under each scenario.)

Year	"40-10"	*Max. Har-vest* 50%	60%*	70%*	*Council Interim* 80%	*Max. Conser-vation* 100%	Year	"40-10"	*Max. Har-vest* 50%	60%*	70%*	*Council Interim* 80%	*Max. Conser-vation* 100%
1998							2024	124.1	121.0	117.1	111.5	106.4	132.0
1999							2025	118.1	115.8	112.0	106.7	101.8	125.5
2000							2026	112.9	110.5	106.9	101.9	97.3	119.4
2001							2027	107.3	105.6	102.2	97.5	93.1	113.6
2002	22.0	209.4	199.3	185.8	173.8	0.0	2028	102.5	100.6	97.3	93.0	88.9	108.1
2003	43.8	217.7	207.0	192.9	180.5	0.0	2029	97.7	96.3	93.1	88.9	84.9	102.8
2004	62.2	222.4	211.8	197.7	185.3	0.0	2030	93.3	91.7	88.8	84.8	97.8	97.8
2005	81.6	223.7	213.3	199.5	187.3	0.0	2031	88.9	87.7	84.9	81.2	93.0	93.0
2006	100.2	222.1	212.0	198.6	186.7	0.0	2032	*88.5*	83.6	81.1	77.5	88.5	88.5
2007	116.9	219.2	209.5	196.6	185.0	0.0	2033	84.2	79.7	77.3	73.8	84.2	84.2
2008	131.2	215.0	205.7	193.3	182.2	0.0	2034	80.0	76.0	73.7	80.0	80.0	80.0
2009	142.7	210.6	201.7	189.8	179.1	0.0	2035	76.1	72.5	70.2	76.1	76.1	76.1
2010	151.9	205.7	197.2	185.7	175.4	0.0	2036	72.4	69.0	66.9	72.4	72.4	72.4
2011	158.2	199.3	191.3	180.6	170.7	0.0	2037	68.9	65.6	63.6	68.9	68.9	68.9
2012	162.6	193.8	186.2	175.9	166.5	0.0	2038	65.5	62.5	60.7	65.5	65.5	65.5
2013	164.6	187.6	180.2	170.4	161.4	0.0	2039	62.3	59.7	57.9	62.3	62.3	62.3
2014	165.1	181.5	174.5	165.0	156.5	217.6	2040	59.3	56.7	59.3	59.3	59.3	59.3
2015	163.5	174.7	168.2	159.3	151.1	207.0	2041	56.4	54.0	56.4	56.4	56.4	56.4
2016	161.4	168.1	161.7	153.4	145.6	196.9	2042	53.7	51.4	53.7	53.7	53.7	53.7
2017	156.9	161.5	155.7	147.8	140.5	187.3	2043	51.0	48.9	51.0	51.0	51.0	51.0
2018	152.5	155.4	149.9	142.1	135.2	178.1	2044	48.6	46.3	48.6	48.6	48.6	48.6
2019	148.2	149.4	144.1	136.9	130.2	169.5	2045	46.2	44.2	46.2	46.2	46.2	46.2
2020	143.7	143.5	138.5	131.6	125.2	161.2	2046	43.9	42.1	43.9	43.9	43.9	43.9
2021	138.6	138.2	133.5	126.9	120.8	153.3	2047	41.8	41.8	41.8	41.8	41.8	41.8
2022	133.2	132.5	127.9	121.8	116.0	145.9	2028	39.8	39.8	39.8	39.8	39.8	39.8
2023	128.8	126.9	122.6	116.8	111.3	138.7	2049	37.8	37.8	37.8	37.8	37.8	37.8
							2002-2007	427	1,315	1,253	1,171	1,099	0
							2002-2014	1,503	2,708	2,590	2,432	2,291	218
							2002-2024	2,954	4,179	4,009	3,780	3,573	1,887
							2002-2034	3,927	5,127	4,926	4,665	4,482	2,900
							2002-2049	4,751	5,919	5,724	5,489	5,306	3,724

* While not treated as structured alternatives, these intermediate harvest levels are provided for comparison purposes.

TABLE 4-XX. Projected gross revenue (thousands of dollars) on the west coast associated with potential future yields of darkblotched rockfish under rebuilding alternatives.

[Hastie/Harms to provide after resolution of Table 4-3 yield estimates]

FIGURES

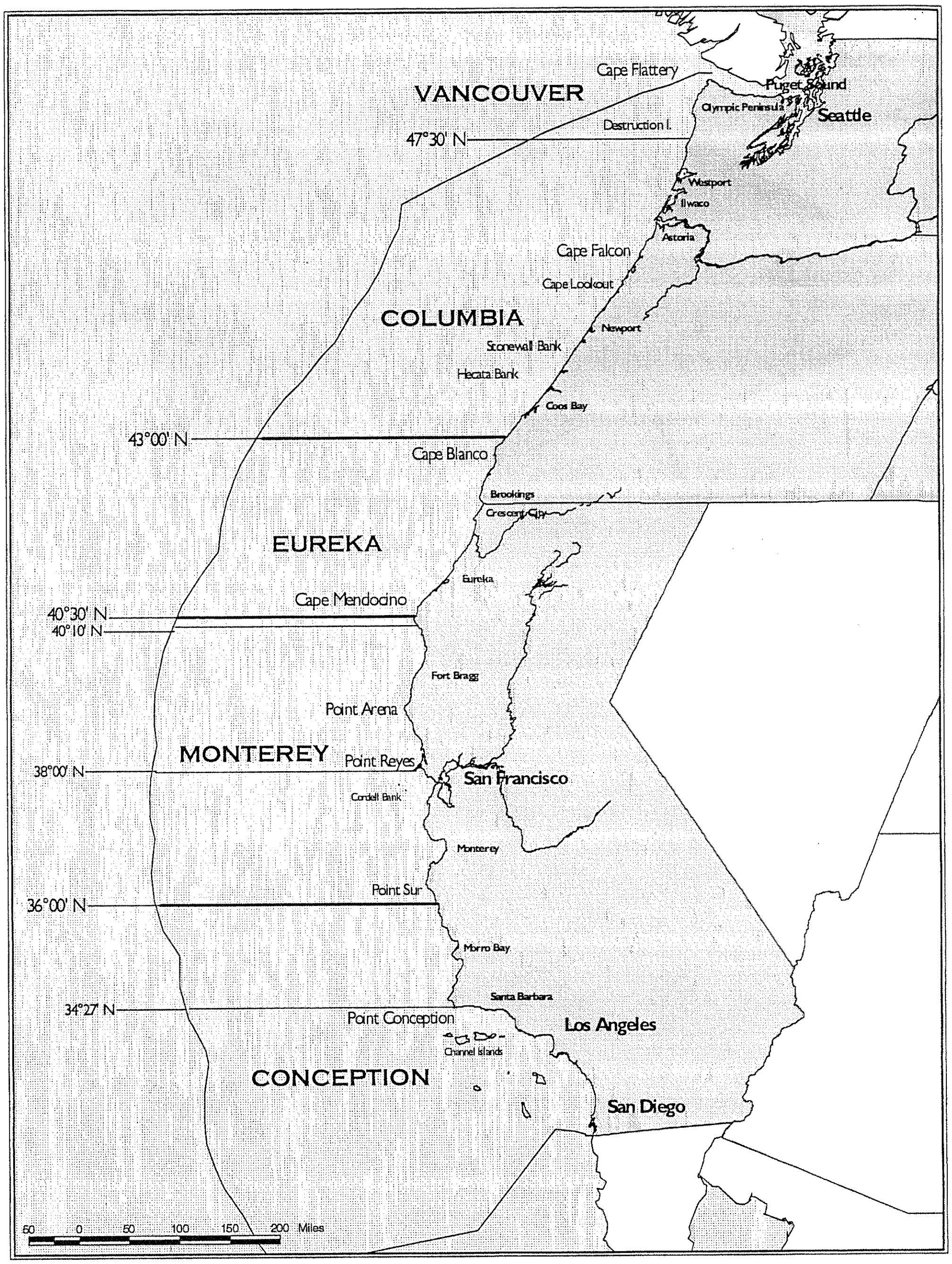

FIGURE 1-1. The Pacific Fishery Management Council management area (EEZ of the west coast of the United States) and INPFC management areas.

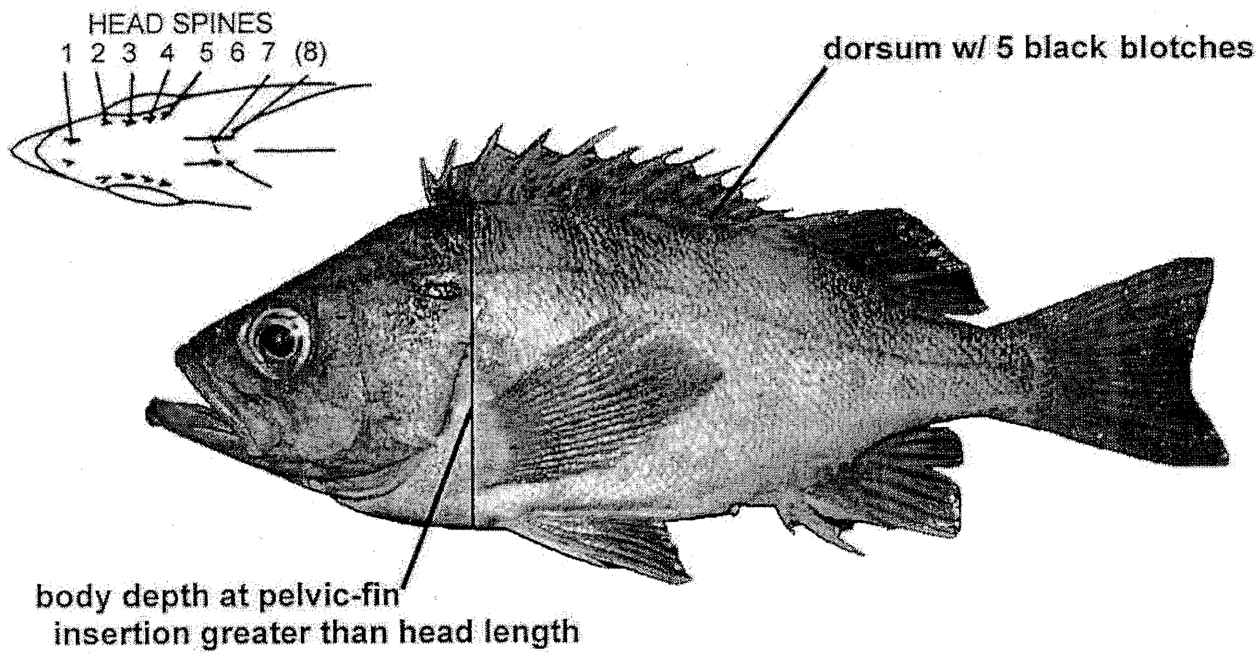

FIGURE 3-1. Darkblotched rockfish (*Sebastes crameri*).

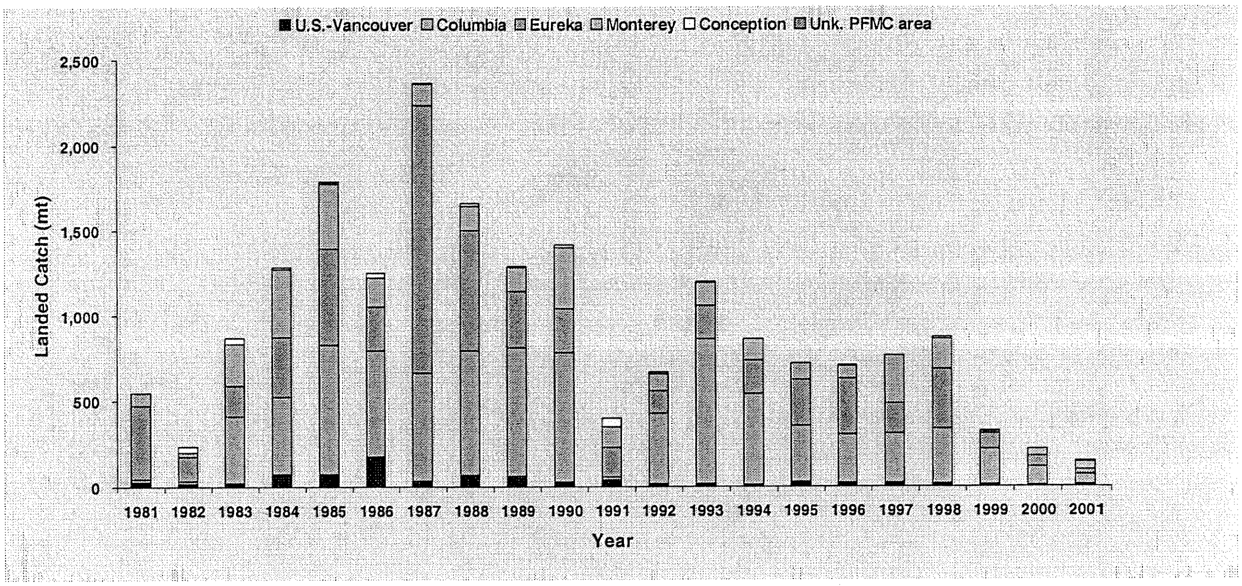

FIGURE 3-2. Landed catch (mt) of darkblotched rockfish by INPFC area on the U.S. west coast, 1981-2001. Data from PacFIN ("darkblotched rockfish" and "nominal darkblotched rockfish" categories).

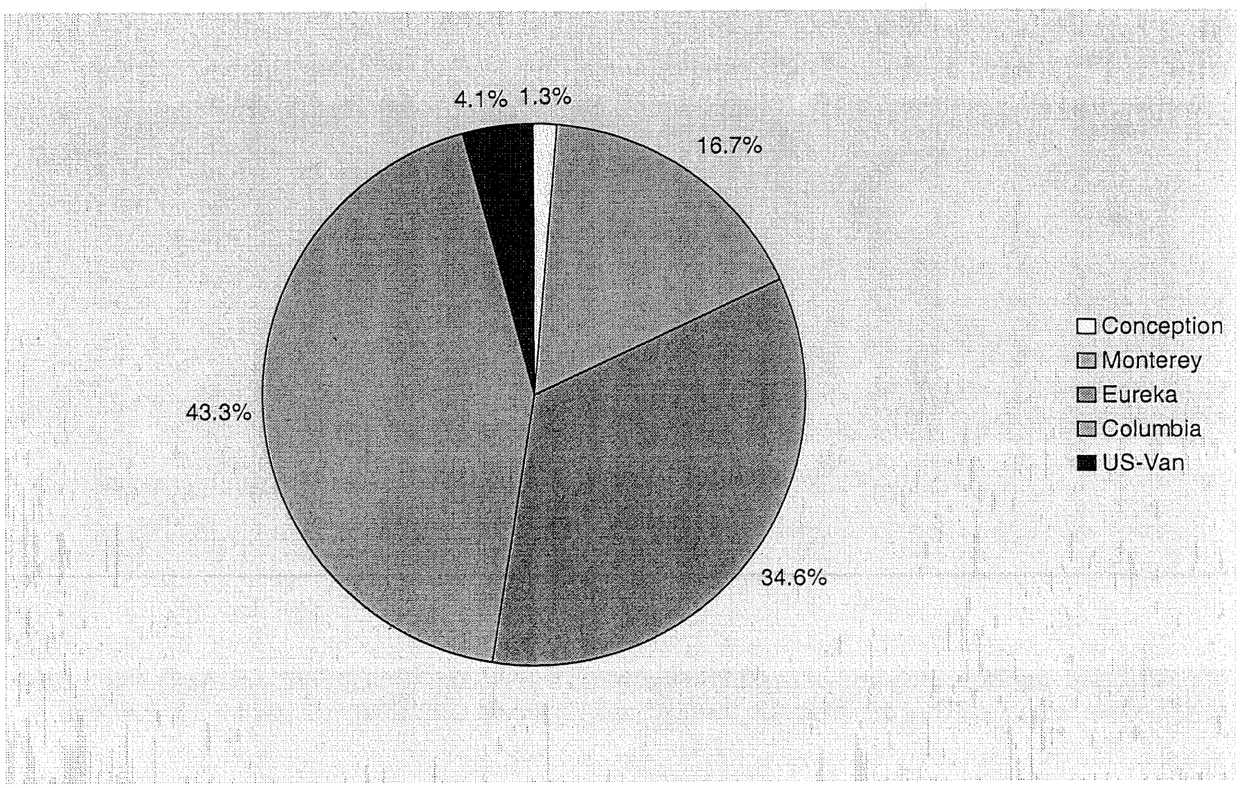

FIGURE 3-3. Average annual percent of landed darkblotched rockfish by INPFC area, 1981-2001.

Exhibit E.5
Attachment 4
April 2003

DRAFT PACIFIC OCEAN PERCH REBUILDING PLAN

PART III TO AMENDMENT 16-2
OF THE PACIFIC COAST GROUNDFISH FISHERY MANAGEMENT PLAN

INCLUDING DRAFT ENVIRONMENTAL IMPACT STATEMENT AND REGULATORY ANALYSES

PREPARED BY THE PACIFIC FISHERY MANAGEMENT COUNCIL

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1.0 PURPOSE AND NEED FOR REBUILDING PACIFIC OCEAN PERCH

1.1 Purpose and Need

The Pacific ocean perch (*Sebastes alutus*, POP) stock in the northeast Pacific was the target of intense fishing pressure from 1965-1977, mostly by Soviet and Japanese trawlers. Large removals, followed by significant declines in catch and abundance led the Pacific Fishery Management Council (Council) to adopt a 20-year rebuilding plan for POP in 1981. Rebuilding under the original plan was largely influenced by a cohort analysis of 1966-76 catch and age composition data (Gunderson 1979), updated with 1977-1980 data (Gunderson 1981), and an evaluation of trip limits as a management tool (Tagart *et al.* 1980). Management under the original rebuilding strategy served to halt further declines in stock biomass. However, the stock has not recovered to an abundance that supports maximum sustainable yield (MSY).

Adoption of Amendments 11 and 12 of the Pacific Coast Groundfish Fishery Management Plan (FMP) incorporated the legal rebuilding mandates of the Sustainable Fishery Act and established an overfishing threshold of 25% of the estimated unfished spawning biomass for groundfish stocks. Ianelli and Zimmerman (1998) estimated the 1998 abundance of the POP stock in U.S. waters to be at 13% of its unfished biomass. Therefore, the National Marine Fisheries Service (NMFS) declared the stock overfished in March 1999.

Under the terms of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) and the FMP, the Council must prepare a rebuilding plan to increase POP stock abundance to a level that supports MSY (40% of its unfished biomass). The purpose of this draft rebuilding plan and Environmental Impact Statement (EIS) is to evaluate alternative strategies designed to rebuild POP within the allowable time frame (T_{MAX}) mandated by the MSA and FMP.

1.2 Rebuilding Plan Overview

The Draft Pacific Ocean Perch Rebuilding Plan (Part III, April 2003 draft) is organized to address the requirements of the MSA, National Environmental Policy Act, Executive Order 12866, and the Regulatory Flexibility Act. This document conforms to a National Environmental Policy Act (NEPA) structure and format with a purpose and need statement (section 1.1), a reasonable range of rebuilding alternatives presented in Chapter 2, a description of the affected environment (physical (habitat), biological (POP and other affected species), and socioeconomic (affected fisheries, fishing industry, and fishing communities)) in Chapter 3, and an analysis of rebuilding consequences expected for affected environments in Chapter 4. Subsequent chapters document references cited, how the rebuilding plan and alternatives conform to legal mandates, and individuals contributing to preparation of the rebuilding plan. Appendix B-1 is the rebuilding analysis prepared for this rebuilding plan (not included in this draft) and Appendix B-2, the FMP Amendment language for POP rebuilding. The modular design of the rebuilding plan framework (each species rebuilding plan is stratified in Parts) is to allow it to stand alone as a decision-making document for rebuilding POP on the slope within the Council's jurisdiction. This April 2003 draft adopts a ***bold italic font for items of particular emphasis (especially to the Council and other decision-makers)*** and *italic font for names of rebuilding alternatives and scientific species names.*

The overarching objective of this rebuilding plan is to increase Pacific ocean perch stock spawning biomass to a level that supports MSY within a target time set by the Council (T_{TARGET}). For POP, the Council-approved proxy for this level of abundance is 40% of its estimated unfished biomass ($B_{40\%}$). Estimation of unfished biomass (B_0) is especially critical since it forms the basis for declaring a stock's biological and legal status. There is uncertainty about the estimate of B_0 and this value can be expected to change with improved understanding of the stock and when new stock assessments are conducted.

Rebuilding parameters specified in a rebuilding plan must include at least T_{TARGET} and may be required to include other parameters listed in Table 1-1 depending on decisions made in Part A of this amendment package. The values adopted for these parameters are determined by the best available science, Council/NMFS policies, and legal mandates (including the MSA, National Standard Guidelines for interpreting the MSA, and legal precedent). The time to rebuild is constrained on the high end ($T_{MAX} = T_{MIN}$ + 1 mean generation; 1 mean generation = the mean time period for a spawning female to replace herself in the population) (Restrepo *et al.* 1998) and on the low end (T_{MIN} = time to rebuild in the absence of fishing; F=0) by biological limits imposed by our understanding of the stock's potential productivity (50 CFR §600.310 (e)(4)(ii)(B)). The mean generation time for POP is the mean age weighted by spawning output (Punt and Ianelli 2001). There is a legal mandate to rebuild within ten years if T_{MIN} is estimated to be less than or equal to ten years.

Scientific uncertainty exists for every aspect of rebuilding and thus influences success and failure of rebuilding. Uncertainty surrounds the estimation of parameters that define rebuilding targets and objectives, assessments of stock status and structure, projections of future recruitment and biomass, and evaluating how well management measures meet rebuilding objectives. All alternatives in this rebuilding plan (except *No Action*) assume the best available science. Ensuring the best available science is incorporated in Council decision-making is the role of the Council's Scientific and Statistical Committee (SSC) and therefore not analyzed specifically as a policy choice. However, recommendations for mitigating risk associated with scientific uncertainties are explored throughout this rebuilding plan.

This rebuilding plan generally analyzes alternative strategies and explores mitigating measures for achieving rebuilding targets and objectives. Specifically, this plan analyzes the tradeoffs (physical, biological, and socioeconomic) associated with alternative total fishing-related mortality limits (total catch OYs) and the management specifications (harvest controls and measures) to achieve these limits.

Area closures are considered in this rebuilding plan. Currently depth-based closures are in place to move the fishery off POP and darkblotched areas to reduce the total mortality of adult fish. Additionally, the Council and NMFS are developing a policy for habitat-based management that may result in modification to existing closures, or other management measures intended to protect habitat deemed important to groundfish production. At issue in the development of this policy is the integration of habitat-based management with the harvest control management strategies that have historically been the foundation for Council actions. Alternative policies are being analyzed in a Programmatic EIS (contact Mr. Jim Glock, NMFS, (503) 231-2178). The policies adopted through the Programmatic EIS will be implemented through subsequent decisions such as implementation of the EFH provisions of the Magnuson-Stevens Act or the annual management process and may be utilized to achieve the mortality goals for Pacific ocean perch established in the rebuilding plan. Implementation of the EFH provisions is underway through another EIS that tiers off the Programmatic EIS. Publication of the draft action-specific EFH EIS is anticipated for August 2003 (contact Mr. Steve Copps, NMFS, (206) 526-6187).

2.0 PACIFIC OCEAN PERCH REBUILDING PLAN ALTERNATIVES

Pacific ocean perch rebuilding alternatives within MSA, FMP, and other legal constraints are analyzed in this rebuilding plan. The most risk-averse alternative (*Maximum Conservation*), most risk-prone alternative (*Maximum Harvest*), and an alternative with intermediate risk (*Council Interim*) are compared with a *No Action* alternative. All rebuilding alternatives except *No Action* consider the best available science for determining risk-neutral bycatch and discard rates[1]. The best available science is anticipated to be direct observations of bycatch and discard in west coast groundfish fisheries. However, until these data are available to account for all sources of fishing-related mortality, the best available science is considered to be a bycatch/discard model developed by the Northwest Fisheries Science Center of the National Marine Fisheries Service (Hastie 2001). Assumed bycatch rates of POP in trawl fisheries targeting other species would be at the mid-point of the range estimated from log books and EDCP data (Hastie 2001) for all alternatives except *No Action*. Rebuilding parameter estimates and probabilities for all alternatives (Table 2-1) are derived in the most recent rebuilding analysis by Punt and Ianelli {Punt, 2001 #456; Appendix B-1}. The median year when POP spawning biomass is projected to reach B_{MSY} (T_{TARGET}) under each alternative is noted in Table 2-1. The choice of T_{TARGET} is constrained to fall between T_{MIN} and T_{MAX}. The probability of the stock attaining B_{MSY} in the maximum allowable time (T_{MAX}) is denoted as P_{MAX}. These estimated rebuilding parameters under each alternative are summarized in Table 2-1. Relative risk and probability of rebuilding alternatives meeting rebuilding objectives is sensitive to our current state of knowledge and the harvest control rule (i.e., harvest rate) adopted as a rebuilding target and strategy. The harvest control rule varies between rebuilding alternatives analyzed in this rebuilding plan, the best available science informing decisions and our current state of knowledge does not.

2.1 The *No Action* Alternative

Under the *No Action* alternative POP would be managed with specified trip limits and Council-adopted precautionary management measures. The harvest level would be based on the Council's default $F_{50\%}$ MSY proxy harvest rate and the precautionary "40-10" adjustment of the ABC to calculate a total catch OY. The total catch OY would be calculated using a fishing mortality rate of 0.0XXX. A 16% discard rate (of landed catch) would be assumed for controlling bycatch mortality. The probability of achieving B_{MSY} by T_{MAX} is X%. The median year of reaching B_{MSY} is projected to be 20XX.

The choice of the *No Action* alternative for POP was considered in terms of providing the most informative analysis of the consequences and tradeoffs of rebuilding the stock. Technically, a *No Action* alternative would be the action that would be taken in the absence of an approved rebuilding plan (or status quo). Under the strict context of that definition, *Council Interim Rebuilding* might be considered to represent status quo. For the purposes of this NEPA analysis *No Action* is considered to be the action prior to the Council approval of *Council Interim Rebuilding*, which is also analyzed.

2.2 The *Maximum Conservation* Alternative

Under the *Maximum Conservation* alternative rebuilding would occur in the shortest time possible by setting the fishing mortality rate to zero (F = 0) for all fisheries in the EEZ that take POP. The tradeoff is the greatest adverse socioeconomic impact occurs to fisheries and fishing-dependent communities on the west coast during the course of rebuilding. Bottom trawl fisheries (and any other fisheries that demonstrate a bycatch of POP) operating on the shelf and slope would be closed or modified to the point where targeted and incidental catch of POP did not occur. While POP is primarily a slope species, adults are found on the edge of the shelf in the summer and juveniles are found in shallower depths on the shelf. Therefore, the *Maximum Conservation* alternative would analyze restrictions on fisheries with a potential take of POP at all life stages. The analysis of this alternative assumes restrictions on trawl and fixed gear line fisheries operating in the west coast EEZ in depths 50-250 fm. The target rebuilding period (T_{TARGET}) would be the

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[1] In this rebuilding plan bycatch rate is defined as the rate of co-occurrence of non-targeted species during fishing while discard rate refers to the rate of those non-targeted species caught and thrown overboard prior to landing. The discard mortality rate of darkblotched is assumed to be 100%. Differentiation of bycatch and discard in this rebuilding plan is noted since the MSA defines bycatch as discard in marine fisheries.

minimum rebuilding time to achieve B_{MSY} (T_{MIN}) which is estimated to be 2012. There would be no bycatch of POP since there is no fishing-related mortality. Potential habitat impacts would be minimized by eliminating fishing effort. A subsequent decision-making process to implement the EFH provisions of the MSA would be utilized to determine if additional habitat based management measures were necessary to enhance productivity of the stock.

2.3 The *Maximum Harvest* Alternative

Under the *Maximum Harvest* alternative rebuilding would occur in the maximum allowable time (T_{MAX}), thereby allowing the maximum allowable harvest under rebuilding. A minimal impact would be expected on existing slope and shelf fisheries and dependent fishing communities, but at a cost of the slowest legal rebuilding schedule allowed by the FMP, MSA, and the National Standard Guidelines. The target rebuilding period (T_{TARGET}) would be the maximum rebuilding time (T_{MAX}) with the median year of reaching B_{MSY} projected to be 2042. The *Maximum Harvest* alternative has a 50% probability of rebuilding within T_{MAX}. The total catch OY would be calculated using a fishing mortality rate of 0.0109. Depth-based or other area fishing restrictions would not be required under the *Maximum Harvest* alternative. It is also assumed that small footrope restrictions on bottom trawls would not be needed.

2.4 The *Council Interim* Alternative

Under the *Council Interim Rebuilding* alternative there would be a 70% probability of rebuilding within T_{MAX}. This alternative was the one the Council selected in 2001 as its preferred alternative for rebuilding POP. This analysis does not presume this is still the Council's preferred alternative. The target rebuilding time (T_{TARGET}) would be 27 years with the median year of reaching B_{MSY} projected to be 2027. The total catch OY would be calculated using a fishing mortality rate of 0.0082. Consideration may be given to area closures that move the fishery off POP hotspots and reduce total mortality.

2.5 Alternatives Considered But Rejected

Any alternatives with less than a 50% probability of rebuilding to B_{MSY} within the maximum allowable rebuilding time (T_{MAX}) are not compliant with the MSA as interpreted in a federal court 2000 ruling (*Natural Resources Defense Council v. Daley, April 25, 2000, U.S. Court of Appeals for the District of Columbia Circuit*). Such alternatives are not analyzed in this rebuilding plan. **The *No Action* alternative has a probability of rebuilding to B_{MSY} of less than 50%**, but is still analyzed as per NEPA requirements.

Under a Mixed Stock Exception alternative, rebuilding constraints would not be imposed thereby allowing overfishing of POP. The mixed stock exception is a provision in National Standard Guideline 1 allowing an increased OY above the overfishing level as long as the harvest meets certain standards. Harvesting one species of a mixed-stock complex at its optimum level may result in the overfishing of another stock component in the complex. The Council may decide to permit this type of overfishing only if all of the following conditions are satisfied:

(a) The Council demonstrates by analysis that such action will result in long-term net benefits to the Nation.
(b) The Council demonstrates by analysis that mitigating measures have been considered and that a similar level of long-term net benefits cannot be achieved by modifying fleet behavior, gear selection/ configuration, or other technical characteristic in a manner such that no overfishing would occur.
(c) The resulting rate or level of fishing mortality will not cause any species or evolutionarily significant unit thereof to require protection under the Endangered Species Act.

Since this stock does not constrain fisheries to the extent that darkblotched rockfish constrain slope fisheries and canary and yelloweye rockfish constrain fisheries on the edge of the shelf, POP are not considered to meet the standards of the Mixed Stock Exception provision.

3.0 AFFECTED ENVIRONMENT

3.1 Physical Environment

3.1.1 Pacific Ocean Perch Habitat

Pacific ocean perch are distributed from Japan and the Bering Sea to La Jolla, California, although they are uncommon south of Oregon (Eschmeyer *et al.* 1983). The species is most abundant on the northern end of their range in northern British Columbia, Gulf of Alaska, and the Aleutian Islands (NMFS (National Marine Fisheries Service) *et al.* 1998). They are abundant offshore in depths of 55-825 m with adults primarily found along the upper continental slope and shelf edge in depths of 100-450 m. They are classified as an outer shelf-mesobenthal species (Allen and Smith 1988).

Larvae and juveniles are pelagic. Larvae are released at dusk, 20-30 m off the bottom in depths of 360-400 m, and rise to midwater depths of 215-275 m. Early POP studies suggest that after release, larvae immediately move to surface waters. However, recent research off British Columbia indicates that larvae remain at depth for extended periods and gradually move to shallower waters over several months (Leaman 2002). Juvenile POP are found in the shallow and intermediate portion of their bathymetric range until age ten. They tend to aggregate over rough or rocky bottoms.

Subadults and adults are benthopelagic (reside near the bottom and up in the water column). Adults are generally associated with gravel, rocky, or boulder substrates found in and along gullies, canyons, and submarine depressions; they may also occur on smooth substrates. Adults primarily inhabit waters 180-220 m in depth during summer months, but migrate to deeper waters (>275 m) in the fall and winter months to spawn and give birth. Research off British Columbia suggests that POP prefer a temperature range of 4-7°C (Scott 1995).

3.1.2 Human Effects on Rockfish Habitat

Potential fishing-related impacts to rockfish habitat are incurred from direct disturbance of the seafloor from contact by actively-fished, lost, or discarded fishing gear. The most common bottom fishing gears associated with seafloor disturbance on the west coast are trawl nets, longlines, and fish traps.

Auster and Langton {1999 #576} 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). High-resolution sidescan sonar images on the shelf and slope off Eureka, California, 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 were also investigated in the Gulf of Alaska where 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 displace it reduces the number and complexity of crevices (Freese *et al.* 1999).

Limited qualitative observations of fish traps, longlines, and gill nets dragged across the seafloor during set and retrieval were similar to observations of bottom trawling gear, in 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 other direct and indirect effects on fish habitat. While non-fishing human impacts have not been directly assessed on POP 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 disposal (Wilbur and Pentony 1999).

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 U.S. - Mexico border at depths of 10 to 200 m and anthropogenic debris occurred on approximately 14 percent 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.

As more information is gathered about the effects of fishing and non-fishing human activities on POP habitat, additional management measures may be taken.

3.2 Biological Environment

3.2.1 Affected Stocks

3.2.1.1 Pacific Ocean Perch Life History

Pacific ocean perch have a low potential productivity and a very low population resilience with a minimum population doubling time of more than 14 years (Musick *et al.* 2000). Genetic analyses suggest a significant mixing of the population across the species' range (Seeb and Gunderson 1988; Wishard *et al.* 1980). This could be explained by a widespread dispersal of larvae and juveniles transported to deeper waters in a prolonged pelagic phase. ***[confirm mtDNA evidence of some genetic stock structuring in AK and BC?]***

Adult POP make seasonal onshore migrations to feeding grounds in shallower water (180-220 m) during June to August to allow gonads to ripen. They form large schools as much as 30 m wide, 80 m deep, and 1,300 m long. They then migrate offshore to spawn in deeper water (>275 m) in large spawning aggregations. Spawning occurs in September and October in Washington and British Columbia waters. Pacific ocean perch are viviparous (bear live young) and eggs are internally fertilized. Young are born in January and February off Oregon (Hitz 1962) and one to three months later in the season in more northern waters (Westrheim 1970). Juveniles remain pelagic for two or three years before becoming demersal (Alverson and Westrheim 1959). Juvenile POP form ball-shaped schools near the surface or hide in rocks. Pacific ocean perch migrate to deeper waters as they mature and attain adulthood on the continental slope.

Pacific ocean perch are carnivorous. Larvae eat small zooplankton. Small juveniles eat copepods and larger juveniles feed on euphausiids. Adults eat euphausiids, shrimps, squids, and small fishes. Adults occurring shallower than 150 m feed during the day; those at greater depths move toward the surface to feed at dawn and dusk. Immature fish feed throughout the year, but adults feed only seasonally, mostly April-August. Predators of POP include sablefish (*Anoplopoma fimbria),* Pacific halibut (*Hippoglossus stenolepis*), (*Physeter catodon*), and albacore tuna (*Thunnus alalunga*).

Pacific ocean perch are slow growing, long-lived, and late to mature. Larvae are 5-8 mm SL (standard length) at birth and the larval period lasts several weeks. Juveniles range up to 22-35 cm depending on sex and region ***[larger fish further south?]***. Growth is slower for males. Largest size is about 54 cm and 2 kg. Maximum age of POP has been revised upwards with recent advances in ageing techniques. Gunderson {1977 #617} originally estimated a maximum age of 30 years for POP. However, estimated longevity using the break and burn technique of ageing otoliths indicate POP can live up to 98 years (Heifetz *et al.* 2000). Estimated age at 50% maturity of POP is 10 years (Heifetz *et al.* 1996). ***[Ianelli et al. 2000 indicate age at 50% mat. of 8 years; no ref?]*** Relatively small numbers of young are produced during parturition with only about 300,000 for a female of 20 years of age (Frimodt 1995).

3.2.1.2 Pacific Ocean Perch Stock Status

The first POP stock assessments were done after the heavy exploitation of the 1960s. Westrheim *et al.* {1972 #646} assessed the POP population in the Columbia and Vancouver INPFC areas and determined the mean exploitable biomass during 1966-68 was 34,000 mt. Catch rates declined about 55% for the Washington fleet from that period; the biomass was then estimated to be 18,700 mt during 1969-71 (Technical Subcommittee 1972). Biomass was estimated to have declined another 11% during 1972-74 based on a further decline in catch rates (Gunderson 1977). While the catch rate increased during 1975-77 (Fraidenburg *et al.* 1978), it was believed this was due to the advent of more efficient high rise nets. Biomass was estimated to be between 8,000 and 9,600 mt.

A rockfish survey conducted in 1977 (Gunderson and Sample 1980) was the first fishery-independent index of Pacific ocean perch and the beginning of triennial surveys on the west coast. Pacific ocean perch biomass estimates were imprecise prompting fishermen to ask for closer scrutiny of POP assessments. Therefore, in 1979 NMFS, WDFW, and ODFW cooperated in a research survey of POP stocks off Washington and Oregon. More precise biomass estimates indicated stock sizes had not changed since 1977 (Wilkins and Golden 1983). Six years later another survey was conducted to determine the effect of regulations imposed on the fishery in the interim which was considered minimal. Subsequent assessments (Ianelli *et al.* 1992; Ianelli *et al.* 1995) explored an age-structured statistical model (Methot 1990), laying the foundation for more recent assessment work.

Ianelli and Zimmerman (1998) estimated POP female spawning biomass in 1997 was at 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 new assessment for POP was done in 2000 which suggests the stock was 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 (2012) and a T_{MAX} of 42 years (2042) (Table 2-1). It was noted in the rebuilding analysis the ongoing retrospective analysis of historic foreign fleet catches {Rogers, In prep #640; Table 3.2-1} is likely to change projections of POP rebuilding downward.

3.2.1.3 Species Co-occurring With Pacific Ocean Perch

Pacific ocean perch are part of the northern slope rockfish complex (Table 3.2-3 in Part II - Draft Darkblotched Rockfish Rebuilding Plan) and are primarily associated with these rockfish species. The deep water trawl fishery targeting Dover sole (*Microstomus pacificus*), shortspine and longspine thornyheads (*Sebastolobus alascanus* and *S. altivelis*, respectively), and sablefish (collectively referred to as the DTS complex) incidentally catch POP. There are also strong seasonal associations with other deepwater flatfishes caught in bottom trawl fisheries that incidentally catch POP, such as petrale sole (*Eopsetta jordani*) in the winter and rex sole (*Errex zachirus*), and, to a lesser extent, English sole (*Pleuronectes vetulus*).

3.3 Socioeconomic Environment

3.3.1 Management Regime

3.3.1.1 Management History

Pacific ocean perch 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 1966-1975 period (Figure 3-1). The foreign fishery ended in 1977 after passage of the MSA and the transition to a domestic fishery.

The POP resource off the west coast was overfished before implementation of the Pacific Coast

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 1966-1976 catch and age composition data (Gunderson 1979), updated with 1977-1980 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 allowable catch (optimum yield) for POP was also lowered significantly. After twenty years of rebuilding under the original plan, the stock was 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}.

3.3.1.2 Data Systems

Catch Monitoring

See section 3.3.1.2 in Part II - Draft Darkblotched Rockfish Rebuilding Plan.

Monitoring Commercial Landings

See section 3.3.1.2 in Part II - Draft Darkblotched Rockfish Rebuilding Plan.

Discard Estimation

See section 3.3.1.2 in Part II - Draft Darkblotched Rockfish Rebuilding Plan. Table 3.3-1 depicts the depth-based bycatch rates from the Hastie trawl bycatch model (Hastie 2001) that are applied to landed weight of the target species to estimate seasonal bycatch of canary rockfish.

The Stock Assessment Process

See section 3.3.1.2 in Part II - Draft Darkblotched Rockfish Rebuilding Plan.

Research Fisheries

See section 3.3.1.2 in Part II - Draft Darkblotched Rockfish Rebuilding Plan.

3.3.1.3 Enforcement

See section 3.3.1.3 in Part II - Draft Darkblotched Rockfish Rebuilding Plan.

3.3.1.4 Pacific Ocean Perch Constraint Over Time

[NOTE: This is a relatively brief section. Mainly a place holder to maintain parallel structure between Chapter 3 and 4. The bulk of the discussion of how things vary over time between rebuilding options will be in Chapter 4. Authors anticipate adding to this section if, in developing the Chapter 4 discussion, it turns out there is additional background information needed that has not been developed in other sections of Chapter 3. They will also consider expanding some of the ideas placed here if they are not already developed elsewhere and it is decided this is the best section to do it in.]

3.3.1.5 Complex Values and Allocation Among Sectors Over Time

List the complexes in which POP is taken.
Provide data on the economic value per pound of POP in each complex.
Provide total values of the complexes in 1998 and 200?.

Distribution Among Commercial Sectors

Groundfish Complexes in Which Pacific Ocean Perch are Harvested

Directed - Trawl DTS

Directed - Trawl Flatfish

Incidental - Trawl Whiting

Incidental - Fixed Gear

Incidental - Pink Shrimp

Unit Value of Harvest Complexes

- on a value per mt of POP basis (marginal value)
- valid only over the range within which other constraints are not encountered

Total Value of Harvest Complexes (1998, 2001,2002)

3.3.1.6 Managing with Risk and Uncertainty

See section 3.3.1.6 in Part II - Draft Darkblotched Rockfish Rebuilding Plan.

3.3.2 Aggregate Commercial Catch and Recreational Effort for First Year of Management–Coastwide

3.3.3 Primary Producers - Commercial Vessels

To be completed before public review.

3.3.4 Commercial Distribution Chain

3.3.4.1 Buyers and Processors

To be completed before public review

3.3.4.2 Markets

To be completed before public review

3.3.5 Recreational Fishery - Charter and Private Vessel Sectors

To be completed before public review.

3.3.6 Tribal Fishery

To be completed before public review.

3.3.7 Communities

To be completed before public review.

3.3.8Net Economic Benefits- Cost Benefit Analysis

To be completed before public review.

4.0 ENVIRONMENTAL CONSEQUENCES

This rebuilding plan EIS analyzes the effects of alternative strategies for rebuilding Pacific ocean perch on the probability of successful stock rebuilding, co-occurring species, affected habitat, and the socioeconomic environment (Table 4-1).

4.1 Affected Pacific Ocean Perch Habitat Including Essential Fish Habitat

Alternative rebuilding strategies have varying effects on the rocky bottom habitats of the continental shelf and slope where POP reside, primarily due to the extent fishing activities are affected but also to the degree MPAs are considered. The *No Action* alternative would have the greatest potential impact on POP habitats since a greater fishing intensity would ensue and no consideration would be given to MPAs to aid in controlling fishing-related mortality or protect EFH. The *Maximum Conservation* alternative would have the least habitat impact since it eliminates fisheries that target or incidentally catch POP and therefore eliminates potential fishing-related habitat impacts. Conversely, the *Maximum Harvest* alternative allows the maximum harvest under rebuilding constraints and therefore creates a greater potential disturbance to POP habitat from a greater intensity of fishing effort relative to all rebuilding alternatives other than *No Action*. There would also be no special consideration given to MPAs to control total mortality and protect EFH. The intermediate risk alternative (*Council Interim*) would have intermediate effects relative to the "maximum" alternatives.

Pacific ocean perch, as with many of the *Sebastes* species, have strong habitat affiliations with rocky habitats and other bottom structures. Gunderson (*pers. comm.*) suggests that MPAs designed to protect submarine canyons and other high relief, rocky habitats on the edge of the continental slope could be effective measures for reducing fishing-related mortality and enhancing productivity of the stock. Depth-based restrictions or incentives may also be effective in displacing trawl effort away from POP habitats.

Population productivity could be enhanced by protecting these habitats through the use of MPAs. This may be true globally for rockfish and other west coast groundfish species. Programmatic measures designed to identify, protect, and minimize potential fishing impacts on west coast rockfish EFH will be analyzed in the Supplemental EIS in preparation by NMFS. Any habitat protection measures identified in the EFH Supplemental EIS that can be applied to encourage rebuilding POP either through reducing total mortality or enhancing population productivity should be seriously considered as an adjunct to other harvest control measures analyzed in this plan.

Bottom trawl operations on the slope and edge of the continental shelf would most affect POP habitats. The relative effects of POP rebuilding alternatives on these habitats resulting from the amount of physical contact with the bottom are assumed to be with duration of trawl gear bottom contact in sensitive rocky habitats and gear type. The relative fishing intensity of POP rebuilding alternatives is assumed to be correlated with potential negative habitat effects. The ranking of POP rebuilding alternatives by their assumed relative effect on these habitats (Table 4-1) is on this basis.

Since bottom trawl operations account for over 99% of recent POP catches, associated trawl fishery impacts should be the focus of mitigating potentially negative habitat effects. Small footrope and chafing gear restrictions are believed to reduce potentially harmful effects of bottom trawls in rocky shelf habitat (National Academy Press 2002) and should be considered. To the extent that fixed gear and other potential fishery impacts to POP habitat can be avoided or mitigated, a modest benefit could also be anticipated.

4.2 Affected Biological Environment

4.2.1 Controlling Fishing-Related Mortality of Pacific Ocean Perch

Successful stock rebuilding depends on the ability of management/rebuilding measures to effectively control all sources of fishing-related mortality, including landed catch and bycatch. All rebuilding alternatives analyzed in this EIS has a calculated total catch OY to accommodate landings of unavoidable incidental catch of POP (except the *Maximum Conservation* alternative which has a total catch OY of 0 mt). The effectiveness of all rebuilding strategies (given the probabilistic trajectories of future increases in biomass relative to B_{MSY}) depends on managing POP fishing-related mortality within prescribed total catch OYs. Landed catch allowances for all overfished species are designed to minimize target opportunities on these species while allowing landings of unavoidable bycatch that would otherwise be discarded dead at sea. Management measures consistent with rebuilding should have harvest control rules that are enforceable and effectively stay within total catch targets. Harvest control rules and management measures commensurate with alternative rebuilding strategies will be specifically analyzed in this rebuilding plan EIS. Potential management measures that are likely to reduce all sources fishing-related mortality are also discussed.

4.2.2 Species Co-occurring With Pacific Ocean Perch

Pacific ocean perch are part of the northern slope rockfish complex (Table 4-3) and are primarily associated with these rockfish species. Darkblotched rockfish (*Sebastes crameri*) are part of this complex and overfished as well (see Part II - Draft Darkblotched Rockfish Rebuilding Plan). The deep water trawl fishery targeting Dover sole (*Microstomus pacificus*), shortspine and longspine thornyheads (*Sebastolobus alascanus* and *S. altivelis*, respectively), and sablefish (collectively referred to as the DTS complex) incidentally catch POP. There are also strong seasonal associations with other deepwater flatfishes caught in bottom trawl fisheries that incidentally catch POP, such as petrale sole (*Eopsetta jordani*) in the winter and rex sole (*Errex zachirus*), and, to a lesser extent, English sole (*Pleuronectes vetulus*).

4.3.1.1 Landed Catch Accounting and Control

See section 4.3.1.1 in Part II - Draft Darkblotched Rockfish Rebuilding Plan.

4.3.1.2 Bycatch Accounting and Control

See section 4.3.1.2 in Part II - Draft Darkblotched Rockfish Rebuilding Plan.

4.3.1.3 Potential Rebuilding Measures to Consider

See section 4.3.1.3 in Part II - Draft Darkblotched Rockfish Rebuilding Plan.

Pacific ocean perch on the west coast south of the U.S. - Canadian border are part of a larger stock assemblage, most of which is managed outside of Council jurisdiction. British Columbia annual landings are over twenty times the magnitude of west coast landings. It is unclear whether the cumulative fishing-related mortality across the stock's range is consistent with that mandated under MSA, FMP, NMFS National Guidelines, and U.S. legal authorities. The relative biomass of POP across the multiple management jurisdictions in the northeast Pacific is also unknown. Coordinated and consistent assessment and management should be explored with the Canadian Department of Fisheries and Oceans. Cooperative management could benefit POP rebuilding in waters off the west coast of the U.S. as well as in foreign waters. It is conceivable that POP rebuilding might not be attainable in west coast U.S. waters if harvest rates exceed biologically-sustainable rates in waters outside Council jurisdiction.

4.3.1.4 Pacific Ocean Perch Constraint Over Time

To be completed before public review. Table 4.3-1 shows total catch OY trajectories for rebuilding alternatives. Darkblotched are the binding constraint on the north slope. Therefore, it is unlikely that any of the POP rebuilding yields (except those under *Maximum Conservation*) could be attained.

4.3.1.5 Complex Values and Allocation Among Sectors Over Time

- Discuss how the marginal value of POP varies between complexes and identify the total value of the complexes if harvested at a rate allowed by the next most constraining non-overfished species.
- Point out that the Council will likely vary the allocation between different fisheries over the period of the rebuilding plan based on changing information about bycatch rates and changing marginal values and changes in limiting species that affect the amount of the complex available.
- Discuss how the Council might take equity, geographic and other social factors into account so that a fishery that consumes POP at a high rate may not be totally shut down.

4.3.1.6 Uncertainty

Rebuilding analyses are stochastic by nature. Harvest rate management variables are derived from hundreds of simulations which together indicate the probability of rebuilding an overfished stock within a fixed time period and harvest regime. Characterizing these stochastic indicators as deterministic biomass and OY trajectories implies a level of certainty that is not supported by the rebuilding analysis.

4.3.2 Aggregate Commercial Catch and Recreational Effort for First Year of Management-Coastwide

To be completed before public review.

4.3.3 Primary Producers - Commercial Vessels

To be completed before public review.

4.3.4 Commercial Distribution Chain

To be completed before public review.

4.3.4.1 Buyers and Processors

To be completed before public review.

4.3.4.2 Markets

To be completed before public review.

4.3.5 Recreational Fishery

Recreational fisheries do not catch POP.

4.3.6 Tribal fishery

To be completed before public review.

4.3.7 Communities

To be completed before public review.

4.3.8 Cost Benefit Summary

To be completed before public review.

Include nonmarket, existence and other social values in the summary. Largely qualitative, illustrating tradeoffs.

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Appendix B-1. Pacific Ocean Perch Rebuilding Analysis

To be included before public review.

Appendix B-2. FMP Amendment Language

To be included before public review.

TABLES

TABLE 1-1. Estimated parameters/targets specified for rebuilding Pacific ocean perch. Data from Ianelli *et al.* (2000) and Punt and Ianelli (2001).

Rebuilding Parameter/Target	Estimate or proxy
T_0 (year declared overfished)	1999
T_{MIN} (minimum time to achieve B_{MSY} = mean time to rebuild at F = 0)	12 years
Mean generation time	30 years
T_{MAX} (maximum time to achieve $B_{MSY} = T_{MIN}$ + 1 mean generation time)	42 years
P_{MAX} (P to achieve B_{MSY} by T_{MAX}) [1/]	70%
Most recent stock assessment	Ianelli *et al.* 2000
Most recent rebuilding analysis	Punt and Ianelli 2001
B_0 (estimated unfished biomass)	60,212 units of spawning output
$B_{CURRENT}$ (current estimated biomass)	13,066 units of spawning output in 1998
% Unfished Biomass	21.7% in 1998
MSST (minimum stock size threshold = 25% of B_0)	15,053 units of spawning output
B_{MSY} (rebuilding biomass target = 40% of B_0)	24,084 units of spawning output
MFMT (maximum fishing mortality threshold = F_{MSY})	$F_{50\%}$
Harvest control rule [1]	F = 0.0082
T_{TARGET} [1]	2027

[1] Under *Council Interim.*

TABLE 2-1. Rebuilding parameters associated with Pacific ocean perch rebuilding alternatives.

Alternative	F rate	Probability of rebuilding within T_{MAX}	T_{TARGET} Mean year of reaching B_{MSY}
No Action	0.0*XXX*	*X*%	20*XX*
Maximum Conservation	0.0000	100%	2012
Maximum Harvest	0.0109	50%	2042
60%[1]	0.0096	60%	2034
Council Interim Rebuilding	0.0082	70%	2027
80%[1]	0.0068	80%	2022

[1] *While this intermediate level of harvest is not a structured alternative, associated rebuilding parameters are displayed to understand the relative difference of intermediate rebuilding scenarios.*

[GMT/Punt: determine missing values for No Action in Table 2-1]

TABLE 3-1. Biological reference points for Pacific ocean perch.

Biological Reference Point	Value
Maximum age	98 years
Maximum length	54 cm
Maximum weight	2 kg
Age at 50% maturity	8 yrs females
Length at 50% maturity	
Natural mortality rate (M)	

TABLE 3.2-2. Allocation of Pacific ocean perch in the reported foreign rockfish catch (mt) off Washington, Oregon, and California in 1966-1976 by INPFC area and year. Data from Rogers (In prep).

INPFC Area	Year											
	66	**67**	**68**	**69**	**70**	**71**	**72**	**73**	**74**	**75**	**76**	**Total**
US-Van	4,595	4,319	2,417	64	68	548	421	607	992	0	29	14,060
Col	10,966	8,038	4,222	405	373	354	529	1,166	465	496	210	27,224
Eur	0	9	344	1	0	0	17	62	15	35	93	576
Mon	0	11	1	3	0	0	0	11	19	40	40	125

TABLE 3.3-1. Bycatch rates used in modeling trawl fishery bycatch of Pacific ocean perch north of Cape Mendocino for the 2003 season.

2-mo per	Target fishery	All depths	In depths shallower than:				In depths deeper than:			
			50 fm	75 fm	100 fm	125 fm	150 fm	180 fm	200 fm	250 fm
1	DTS	0.522%	0.000%	0.000%	0.631%	0.631%	0.521%	0.472%	0.474%	0.395%
2	DTS	1.243%	0.000%	0.000%	3.285%	4.672%	1.202%	1.132%	1.017%	0.472%
3	DTS	1.985%	0.000%	0.000%	2.743%	4.029%	1.705%	1.280%	1.116%	0.482%
4	DTS	1.562%	0.000%	0.000%	1.926%	4.545%	1.078%	0.918%	0.714%	0.497%
5	DTS	0.646%	0.000%	0.000%	0.764%	2.423%	0.385%	0.316%	0.298%	0.141%
6	DTS	1.014%	0.000%	0.000%	0.000%	15.454	0.992%	0.777%	0.397%	0.329%
1	Flatfish	1.315%	0.000%	0.000%	0.306%	0.859%	1.330%	0.884%		
2	Flatfish	3.003%	0.000%	0.000%	2.706%	2.733%	2.391%	1.225%		
3	Flatfish	4.464%	0.000%	0.000%	2.262%	3.218%	6.824%	5.771%		
4	Flatfish	1.865%	0.000%	0.000%	0.627%	1.461%	2.570%	1.698%		
5	Flatfish	2.929%	0.000%	0.000%	0.529%	1.602%	4.211%	2.155%		
6	Flatfish	1.319%	0.000%	0.000%	0.481%	0.707%	1.325%	1.378%		
1	Arrowtooth	2.369%					2.369%	2.369%		
2	Arrowtooth	3.160%					1.129%	1.184%		
6	Arrowtooth	2.276%					2.276%	2.276%		
1	Petrale	2.337%					2.415%	1.454%		
2	Petrale	5.555%					6.122%	4.163%		
6	Petrale	6.903%					7.232%	7.477%		
1	Midwater	0.000%								
2	Midwater	0.009%								
3	Midwater	0.000%								
4	Midwater	0.000%								
5	Midwater	0.241%								
6	Midwater	0.001%								
1	Other	11.500%	0.000%	0.000%	1.150%	4.600%	6.900%	3.450%	2.300%	0.000%
2	Other	2.750%	0.000%	0.000%	0.275%	1.100%	1.650%	0.825%	0.550%	0.000%
3	Other	5.000%	0.000%	0.000%	0.500%	2.000%	3.000%	1.500%	1.000%	0.000%
4	Other	10.750%	0.000%	0.000%	1.075%	4.300%	6.450%	3.225%	2.150%	0.000%
5	Other	4.250%	0.000%	0.000%	0.425%	1.700%	2.550%	1.275%	0.850%	0.000%
6	Other	5.650%	0.000%	0.000%	0.565%	2.260%	3.390%	1.695%	1.130%	0.000%

TABLE 4-1. Ranked relative effects of alternative Pacific ocean perch rebuilding strategies of potential negative habitat impacts, the probability of rebuilding by T_{MAX}, and short term economic costs (1 is highest rank, 6 is lowest rank).

Alternative	Potential Negative Habitat Effects	Probability of Rebuilding by T_{MAX}	Short Term Economic Costs
No Action	1	6	6
Maximum Conservation	6	1	1
Maximum Harvest	2	5	5
60%	3	4	4
Council Interim Rebuilding	4	3	3
80%	5	2	2

TABLE 4.3-1. Projected total catch optimum yields (mt) for Pacific ocean perch under different rebuilding probabilities and the default "40-10" policy. Actual catches shown for 1999-2001.

Year	*No Action* "40-10"	*Maximum Harvest* 50%	60%	*Council Interim Rebuilding* 70%	80%	Year	*No Action* "40-10"	*Maximum Harvest* 50%	60%	*Council Interim Rebuilding* 70%	80%
1999	544	544	544	544	544	2021	1,155	599	538	473	398
2000	270	270	270	270	270	2022	1,137	599	539	474	400
2001	303	303	303	303	303	2023	1,133	599	539	474	400
2002	1,120	464	410	353	290	2024	1,116	599	539	475	401
2003	1,313	496	438	377	311	2025	1,108	598	539	475	401
2004	1,438	518	458	396	327	2026	1,100	599	540	475	402
2005	1,484	533	472	408	338	2027	1,090	600	541	477	403
2006	1,482	542	481	416	345	2028	1,091	602	543	478	404
2007	1,460	550	489	424	352	2029	1,097	602	543	479	405
2008	1,432	557	496	430	358	2030	1,097	602	543	479	406
2009	1,408	565	503	437	364	2031	1,100	602	544	479	406
2010	1,385	572	509	443	369	2032	1,098	601	543	480	406
2011	1,358	577	515	448	374	2033	1,094	601	543	480	407
2012	1,336	582	520	453	379	2034	1,094	603	545	481	408
2013	1,315	587	525	458	383	2035	1,096	605	547	483	409
2014	1,285	592	530	463	387	2036	1,094	605	547	483	410
2015	1,257	594	532	465	390	2037	1,092	605	547	483	410
2016	1,232	596	534	467	392	2038	1,088	606	548	484	411
2017	1,209	597	535	469	394	2039	1,097	606	548	484	411
2018	1,195	597	536	470	395	2040	1,099	605	548	485	412
2019	1,175	599	537	472	397	2041	1,097	608	551	487	414
2020	1,160	599	539	473	398	2042	1,091	607	550	487	413

FIGURES

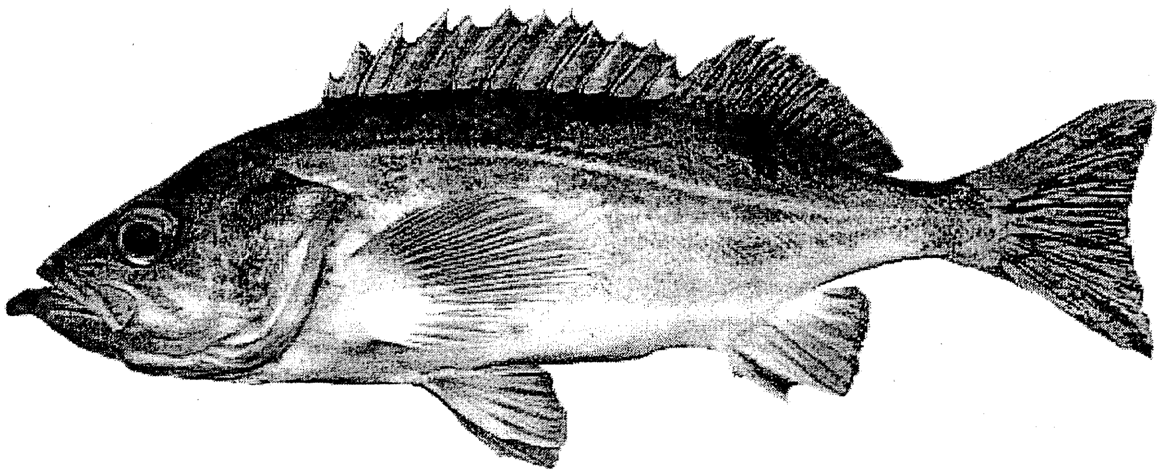

Figure 3-1. Pacific ocean perch (*Sebastes alutus*).

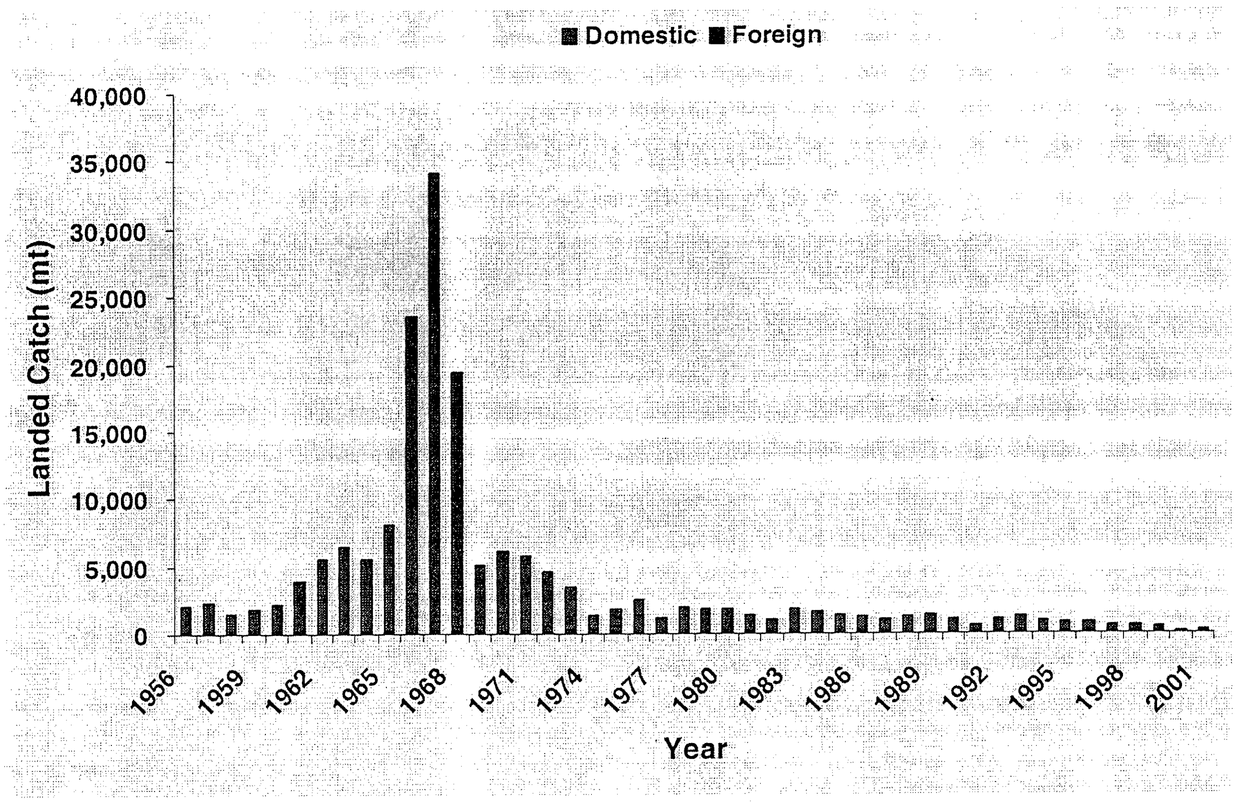

FIGURE 3-2. Landings (mt) of Pacific ocean perch on the U.S. west coast by domestic and foreign vessels, 1956-2001.

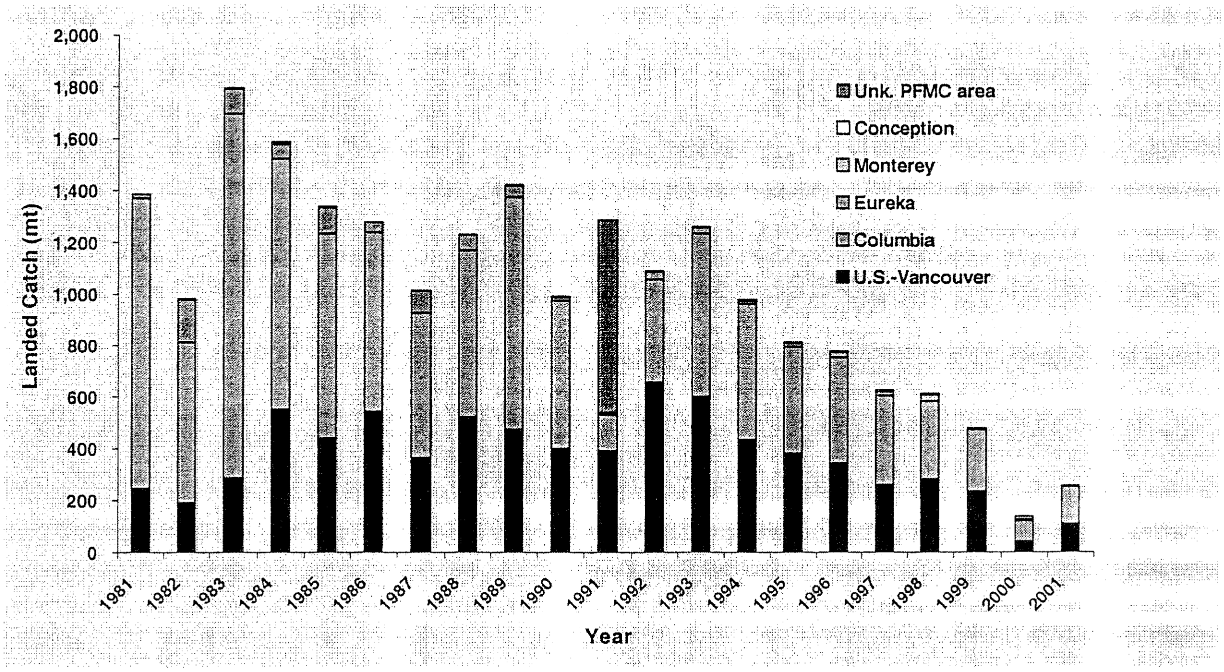

FIGURE 3-3. Landed catch (mt) of Pacific ocean perch by INPFC area, 1981-2001. Data from PacFIN ("Pacific ocean perch" and "nominal POP" categories only).

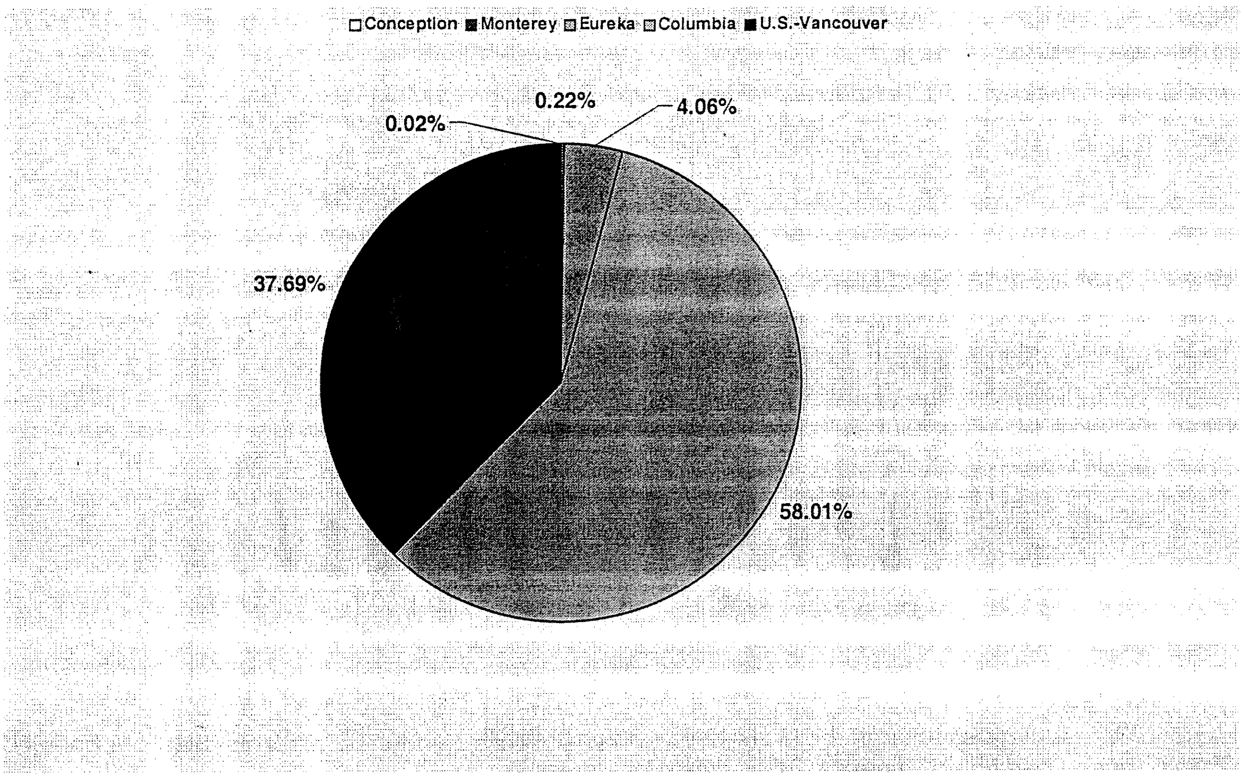

FIGURE 3-4. Average annual proportion of Pacific ocean perch landed catch by INPFC area, 1981-2001. Data from PacFIN ("Pacific ocean perch" and "nominal POP" categories only).

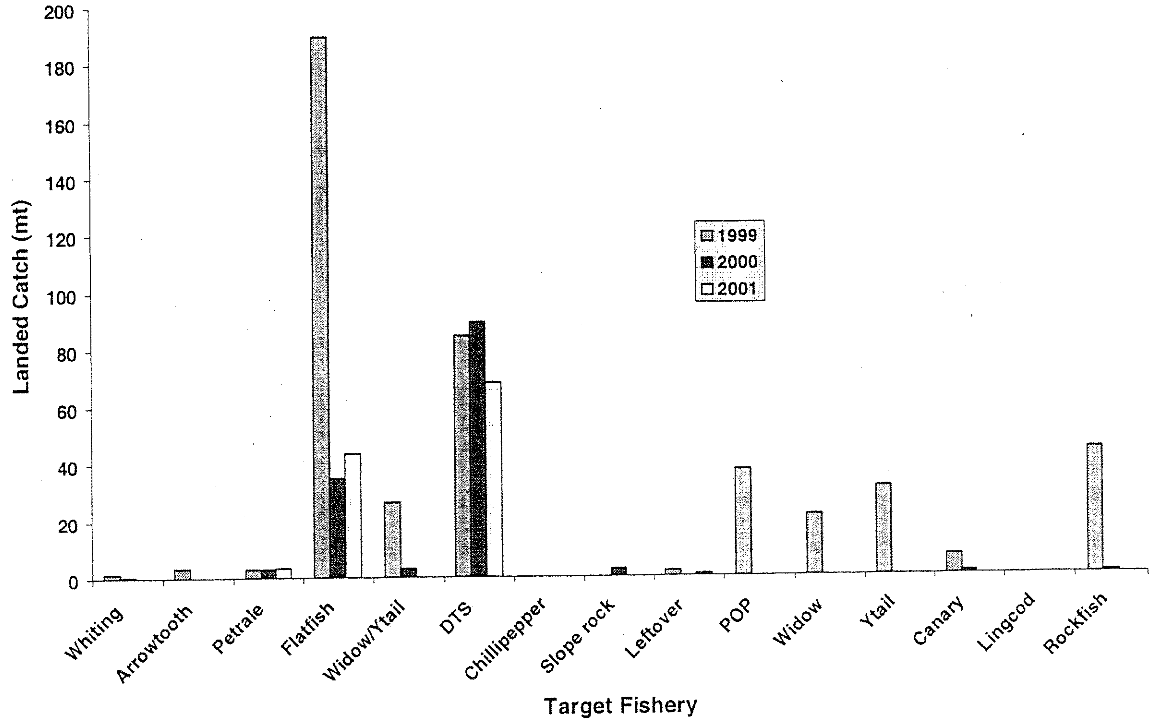

FIGURE 4-1. Landings of Pacific ocean perch in target trawl fisheries on the west coast in 1999, 2000, and 2001. Data from Hastie (2001).

Exhibit E.5
Attachment 5
April 2003

DRAFT CANARY ROCKFISH REBUILDING PLAN

PART IV TO AMENDMENT 16-2 OF THE PACIFIC COAST GROUNDFISH FISHERY MANAGEMENT PLAN

INCLUDING DRAFT ENVIRONMENTAL IMPACT STATEMENT AND REGULATORY ANALYSES

PREPARED BY THE PACIFIC FISHERY MANAGEMENT COUNCIL

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APRIL 2003

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1.0 PURPOSE AND NEED FOR REBUILDING CANARY ROCKFISH

1.1 Purpose and Need

The coastwide canary rockfish (*Sebastes pinniger*) stock is one of the principle shelf rockfish species caught in commercial, recreational, and tribal fisheries operating on the continental shelf within the PFMC management area of the west coast EEZ bounded by the international borders with Mexico and Canada (herein referred to as the "west coast"). Canary rockfish are distributed coastwide on the west coast and are common off Vancouver Island, British Columbia. They are a valued rockfish species and have been a target in directed groundfish commercial and recreational fisheries. They are also a common species caught incidentally in non-groundfish fisheries, such as the pink shrimp trawl fishery.

Adoption of Amendments 11 and 12 of the Pacific Coast Groundfish Fishery Management Plan (FMP) incorporated the legal rebuilding mandates of the Sustainable Fishery Act and established an overfishing threshold (Minimum Stock Size Threshold; MSST) of 25% of the estimated unfished spawning biomass for groundfish stocks. A 1999 stock assessment documented the stock had declined below the overfished level ($B_{25\%}$) in the northern area {Columbia and U.S. Vancouver INPFC areas; /Crone, 1999 #250} and in the southern area {Conception, Monterey, and Eureka INPFC areas; /Williams, 1999 #506} and was declared overfished in January 2000.

Under the terms of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) and the FMP, the Council must prepare a rebuilding plan to increase canary rockfish stock abundance to a level that supports maximum sustainable yield (MSY; 40% of its unfished biomass). Rebuilding measures for canary rockfish will affect a wide distribution of fisheries operating on the continental shelf north of Cape Mendocino, California at 40°10' N. lat. Although canary rockfish distribution is coastwide on the west coast, bocaccio (*S. paucispinis*) is expected to be the most constraining stock to shelf fisheries south of Cape Mendocino. The purpose of this rebuilding plan and Environmental Impact Statement (EIS) is to evaluate alternative strategies designed to rebuild canary rockfish in a time less than or equal to the maximum allowable (T_{MAX}) under the National Standard Guidelines interpreting the MSA.

1.2 Rebuilding Plan Overview

The Draft Canary Rockfish Rebuilding Plan (Part IV, April 2003 draft) is organized to address the requirements of the MSA, National Environmental Policy Act, Executive Order 12866, the Regulatory Flexibility Act, and other applicable laws. This document conforms to a National Environmental Policy Act (NEPA) structure and format with a purpose and need statement (section 1.1), a reasonable range of rebuilding alternatives presented in Chapter 2, a description of the affected environment (physical (habitat), biological (canary rockfish and other affected species), and socioeconomic (affected fisheries, fishing industry, and fishing communities)) in Chapter 3, and an analysis of rebuilding consequences expected for affected environments in Chapter 4. Subsequent chapters document references cited, how the rebuilding plan and alternatives conform to legal mandates, and individuals contributing to preparation of the rebuilding plan. Appendix C-1 is the rebuilding analysis prepared for this rebuilding plan and Appendix C-2, the FMP Amendment language for canary rockfish rebuilding. The modular design of the rebuilding plan framework (each species rebuilding plan is stratified in Parts) is to allow each part/plan to stand alone as a decision-making document for rebuilding overfished groundfish species within the Council's jurisdiction (Figure 1-1 in Part II - Draft Darkblotched Rockfish Rebuilding Plan). This April 2003 draft adopts a ***bold italic font for items of particular emphasis (especially to the Council and other decision-makers)*** and *italic font for names of rebuilding alternatives and scientific species names.*

The overarching objective of this rebuilding plan is to increase canary rockfish stock spawning biomass to a level that supports MSY within a target time set by the Council (T_{TARGET}). For canary rockfish, the Council-approved proxy for this level of abundance is 40% of its estimated unfished biomass ($B_{40\%}$). Estimation of unfished biomass (B_0) is especially critical since it forms the basis for declaring a stock's biological and legal status. There is uncertainty about the estimate of B_0 and this value can be expected to change with improved understanding of the stock and when new stock assessments are conducted.

Rebuilding parameters specified in a rebuilding plan must include at least T_{TARGET} and may be required to include other parameters listed in Table 1-1 depending on decisions made in Rebuilding Process and

Standards part of this amendment package. The values adopted for these parameters are determined by the best available science, Council/NMFS policies, and legal mandates (including the MSA and the National Standard Guidelines for interpreting the MSA). The time to rebuild is constrained on the high end ($T_{MAX} = T_{MIN}$ + 1 mean generation; 1 mean generation = the mean time period for a spawning female to replace herself in the population) (Restrepo *et al.* 1998) and on the low end (T_{MIN} = time to rebuild in the absence of fishing; F=0) by biological limits imposed by our understanding of the stock's potential productivity (50 CFR §600.310 (e)(4)(ii)(B)). The National Standard Guidelines specify that the Council must manage to rebuild in no more than ten years if T_{MIN} is estimated to be less than or equal to ten years.

Scientific and management uncertainty exists for every aspect of rebuilding and thus influences success and failure of rebuilding. Uncertainty surrounds the estimation of parameters that define rebuilding targets and objectives, assessments of stock status and structure, projections of future recruitment and biomass, evaluation of how well management measures meet rebuilding objectives, and estimation of total fishing mortality. All alternatives in this rebuilding plan assume the best available science. Ensuring the best available science is incorporated in Council decision-making is the role of the Council's Scientific and Statistical Committee (SSC) and therefore not analyzed specifically as a policy choice. However, recommendations for mitigating risk associated with scientific uncertainties are explored throughout this rebuilding plan.

This rebuilding plan generally analyzes alternative strategies and explores management measures for achieving rebuilding targets and objectives. Specifically, this plan analyzes the tradeoffs (physical, biological, and socioeconomic) associated with alternative total fishing-related mortality limits (total catch OYs) and the management specifications (harvest controls and measures) to achieve these limits.

Area closures are considered in this rebuilding plan. Currently depth-based closures are in place to move the fishery off darkblotched areas to reduce the total mortality of adult fish. Additionally, the Council and NMFS are developing a policy for habitat-based management that may result in modification to existing closures, or other management measures intended to protect habitat deemed important to groundfish production. At issue in the development of this policy is the integration of habitat-based management with the harvest control management strategies that have historically been the foundation for Council actions. Alternative policies are being analyzed in a Programmatic EIS (contact Mr. Jim Glock, NMFS, (503) 231-2178). The policies adopted through the Programmatic EIS will be implemented through subsequent decisions such as implementation of the EFH provisions of the Magnuson-Stevens Act or the annual management process and may be utilized to achieve the mortality goals for darkblotched rockfish established in the rebuilding plan. Implementation of the EFH provisions is underway through another EIS that tiers off the Programmatic EIS. Publication of the draft action-specific EFH EIS is anticipated for August 2003 (contact Mr. Steve Copps, NMFS, (206) 526-6187).

2.0 CANARY ROCKFISH REBUILDING PLAN ALTERNATIVES

Canary rockfish rebuilding alternatives within MSA, FMP, and other legal constraints are analyzed in this rebuilding plan. The most risk-averse alternative (*Maximum Conservation*), most risk-prone alternatives (*Mixed Stock Exception* and *Maximum Harvest*), and an alternative with intermediate risk (*Council Interim*) are compared with a *No Action* alternative. All rebuilding alternatives except *No Action* and *Mixed Stock Exception* consider the best available science for determining risk-neutral bycatch and discard rates[1]. The best available science for determining discard mortality rates is anticipated to be direct observations of bycatch and discard in west coast groundfish fisheries. However, until these data are available to account for all sources of fishing-related mortality, the best available science is considered to be a bycatch/discard model developed by the Northwest Fisheries Science Center of the National Marine Fisheries Service (Hastie 2001). Assumed bycatch rates of darkblotched rockfish in trawl fisheries targeting other species would be at the mid-point of the range estimated from log books and EDCP data (Hastie 2001) for all alternatives except *No Action*. Rebuilding parameter estimates and probabilities for all alternatives (Table 2-1) are derived in the most recent stock assessment (Methot and Piner 2002b) and rebuilding analysis {Methot, 2002 #425; Appendix C-1}. The median year when canary rockfish spawning biomass is projected to reach B_{MSY} (T_{TARGET}) under each alternative is noted in Table 2-1. The choice of T_{TARGET} is constrained to fall between T_{MIN} and T_{MAX}. The probability of the stock attaining B_{MSY} in the maximum allowable time (T_{MAX}) is denoted as P_{MAX}. These estimated rebuilding parameters under each alternative are summarized in Table 2-1 and their relationship is displayed in Figure 2-1. Relative risk and probability of rebuilding alternatives meeting rebuilding objectives is sensitive to our current state of knowledge and the harvest control rule (i.e., harvest rate) adopted as a rebuilding target and strategy. The harvest control rule varies between rebuilding alternatives analyzed in this rebuilding plan, the best available science informing decisions and our current state of knowledge does not.

2.1 The *No Action* Alternative

Under the *No Action* alternative canary rockfish would be managed with specified trip limits and Council-adopted precautionary management measures. The harvest level would be based on the Council's default $F_{50\%}$ MSY proxy harvest rate and the precautionary "40-10" adjustment of the ABC to calculate a total catch OY. The total catch OY would be calculated using a fishing mortality rate of 0.0XXX. A 16% discard rate (of landed catch) would be assumed for controlling bycatch mortality. The probability of achieving B_{MSY} by T_{MAX} is 19%. The median year of reaching B_{MSY} is projected to be 2094.

The choice of the *No Action* alternative for canary rockfish was considered in terms of providing the most informative analysis of the consequences and tradeoffs of rebuilding the stock. The choice of 1998 for the *No Action* alternative was based on the desire to compare rebuilding alternatives to a time prior to any stocks being declared overfished under the mandates of the Sustainable Fisheries Act. Technically, a *No Action* alternative would be the action that would be taken in the absence of an approved rebuilding plan (or status quo). Under the strict context of that definition, the *Council Interim* alternative might be considered to represent status quo. Since the *Council Interim* alternative is also analyzed, this rebuilding plan follows strict NEPA requirements.

2.2 The *Maximum Conservation* Alternative

Under the *Maximum Conservation* alternative rebuilding would occur in the shortest time possible by setting the fishing mortality rate to zero (F = 0) for all fisheries in the EEZ that take canary rockfish. The tradeoff is the greatest adverse socioeconomic impact occurs to fisheries and fishing-dependent communities on the west coast during the course of rebuilding. Bottom trawl fisheries (and any other fisheries that demonstrate a bycatch of canary rockfish) operating on the shelf would be closed or modified to the point where targeted and incidental catch of canary rockfish did not occur. The analysis of this alternative

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[1] In this rebuilding plan bycatch rate is defined as the rate of co-occurrence of non-targeted species during fishing while discard rate refers to the rate of those non-targeted species caught and thrown overboard prior to landing. The discard mortality rate of darkblotched is assumed to be 100%. Differentiation of bycatch and discard in this rebuilding plan is noted since the MSA defines bycatch as discard in marine fisheries.

assumes restrictions on commercial trawl, fixed gear, and recreational fisheries operating in the west coast EEZ in depths 50-150 fm. The target rebuilding period (T_{TARGET}) would be the minimum rebuilding time to achieve B_{MSY} (T_{MIN}) which is estimated to be 2057. There would be no bycatch of canary rockfish since there is no fishing-related mortality. Potential habitat impacts would be minimized by eliminating fishing effort. A subsequent decision-making process to implement the EFH provisions of the MSA would be utilized to determine if additional habitat based management measures were necessary to enhance productivity of the stock. The *Maximum Conservation* alternative has a 100% probability of rebuilding within T_{MAX}.

2.3 The *Maximum Harvest* Alternative

Under the *Maximum Harvest* alternative rebuilding would occur in the maximum allowable time (T_{MAX}), thereby allowing the maximum allowable harvest under rebuilding. While there would still be a significant impact expected on existing shelf fisheries and dependent fishing communities, it would be minimal relative to all rebuilding alternatives because this alternative has the slowest legal rebuilding schedule allowed by the FMP, MSA, and the National Standard Guidelines. The target rebuilding period (T_{TARGET}) would be T_{MAX} with the median year of reaching B_{MSY} projected to be 2076. The *Maximum Harvest* alternative has a 50% probability of rebuilding within T_{MAX}. The total catch OY would be calculated using a fishing mortality rate of 0.022. Depth-based or other area fishing restrictions might still be considered under the *Maximum Harvest* alternative, but they would be more liberal in time and area relative to other rebuilding alternatives. It is also assumed that small footrope restrictions on bottom trawls would still be needed.

2.4 The *Council Interim* Alternative

Under the *Council Interim* alternative there would be a 60% probability of rebuilding within T_{MAX}. This alternative was the one the Council selected in September 2002 when setting the 2003 groundfish annual harvest specifications and management measures as its preferred alternative for rebuilding darkblotched rockfish. The target rebuilding year (T_{TARGET}) would be 2074 under this alternative. The total catch OY would be calculated using a fishing mortality rate of 0.022. Depth-based restrictions and mandatory use of small footropes in bottom trawls operating in primary canary rockfish habitats, such as adopted for 2003 management, are measures anticipated to be needed to manage canary rockfish under harvest levels associated with the *Council Interim* alternative.

2.5 The *Mixed Stock Exception* Alternative

The Mixed Stock Exception is a provision in National Standard Guideline 1 allowing an increased OY above the overfishing level as long as the harvest meets certain standards. Harvesting one species of a mixed-stock complex at its optimum level may result in the overfishing of another stock component in the complex. The Council may decide to permit this type of overfishing only if all of the following conditions are satisfied:

(a) The Council demonstrates by analysis that such action will result in long-term net benefits to the Nation.
(b) The Council demonstrates by analysis that mitigating measures have been considered and that a similar level of long-term net benefits cannot be achieved by modifying fleet behavior, gear selection/ configuration, or other technical characteristic in a manner such that no overfishing would occur.
(c) The resulting rate or level of fishing mortality will not cause any species or evolutionarily significant unit thereof to require protection under the Endangered Species Act.

Since the west coast canary rockfish stock is the most binding constraint to most shelf fisheries north of Cape Mendocino, California at 40°10' N. lat., canary may be considered to meet the standards of the Mixed Stock Exception provision. While the Council has the authority to recommend a harvest level under a Mixed Stock Exception, this rebuilding plan assumes a level of harvest estimated to maintain the current spawning stock biomass at equilibrium for the next 100 years. In this case, spawning stock biomass is not projected to decline or increase in that time.

2.6 Alternatives Considered But Rejected

Any alternatives 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 (*Natural Resources Defense Council v. Daley, April 25, 2000, U.S. Court of Appeals for the District of Columbia Circuit*). Such alternatives are not analyzed in this rebuilding plan. The *No Action* alternative has a probability of rebuilding to B_{MSY} of less than 50%, but is still analyzed as per NEPA requirements.

3.0 AFFECTED ENVIRONMENT

3.1 Physical Environment

3.1.1 Canary Rockfish Habitat

Canary rockfish are found between Cape Colnett, Baja, California, and southeastern Alaska (Boehlert 1980; Boehlert and Kappenman 1980; Hart 1988; Love 1991; Miller and Lea 1972; Richardson and Laroche 1979). They are considered a middle shelf-mesobenthal species. There is a major population concentration of between latitude 44°30' N. lat. and 45° N. lat. off Oregon (Richardson and Laroche 1979). Canary rockfish have a depth range from the surface to 274 m, but primarily inhabit waters 91 m to 183 m (50 fm to 100 fm) deep (Boehlert and Kappenman 1980). A Washington Department of Fish and Wildlife (WDFW) analysis of trawl logbooks indicated most catch of canary rockfish occurred in depths of 50-150 fathoms (Table 3.2-4 in Part II - Draft Darkblotched Rebuilding Plan; Figure 3.1-1). Canary rockfish are densely aggregating, and are most abundant above hard bottoms. They are often seen hovering above sand or small rock piles.

In general, canary rockfish 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 1980). Canary rockfish appear to be a reef-associated species in the southern part of its range (Boehlert and Kappenman 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). Larvae can be captured over a wide area, from 13-306 km offshore in neritic and oceanic habitats. Pelagic juveniles occur mostly beyond the continental shelf. Young-of-the-year can also be found in tide pools. Juveniles descend into deeper water as they mature. Adults continue to move deeper with age and also are capable of major latitudinal movements.

No information is available on habitat needs during the mating stage. Parturition occurs from November through March, probably within adult habitat.

3.1.2 Human Effects on Rockfish Habitat

See Section 3.1.2 in Part II -Draft Darkblotched Rockfish Rebuilding Plan.

3.2 Biological Environment

3.2.1 Affected Stocks

3.2.1.1 Canary Rockfish Life History

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). Very little is known about the early life history strategies of canary rockfish, but limited research indicates larvae which are strictly pelagic (near ocean surface) for a short period of time, begin to migrate to demersal waters during the summer of their first year of life and 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. Adult canary rockfish feed primarily on small fishes, as well as planktonic creatures, such as krill and euphausiids (Love 1991; Phillips 1964).

3.2.1.2 Canary Rockfish Stock Status

Canary rockfish were first assessed on the west coast in 1984, but the assessment was more a qualitative trend analysis using survey and catch data (Golden and Demory 1984). Highly variable or unavailable sample data precluded a more quantitative approach. This assessment concluded that the stock was stable and the ABC and management measures in place were adequate.

The 1990 canary rockfish stock assessment (Golden and Wood 1990) was the first to use the Stock Synthesis Model (Methot 1990) and a catch-at-age analysis. Data sources in this assessment included commercial landings (1967-89), fishery age distribution (1980-88), a commercial trawl effort index from logbooks (1980-87), a CPUE index from the NMFS trawl survey (1977-89), and size distribution data from the survey (1977-89). Only the canary rockfish resource in the Columbia INPFC area was modeled. Golden and Wood {1990 #641} were the first to offer competing hypotheses to explain the lack of older females in the population. These two hypotheses, which have still not been resolved, are that older females have a higher natural mortality than older males or they are less susceptible to capture by fishing gears than older males. This assessment indicated that stock biomass had declined in the Columbia INPFC area.

The next canary rockfish assessment was in 1994 (Sampson and Stewart 1994). An age-based version of the Stock Synthesis Model was used to assess the status of the resource in the Columbia and U.S. Vancouver INPFC areas. All of the same data sources from the previous assessment were updated and used except the trawl effort index because of sample and estimation biases associated with logbook data. Results indicated that harvest rate exceeded the $F_{20\%}$ overfishing threshold and a reduction in the ABC was recommended. The assessment was updated in 1996 (Sampson 1996). It verified continued exploitation in excess of the $F_{20\%}$ threshold.

Two age-based stock assessments in 1999 documented the stock had declined below the overfished level ($B_{25\%}$) in the northern area {Columbia and U.S. Vancouver INPFC areas; /Crone, 1999 #250} and in the southern area {Conception, Monterey, and Eureka INPFC areas; /Williams, 1999 #506} and 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.

A new assessment was done coastwide in 2002 for canary rockfish, treating the stock as a single unit from the Monterey INPFC area north through the U.S. Vancouver INPFC area, and thus, departing from the methodologies of past assessments (Methot and Piner 2002b). 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. They also determined the areas of highest canary rockfish density were off headlands that separate INPFC areas, which would tend to bias results if the assessment was stratified by INPFC area. A critical uncertainty in canary rockfish assessments is the lack of older, mature females in surveys and other assessment indices. There 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, because older females hide in places inaccessible to the gear, for example. 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 {2002 #424} 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 (the model determines the selectivity of survey and fishery gear as opposed to assuming a fixed selectivity). They estimated the 2002 abundance of canary rockfish coastwide was about 8% of B_0. The historical time series of canary rockfish recruitments and spawning biomass is shown in Figure 3.2-1.

3.2.1.3 Species Co-occurring With Canary Rockfish

Table 3.2-4 in the Draft Darkblotched Rockfish Rebuilding Plan (Part II) shows the groundfish species managed under the FMP. Those species with an overlapping distribution in the 50-150 fm depth range where canary rockfish are considered co-occurring. This includes most of the rockfish species (*Sebastes* spp.) managed under the FMP as well as some commercially important flatfish species such as Dover sole (*Microstomus pacificus*) that make seasonal migrations on the shelf. Of the *Sebastes* species that co-occur with canary rockfish, four are overfished. These are bocaccio (*S. paucispinis*), cowcod (*S. levi*), widow rockfish (*S. entomelas*), and yelloweye rockfish (*S. ruberrimus*). Canary rockfish often associate with yellowtail (*S. flavidus*), widow, and silvergray rockfish (*S. brevispinis*). Important roundfish species that also occur with canary rockfish are sablefish (*Anoplopoma fimbria*), which make seasonal migrations on the shelf and lingcod (*Ophiodon elongatus*), another overfished groundfish species (see Part V - Draft Lingcod Rebuilding Plan).

3.3 Socioeconomic Environment

3.3.1 Management Regime

3.3.1.1 Management History

Canary rockfish exploitation began in the early 1940s when World War II increased demand for protein (Alverson *et al.* 1964; Browning 1980). Through this decade the trawl fishery expanded in Oregon and Washington accounting for most of the canary rockfish catch then, while rockfish were primarily targeted using longlines in California. The primary gear type to harvest canary rockfish has historically been trawls, followed by hook and line (primarily vertical longline), shrimp trawls, and other gears such as pots and traps. Foreign trawlers were responsible for most of the harvest in the 1966-76 period (Table 3.2-2), but the fishery transitioned to a domestic one after passage of the MSA in 1977. Canary rockfish has become an important recreational target in recent years north of Cape Mendocino.

Annual catches of canary rockfish dropped substantially from the late 1940s through the mid-1960s when foreign fleets started fishing off the west coast and averaged less than 500 mt {Figure 3.3-1; /Golden, 1990 #641}. High Asian demand for rockfish resulted in catches that averaged between 2,000 and 4,000 mt per year from the late 1960s through the early 1990s. In 1983, a 40,000 lb trip limit was imposed on the *Sebastes* complex for the Columbia and U.S. Vancouver INPFC areas. Canary rockfish were managed as part of this complex, so this represented the first regulation of canary harvest. Sampson and Stewart {1994 #642} recommended a reduced ABC for canary for 1995 to decrease the harvest rate which was estimated to be greater than the overfishing threshold of $F_{20\%}$. Beginning in 1995 the canary rockfish ABC was reduced by nearly 60%; this harvest level (ABC) has remained at about 1,000 mt since.

The first species-specific trip limit was also imposed for canary rockfish in 1995 (6,000 lb/month) when the stock was first required to be sorted from the other *Sebastes*. In 1998, canary rockfish were still managed as part of the *Sebastes* complex, but no more than 15,000 lb of the 40,000 two-month cumulative limit of *Sebastes* could be canary. Since 1998, commercial harvest of canary rockfish has been drastically reduced. The stock is managed separately from the *Sebastes* complex with its own total catch OY. There is no commercial targeting of canary and the total catch OY is managed for incidental catch or bycatch. Small footrope trawls were required beginning in 2000 to land shelf rockfish. This gear restriction eliminated trawl targeting of shelf rockfish since bottom trawls with small footropes would be destroyed if they were to venture into high relief habitats.

In 2003, the new assessment by Methot and Piner {2002 #424} indicated a more pessimistic outlook for canary rockfish. The total catch OY was reduced by about half from the 2000-02 period resulting in implementation of significantly conservative management measures. Depth-based restrictions were put in place to avoid canary rockfish and other overfished groundfish species. No retention regulations were imposed for fixed gear commercial fisheries (line gears can more readily target canary in high relief habitats) and reduced bag limits were imposed on recreational fisheries. A small trip limit was adopted for the limited entry trawl fishery to allow landings of incidentally-caught canary rockfish that would otherwise be discarded at sea. Shrimp trawls were required to have fish excluders or bycatch reduction devices (BRDs) year round starting in 2003. Previously, BRDs were required inseason when the shrimp fishery reached their canary rockfish harvest guideline.

3.3.1.2 Data Systems

Catch Monitoring

See section 3.3.1.2 in Part II - Draft Darkblotched Rockfish Rebuilding Plan.

Monitoring Commercial Landings

See section 3.3.1.2 in Part II - Draft Darkblotched Rockfish Rebuilding Plan.

Discard Estimation

See section 3.3.1.2 in Part II - Draft Darkblotched Rockfish Rebuilding Plan. Table 3.3-1 depicts the depth-based bycatch rates from the Hastie trawl bycatch model {Hastie, 2001 #17} that are applied to landed weight of the target species to estimate seasonal bycatch of canary rockfish.

Monitoring Recreational Catch

Recreational catch is monitored by the states as it is landed in port. These data are compiled by the Pacific States Marine Fisheries Commission (PSMFC) in the Recreational Fisheries Information Network (RecFIN) database. The types of data compiled in RecFIN include sampled biological data, estimates of landed catch plus discards, and economic data. These data are readily available to managers, assessment scientists, and the general public in prepared reports that can be accessed on the Internet (http://www.psmfc.org/recfin/index.html).

The Marine Recreational Fisheries Statistics Survey (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 were 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/charterboat (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. However, the requisite precision for managing for the low OYs of overfished species like canary rockfish and bocaccio was still lacking. Therefore, the Council and west coast states lobbied for a different system to replace MRFSS on the west coast. NMFS agreed and a new catch and effort estimation season is being developed.

Washington and Oregon have used the MRFSS system as a supplement to their port sampling programs from which most of their recreational catch estimates are derived. California has had a greater dependence on MRFSS to estimate their recreational catch. One outcome of this dependent are highly uncertain catch estimates of California recreational catch. This has likely compromised efforts to control total mortality of recreational groundfish species in California such as bocaccio and canary rockfish.

The Stock Assessment Process

See section 3.3.1.2 in Part II - Draft Darkblotched Rockfish Rebuilding Plan.

Research Fisheries

See section 3.3.1.2 in Part II - Draft Darkblotched Rockfish Rebuilding Plan.

3.3.1.3 Enforcement

See section 3.3.1.3 in Part II - Draft Darkblotched Rockfish Rebuilding Plan.

3.3.1.4 Canary Rockfish Constraint Over Time

[NOTE: This is a relatively brief section. Mainly a place holder to maintain parallel structure between Chapter 3 and 4. The bulk of the discussion of how things vary over time between rebuilding options will be in Chapter 4. Authors anticipate adding to this section if, in developing the Chapter 4 discussion, it turns out there is additional background information needed that has not been developed in other sections of Chapter 3. They will also consider expanding some of the ideas placed here if they are not already developed elsewhere and it is decided this is the best section to do it in.]

The degree to which canary rockfish is the constraining factor which shapes fishery regulations may vary through time. Since canary rockfish are taken in mixed stock fisheries, if during a period of time the regulations necessary to protect other species provide sufficient protection to canary, then target harvest mortality levels for canary rockfish will not affect the regulatory regime. On the other hand, if regulations necessary to protect other species provide inadequate protection for canary rockfish then the need to protect canary rockfish may be a driving factor which shapes the regulatory regime. The degree to which canary is a constraint is largely a function of canary rockfish productivity (Sections 3.2.1 and 3.2.2) relative to other stocks in shelf assemblages and the ratio in which canary is taken relative to other stocks in the assemblage (Section 3.3.1.2). The assemblages in which canary rockfish are taken are discussed in the following section.

3.3.1.5 Complex Values and Allocation Among Sectors Over Time

List the complexes in which canary is taken.
Provide data on the economic value per pound of canary in each complex.
Provide total values of the complexes in 1998 and 200?.

<u>Distribution Among Commercial Sectors</u>

<u>Groundfish Complexes in Which Canary Rockfish are Harvested</u>

<u>Directed - Trawl DTS</u>

<u>Directed - Trawl Flatfish</u>

<u>Incidental - Trawl Whiting</u>

<u>Incidental - Fixed Gear</u>

<u>Incidental - Pink Shrimp</u>

<u>Unit Value of Harvest Complexes</u>

- on a value per mt of canary basis (marginal value)
- valid only over the range within which other constraints are not encountered

<u>Total Value of Harvest Complexes (1998, 2001,2002)</u>

3.3.1.6 Managing with Risk and Uncertainty

See section 3.3.1.6 in Part II - Draft Darkblotched Rockfish Rebuilding Plan.

3.3.2 Aggregate Commercial Catch and Recreational Effort for First Year of Management–Coastwide

3.3.3 Primary Producers - Commercial Vessels

To be completed before public review.

3.3.4 Commercial Distribution Chain

3.3.4.1 Buyers and Processors

To be completed before public review

3.3.4.2 Markets

To be completed before public review

3.3.5 Recreational Fishery - Charter and Private Vessel Sectors

To be completed before public review.

3.3.6 Tribal Fishery

To be completed before public review.

3.3.7 Communities

To be completed before public review.

3.3.8Net Economic Benefits- Cost Benefit Analysis

To be completed before public review.

4.0 ENVIRONMENTAL CONSEQUENCES

This rebuilding plan EIS analyzes the effects of alternative strategies for rebuilding canary rockfish on the probability of successful stock rebuilding, co-occurring species, affected habitat, and the socioeconomic environment (Table 4-1).

4.1 Affected Canary Rockfish Habitat Including Essential Fish Habitat

The same assumptions regarding relative fishing intensity of rebuilding alternatives discussed in section 4.1 of the draft darkblotched rebuilding plan (Part II) apply for canary rockfish. The *Mixed Stock Exception* alternative for canary rockfish is assumed to have the greatest relative negative impact of all alternatives analyzed in this rebuilding plan since more fishing effort is implied (Table 4-1).

4.2 Affected Biological Environment

Since canary are the binding constraint for shelf fisheries north of Cape Mendocino, all co-occurring species on the northern shelf will be affected by canary rebuilding. Lingcod are overfished and should recover faster with the fishery constraints imposed by measures implemented to rebuild canary. The exploitation rates that caused overfishing for canary and lingcod are likely to have caused overfishing for some of the other unassessed shelf species, especially rockfish species.

Rebuilding canary rockfish will significantly constrain harvests on the West coast, especially north of Cape Mendocino since the bocaccio stock is the binding constraint on the southern shelf. Harvest levels considered for 2003 are about half those used in annual management since canary rockfish rebuilding measures were first adopted in 2001. Although canary rockfish are a rocky reef shelf species, they are readily caught in midwater trawl fisheries at times, such as those trawl fisheries targeting yellowtail rockfish and pink shrimp. The small footrope restrictions imposed for groundfish trawls landing shelf rockfish, and considerations for hard-grate finfish excluders in shrimp trawls in recent years were largely influenced by the need to reduce canary rockfish bycatch. Low sublimits in west coast marine recreational fisheries and no retention regulations (or low landing limits) in commercial fisheries were also imposed to reduce canary rockfish targeting and bycatch. Reducing canary fishing mortality in 2003 to about half will require a much more conservative management regime. Bocaccio rebuilding measures considered for 2003 and beyond will likely benefit canary rockfish rebuilding in the southern end of their range. However, further constraints to shelf fisheries north of Cape Mendocino are likely needed.

Methot and Piner (2002b) describe the uncertainties inherent in the canary rockfish assessment. Foremost, estimating past recruitment and predicting future recruitment provide the basis for any understanding of the productive potential of the stock and the ability to sustain harvest. The strong pattern of declining recruitment at low spawning stock levels was noted in previous assessments (Crone *et al.* 1999; Williams *et al.* 1999) and is now quantified by fitting a spawner-recruitment curve. This curve allows calculation of MSY, the fishing mortality rate that would produce MSY (F_{MSY}), and the equilibrium level of spawning stock biomass associated with MSY (B_{MSY}). The curve also provides a basis for calculation of the level of unfished recruitment (R_0) and projection of recruitment levels into the future.

The critical factor influencing the rate of rebuilding is the degree to which recruitments will be above the replacement level, thus able to rebuild the stock and potentially support a small harvest during rebuilding. Since the level of recruitment is not much above the replacement level (Figure 4.2-3), rebuilding will be extremely slow. The expected level of recruitment is determined by the steepness parameter of the Beverton-Holt formula. Methot and Piner (2002a) provide results for three levels of steepness: the steepness level initially estimated within the model (0.289, lower dashed line in Figure 4.2-3), the best-estimate of steepness obtained from a focused examination of the recruitment-spawner information (0.33, solid line), and a higher steepness level (0.36, upper dashed line), which provides a contrast to the 0.289 level. If steepness is 0.289, rather than 0.33, then T_{MIN} is extended by 20 years. Steepness levels near 0.7 are normal, and Dorn's (1995) review of steepness for rockfish found an average value near 0.6 when he included rockfishes off Alaska and off the West coast. If future steepness for canary rockfish increases to 0.5, rebuilding will accelerate, but will still have a T_{MIN} that is 30 years away. Methot and Piner (Methot and Piner 2002a) attest a steepness of 0.33 is the best estimate of the level of recruitment to be expected as the stock begins to rebuild.

This low level of steepness is conditional upon all the downward trend in recruitment being caused by the decline in spawner abundance. Other fish species often have steepness levels near 0.7 (Myers *et al.* 1999) and Dorn's (2000) meta-analysis of rockfish found a level of approximately 0.67. If some of this recruitment downtrend for canary rockfish has been because of long-term shifts in the ocean climate, then it is possible a future shift in the ocean climate will cause an upward shift in recruitment, and future estimates of the spawner-recruitment steepness will be higher and representative of a longer-term environmental average. As an illustration of such a shift, a spawner-recruitment curve with steepness of 0.5 is shown on Figure 4.2-3 Although there are signs of a shift in the ocean climate towards a more productive regime in 1999 and evidence of stronger sablefish, whiting, and salmon survival in 1999, there is yet no evidence of such a shift for canary rockfish.

The assessment area extends northward to the U.S./Canada border, but the trawl survey which extends northward to about 49° N latitude shows that canary rockfish abundance is often high near the border. Canadian catch has been near 200 mt in recent years, so the combined impact of the U.S. and Canadian fisheries could be greater than the levels forecast here as necessary for rebuilding. A combined U.S. and Canadian stock assessment is advised to improve the estimate of total fishery impact.

4.3 Affected Socioeconomic Environment

4.3.1 Controlling Fishing-Related Mortality of Canary Rockfish

Successful stock rebuilding depends on the ability of management/rebuilding measures to effectively control all sources of fishing-related mortality, including landed catch and bycatch. All rebuilding alternatives analyzed in this EIS has a calculated total catch OY to accommodate landings of unavoidable incidental catch of canary rockfish (except the *Maximum Conservation* alternative which has a total catch OY of 0 mt). The effectiveness of all rebuilding strategies (given the probabilistic trajectories of future increases in biomass relative to B_{MSY}) depends on managing canary fishing-related mortality within prescribed total catch OYs. Landed catch allowances for all overfished species are designed to minimize target opportunities on these species while allowing landings of unavoidable bycatch that would otherwise be discarded dead at sea. Management measures consistent with rebuilding should have harvest control rules that are enforceable and effectively stay within total catch targets. Harvest control rules and management measures commensurate with alternative rebuilding strategies are analyzed qualitatively in this rebuilding plan EIS. Potential management measures that are likely to reduce sources of fishing-related mortality are also discussed. A "bycatch scorecard" of all expected sources of total mortality of overfished species is shown in Table 4.3-1 in the Draft Darkblotched Rockfish Rebuilding Plan (Part II).

4.3.1.1 Landed Catch Accounting and Control

See section 4.3.1.1 in Part II - Draft Darkblotched Rockfish Rebuilding Plan.

4.3.1.2 Bycatch Accounting and Control

All rebuilding plan alternatives except *No Action* and *Maximum Conservation* use the mid range of bycatch rates estimated in the Hastie model to estimate canary bycatch (Table 3.3-1). The *No Action* alternative assumes a 16% bycatch/discard rate for canary. This is a proxy for canary that was originally estimated for widow rockfish from trawl observations in the mid-1980s {Pikitch, 1988 #20}. The *Maximum Conservation* does not rely on modeled bycatch or any other bycatch accounting mechanism since all fishing-related mortality is eliminated. It is anticipated that all rebuilding alternatives will benefit from direct observations of bycatch. While the initial observer data report from the NWFSC is hardly a definitive picture of canary rockfish bycatch dynamics (at least until the dataset is robust across all key strata), it does raise a serious caution flag for canary rockfish. It appears from the aggregated data that actual canary bycatch rates in the groundfish trawl sector are larger than modeled in the Hastie bycatch model. This may be a significant concern as observer-based bycatch rates are used in management. Given the significant constraints already imposed on west coast shelf fisheries, there may be further constraints once the bycatch accounting of canary rockfish is sorted out.

4.3.1.3 Potential Rebuilding Measures to Consider

Potential rebuilding measures to consider for canary rockfish include all those discussed in the Draft

Darkblotched Rockfish Rebuilding Plan (Part II). However, many more groundfish and non-groundfish fisheries are potentially affected by canary rockfish rebuilding. These include groundfish trawl, fixed gear, recreational, exempt trawl (i.e., pink shrimp), and even research fisheries. There is also a significant bycatch of canary in the widow/yellowtail midwater fishery as well as the shoreside whiting fishery at times.

The depth restrictions considered in the darkblotched plan are similar in concept to those that should be considered for canary except nearshore and shelf depths would be considered for fishery closures. The maximum protection to canary would come from closing the shelf and nearshore from the beach where juveniles occur to about 150 fm. However, most of the population, especially spawners reside in the 50-150 fm zone. Some sources of information such as trawl logbooks suggest that canary are found in shallower waters within this depth zone during summer months and closer to the outer shelf at the deep end of their depth range at other times of the year.

For whatever reason, canary rockfish have been observed to disperse from the rocky reefs, pinnacles, and other high relief habitats they normally occur into areas not typically associated with rockfish such as flat, muddy bottoms. In 1999 about 36 mt of canary were caught in west coast pink shrimp fisheries. While mandatory use of excluders in shrimp trawls will probably prevent a re-occurrence of such a high bycatch, it was odd to catch so many canary rockfish in a fishery that typically deploys their gear over soft substrates. This apparently aberrant behavior, coupled with the low OYs associated with canary rebuilding, threatens many year round fishing opportunities.

Approach to Analysis and Modeling Assumptions

Models used to develop regulations for the 2003 fishery were used to project harvest regulations in the first year of management under the different rebuilding options. Using the depth management regime recommended by the Council for the 2003 fishery and assuming that all other overfished species had been rebuilt, an analysis was conducted to evaluate the degree to which the fishery would be constrained by each particular overfished species under each rebuilding option for that species. Assuming average conditions and response to reduction in harvest mortality, the firs year of the rebuilding plan should be the year that is most constrained.

A number of assumptions have been made in order to project the regulatory the framework. For example, some of the analyses that follow assume that all other presently overfished stocks, with the exception of the subject stock, are rebuilt and are being harvested at a long-term, sustainable level. Proxy values for F_{MSY} and B_{MSY} were generally used to determine proxy estimates of "MSY" for these analyses. The proxy F_{MSY} for overfished rockfish species is generally $F_{50\%}$, i.e. the harvest rate that corresponds to the spawning output being reduced to 50% of its unfished equilibrium level (B_0) assuming recruitment is independent of spawning output. Because some decline in recruitment is expected as the spawning stock declines, the equilibrium spawning biomass that will result from a $F_{50\%}$ harvest rate will be probably be somewhat less than $B_{50\%}$, and presumably near $B_{40\%}$, the rebuilding target and generally considered a reasonable proxy for B_{MSY}.

$F_{45\%}$ was used to define harvest rates for calculating proxy MSY levels for lingcod and Pacific whiting. These proxy MSY harvest rates were recommended by participants in the West Coast Groundfish Harvest Rate Policy Workshop that was sponsored by the SSC, and adopted by Council action in 2000 (PFMC 2000). Considered risk-neutral, these harvest rates were substantially lower than those previously used to manage groundfish stocks. They are considered to meet the MSA mandate to "...achieve and maintain, on a continuing basis, the optimal yield from each fishery...".

MSY proxies used in the following economic analyses were derived by simply calculating the yield that corresponds to applying the proxy F_{MSY} to $B_{40\%}$, the proxy B_{MSY}. An exception to the use of proxy estimates is the approach used to estimate F_{MSY} rates and MSY for canary rockfish and yelloweye rockfish. For these species, F_{MSY} was estimated by fitting a spawner-recruit curve and finding the fishing mortality rate at which yield is maximized. Converted to units of $F_{x\%}$, the estimates of F_{MSY} for canary rockfish and yelloweye rockfish are $F_{73\%}$ and $F_{57\%}$ respectively (Methot and Piner 2002a; Methot *et al.* 2002). These F_{MSY} rates for canary and yelloweye were applied to the $B_{40\%}$ biomass level because that is the target biomass level for rebuilding, and the calculated B_{MSY} levels were near $B_{40\%}$.

Note: These MSY estimates should be interpreted with great caution. While these proxy MSY estimates were developed for informing the rebuilding plan economic analyses, they should not to be applied to consideration of long-term management options for West coast groundfish. Evidence of low productivity for many of the overfished rockfish stocks suggests that the proxy F_{MSY} rates may overestimate true F_{MSY} as well as MSY. For instance, the 2002 bocaccio assessment (MacCall 2002) indicated that the productivity of the bocaccio stock in waters off southern and central California was so low that rebuilding could not occur according to the National Standard Guidelines (i.e., P_{MAX} was less than 50%, even with no harvest, over more than 100 years). Clearly, a harvest rate of $F_{50\%}$ is too aggressive for such an unproductive stock, just as it is too aggressive for canary rockfish and yelloweye rockfish that had F_{MSY} estimates lower than $F_{50\%}$. In other words, the current information on the productivity of bocaccio indicates that the stock would decline if fished at $F_{50\%}$ after it is rebuilt to the $B_{40\%}$ level. Unlike canary rockfish and yelloweye rockfish, the fit of a stock-recruit curve to the spawner-recruit data for bocaccio was inadequate to allow F_{MSY} to be estimated directly. Therefore, the proxy F_{MSY} rate for bocaccio is not considered to be realistic, nor is there a straightforward way to estimate a more appropriate value. This qualification may also be true for other overfished rockfish stocks.

4.3.1.4 Canary Constraint Over Time

To be completed before public review.

4.3.1.5 Complex Values and Allocation Among Sectors Over Time

- Discuss how the marginal value of canary varies between complexes and identify the total value of the complexes if harvested at a rate allowed by the next most constraining non-overfished species.
- Point out that the Council will likely vary the allocation between different fisheries over the period of the rebuilding plan based on changing information about bycatch rates and changing marginal values and changes in limiting species that affect the amount of the complex available.
- Discuss how the Council might take equity, geographic and other social factors into account so that a fishery that consumes canary at a high rate may not be totally shut down.

4.3.1.6 Uncertainty

Rebuilding analyses are stochastic by nature. Harvest rate management variables are derived from hundreds of simulations which together indicate the probability of rebuilding an overfished stock within a fixed time period and harvest regime. Characterizing these stochastic indicators as deterministic biomass and OY trajectories implies a level of certainty that is not supported by the rebuilding analysis.

4.3.2 Aggregate Commercial Catch and Recreational Effort for First Year of Management-Coastwide

To be completed before public review.

4.3.3 Primary Producers - Commercial Vessels

To be completed before public review.

4.3.4 Commercial Distribution Chain

To be completed before public review.

4.3.4.1 Buyers and Processors

To be completed before public review.

4.3.4.2 Markets

To be completed before public review.

4.3.5 Recreational Fishery

To be completed before public review.

4.3.6 Tribal fishery

To be completed before public review.

4.3.7 Communities

To be completed before public review.

4.3.8 Cost Benefit Summary

To be completed before public review.

Include nonmarket, existence and other social values in the summary. Largely qualitative, illustrating tradeoffs.

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Rebuilding Analysis for Canary Rockfish: Update to Incorporate Results of Coastwide Assessment in 2002

June 2002

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Summary

The rebuilding analysis for canary rockfish was first conducted in 2000 based on the 1999 stock assessment. This document updates the analysis based upon the 2002 assessment.

The target spawning stock biomass is 40% of the unfished spawning stock biomass (Bzero). The method to calculate Bzero is improved to incorporate more historical information and results in a higher level than estimated in 2000. Spawning stock abundance reached a low of 6.6% of the unfished level in 2000, the year of the overfished declaration. By 2002 it had increased to 7.9%.

The mean generation time is 19 years. The time to rebuild with no fishing is year 2057. This is longer than the previous estimate of 2041 primarily because of the higher Bzero level.

The rate of rebuilding is based on the estimated spawner-recruitment relationship with steepness of 0.33. Based on this relationship, Fmsy = F73%; MSY = 622 mt; Bmsy = 45% of Bzero; and ABC in 2003 is 116 mt at the estimated Fmsy and 256 mt at the default F50% proxy for Fmsy.

The table below shows the initial OY associated with a range of rebuilding targets.

Pr(rebuild by 2076)	Year to 50% Pr(rebuild)	OY in 2003
50%	2076	45 mt
60%	2074	41 mt
70%	2071	36 mt
80%	2068	30 mt

Rate of rebuilding is most sensitive to the steepness of the spawner-recruitment relationship. Improved ocean conditions could cause higher steepness, but no evidence yet. The level of allowable catch during rebuilding is sensitive to the recreational:commercial allocation because of their difference in selectivity for young versus old fish.

Introduction

The stock assessment for canary rockfish in 1999 documented that the stock had declined below the overfished level (25% of Bzero) in the northern area (Columbia and U.S. Vancouver INPFC areas; Crone et al., 1999) and in the southern area (Williams et al., 1999). Canary rockfish was determined to be in an "overfished" state on Jan. 1, 2000 which initiated development of a rebuilding plan. The first rebuilding analysis (Methot, 2000) 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 catch (93 mt) throughout the rebuilding period.

The purpose of this document is to use results of the updated canary rockfish stock assessment (Methot and Piner, 2002) to update estimates of the potential rate of rebuilding of canary rockfish. The basic results of this assessment are summarized in the Assessment Summary below. In addition to using results from the updated assessment, the following changes were made at the request of the Council's Groundfish Management Team:

a. Use a constant exploitation rate, as in most other rebuilding plans, rather than a constant catch;
b. Evaluate sensitivity to the allocation between recreational and commercial fishing sectors.

The rebuilding analysis was conducted using software developed by A. Punt (version 2.0). The analysis involves six steps:

(1) examine the recruitment-spawner information to determine levels of historical and current recruitment;
(2) determine unfished level of spawning biomass (Bzero) in order to calculate target levels for rebuilding (Btarget);
(3) calculate the generation time (Gentim), which affects the maximum allowable duration of rebuilding;
(4) determine expected levels of recruitment during the rebuilding period;
(5) calculate the time to 50% probability of rebuilding with no fishing mortality (Tmin);
(6) finally, calculate the year to 50% probability of rebuilding (Ttarget) associated with various levels of fishing mortality. This is subject to the constraint that Ttarget must be no more than Tmax. Tmax is 10 years if Tmin is less than 10 years, and is Tmin plus Gentim otherwise. The selection of Ttarget between Tmin and Tmax is a management decision and is beyond the scope of the rebuilding analysis.

Assessment Summary

The updated assessment for canary rockfish (Methot and Piner, 2002) has several features that influence the rebuilding analysis:

1. The assessment is now coastwide (California to Washington) so the ad hoc adjustment for the southern area is not needed as it was in Methot (2000). The previous assessments (Crone et al., 1999; Williams et al., 1999) did not have a strong biological rationale for the north-south split, and the present assessment's review of patterns in growth and distribution does not support a split at the Eureka-Columbia border. However, uncertainty regarding the contribution of canary rockfish in Canada to the U.S. assessment area remains unresolved.

2. The previous dichotomy between natural mortality and dome-shaped selectivity to explain the low occurrence of old females is blended into one assessment scenario that links female natural mortality to maturation and allows for dome-shaped selectivity. This does not fully resolve the issue, but does eliminate the need for a rebuilding analysis for each mortality/selectivity scenario.

3. The assessment start year was moved from 1967 back to 1941 because the previous assessment had found that historical catch levels were relatively large and that the model was estimating a historical recruitment level that was greater than the recruitment level of the 1967-1977 period. The recruitment level from 1967-1977 had been used to estimate the unfished recruitment in the previous rebuilding analysis, but this level is now seen to be a better estimate of the recruitment level at MSY, which is substantially less than the unfished recruitment level.

4. The strong pattern of declining recruitment at low spawning stock levels was noted in the previous assessment and is now quantified by fitting a spawner-recruitment curve. This curve allows calculation of maximum long-term average yield (MSY), the fishing mortality rate that would produce MSY (Fmsy), and the equilibrium level of spawning stock biomass associated with MSY (Bmsy). The curve also provides a basis for calculation of the level of unfished recruitment (Rzero) and projection of recruitment levels into the future.

5. A large focus of the uncertainty in the previous rebuilding analysis was with regard to the magnitude of

recruitment from the 1995 to 1997 year classes as they appeared among the smallest size groups occurring in the 1998 trawl survey. The new assessment does not find these recruitments to be large in subsequent fishery and survey data, and the new method of projecting future recruitments from the spawner-recruitment curve diminishes the influence of any one year's estimate of recruitment.

Rebuilding Calculations

Spawner-Recruit Relationship

The level of recruitment has declined from a level of 3907 thousand fish in the unfished state, to 2549 thousand in 1967-1977, 1918 thousand during 1978-1993, and only 713 thousand during 1994-1999 (Table 1, Figure 1). As long as this lowest level of recruitment persists, the stock cannot rebuild to the 40% biomass level, even without fishing. However, the decline is considered to be primarily a result of the declining level of spawner abundance, so recruitment should increase as the spawning stock is rebuilt.

The critical factor influencing the rate of rebuilding is the degree to which recruitments will be above the replacement level, thus able to rebuild the stock and potentially support a small harvest during rebuilding. Since the level of recruitment is not much above the replacement level (Figure 2), rebuilding will be extremely slow. The expected level of recruitment is determined by the steepness parameter of the Beverton-Holt formula. The canary rockfish assessment in 2002 provides results for three levels of steepness: the steepness level initially estimated within the model (0.289, lower dashed line in Figure 2), the best-estimate of steepness obtained from a focused examination of the recruitment-spawner information (0.33, solid line), and a higher steepness level (0.36, upper dashed line) which provides a contrast to the 0.289 level. The steepness of 0.33 is the best estimate of the level of recruitment to be expected as the stock begins to rebuild.

This low level of steepness is conditional upon all the downward trend in recruitment being caused by the decline in spawner abundance. Other fish species often have steepness levels near 0.7 (Myers, 1999) and Dorn's (2000) meta-analysis of rockfish found a level of approximately 0.67. If some of this recruitment downtrend for canary rockfish has been because of long-term shifts in the ocean climate, then it is possible that a future shift in the ocean climate will cause an upward shift in recruitment and future estimates of the spawner-recruitment steepness will be higher and representative of a longer-term environmental average. As an illustration of such a shift, a spawner-recruitment curve with steepness of 0.5 is shown on Figure 2. Although there are signs of a shift in the ocean climate towards a more productive regime in 1999 and evidence of stronger sablefish, whiting, and salmon survival in 1999, there is yet no evidence of such a shift for canary rockfish. Only time will tell.

The year-to-year variability of recruitment is also important for the rebuilding analysis. The log-normal variability of recruitment about the curve is approximately 0.4, and this level will be used in the forecasts of future recruitment. This lognormal variability is used in lieu of resampling the from the individual year estimates of recruitment deviations.

ABC, Overfishing and Fmsy

The current Council policy for the calculation of ABC is to apply an exploitation rate based on F50%. This would be 256 mt in 2003. However, the calculation of the spawner-recruitment relationship demonstrates that F50% is not a sustainable harvest policy for canary rockfish because of the low spawner-recruitment steepness. The estimate of Fmsy is 0.0601 $year^{-1}$ and corresponds to F73% [2]. This rate would result in an ABC of 116 mt in 2003. Once rebuilt, fishing at F73% would be expected to produce an average catch of 622 mt from a biomass that would average 45% of the unfished level.

Unfished Abundance Level

The previous rebuilding analysis considered three possible methods for calculating the level of recruitment expected under unfished conditions. The selected method was based upon the estimated recruitments from the early (1967-1977) portion of the assessment time series, but an alternative based upon the

[2] This instantaneous fishing mortality rate is for the age(s) with selectivity equal to 1.0. Because of the dome-shaped selectivity pattern (Table 2), the rate for other ages is less.

model's higher estimate of initial recruitment levels was also considered. The new assessment starts in 1940 and provides stronger evidence that recruitment had already begun to decline by 1967. It shows that recruitment during 1967-1977 is at about the reduced level expected at MSY, rather than the higher level expected from an unfished stock. This higher, unfished level of recruitment is used as the basis for Bzero in this updated rebuilding analysis, although a comparative run will be made using the updated estimates of the 1967-1977 recruitments. Bzero is calculated as the product of the initial, unfished level of recruitment in the assessment model (3907 thousand fish) and the level of female spawning biomass per recruit that occurs in the absence of fishing (8.135).

Expected Recruitment Level
Three methods of calculating recruitment during rebuilding were considered. These are random resampling of observed recruitment levels, random resampling of observed levels of recruits/spawner (R/S) and random generation of lognormal deviations from the estimated spawner-recruitment relationship. The first method is not reasonable because of the large change in recruitment level observed during the time series. The second method has been used in some other rebuilding analyses and the previous canary rockfish analysis, but there are aspects of this approach that may not be the best that can be done with available information. In particular, it is difficult to objectively select the time frame of the recent period from which to re-sample. If it is short enough to accurately represent recent recruitment, it will not have enough observations to fully represent the frequency distribution of future possible recruitments. Also, this method incorporates no population compensation. . It is effectively a linear spawner-recruitment relationship, so leads to exponential population growth as the stock increases above its current low level.

The third method incorporates compensation in the form of the spawner-recruitment curve and was used in this rebuilding analysis. This third method has several desirable features:
1. Reproduces current low recruitment levels while spawning biomass remains low;
2. Smoothly increases mean recruitment (and decreases recruits per spawner) towards the unfished level as spawning biomass increases;
3. Parametric sampling from the lognormal distribution generates a smoother frequency distribution of future recruitments (in comparison to resampling from the model's time series of annual recruitment deviations) thus provides rebuilding calculations that are less sensitive to individual historical recruitment estimates.

Rebuilding in the Absence of Fishing - Tmin
The best estimate of the unfished time to 50% probability of rebuilding is the year 2057 (Tmin in Table 4 for the BASELINE MODEL column). The level of steepness greatly affects the time to rebuild: year 2049 with a steepness of 0.36, 2057 with the best steepness estimate of 0.33, and 2077 with a steepness of 0.289.

With the previous method for calculating the unfished biomass level, the target biomass level is lower and would be achieved more quickly. There is a 50% probability of achieving this lower level by 2044 (Table 3), which is only 3 years greater than the Tmin (2041) calculated in the initial canary rockfish rebuilding analysis (Methot, 2000). However, this lower target biomass level is not the best estimate of Bzero. In fact, the recruitment level that generates the previous Bzero level is close to the expected recruitment at MSY (Methot and Piner, 2002).

Generation Time
Generation time is calculated as the mean age of female spawners, weighted by age-specific spawn production (Table 2), in an unfished population. It is calculated to be 19 years in the new assessment in which female natural mortality increases at older ages in proportion to maturation. This is intermediate between the 16.8 and 24.7 years calculated for the two natural mortality scenarios in the 1999 assessment (Crone et al., 1999) and used in the 2000 rebuilding analysis. Note that the generation time was erroneously reported as 16 years in the June 2002 version of the 2002 assessment document.

Maximum Allowable Rebuilding Time - Tmax
With Tmin at 2057, the Tmax would be 19 years greater, or 2076. However, two years have elapsed since the stock was declared overfished. The low level of catch during these two years has a small, but unquantified, delay on Tmin. Consequently, the Ttarget (year with 50% expectation of achieving the rebuilt level) should be set less than Tmax.

Rebuilding with Fishing

If the exploitation rate is set to Fmsy, then the stock will not have a 50% probability of rebuilding until 2094, even with the 40:10 adjustment which would set the OY to zero until the stock rebuilt to the 10% biomass level. The year 2094 exceeds Tmax and does not meet the requirement to have a 50% probability of rebuilding before 2076.

At a reduced fishing mortality rate of 0.0242 year^{-1} there is a 50% probability of rebuilding by 2076 (Table 4), and the OY in 2003 would be 45 mt. This harvest level corresponds to the maximum permissible Ttarget.

Lower harvest rates will result in an earlier Ttarget year, a higher probability of being rebuilt by Tmax, and a lower OY in 2003 (Figure 4). Results shown in Figure 4 and Figure 5 are calculated for 50, 60, 70 and 80% probabilities of being rebuilt by Tmax. For these probabilities, the OY in 2003 ranges from 30 to 45 mt. By 2023, the range of expected OY would be 57 to 81 mt (Figure 5). These calculations at 50, 60, 70 and 80% are particular points along a continuum (Figure 4). If socio-economic considerations lead to the need to consider other levels, then interpolation form the results presented here is technically reasonable.

Because future recruitment will vary around the spawner-recruitment relationship (Figure 2), there is variability in the estimate of time to rebuild. Figure 6 shows this variability for a 60% probability of rebuilding

<u>Other Factors Affecting Rebuilding</u>
One factor affecting the level of allowable harvest during rebuilding is the age selectivity of the combined fisheries. Because recreational fisheries take younger fish, their per-ton impact on rebuilding is greater than that of the commercial fisheries which take a broad age range of older fish. Table 4 shows the trade-off for 80:20, 50:50, and 20:80 splits of catch between recreational and commercial fisheries.

The most significant factor affecting the rate of rebuilding, and the level of sustainable fishery post-rebuilding, is the steepness of the spawner-recruitment relationship. If steepness is 0.289, rather than 0.33, then the Tmin is extended by 20 years!. Steepness levels near 0.7 are normal and Dorn's (2000) review of steepness for rockfish found an average value near 0.6 when he included rockfishes off Alaska and off the west coast. If future steepness for canary rockfish increases to 0.5 rebuilding will accelerate, but will still have a Tmin that is 30 years away (Table 3).

The assessment area extends northward to the US-Canada border, but the trawl survey which extends northward to about 49° N shows that canary rockfish abundance is often high near the border. Canadian catch has been near 200 mt in recent years, so the combined impact of the US and Canadian fisheries could be greater than the levels forecast here as necessary for rebuilding. A combined US and Canadian stock assessment is advised to improve the estimate of total fishery impact.

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Table 1. Time series of canary rockfish abundance, recruitment and total catch as estimated in Methot and Piner (2002).

Year	Total Biomass	Female Spawning Biomass	Age 1 Recruitment	Exploitation Rate	Total Catch
Unfished	94062	31782	3907	0	0
Initial Equilibrium	85325	29848	3907	0.006	500
1941	85326	29848	3948	0.006	500
1942	85331	29847	3948	0.040	3363
1943	82235	28852	3948	0.043	3491
1944	79153	27860	3867	0.049	3842
1945	75842	26792	3783	0.060	4500
1946	71975	25538	3691	0.060	4296
1947	68496	24417	3579	0.059	4041
1948	65438	23449	3476	0.016	1069
1949	65720	23626	3384	0.016	1017
1950	66016	23829	3401	0.019	1223
1951	66029	23941	3420	0.023	1500
1952	65686	23919	3431	0.023	1474
1953	65325	23871	3429	0.025	1618
1954	64769	23725	3424	0.026	1657
1955	64147	23525	3410	0.026	1662
1956	63505	23294	3391	0.030	1878
1957	62625	22960	3369	0.032	1989
1958	61731	22577	5788	0.035	2156
1959	60790	22134	3750	0.032	1910
1960	60237	21803	3058	0.029	1760
1961	60040	21561	6281	0.025	1483
1962	60276	21481	2871	0.023	1388
1963	60670	21521	2703	0.026	1571
1964	60937	21582	5547	0.019	1129
1965	61668	21895	2116	0.018	1122
1966	62263	22268	1275	0.043	2690
1967	60889	22060	1271	0.032	1950
1968	60066	22142	2007	0.039	2331
1969	58585	22015	3467	0.027	1578
1970	57769	22078	3530	0.027	1542
1971	56881	21982	2795	0.028	1585
1972	55841	21662	1653	0.030	1682
1973	54592	21124	1973	0.046	2516
1974	52392	20159	3035	0.037	1918
1975	50859	19455	2182	0.038	1921
1976	49347	18792	2618	0.032	1561
1977	48302	18314	3513	0.046	2181
1978	46650	17622	1833	0.066	3060
1979	44149	16596	3158	0.091	3995
1980	40822	15246	3701	0.103	4138
1981	37514	13968	1288	0.086	3174
1982	35365	13106	2443	0.158	5538
1983	30699	11340	2134	0.160	4853
1984	26897	9883	1962	0.089	2361

Year	Total Biomass	Female Spawning Biomass	Age 1 Recruitment	Exploitation Rate	Total Catch
1985	25885	9543	2091	0.107	2748
1986	24436	9083	2341	0.095	2299
1987	23415	8788	1344	0.136	3148
1988	21395	8088	1275	0.143	3038
1989	19404	7355	1986	0.171	3283
1990	17090	6438	1488	0.175	2932
1991	15118	5667	1227	0.219	3255
1992	12739	4683	1255	0.236	2960
1993	10644	3831	1169	0.212	2212
1994	9286	3254	830	0.134	1220
1995	8969	3130	1342	0.132	1168
1996	8657	3037	766	0.178	1508
1997	7899	2762	449	0.180	1399
1998	7160	2512	374	0.204	1444
1999	6266	2195	516	0.142	883
2000	5887	2102	454	0.030	177
2001	6197	2312	435	0.015	90
2002	6540	2524	477	0.014	89

Table 2. Life history parameters, fishery selectivity (with 50:50 commercial:recreational allocation) and population numbers at age in 2002.

	Females					Males			
Age	Fecundity	M	Weight	Selectivity	InitN	M	Weight	Selectivity	Init N
1	0.000	0.060	0.047	0.000	238.4	0.06	0.032	0.000	238.4
2	0.000	0.060	0.133	0.008	205.0	0.06	0.119	0.007	205.0
3	0.004	0.060	0.265	0.193	201.1	0.06	0.260	0.193	201.1
4	0.022	0.060	0.435	0.980	213.0	0.06	0.441	0.980	213.0
5	0.081	0.060	0.635	0.997	136.8	0.06	0.645	1.000	136.8
6	0.216	0.061	0.855	0.576	140.3	0.06	0.858	0.587	140.3
7	0.441	0.064	1.085	0.354	208.9	0.06	1.069	0.373	209.1
8	0.735	0.070	1.319	0.278	318.7	0.06	1.269	0.297	319.3
9	1.057	0.079	1.550	0.253	167.6	0.06	1.455	0.266	168.1
10	1.377	0.088	1.775	0.241	199.9	0.06	1.623	0.248	198.3
11	1.676	0.096	1.988	0.233	173.4	0.06	1.774	0.236	166.5
12	1.945	0.102	2.190	0.226	126.2	0.06	1.907	0.227	117.8
13	2.188	0.107	2.378	0.220	104.8	0.06	2.023	0.220	99.2
14	2.401	0.110	2.552	0.214	95.4	0.06	2.124	0.214	95.0
15	2.594	0.113	2.711	0.210	43.4	0.06	2.210	0.210	46.4
16	2.762	0.114	2.856	0.204	32.7	0.06	2.285	0.206	37.0
17	2.913	0.116	2.988	0.199	39.5	0.06	2.348	0.203	44.6
18	3.048	0.117	3.107	0.194	22.9	0.06	2.402	0.201	25.2
19	3.166	0.117	3.214	0.182	13.5	0.06	2.448	0.199	15.1
20	3.270	0.118	3.310	0.172	9.4	0.06	2.486	0.197	11.4
21	3.362	0.118	3.396	0.164	7.2	0.06	2.519	0.196	9.5
22	3.445	0.119	3.473	0.157	2.7	0.06	2.546	0.195	3.8
23	3.520	0.119	3.541	0.139	5.6	0.06	2.569	0.194	8.4
24	3.584	0.119	3.602	0.127	3.7	0.06	2.589	0.193	5.7
25	3.884	0.119	3.900	0.118	45.3	0.06	2.700	0.192	23.5

Table 3. Rebuilding results with alternative levels of Bzero or spawner-recruitment steepness. Baseline model with best steepness estimate is in Table 3.

	Rzero from 67-77 (old method)	Low Steepness	High Steepness	Recruitment Upshift **speculative**
Spawn-recruit steepness	0.33	0.289	0.36	0.50
comm:recr allocation	50:50	50:50	50:50	50:50
F(msy)	F73%	F79%	F69%	F55%
Bmsy/Bzero	45%	45%	43%	40%
MSY (mt)	622	461	728	1395
2003 ABC (mt)				
@ F50%	256	256	256	256
@ Fmsy	116	87	137	222
Btarget (fem. spawn biomass)	8296	12713	12713	12713
Tmin	2044	2077	2049	2032
Tmax	2063	2096	2068	2051
% reb. by Tmax	50%	50%	50%	50%
F	0.0272	0.0136	0.0322	0.0695
OY in 2003 (mt)	51	26	61	129
Yr to 50% reb.	2063	2096	2068	2051
% reb. by Tmax	60%	60%	60%	60%
F	0.0249	0.0116	0.0297	0.0665
OY in 2003 (mt)	47	22	56	124
Yr to 50% reb.	2061	2092	2066	2050
% reb. by Tmax	70%	70%	70%	70%
F	0.0226	0.0096	0.0265	0.0634
OY in 2003 (mt)	43	18	50	118
Yr to 50% reb.	2058	2089	2064	2048
% reb. by Tmax	80%	80%	80%	80%
F	0.0194	0.0071	0.0234	0.0592
OY in 2003 (mt)	36	13	44	110
Yr to 50% reb.	2055	2085	2062	2046
Fmsy with 40:10				
% reb. by Tmax	19%	13%	22%	35%
OY in 2003 (mt)	11	0	0	0
Yr to 50% reb.	2079	2127	2082	2058

Table 4. Rebuilding results with alternative selectivities based upon different commercial:recreational allocation.

	Recreational	BASELINE MODEL Even	Commercial
Spawn-recruit steepness	0.33	0.33	0.33
comm:recr allocation	20:80	50:50	80:20
F(msy)	F73%	F73%	F73%
Bmsy/Bzero	44%	45%	45%
MSY (mt)	525	622	749
2003 ABC (mt)			
@ F50%	218	256	309
@ Fmsy	99	116	140
Btarget (fem. spawn biomass)	12713	12713	12713
Tmin	2057	2057	2057
Tmax	2076	2076	2076
% reb. by Tmax	50%	50%	50%
F	0.0317	0.0242	0.0161
OY in 2003 (mt)	37	45	57
Yr to 50% reb.	2076	2076	2076
% reb. by Tmax	60%	60%	60%
F	0.0289	0.0220	0.0147
OY in 2003 (mt)	34	41	52
Yr to 50% reb.	2074	2074	2074
% reb. by Tmax	70%	70%	70%
F	0.0253	0.0193	0.0129
OY in 2003 (mt)	29	36	45
Yr to 50% reb.	2071	2071	2071
% reb. by Tmax	80%	80%	80%
F	0.0212	0.0161	0.0108
OY in 2003 (mt)	25	30	38
Yr to 50% reb.	2068	2068	2068
Fmsy with 40:10			
% reb. by Tmax	20%	19%	19%
OY in 2003 (mt)	0	0	0
Yr to 50% reb.	2093	2094	2094

Table 5. Time series of median catch, probability of rebuilding (with P=0.6 by 2076 and with F=0.0), anf the median spawning biomass relative to the unfished level.

Year	Median Catch P=0.6	Pr(rebuilt) P=0.6	Pr(rebuilt) F=0	Median(SPB)/Bzero P=0.6	Median(SPB)/Bzero F=0
2003	41	0.000	0.000	0.085	0.085
2004	42	0.000	0.000	0.090	0.091
2005	43	0.000	0.000	0.094	0.095
2006	45	0.000	0.000	0.097	0.099
2007	47	0.000	0.000	0.099	0.102
2008	48	0.000	0.000	0.101	0.104
2009	50	0.000	0.000	0.103	0.107
2010	52	0.000	0.000	0.105	0.110
2011	54	0.000	0.000	0.107	0.112
2012	55	0.000	0.000	0.109	0.116
2013	57	0.000	0.000	0.112	0.119
2014	59	0.000	0.000	0.115	0.123
2015	60	0.000	0.000	0.118	0.128
2016	62	0.000	0.000	0.122	0.132
2017	64	0.000	0.000	0.125	0.137
2018	65	0.000	0.000	0.128	0.141
2019	67	0.000	0.000	0.132	0.146
2020	69	0.000	0.000	0.136	0.151
2021	71	0.000	0.000	0.139	0.156
2022	73	0.000	0.000	0.142	0.161
2023	75	0.000	0.000	0.146	0.166
2024	77	0.000	0.000	0.150	0.171
2025	79	0.000	0.000	0.154	0.176
2026	81	0.000	0.000	0.157	0.182
2027	83	0.000	0.000	0.161	0.187
2028	85	0.000	0.000	0.165	0.192
2029	87	0.000	0.000	0.169	0.198
2030	89	0.000	0.000	0.173	0.204
2031	91	0.000	0.000	0.176	0.209
2032	93	0.000	0.000	0.181	0.216
2033	95	0.000	0.000	0.186	0.222
2034	98	0.000	0.000	0.190	0.229
2035	100	0.000	0.000	0.194	0.235
2036	103	0.000	0.000	0.198	0.241
2037	104	0.000	0.000	0.203	0.248
2038	106	0.000	0.000	0.208	0.255
2039	109	0.000	0.000	0.212	0.262
2040	111	0.000	0.000	0.217	0.269
2041	114	0.000	0.002	0.221	0.275
2042	117	0.000	0.005	0.226	0.283
2043	120	0.000	0.010	0.230	0.290
2044	122	0.000	0.018	0.235	0.297
2045	124	0.000	0.024	0.240	0.305
2046	127	0.000	0.033	0.245	0.312
2047	129	0.001	0.047	0.251	0.321
2048	131	0.001	0.072	0.256	0.329
2049	135	0.001	0.105	0.262	0.338
2050	137	0.002	0.143	0.267	0.346
2051	139	0.002	0.189	0.272	0.354

Year	Median Catch P=0.6	Pr(rebuilt) P=0.6	F=0	Median(SPB)/Bzero P=0.6	F=0
2052	141	0.004	0.229	0.278	0.362
2053	143	0.007	0.281	0.284	0.371
2054	145	0.009	0.331	0.289	0.378
2055	149	0.015	0.404	0.294	0.386
2056	152	0.020	0.457	0.298	0.393
2057	155	0.023	0.514	0.304	0.403
2058	157	0.032	0.558	0.310	0.411
2059	160	0.042	0.624	0.314	0.419
2060	163	0.057	0.696	0.319	0.427
2061	166	0.078	0.754	0.325	0.435
2062	169	0.093	0.797	0.330	0.443
2063	172	0.116	0.832	0.335	0.451
2064	174	0.140	0.856	0.341	0.460
2065	177	0.170	0.887	0.349	0.472
2066	180	0.207	0.905	0.356	0.482
2067	182	0.235	0.922	0.361	0.491
2068	185	0.278	0.940	0.367	0.498
2069	187	0.314	0.953	0.372	0.508
2070	191	0.359	0.963	0.378	0.516
2071	194	0.391	0.973	0.384	0.525
2072	197	0.432	0.980	0.390	0.534
2073	200	0.472	0.984	0.396	0.542
2074	202	0.508	0.989	0.401	0.550
2075	205	0.556	0.993	0.407	0.559
2076	207	0.601	0.994	0.413	0.568

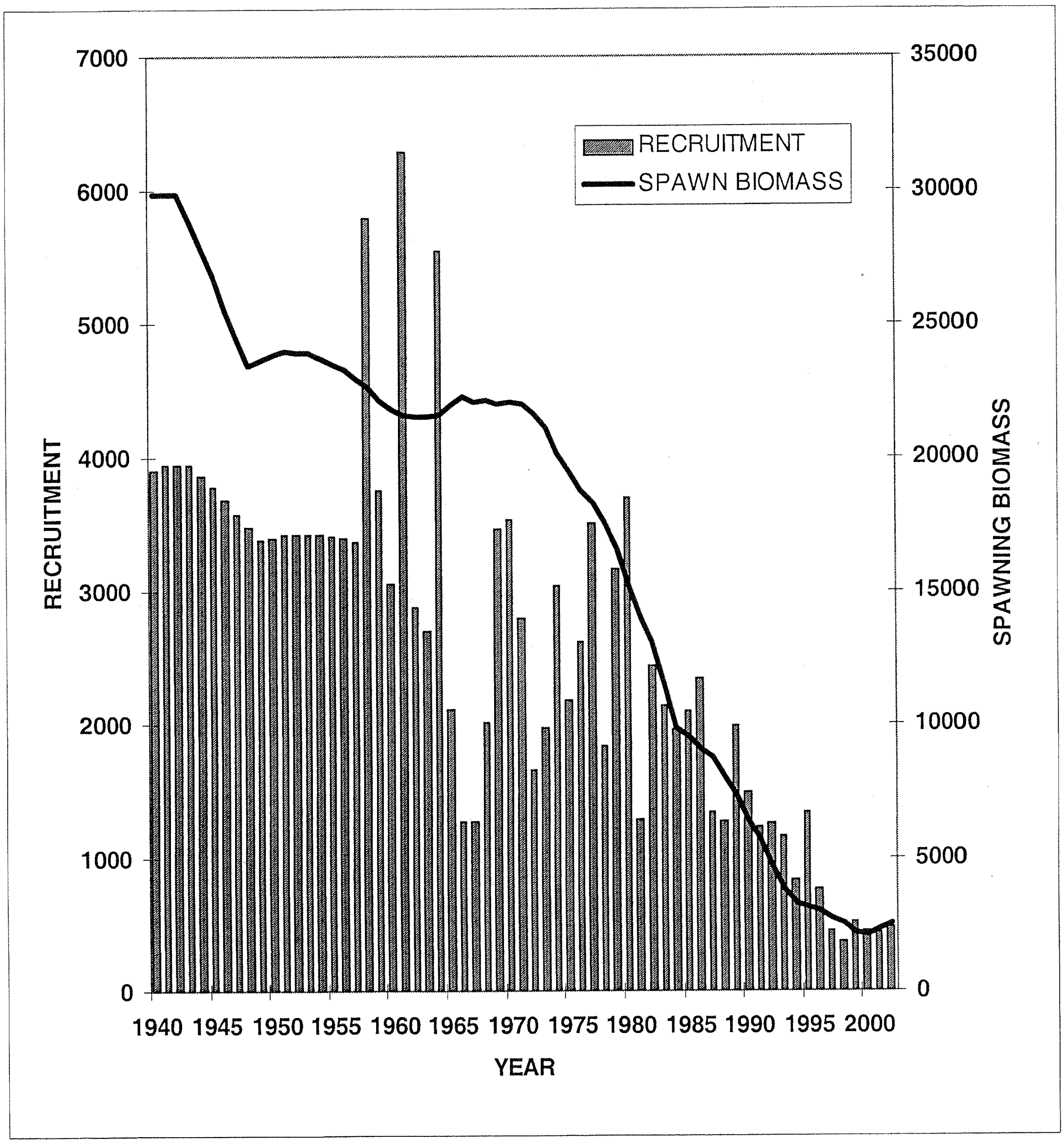


Figure 2 Time series of age 1 recruitment and female spawning biomass.

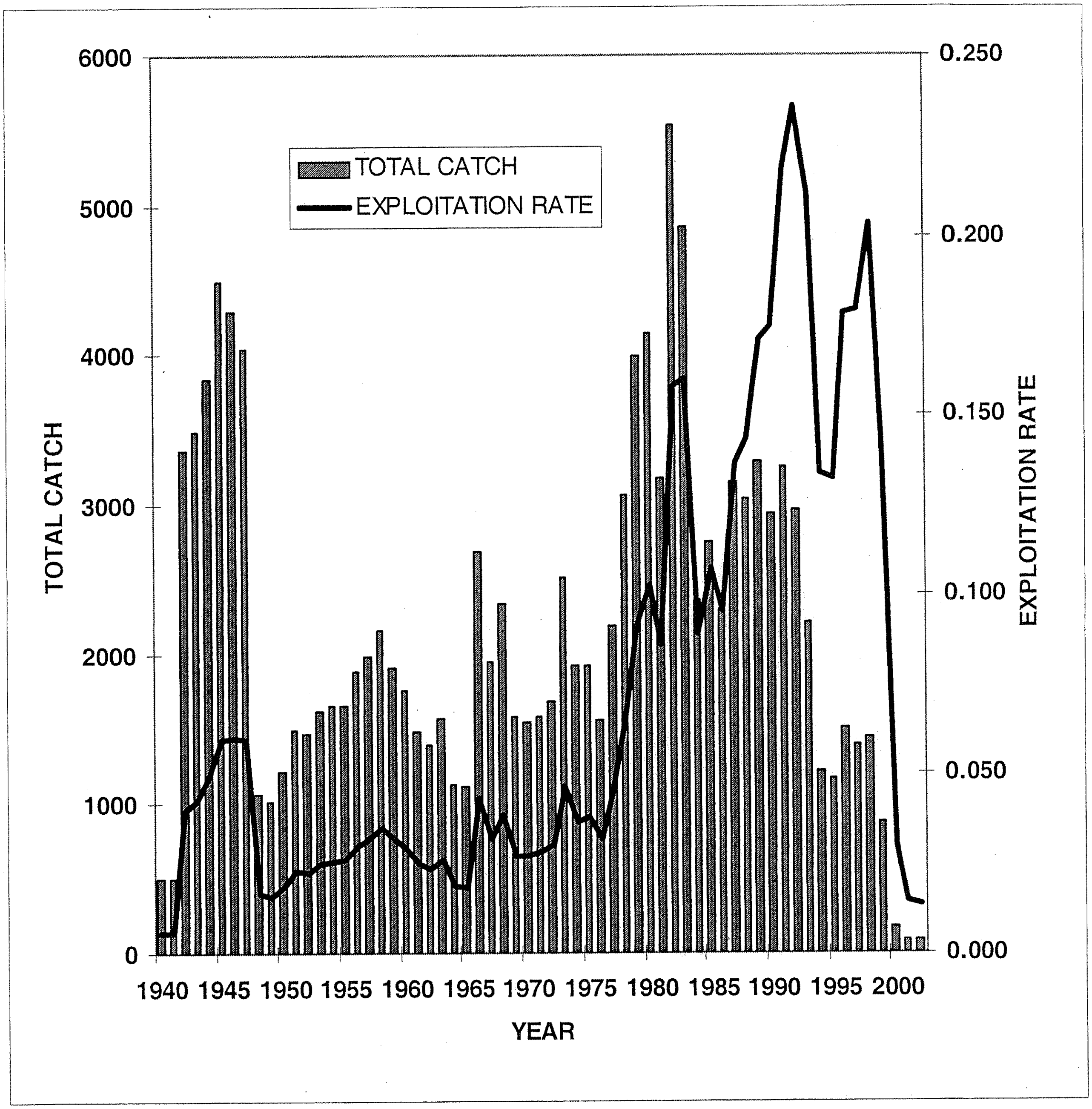


Figure 3 Time series of total catch and exploitation rate.

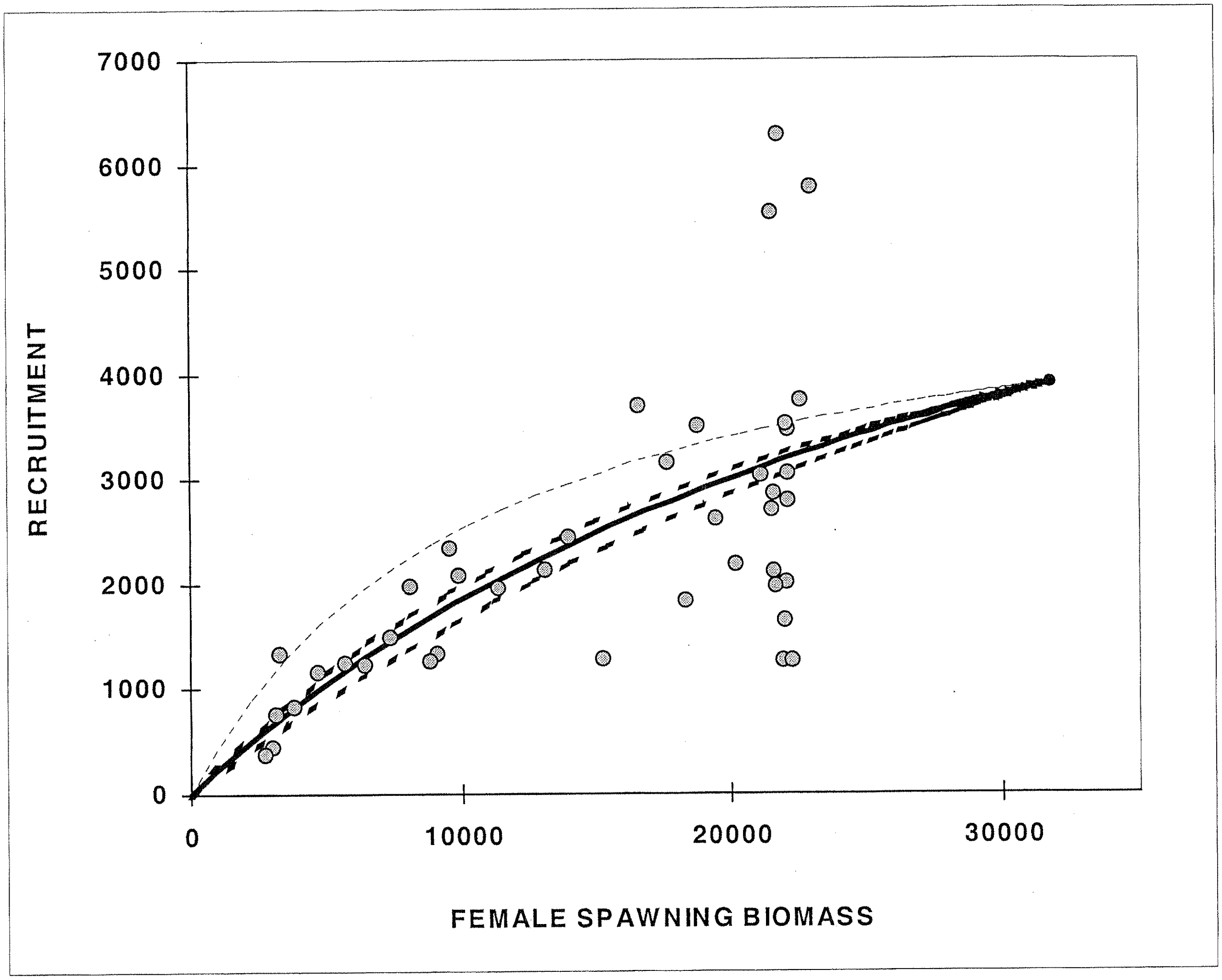


Figure 4 Recruitment-spawner relationship. Bold line is the best estimate of steepness (0.33). Bracketing dashed lines are steepness of 0.289 and 0.36. The light upper line has a steepness of 0.50 which is clips the upper edge of recent recruitments and is closer to the general rockfish steepness level estimated by Dorn (2000).

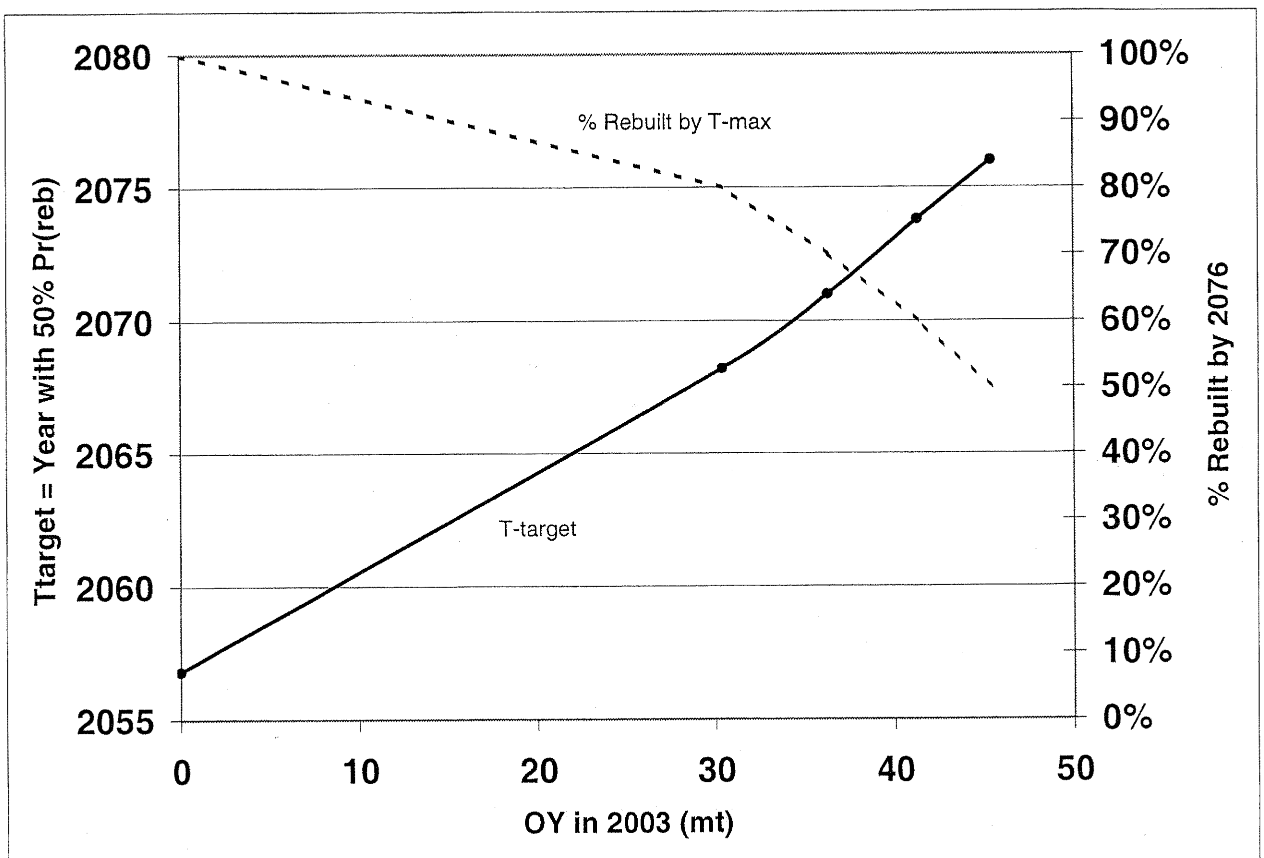
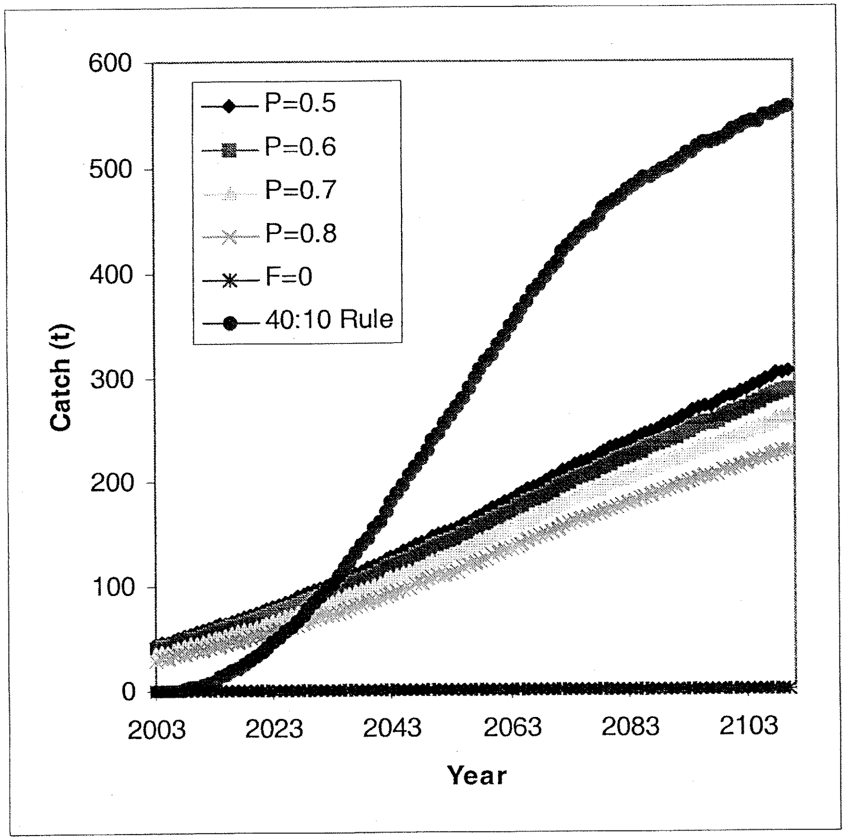


Figure 5 Trade-off between OY in 2003, the year (Ttarget) with 50% probability of achieving the rebuilt level, and the probability of achieving the rebuilt level before Tmax (2076). Each calculation is based upon a constant exploitation rate being applied throughout the rebuilding period.



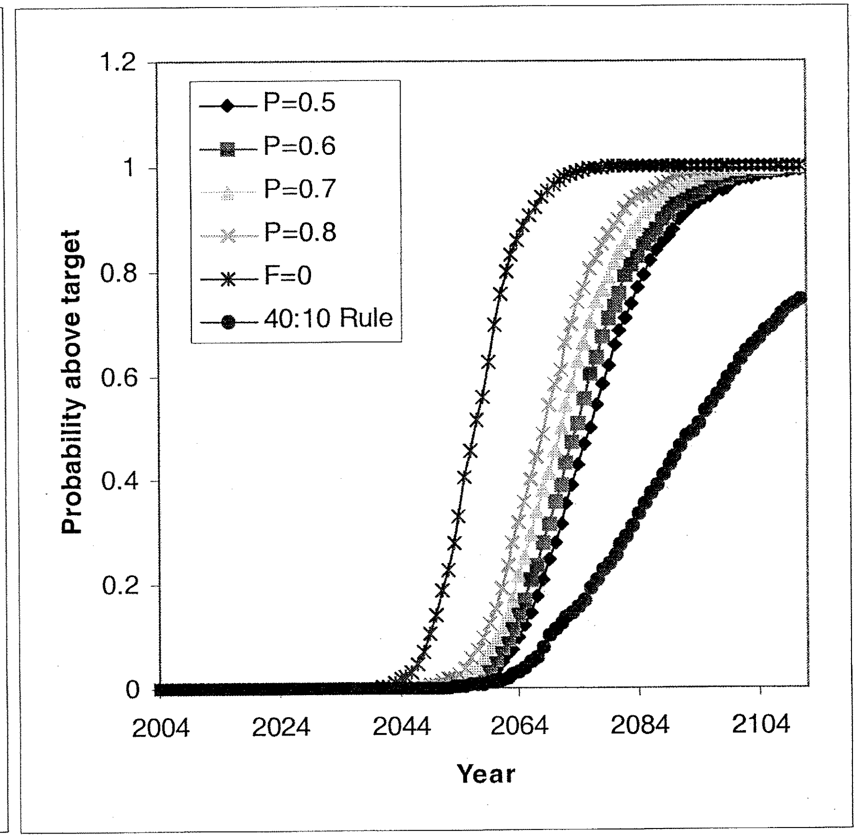


Figure 5. Time series of expected catch level and expected probability of achieving the rebuilt biomass level (40% of Bzero).

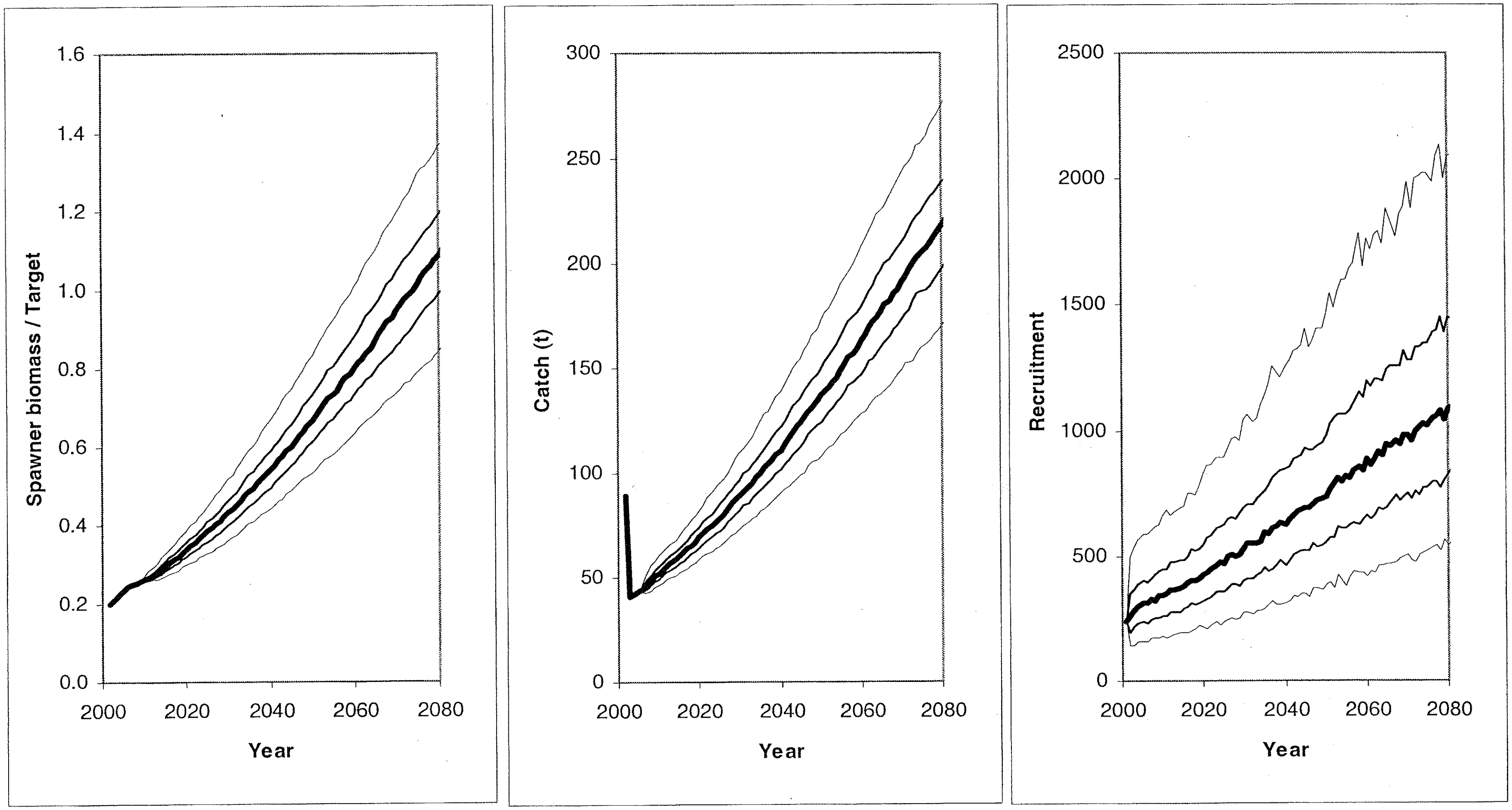


Figure 6. Time series of spawning biomass, catch and recruitment with probability of rebuilding by 2076 at 60%. The 5%, 25%, 50%, 75% and 95% percentiles are shown.

Appendix. Input file for rebuilding analysis.

```
#Title,
Canary rockfish - 50:50 comm:recr
# Number of sexes,
2,
# Age range to consider (minimum age; maximum age),
1,25
# First year of projection,
2002,
# Year declared overfished,
2000,
# Is the maximum age a plus-group (1=Yes;2=No),
1,
# Generate future recruit using: hist. recr (1); hist recr/spawn (2); or a stock-recruit (3),
3,
# Constant fishing mortality (1) or constant Catch (2) projections,
1,
# Pre-specify the year of recovery (or -1) to ignore,,,,,,,,,,,,,,,,,,,,,,,
-1,,,,,,,,,,,,,,,,,,,,,,,,
# FECUNDITY @ AGE,,,,,,,,,,,,,,,,,,,,,,,
# AGES   1   25,,,,,,,,,,,,,,,,,,,,,,,
0,0.00027,0.00371,0.02219,0.08128,0.21632,0.44051,0.73468,1.0571,1.3774,1.67588,1.94472,
2.18776,2.40143,2.59443,2.76175,2.9133,3.04797,3.16579,3.27028,3.36204,3.44522,3.51975,
3.58399,3.8844,
# AGE INFO: M,WT,SELEX,NUMBERS,,,,,,,,,,,,,,,,,,,,
# FEMALE,,,,,,,,,,,,,,,,,,,,,,,
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   .04700,   .13300,   .26500,   .43500,   .63500,   .85500,   1.08500,   1.31900,   1.55000,
 1.77500,   1.98800,   2.19000,   2.37800,   2.55200,   2.71100,   2.85600,   2.98800,   3.10700,
 3.21400,   3.31000,   3.39600,   3.47300,   3.54100,   3.60200,   3.90000,
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  238.35288,  204.98610,  201.08574,  212.96610,  136.79802,  140.27095,  208.92664,  318.68570,
 167.58476,  199.88103,  173.39323,  126.20521,  104.82539,  95.38803,  43.40654,  32.73907,
 39.54165,  22.86064,  13.47217,  9.44046,  7.20839,  2.67660,  5.62894,  3.65099,  45.27893,


# MALE
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 .06000,   .06000,   .06000,   .06000,   .06000,   .06000,   .06000,   .06000,   .06000,   .06000,
 .06000,   .06000,   .06000,   .06000,   .06000,   .06000,
   .03200,   .11900,   .26000,   .44100,   .64500,   .85800,   1.06900,   1.26900,   1.45500,
 1.62300,   1.77400,   1.90700,   2.02300,   2.12400,   2.21000,   2.28500,   2.34800,   2.40200,
 2.44800,   2.48600,   2.51900,   2.54600,   2.56900,   2.58900,   2.70000,
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 .19708,   .19572,   .19463,   .19374,   .19302,   .19245,
  238.35288,  204.98708,  201.08975,  212.98472,  136.82954,  140.32663,  209.07910,  319.30972,
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 44.57084,  25.18530,  15.14766,  11.36878,  9.50305,  3.80037,  8.44462,  5.72975,  23.50413,
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# TIME SERIES,,,,,
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catches for years with pre-specified catches,,,,,
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Number of future recruitments to override,,,,,
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Process for overiding (-1 for average otherwise index in data list),,,,,
Which probability to product detailed results for (1=0.5;2=0.6;etc.),,,,,
2,,,,,
Steepness and sigma-R,
0.330, 0.4
Target SPR rate (FMSY Proxy),
0.73
Target SPR information: Use (1=Yes) and power,
0 20
Discount rate (for cumulative catch),
0.1
Truncate the series when 0.4B0 is reached (1=Yes),
0
Set F to FMSY once 0.4B0 is reached (1=Yes),
0
Percentage of FMSY which defines Ftarget,
0.9
Conduct MacCall transition policy (1=Yes),
0,
Definition of recovery (1=now only;2=now or before)
2
Produce the risk-reward plots (1=Yes)
0
Calculate coefficients of variation (1=Yes)
0
Number of replicates to use
1
First Random number seed
-89102

Appendix C-2 FMP Amendment Language

[to be completed before public review]

TABLES

TABLE 1-1. Current parameter/target estimates specified for rebuilding canary rockfish. Data from Methot and Piner (2002a; 2002b).

Rebuilding Parameter/Target	Estimate or proxy
T_0 (year declared overfished)	2000
T_{MIN} (minimum time to achieve B_{MSY} = mean time to rebuild at F = 0)	2057
Mean generation time	19 years
T_{MAX} (maximum time to achieve $B_{MSY} = T_{MIN}$ + 1 mean generation time)	2076
P_{MAX} (P to achieve B_{MSY} by T_{MAX}) [1/]	60%
Most recent stock assessment	Methot and Piner 2002
Most recent rebuilding analysis	Methot and Piner 2002
B_0 (estimated unfished biomass)	31,550 mt
$B_{CURRENT}$ (current estimated biomass)	2,524 mt in 2002
% Unfished Biomass	8% in 2002
MSST (minimum stock size threshold = 25% of B_0)	7,888 mt
B_{MSY} (rebuilding biomass target = 40% of B_0)	12,620 mt
MFMT (maximum fishing mortality threshold = F_{MSY})	$F_{73\%}$
Harvest Control [1/]	F = 0.022
T_{TARGET} [1/]	2074

[1/] Under *Council Interim* rebuilding measures.

TABLE 2-1. Rebuilding parameters associated with canary rockfish rebuilding alternatives.

Alternative	F rate	P_{MAX} Probability of rebuilding within T_{MAX}	T_{TARGET} Median year of reaching B_{MSY}
No Action	0.0XXX	19%	2094
Maximum Conservation	0.0000	approaches 100%	2057
Maximum Harvest	0.0242	50%	2076
Council Interim	0.0220	60%	2074
70%[1]	0.0193	70%	2071
80%[1]	0.0161	80%	2068

---

1 While this intermediate level of harvest is not a structured alternative, associated rebuilding parameters are displayed to understand the relative difference of intermediate rebuilding scenarios.

TABLE 3.2-2. Allocation of canary rockfish in the reported foreign rockfish catch (mt) off Washington, Oregon, and California in 1966-1976 by INPFC area and year. Data from Rogers {In prep #640}.

INPFC Area	Year											
	66	67	68	69	70	71	72	73	74	75	76	Total
US-Van	113	90	109	12	28	70	68	68	288	0	0	846
Col	1,445	658	286	50	73	118	318	525	81	141	114	3,809
Eur	0	2	385	3	0	0	12	335	46	35	22	840
Mon	41	101	30	2	0	0	1	37	104	28	27	371

TABLE 3.3-1. Bycatch rates used in modeling trawl fishery bycatch of canary rockfish for the 2003 season.

2-mo per.	Target fishery	All depths	In depths shallower than:				In depths deeper than:			
			50 fm	75 fm	100 fm	125 fm	150 fm	180 fm	200 fm	250 fm
North of Cape Mendocino										
1	DTS	0.010%	0.000%	0.101%	0.101%	0.101%	0.000%	0.000%	0.000%	0.000%
2	DTS	0.010%	0.000%	0.200%	0.035%	0.021%	0.000%	0.000%	0.000%	0.000%
3	DTS	0.010%	0.000%	0.119%	0.208%	0.130%	0.000%	0.000%	0.000%	0.000%
4	DTS	0.300%	0.000%	1.362%	1.403%	1.690%	0.000%	0.000%	0.000%	0.000%
5	DTS	0.797%	0.000%	10.359 %	6.348%	5.170%	0.000%	0.000%	0.000%	0.000%
6	DTS	0.010%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
1	Flatfish	0.048%	0.191%	0.098%	0.230%	0.202%	0.000%	0.000%		
2	Flatfish	0.120%	0.386%	0.335%	0.469%	0.586%	0.000%	0.000%		
3	Flatfish	0.236%	0.030%	0.257%	0.437%	0.373%	0.000%	0.000%		
4	Flatfish	0.895%	0.091%	0.436%	1.260%	1.132%	0.000%	0.000%		
5	Flatfish	0.367%	0.405%	0.431%	0.488%	0.519%	0.000%	0.000%		
6	Flatfish	0.050%	0.046%	0.264%	0.214%	0.274%	0.000%	0.000%		
1	Arrowtooth	0.010%					0.000%	0.000%		
2	Arrowtooth	0.010%					0.000%	0.000%		
6	Arrowtooth	0.010%					0.000%	0.000%		
1	Petrale	0.012%					0.000%	0.000%		
2	Petrale	0.452%					0.000%	0.000%		
6	Petrale	0.012%					0.000%	0.000%		
1	MW W/Yt	0.013%								
2	MW W/Yt	0.058%								
3	MW W/Yt	2.758%								
4	MW W/Yt	0.971%								
5	MW W/Yt	0.775%								
6	MW W/Yt	0.011%								
1	Other	0.010%	0.004%	0.009%	0.010%	0.010%	0.000%	0.000%	0.000%	0.000%
2	Other	0.100%	0.040%	0.090%	0.100%	0.100%	0.000%	0.000%	0.000%	0.000%
3	Other	0.500%	0.200%	0.450%	0.500%	0.500%	0.000%	0.000%	0.000%	0.000%
4	Other	1.000%	0.400%	0.900%	1.000%	1.000%	0.000%	0.000%	0.000%	0.000%
5	Other	0.150%	0.060%	0.135%	0.150%	0.150%	0.000%	0.000%	0.000%	0.000%
6	Other	0.100%	0.040%	0.090%	0.100%	0.100%	0.000%	0.000%	0.000%	0.000%
South of Cape Mendocino										
1	Petrale						0.000%	0.000%		
2	Petrale						0.000%	0.000%		
6	Petrale						0.000%	0.000%		
1	Flatfish	0.011%	0.000%	0.000%	0.000%	0.000%	0.000%			
2	Flatfish	0.098%	0.000%	0.000%	0.033%	0.134%	0.000%			
3	Flatfish	0.064%	0.000%	0.000%	0.000%	0.000%	0.000%			
4	Flatfish	0.046%	0.000%	0.000%	0.000%	0.000%	0.000%			
5	Flatfish	0.082%	0.000%	0.071%	0.099%	0.089%	0.000%			
6	Flatfish	0.039%	0.000%	0.561%	0.048%	0.020%	0.000%			
1	DTS	0.000%					0.000%	0.000%		0.000%
2	DTS	0.020%					0.000%	0.000%		0.020%
3	DTS	0.002%					0.000%	0.000%		0.000%

F:\!master\fmg\A16_rbldg_plns\Canary\Am 16 2003\Tables\CAN_RP_AM16_April03-ch3(jdd)_tab.wpd

TABLE 3.3-1. Bycatch rates used in modeling trawl fishery bycatch of canary rockfish for the 2003 season.

2-mo per.	Target fishery	All depths	In depths shallower than:				In depths deeper than:			
			50 fm	75 fm	100 fm	125 fm	150 fm	180 fm	200 fm	250 fm
4	DTS	0.015%					0.000%	0.000%		0.001%
5	DTS	0.002%					0.000%	0.000%		0.000%
6	DTS	0.000%					0.000%	0.000%		0.000%
1	Other	0.010%	0.004%	0.006%	0.008%	0.010%	0.000%	0.000%	0.000%	0.000%
2	Other	0.010%	0.004%	0.006%	0.008%	0.010%	0.000%	0.000%	0.000%	0.000%
3	Other	0.010%	0.004%	0.006%	0.008%	0.010%	0.000%	0.000%	0.000%	0.000%
4	Other	0.010%	0.004%	0.006%	0.008%	0.010%	0.000%	0.000%	0.000%	0.000%
5	Other	0.010%	0.004%	0.006%	0.008%	0.010%	0.000%	0.000%	0.000%	0.000%
6	Other	0.121%	0.048%	0.073%	0.097%	0.115%	0.000%	0.000%	0.000%	0.000%

FIGURES

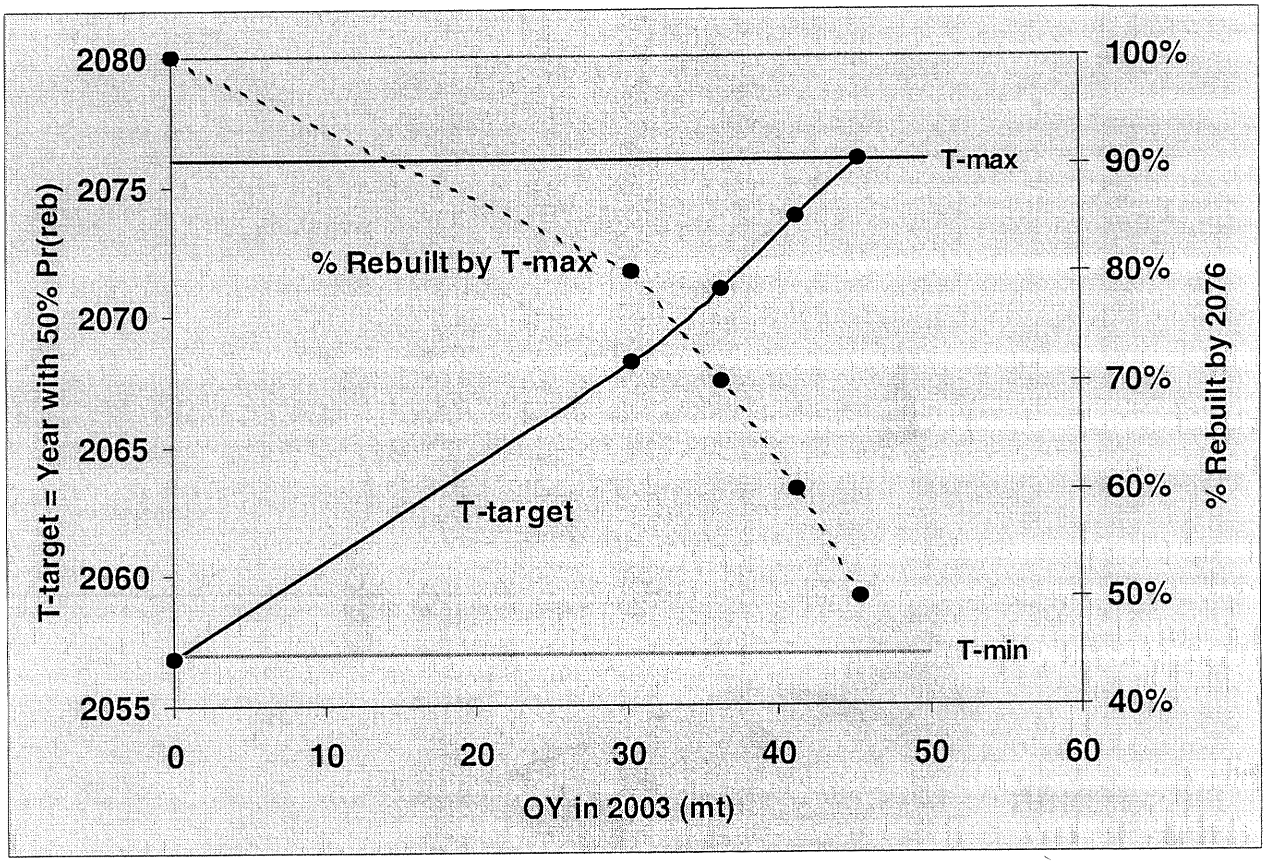

FIGURE 2-1. The relationship between T_{TARGET} and P_{MAX} for canary rockfish rebuilding. Figure from Methot and Piner (2002).

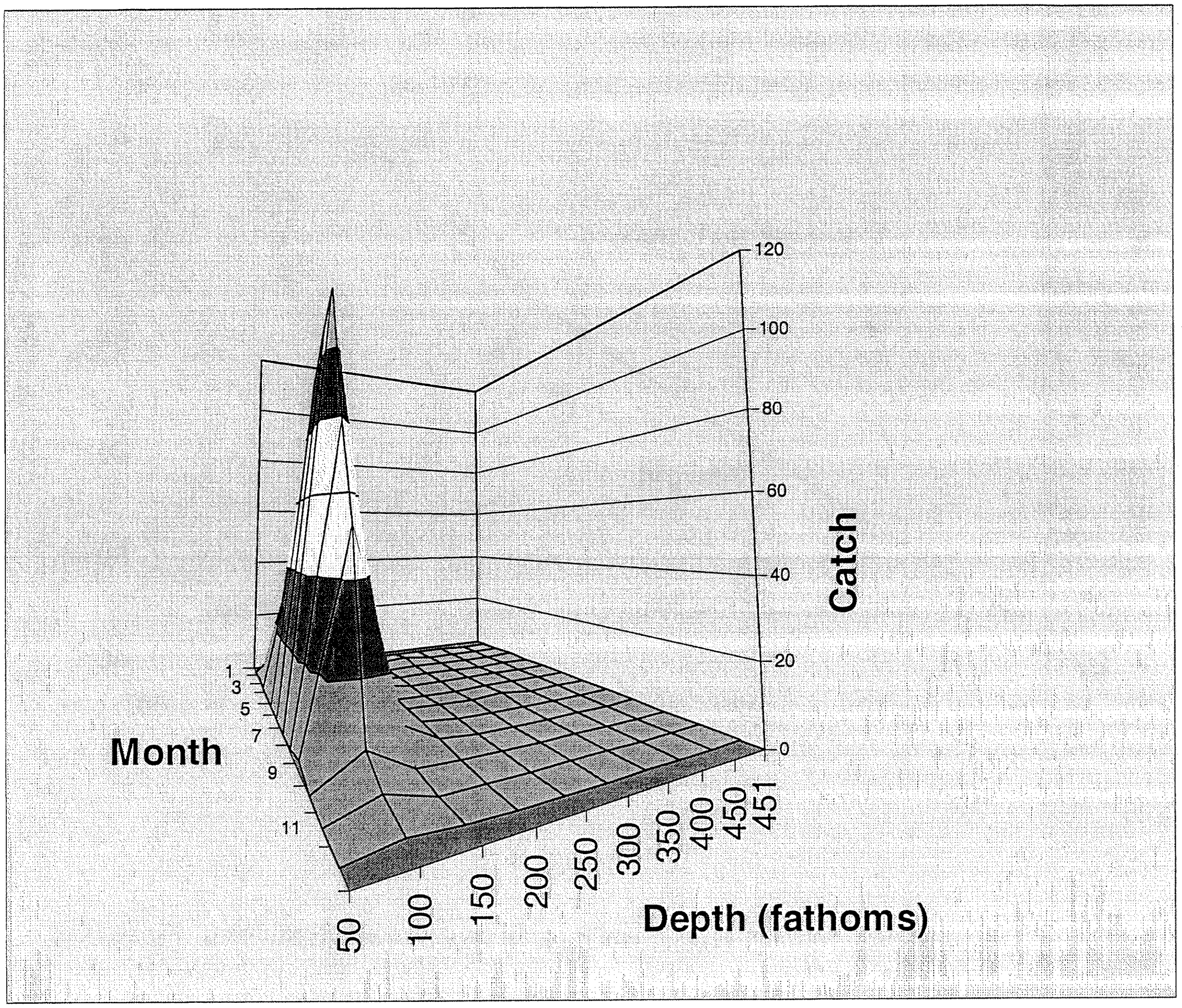

FIGURE 3.1-1. Canary rockfish depth distribution in waters off Washington from trawl logbook data.

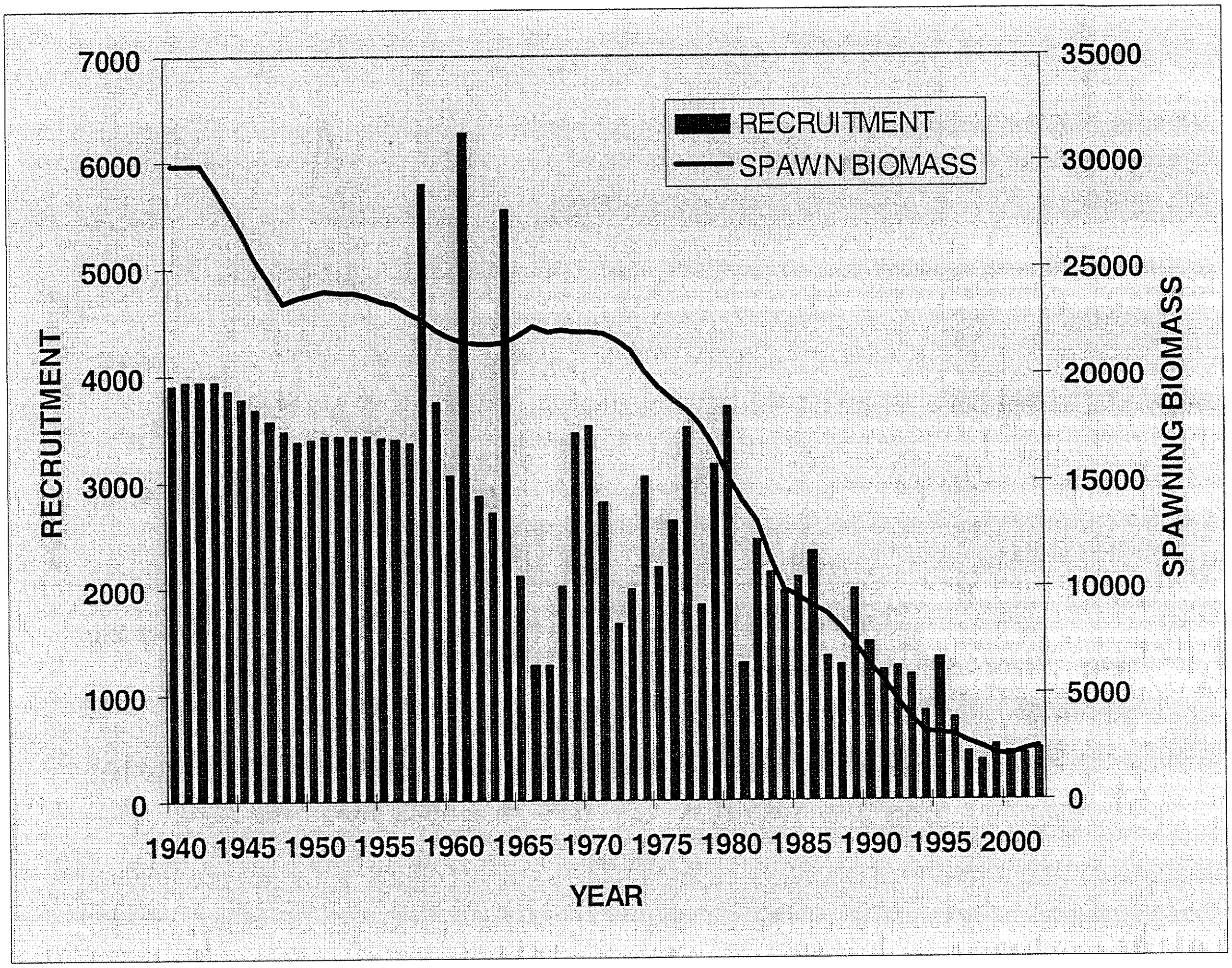

FIGURE 3.2-1. Historical time series of estimated canary rockfish recruitment and spawning biomass. Figure from Methot and Piner (2002).

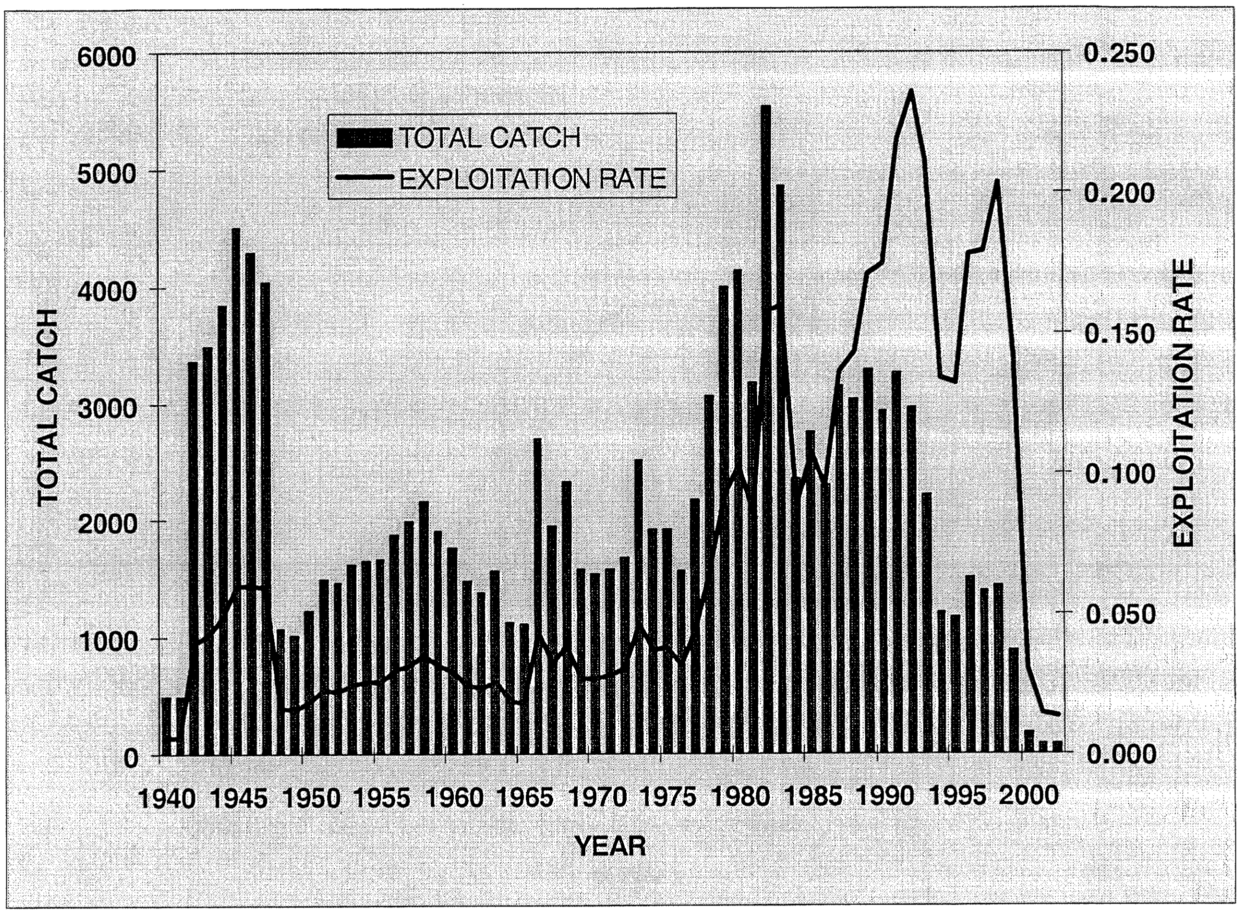

FIGURE 3.3-1. Historical catches and exploitation rate of canary rockfish on the U.S. west coast, 1940-2002.

Exhibit E.5
Attachment 6
April 2003

DRAFT LINGCOD REBUILDING PLAN

PART V TO AMENDMENT 16-2 OF THE PACIFIC COAST GROUNDFISH FISHERY MANAGEMENT PLAN

INCLUDING DRAFT ENVIRONMENTAL IMPACT STATEMENT AND REGULATORY ANALYSES

PREPARED BY THE PACIFIC FISHERY MANAGEMENT COUNCIL

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APRIL 2003

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1.0 PURPOSE AND NEED FOR REBUILDING LINGCOD

1.1 Purpose and Need

The lingcod (*Ophiodon elongatus*) stock within the PFMC management area of the west coast EEZ (Figure 1-1; herein referred to as the "west coast") is a shelf roundfish species of the family *Hexagrammidae*. Most lingcod catch has occurred in the north in the Columbia and U.S.-Vancouver International North Pacific Fisheries Commission (INPFC) areas (Figure 1-1 in Part II - Draft Darkblotched Rockfish Rebuilding Plan) which is consistent with the estimated geographic center of biomass distribution occurring water off Washington and British Columbia (Hart 1988). Lingcod were often caught in shelf trawl and recreational fisheries. Exploitation was estimated to be over the maximum fishing mortality threshold (MFMT) now used as a proxy MSY harvest rate for lingcod ($F_{45\%}$).

Adoption of Amendments 11 and 12 of the Pacific Coast Groundfish Fishery Management Plan (FMP) incorporated the legal rebuilding mandates of the Sustainable Fishery Act and established an overfishing threshold (Minimum Stock Size Threshold; MSST) of 25% of the estimated unfished spawning biomass or spawning potential (i.e., estimated number of eggs, recruits, or other spawning units) for groundfish stocks. Jagielo (1997) estimated the abundance of the northern lingcod stock in the Columbia and U.S.-Vancouver INPFC areas to be at 8.8% of its estimated unfished spawning potential. Therefore, the National Marine Fisheries Service (NMFS) declared the stock overfished in March 1999. Jagielo (2000) estimated a coastwide biomass of lingcod to be at 15% of its unfished biomass, confirming the need to rebuild the stock coastwide.

Under the terms of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) and the FMP, the Council must prepare a rebuilding plan to increase lingcod stock abundance to a level that supports maximum sustainable yield (MSY; 40% of its unfished biomass). The purpose of this draft rebuilding plan and Environmental Impact Statement (EIS) is to evaluate alternative strategies designed to rebuild lingcod in a time less than or equal to the maximum allowable (T_{MAX}) under the National Standard Guidelines interpreting the MSA.

1.2 Rebuilding Plan Overview

The Draft Lingcod Rebuilding Plan (Amendment 16, Part V, April 2003 draft) is organized to address the requirements of the MSA, National Environmental Policy Act, Executive Order 12866, and the Regulatory Flexibility Act. This document conforms to a National Environmental Policy Act (NEPA) structure and format with a purpose and need statement (section 1.1), a reasonable range of rebuilding alternatives presented in Chapter 2, a description of the affected environment (physical (habitat), biological (lingcod and other affected species), and socioeconomic (affected fisheries, fishing industry, and fishing communities)) in Chapter 3, and an analysis of rebuilding consequences anticipated for affected environments in Chapter 4. Chapters 5-8 document how the rebuilding plan and alternatives conform to legal mandates, who contributed in preparation of the rebuilding plan, and the references used throughout this rebuilding plan document. Appendix D-1 is the rebuilding analysis prepared for this rebuilding plan (not included in this draft) and Appendix D-2, the FMP Amendment language for lingcod rebuilding. The modular design of the rebuilding plan framework (each species rebuilding plan is stratified in Parts) is to allow it to stand alone as a decision-making document for rebuilding lingcod in shelf areas within the Council's jurisdiction (Figure 1-1). This June 2002 draft adopts a ***bold italic font for items of particular emphasis (especially to the Council and other decision-makers)***, and *italic font for names of rebuilding alternatives and scientific species names.*

The overarching objective of this rebuilding plan is to increase lingcod stock spawning biomass to a level that supports MSY within a target time set by the Council (T_{TARGET}). For lingcod , the Council-approved proxy for this level of abundance is 40% of its estimated unfished biomass ($B_{40\%}$). Estimation of unfished biomass (B_0) is especially critical since it forms the basis for declaring a stock's biological and legal status. There is uncertainty about the estimate of B_0 and this value can be expected to change with improved understanding of the stock and when new stock assessments are conducted.

Rebuilding parameters specified in a rebuilding plan must include at least T_{TARGET} and may be required to include other parameters listed in Table 1-1 depending on decisions made in Part A of this amendment package. The values adopted for these parameters are determined by the best available science, Council/NMFS policies, and legal mandates (including the MSA and the National Standard Guidelines for interpreting the MSA). The time to rebuild is constrained on the high end ($T_{MAX} = T_{MIN}$ + 1 mean generation; 1 mean generation = the mean time period for a spawning female to replace herself in the population; (Restrepo *et al.* 1998)) and on the low end (T_{MIN} = time to rebuild in the absence of fishing; F=0) by biological limits imposed by our understanding of the stock's potential productivity (50 CFR §600.310 (e)(4)(ii)(B)). The National Standard Guidelines specify that the Council must manage to rebuild in no more than ten years if T_{MIN} is estimated to be less than or equal to ten years. Coastwide, estimates of T_{MIN} for lingcod fall well below ten years requiring the Council to rebuild lingcod mo more than ten years of it being declared overfished, or by 2009.

Scientific uncertainty exists for every aspect of rebuilding and thus influences success and failure of rebuilding. Uncertainty surrounds the estimation of parameters that define rebuilding targets and objectives, assessments of stock status and structure, projections of future recruitment and biomass, and evaluating how well management measures meet rebuilding objectives. All alternatives in this rebuilding plan (except *No Action*) assume the best available science. Ensuring the best available science is incorporated in Council decision-making is the role of the Council's Scientific and Statistical Committee (SSC) and therefore not analyzed specifically as a policy choice. However, recommendations for mitigating risk associated with scientific uncertainties are explored throughout this rebuilding plan.

This rebuilding plan generally analyzes alternative strategies and explores mitigating measures for achieving rebuilding targets and objectives. Specifically, this plan analyzes the tradeoffs (physical, biological, and socioeconomic) associated with alternative total fishing-related mortality limits (total catch OYs) and the management specifications (harvest controls and measures) to achieve these limits.

Area closures may be considered in this rebuilding plan. Currently such closures would be considered to move the fishery off lingcod hot-spots, and therefore reduce the total mortality of adult fish. The Council and NMFS are currently developing a policy for habitat based management that may result in modification to existing (or pending) closures, or other management measures intended to protect habitat deemed important to groundfish production. At issue in the development of this policy is the integration of habitat-based management with the harvest control management strategies that have historically been the foundation for Council actions. Alternative policies are being analyzed in a Programmatic EIS (contact Mr. Jim Glock, NMFS, (503) 231-2178). The policies adopted through the Programmatic EIS will be implemented through subsequent decisions such as implementation of the EFH provisions of the Magnuson-Stevens Act or the annual management process and may be utilized to achieve the mortality goals for lingcod established in the rebuilding plan. Implementation of the EFH provisions is underway through another EIS that tiers off the Programmatic EIS. Publication of the draft action-specific EFH EIS is anticipated for August 2003 (contact Mr. Steve Copps, NMFS, (206) 526-6187).

2.0 LINGCOD REBUILDING PLAN ALTERNATIVES

Lingcod rebuilding alternatives within MSA, FMP, and other legal constraints are analyzed in this rebuilding plan. All alternatives specify north and south harvest control rules. These areas are the Columbia and U.S.-Vancouver INPFC areas in the north and the Conception, Monterey, and Eureka INPFC areas in the south (Figure 1-1). The Acceptable Biological Catch (ABC) and total catch optimum yields (OYs) are the sum of these management reference points calculated for these two management areas. The most risk-averse alternative (*Maximum Conservation*), most risk-prone alternative (*Maximum Harvest*), and alternatives with intermediate risk (*Council Interim Rebuilding*, *70%*, and *80%*) are compared with a *No Action* alternative. Probabilities of rebuilding within T_{MAX} vary between 60% and 80% in intermediate risk alternatives. The *Council Interim* alternative depicts the default rebuilding alternative originally adopted in 1999. All rebuilding alternatives except *No Action* consider the best available science for determining risk-neutral bycatch and discard rates. The best available science is anticipated to be direct observations of bycatch and discard in west coast groundfish fisheries. However, until these data are available to account for all sources of fishing-related mortality, the best available science is considered to be a bycatch/discard model developed by the Northwest Fisheries Science Center of the National Marine Fisheries Service (Hastie 2001). Assumed bycatch rates of lingcod in trawl fisheries targeting other species would be at the mid-point of the range estimated from log books and EDCP data (Hastie 2001) for all alternatives except *No Action*. It is likely that rebuilding measures *(in press)* for shelf rockfish (bocaccio, *(Sebastes paucispinis)*; canary rockfish, *(S. pinniger)*; cowcod, *(S. levis)*; widow (*S. entomelas*) and yelloweye rockfish, (*S. ruberrimus*) will control fishing effort and fishing-related mortality on rocky shelf areas where lingcod are most vulnerable. Bycatch control measures are still evaluated in this rebuilding plan. Rebuilding parameter estimates and probabilities for all alternatives (Table 2-1) are derived in the most recent stock assessment (Jagielo *et al.* 2000) and rebuilding analysis (Jagielo and Hastie 2001). The harvest control rule varies between rebuilding alternatives analyzed in this rebuilding plan, the best available science informing decisions and our current state of knowledge does not. Relative risk and probability of rebuilding alternatives meeting rebuilding objectives is sensitive to our current state of knowledge and the harvest control rule (i.e., harvest rate) adopted as a rebuilding target and strategy. The choice of T_{TARGET} is constrained to fall between T_{MIN} and T_{MAX}. Lingcod, with a high reproductive and growth rate and short mean generation time, must be rebuilt within ten years. ***Note that T_{TARGET} has not been explicitly noted in Table 2-1 and is a choice before the Council.***

2.1 The *No Action* Alternative

Under the *No Action* alternative lingcod would be managed with specified trip limits, recreational fishery regulations, and Council-adopted precautionary management measures. The harvest level would be based on the Council's 1998 default $F_{35\%}$ MSY proxy harvest rate and the precautionary "40-10" adjustment of the ABC to calculate a total catch OY. A 20% discard rate (of landed catch) would be assumed for controlling bycatch mortality..

The choice of the *No Action* alternative for lingcod was considered in terms of providing the most informative analysis of the consequences and tradeoffs of rebuilding the stock. The choice of 1998 for the *No Action* alternative was based on the desire to compare rebuilding alternatives to a time prior to any stocks being declared overfished under the mandates of the Sustainable Fisheries Act. Technically, a *No Action* alternative would be the action that would be taken in the absence of an approved rebuilding plan (or status quo). Under the strict context of that definition, *Council Interim Rebuilding* might be considered to represent status quo. Since the *Council Interim* alternative is also analyzed, this rebuilding plan follows strict NEPA requirements. However, rebuilding plan authors considered this *No Action* alternative more appropriate for comparative analysis primarily due to the cumulative effects associated with nine groundfish species being declared overfished on the west coast.

2.2 The *Maximum Conservation* Alternative

Under the *Maximum Conservation* alternative rebuilding would occur in the shortest time possible by setting the fishing mortality rate to zero (F = 0) for those fisheries under Council control. The tradeoff is the greatest socioeconomic impact occurs to fisheries and fishing-dependent communities on the west coast (Conception, Monterey, Eureka, Columbia and U.S.-Vancouver INPFC areas) during the course of rebuilding. All fisheries operating on the shelf (bottom trawl fisheries, fixed gear, recreational fisheries, and tribal fisheries) under Council control that demonstrate a bycatch mortality of lingcod would be closed or modified to the point where targeted and incidental catch mortality of lingcod did not occur. The target rebuilding period (T_{TARGET}) would be the minimum rebuilding time (T_{MIN} = 4 years in the north and 5 years in the south) with the median year of achieving B_{MSY} estimated to be 2003 and 2004, respectively. There would be no bycatch of lingcod since there is no fishing-related mortality. Potential habitat impacts would be minimized by eliminating fishing effort. A subsequent decision-making process to implement the EFH provisions of the MSA would be utilized to determine if additional habitat based management measures were necessary to enhance productivity of the stock.

2.3 The *Maximum Harvest* Alternative

Under the *Maximum Harvest* alternative rebuilding would occur in the maximum allowable time (T_{MAX}), thereby allowing the maximum allowable harvest under rebuilding. A minimal impact would be expected on existing shelf fisheries and fishing-dependent communities, but at a cost of the slowest legal rebuilding schedule allowed by the FMP, MSA, and the National Standard Guidelines. The target rebuilding period (T_{TARGET}) would be the maximum rebuilding time (T_{MAX} = 10 years) with the median year of reaching B_{MSY} projected to be 2009. The *Maximum Harvest* alternative has a 50% probability of rebuilding within T_{MAX}. The total catch OY would be calculated using a fishing mortality rate of 0.0607 in the north (Columbia and U.S.-Vancouver INPFC areas) and 0.0667 in the south (Conception and Monterey INPFC areas.

2.4 The *60%* or *Council Interim Rebuilding* Alternative

Under the *Council Interim Rebuilding* alternative there would be a 60% probability of rebuilding within T_{MAX}. This alternative was the one the Council selected in 1999 as its preferred alternative for rebuilding lingcod. This analysis does not presume this is still the Council's preferred alternative. Under this alternative $T_{TARGET} = T_{MAX}$ which is 2009. The total catch OY would be calculated using a fishing mortality rate of 0.0531 in the north and 0.061 in the south. Consideration may be given to area closures that move the fishery off lingcod hotspots and reduce total mortality.

2.5 The *Mixed Stock Exception* Alternative

Under the *Mixed Stock Exception* alternative, rebuilding constraints would not be imposed thereby allowing overfishing of lingcod. The mixed stock exception is a provision in National Standard Guideline 1 allowing an increased OY above the overfishing level as long as the harvest meets certain standards. Harvesting one species of a mixed-stock complex at its optimum level may result in the overfishing of another stock component in the complex. The Council may decide to permit this type of overfishing only if all of the following conditions are satisfied:

(a) The Council demonstrates by analysis that such action will result in long-term net benefits to the Nation.
(b) The Council demonstrates by analysis that mitigating measures have been considered and that a similar level of long-term net benefits cannot be achieved by modifying fleet behavior, gear selection/ configuration, or other technical characteristic in a manner such that no overfishing would occur.
(c) The resulting rate or level of fishing mortality will not cause any species or evolutionarily significant unit thereof to require protection under the Endangered Species Act.

2.6 Alternatives Considered But Rejected

Any alternatives 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 (*Natural Resources Defense Council v. Daley, April 25, 2000, U.S. Court of Appeals for the District of Columbia Circuit*). Such alternatives are not analyzed in this rebuilding plan. The *No Action* alternative has a probability of rebuilding to B_{MSY} of less than 50%, but is still analyzed as per NEPA requirements.

Since the west coast lingcod stock is the not the most binding constraint to shelf fisheries in the north or the south, lingcod are not considered to meet the standards of the *Mixed Stock Exception* provision. Therefore, this alternative will not be analyzed in this rebuilding plan.

3.0 AFFECTED ENVIRONMENT

3.1 Physical Environment

3.1.1 Lingcod Habitat

Lingcod occur from Kodiak Island, Gulf of Alaska to Baja, California with the highest densities from Point Conception, California to Cape Spenser, Alaska. They are classified as an estuarine-mesobenthal species (Allen and Smith 1988).

Young lingcod larvae are demersal. Older larvae and young juveniles are epipelagic and primarily found in the upper 3 m of the water column. Off California, young juveniles are pelagic and occur in the upper 35 m of the water column. Juveniles move to deeper water as they grow, but are still most common in waters less than 150 m. Adults are demersal along the continental shelf and most abundant in waters less than 200 m in depth. The catch of lingcod is generally highest in 70 - 150 m of water from Vancouver Island, British Columbia to the Columbia River estuary. Survey data indicates that male lingcod tend to be more abundant in shallower waters than females (Jagielo *et al.* 2000).

In general, lingcod are patchily distributed among areas of hard bottom and rocky relief. Larvae are typically found in nearshore waters. Small juveniles can be found on sandy substrate in estuaries and subtidal zones all along the coast, but are more common in the northern extent of their range. Large juveniles settle to the ocean floor on sand, often near eelgrass or kelp beds. Adults prefer slopes of submerged banks with seaweed, kelp, and eelgrass beds 10 - 70 m below the surface and channels with swift currents flowing around rocky reefs. Adults are strongly residential, tending to remain near the reefs and rocky areas where they live (Adams and Starr 2001).

Spawning lingcod are generally associated with nearshore, rocky reef habitat. During spawning, male and female lingcod gather along rocky reefs affected by strong wave action or tidal currents (Vincent-Lang 1994). Egg masses are usually found in rock crevices or under over hanging boulders and have been found to depths of 97 m (Karpov *et al.* 1995). As current flow is necessary for gas exchange, eggs are usually laid in areas with currents 3.5 km/h or greater. Male lingcod guard egg masses from predators during incubation, removal of the male results in a high incidence of egg loss (Karpov *et al.* 1995). Spawning adults and eggs are common in Puget Sound, Hood Canal, and Skagit Bay, Washington and in Humboldt Bay, California.

3.1.2 Human Effects on Lingcod Habitat

In general, potential fishing-related impacts to fish habitat could take the form of lost or discarded fishing gear, direct disturbance of the seafloor from contact by trawl nets, and direct disturbance of the seafloor contact by longlines and fish traps.

While the effects of fishing on lingcod 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 that a significant number of boulders were displaced and emergent epifauna were removed or damaged after a single pass with trawl gear. As adult lingcod are associated with hard bottom and rock relief, trawl gear may therefore affect the quality of lingcod habitat.

Limited qualitative observations of fish traps, longlines, and gill nets dragged across the seafloor during set and retrieval showed results similar to mobile gear, such that some 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, anthropogenic influences on marine ecosystems is a growing area of interest and concern. The United States has doubled its population in the last five decades, and accompanying this growth, there has been a dramatic shift from inland rural areas to coastal urban areas. With over 50 percent of the country's population living within 50 miles of a coast, there have been major declines in the nation's coastal ecosystems (Sea Grant 2001). Because lingcod occupy coastal areas and are relatively sedentary, the species may be susceptible to habitat degradation due to urbanization. Research in California coastal areas indicates that contaminants of marine habitats stem from sewage discharges, aerial fallout, land runoff, industrial and munitions disposal, dredged material disposal, and thermal enrichment (Commission on Engineering and Technical Systems 1990). If lingcod habitat becomes contaminated, lingcod may be exposed to such things as petrochemical spills and can accumulate high concentrations of heavy metals. Human activities in and around estuaries, such as dredging for development, alteration of wetlands, and nutrient runoff, pose additional threats to lingcod.

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 to 200 m and anthropogenic debris occurred on approximately 14 percent 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.

As more information is gathered about the effects of fishing and non-fishing human activities on lingcod habitat, additional management measures may be taken for habitat protection.

3.2 Biological Environment

3.2.1 Affected Stocks

3.2.1.1 Lingcod Life History

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 and Thomson 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 . Spawning generally occurs over rocky reefs in areas of swift current (Adams 1986; Adams and Hardwick 1992; Giorgi 1981; 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).

3.2.1.2 Lingcod Stock Status

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 (Jagielo *et al.* 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 has 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.

3.2.1.3 Species Co-occurring with Lingcod

Table 3.2-4 in Part II - Draft Darkblotched Rockfish Rebuilding Plan shows the groundfish species managed under the FMP. Those species with a distribution overlapping lingcod distribution in the 0-233 fm depth range are considered co-occurring. This includes most of the rockfish species (*Sebastes* spp.) managed under the FMP as well as some commercially important flatfish species such as Dover sole (*Microstomus pacificus*) that make seasonal migrations on the shelf. Of the *Sebastes* species that co-occur with lingcod, five are overfished. These are bocaccio (*S. paucispinis*), canary (*S. pinniger*) (see Part IV - Draft Canary Rockfish Rebuilding Plan), cowcod (*S. levi*), widow rockfish (*S. entomelas*), and yelloweye rockfish (*S. ruberrimus*). Important roundfish species that also occur with lingcod are sablefish (*Anoplopoma fimbria*), which make seasonal migrations on the shelf. Lingcod are of coastwide distribution and utilize nearshore and continental shelf habitats. Principle FMP groundfish species are summarized by nearshore and shelf species for geographic areas north and south of Cape Mendocino, CA in Table 3.2-2a and Table 3.2-2b.

3.3 Socioeconomic Environment

3.3.1 Management Regime

3.3.1.1 Management History

From 1983 through 1993, a coastwide ABC of 7000 mt was in effect with the INPFC area components: US Vancouver (1000 mt), Columbia (4000 mt), Eureka (500 mt), Monterey (1100 mt) and Conception (400 mt) (Table 5). In 1994, ABC's were unchanged and a coastwide Harvest Guideline of 4000 mt was established. Following a new assessment for the northern area (Jagielo 1994), the coastwide ABC and Harvest Guideline were reduced for 1995 through 1997 to 2400 mt with separate ABC's for the US Vancouver-Columbia (1300 mt), Eureka (300 mt), Monterey (700 mt), and Conception (100 mt) areas. In 1998, following an updated assessment for the northern area (Jagielo *et al.* 1997), the coastwide ABC was reduced to 1532 mt with a Harvest Guideline of 838 mt. Separate ABC's by area were: Vancouver (including Canada)-Columbia (1021 mt), Eureka (139 mt), Monterey (325 mt), and Conception (46 mt). For 1999, the Council established a coastwide ABC of 960 mt and a Harvest Guideline of 730 mt, with area specific ABC's of US Vancouver-Columbia (450 mt), Eureka (139 mt), Monterey (325 mt), and Conception (46 mt). Following a new assessment for the southern area (Adams *et al.* 1999) and a rebuilding analysis (Jagielo 1999), the coastwide ABC for 2000 was reduced to 700 mt which included area values of US Vancouver-Columbia (450 mt) and Eureka-Monterey-Conception (250 mt). In 2001, the Council established a coastwide ABC of 960 mt and an OY of 730 mt. Following the most recent assessment for lingcod (Jagielo *et al.* 2000) and rebuilding analysis (Jagielo and Hastie 2001, Appendix D-1) the Council approved ABCs for 2002 and 2003 of 745 mt and 841 mt respectively.

A history of lingcod commercial trawl trip limits is summarized in Table 3.3-1. No trip limits were in effect prior to 1995, and trip limits have become increasingly restrictive. The Council adopted a new, more conservative groundfish management regime for 2003 largely in response to new, more pessimistic assessments for bocaccio (south of Cape Mendocino, California), canary rockfish (see Part IV - Draft Canary Rockfish Rebuilding Plan), and yelloweye rockfish. The centerpiece of the new management regime is a strategy of seasonal depth-based area closures that are designed to reduce mortality of overfished groundfish species.

A history recreational size and bag limits is summarized in Table 3.3-2. Management tools used to reduce the recreational take of lingcod include the establishment of increasing minimum size limits and decreasing bag limits. Additionally, seasonal closures have been utilized to both reduce recreational landings and to provide protection for nest-guarding males in the winter months. In 2003 for example, retention of lingcod in Washington recreational fisheries is restricted to the period from March 16 - October 15 and California recreational fisheries south of Cape Mendocino are close from January-June. Depth-based management measures were also implemented in 2003 as a means of minimizing mortality of shelf rockfish species designated as overfished. California recreational fisheries are restricted to waters shallower that 20 fm and Washington and Oregon recreational fisheries will be restricted to waters shallower than 25 fm and 27 fm respectively if harvest guidelines for canary rockfish or yelloweye rockfish are exceeded before the end of the year. The Council also established the Yelloweye Rockfish Conservation Area (YRCA) off the northern Washington coast where recreational fishing is prohibited.

[Insert updated historical catch figures and text]

3.3.1.2 Data Systems

Catch Monitoring

See section 3.3.1.2 of Part II - Draft Darkblotched Rockfish Rebuilding Plan.

Monitoring Commercial Landings

See section 3.3.1.2 of Part II - Draft Darkblotched Rockfish Rebuilding Plan.

Discard Estimation

See section 3.3.1.2 of Part II - Draft Darkblotched Rockfish Rebuilding Plan.

Monitoring Recreational Landings

See section 3.3.1.2 of Part IV - Draft Canary Rockfish Rebuilding Plan.

Lingcod specific, depth-based bycatch rates from the Hastie model are applied to landed weight of the target species in the target fisheries depicted in Table 3.3-2a and Table 3.3-2b to estimate seasonal bycatch of lingcod.

3.3.1.3 Enforcement

See section 3.3.1.3 of Part II - Draft Darkblotched Rockfish Rebuilding Plan.

3.3.1.4 Lingcod Constraint Over Time

[NOTE: This is a relatively brief section. Mainly a place holder to maintain parallel structure between Chapter 3 and 4. The bulk of the discussion of how things vary over time between rebuilding options will be in Chapter 4. Authors anticipate adding to this section if, in developing the Chapter 4 discussion, it turns out there is additional background information needed that has not been developed in other sections of Chapter 3. They will also consider expanding some of the ideas placed here if they are not already developed elsewhere and it is decided this is the best section to do it in.]

The west coast lingcod stock has not been the most binding constraint to fisheries. However, recreational fishery landings are a major component of the total fishing mortality of lingcod (see Figure 4.2-1 in Part II - Draft Darkblotched Rockfish Rebuilding Plan) and preliminary data suggest that recreational lingcod harvest in 2002 was substantially higher than anticipated (see section 4.3.1).

3.3.1.5 Complex Values and Allocation Among Sectors Over Time

See section 3.3.1.5 of Part II - Draft Darkblotched Rockfish Rebuilding Plan.

3.3.1.6 Managing with Risk and Uncertainty

See section 3.3.1.6 of Part II - Draft Darkblotched Rockfish Rebuilding Plan.

[The following sections are listed as a placeholder and will be completed prior to public review]

3.3.2 Aggregate Commercial Catch and Recreational Effort for the First Year of Management–Coastwide

3.3.3 Primary Producers - Commercial Vessels

3.3.4 Commercial Distribution Chain

3.3.4.1 Buyers and Processors

3.3.4.2 Markets

3.3.5 Recreational Fishery - Charter and Private Vessel Sectors

3.3.6 Tribal Fishery

3.3.7 Communities

3.3.8 Net Economic Benefits- Cost Benefit Analysis

4.0 ENVIRONMENTAL CONSEQUENCES

This rebuilding plan EIS analyzes the effects of alternative strategies for rebuilding lingcod on the probability of successful stock rebuilding, co-occurring species, affected habitat, and the socioeconomic environment (Table 4-1).

NOTE: Some of the biological and economic analyses anticipated for this rebuilding plan are not currently available. The cumulative effects analyses are not included in this draft, but will be incorporated in the final draft. There may be some additional rebuilding plan analysis and relevant data available as supplemental information at the April Council meeting.

4.1 Affected Lingcod Habitat Including Essential Fish Habitat

The same assumptions regarding relative fishing intensity of rebuilding alternatives discussed in section 4.1 of the draft darkblotched rebuilding plan (Part II) apply for lingcod.

4.2 Affected Biological Environment

Lingcod are on a fast rebuilding trajectory due to their fast growth rate and high reproductive potential. Jagielo (2001) estimated lingcod would rebuild by 2009 under all the alternatives analyzed herein. Preliminary evidence suggests lingcod are rebuilding coastwide faster than predicted and may reach $B_{40\%}$ two to three years early (Jagielo pers. comm.). A new assessment in 2003 should confirm rebuilding progress. Additionally, fisheries are likely to be more constrained by rebuilding measures for shelf rockfish species such as bocaccio, canary rockfish, and yelloweye rockfish.

4.3 Affected Socioeconomic Environment

4.3.1 Controlling Fishing-Related Mortality of Lingcod

See section 4.3.1 of Part II - Draft Darkblotched Rockfish Rebuilding Plan.

4.3.1.1 Landed Catch Accounting and Control

Commercial landed catch accounting and control methods are considered relatively effective. There have been some violations of the fish ticket reporting system in the past. To the extent that landed catch is not properly monitored and reported, there will be repercussions for inseason management of overfished stocks including lingcod, as well as fishery-dependent data inputs in future stock assessments and the logbook-fish ticket reconciliation process that is done to help determine total catch. If this results in underestimates of total catch of lingcod and/or other overfished stocks, then rebuilding strategies could be compromised resulting in an underachievement of rebuilding progress.

Recreation landed catch accounting and estimation methods have come under close scrutiny in recent years (see section 3.3.1.2 of Part IV - Draft Canary Rockfish Rebuilding Plan). Increased dockside sampling has been suggested as a means of improving the quality and timeliness of recreational catch reporting over the current organization of the MRFFS program. This is an important issue for species like lingcod for which a substantial amount of the total OY is taken in recreational fisheries (see Table 4.3-1 in Part II - Draft Darkblotched Rebuilding Plan). As an example, during the February, 2003 GMT meeting, the Team discussed 2002 recreational lingcod catch and roughly accounted for 600 mt in the recreational fishery alone when the total catch OY for 2002 was 570 mt. These results are preliminary but suggest a real need for better data coordination and a timely inseason estimator for recreational catches.

4.3.1.2 Bycatch Accounting and Control

Limiting bycatch (defined as dead discard) to the extent practicable is a MSA mandate. 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 and area. Bycatch rates of lingcod in west coast trawl (and non-trawl) fisheries are uncertain. The NMFS first implemented a west coast Groundfish Fishery Observer Program in August 2001 to make direct observations of commercial groundfish targeting efforts. Observer coverage extends to about 10% of the west coast fleet currently, but should approach 20% by the summer of 2002 (E. 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) will be needed to estimate representative rates of lingcod bycatch. Therefore, NMFS has stated that Observer Program data probably won't be available for management use until the summer of 2003 at the earliest. There may be a period when a combination of Observer Program data and the best currently available methods for estimating bycatch are used to estimate bycatch.

Currently, the best available science that informs managers of bycatch and discard rates of lingcod in the groundfish fishery is a model (Hastie model) that uses logbook and EDCP data to estimate coincident catch rates in target trawl efforts for other species (Hastie 2001). The Hastie model estimates bycatch rates (defined as coincident catch rates in this context) of lingcod in two-month blocks. The seasonality of bycatch is an important management consideration. Target opportunities for healthy flatfish, DTS, and rockfish species vary seasonally and geographically. It is reasonable to expect bycatch rates of lingcod to vary in accordance with the concurrence of target species and lingcod. In November 2001, the Council adopted the Hastie model to use for bycatch accounting and control starting in 2002.

The Council selected and NMFS approved the use of the mid range of considered lingcod bycatch rates to seasonally adjust landing limits to limit bycatch of lingcod starting in 2002 (Table 3.3-1a and Table 3.3-1b). The Council did not consider the high range plausible due to the effect of the small footrope restriction not represented in input data (Hastie 2001). The low range was considered unlikely because implicit retained catch is smaller than actual landings in 2000 and 2001. The discard mortality deduction for lingcod assumes a discard mortality of 50% of estimated discard (Rickey 1997). The extent that these bycatch and discard rates are a reasonable proxy for lingcod in lieu of direct (contemporary) observations of fishery interceptions is unknown. In this analysis, the mid range of bycatch rates is considered the most plausible and risk neutral. Bycatch rates from the Hastie model are applied to landed weight of the target species in the target fisheries depicted in Table 3.3-1a and Table 3.3-1b to estimate seasonal bycatch of lingcod.

All rebuilding plan alternatives except *No Action* and *Maximum Conservation* use the mid range of bycatch rates estimated in the Hastie model to estimate lingcod bycatch. The *No Action* alternative assumes a 20% bycatch/discard rate for lingcod. The *Maximum Conservation* does not rely on modeled bycatch or any other bycatch accounting mechanism since all fishing-related mortality is eliminated. It is anticipated that all rebuilding alternatives will benefit from direct observations of bycatch. Rebuilding measures should always use the best available estimates of bycatch.

4.3.1.3 Potential Rebuilding Measures to Consider

Measures that would effectively displace fisheries with a relatively high incidence of lingcod catch or other fishery/gear modifications could be considered to reduce fishing-related mortality. These measures would affect rebuilding through reducing risk of considered rebuilding alternatives in terms of achieving target fishing harvest rate (F) and the specified total catch OY. Avoidance measures through gear modification or fishing techniques should be investigated.

Approach to Analysis and Modeling Assumptions

Models used to develop regulations for the 2003 fishery were used to project harvest regulations in the first year of management under the different rebuilding options. Using the depth management regime recommended by the Council for the 2003 fishery and assuming that all other overfished species had been rebuilt, an analysis was conducted to evaluate the degree to which the fishery would be constrained by each particular overfished species under each rebuilding option for that species. Assuming average conditions and response to reduction in harvest mortality, the first year of the rebuilding plan should be the year that is most constrained.

A number of assumptions have been made in order to project the regulatory the framework. For example, some of the analyses that follow assume that all other presently overfished stocks, with the exception of the subject stock, are rebuilt and are being harvested at a long-term, sustainable level. Proxy values for F_{MSY} and B_{MSY} were generally used to determine proxy estimates of "MSY" for these analyses. The proxy F_{MSY} for overfished rockfish species is generally $F_{50\%}$, i.e. the harvest rate that corresponds to the spawning output being reduced to 50% of its unfished equilibrium level (B_0) assuming recruitment is independent of spawning output. Because some decline in recruitment is expected as the spawning stock declines, the equilibrium spawning biomass that will result from a $F_{50\%}$ harvest rate will be probably be somewhat less than $B_{50\%}$, and presumably near $B_{40\%}$, the rebuilding target and generally considered a reasonable proxy for B_{MSY}.

$F_{45\%}$ was used to define harvest rates for calculating proxy MSY levels for lingcod and Pacific whiting. These proxy MSY harvest rates were recommended by participants in the West Coast Groundfish Harvest Rate Policy Workshop that was sponsored by the SSC, and adopted by Council action in 2000. Considered risk-neutral, these harvest rates were substantially lower than those previously used to manage groundfish stocks. They are considered to meet the MSA mandate to "...achieve and maintain, on a continuing basis, the optimal yield from each fishery...".

MSY proxies used in the following economic analyses were derived by simply calculating the yield that corresponds to applying the proxy F_{MSY} to $B_{40\%}$, the proxy B_{MSY}. An exception to the use of proxy estimates is the approach used to estimate F_{MSY} rates and MSY for canary rockfish and yelloweye rockfish. For these species, F_{MSY} was estimated by fitting a spawner-recruit curve and finding the fishing mortality rate at which yield is maximized. Converted to units of $F_{x\%}$, the estimates of F_{MSY} for canary rockfish and yelloweye rockfish are $F_{73\%}$ and $F_{57\%}$ respectively (Methot and Piner 2002; Methot *et al.* 2002). These F_{MSY} rates for canary and yelloweye were applied to the $B_{40\%}$ biomass level because that is the target biomass level for rebuilding, and the calculated B_{MSY} levels were near $B_{40\%}$.

Note: These MSY estimates should be interpreted with great caution. While these proxy MSY estimates were developed for informing the rebuilding plan economic analyses, they should not to be applied to consideration of long-term management options for West coast groundfish. Evidence of low productivity for many of the overfished rockfish stocks suggests that the proxy F_{MSY} rates may overestimate true F_{MSY} as well as MSY. For instance, the 2002 bocaccio assessment (MacCall 2002) indicated that the productivity of the bocaccio stock in waters off southern and central California was so low that rebuilding could not occur according to the National Standard Guidelines (i.e., P_{MAX} was less than 50%, even with no harvest, over more than 100 years). Clearly, a harvest rate of $F_{50\%}$ is too aggressive for such an unproductive stock, just as it is too aggressive for canary rockfish and yelloweye rockfish that had F_{MSY} estimates lower than $F_{50\%}$. In other words, the current information on the productivity of bocaccio indicates that the stock would decline if fished at $F_{50\%}$ after it is rebuilt to the $B_{40\%}$ level. Unlike canary rockfish and yelloweye rockfish, the fit of a stock-recruit curve to the spawner-recruit data for bocaccio was inadequate to allow F_{MSY} to be estimated directly. Therefore, the proxy F_{MSY} rate for boccacio is not considered to be realistic, nor is there a straightforward way to estimate a more appropriate value. This qualification may also be true for other overfished rockfish stocks.

Depth-Based Restrictions

See section 4.3.1 of Part II - Draft Darkblotched Rockfish Rebuilding Plan.

The lingcod management benefits of depth-based restrictions in recreational fisheries are yet to be proven. Recreational fisheries south of Cape Mendocino (40° 10' N. lat.) are limited to waters no deeper than 20 fm in 2003. North of Cape Mendocino (40° 10' N. lat.) for 2003, fisheries are not restricted by depth. However, fishing may be limited to areas no deeper than 27 fm in northern California and Oregon and no deeper than 25 fm in Washington if established harvest guidelines are reached for canary rockfish or yelloweye rockfish. Whereas these depth-based restrictions provide protection for lingcod populations on the continental shelf, they allow year round opportunity for nearshore lingcod populations, and the degree of catch reduction is uncertain. Additionally, the use of inseason harvest guidelines for the implementation of depth-based restrictions underscores the need for better data coordination and a timely inseason estimator for recreational catches.

Seasonal Restrictions

See section 4.3.1 of Part II - Draft Darkblotched Rockfish Rebuilding Plan.

Seasonal closures can provide additional protection for lingcod beyond reducing fishing effort. Seasonal closures have been utilized to both reduce recreational landings and to provide protection for nest-guarding males in the winter months. *[Inset findings on the efficacy of winter closures on lingcod management]*

Trip Limit Management

See section 4.3.1 of Part II - Draft Darkblotched Rockfish Rebuilding Plan.

Gear Modifications

See section 4.3.1 of Part II - Draft Darkblotched Rockfish Rebuilding Plan.

Cooperative International Management

All of the overfished groundfish stocks on the west coast are distributed across international boundaries. While the Council process is designed to provide good coordination of state and federal management systems, Council jurisdiction and authorities are limited to the EEZ of the U.S. Cooperative international management could therefore be an avenue worth exploring to aid in the rebuilding of overfished stocks. There is such an active front being pursued with Canada at the Council, NMFS, and State Department levels to improve Pacific whiting assessment and management. All groundfish stocks under rebuilding would potentially benefit if management were coordinated with our international neighbors to the north and south.

Lingcod on the west coast south of the U.S. - Canadian border are part of a larger stock assemblage, some of which is managed outside of Council jurisdiction. British Columbia annual lingcod landings have averaged about *X* mt annually during 19*XX-XXXX*, or about *X*% of average annual landings from U.S. waters for the same period. It is unclear whether the cumulative fishing-related mortality across the stock's range is consistent with that mandated under MSA, FMP, NMFS National Guidelines, and U.S. legal authorities. The relative biomass of lingcod across the multiple management jurisdictions in the northeast Pacific is also unknown. Coordinated and consistent assessment and management should be explored with the Canadian Department of Fisheries and Oceans. Cooperative management could benefit lingcod rebuilding in waters off the west coast of the U.S. as well as in foreign waters.

4.3.1.4 Lingcod Constraint Over Time

Table 4.3-1 shows projected total catch optimum yields (OYs) over time under different probabilities of rebuilding within T_{max}. Note that the OY levels in the table revert to the proxy MSY harvest level once the median rebuilding year under each scenario has been reached (i.e. in years following T_{target}). The proxy MSY harvest level for lingcod is 1,373 mt.

4.3.1.5 Complex Values and Allocation Among Sectors Over Time

See section 4.3.1.5 of Part II - Draft Darkblotched Rockfish Rebuilding Plan.

4.3.1.6 Uncertainty

Rebuilding analyses are stochastic by nature. Harvest rate management variables are derived from hundreds of simulations which together indicate the probability of rebuilding an overfished stock within a fixed time period and harvest regime. Characterizing these stochastic indicators as deterministic biomass and OY trajectories implies a level of certainty that is not supported by the rebuilding analysis.

[The following sections are listed as a placeholder and will be completed prior to public review]

4.3.2 Aggregate Commercial Catch and Recreational Effort for First Year of Management-Coastwide

4.3.3 Primary Producers - Commercial Vessels

4.3.4 Commercial Distribution Chain

4.3.4.1 Buyers and Processors

4.3.4.2 Markets

4.3.5 Recreational Fishery

4.3.6 Tribal fishery

4.3.7 Communities

4.3.8 Cost Benefit Summary

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Appendix D-1 Lingcod Rebuilding Analysis

Updated Rebuilding Analysis for Lingcod

August 8, 2001

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Introduction

In 1997, an assessment of lingcod prepared for the PFMC found that female spawning biomass estimates were below 25% of the unfished biomass level for the northern portion of the stock (Jagielo et al 1997). An analysis was subsequently prepared which indicated that rebuilding to the $B_{40\%}$ level was possible within 10 years at F=0 (Jagielo 1999). Based on the analysis for the northern area, a 10 year rebuilding plan was implemented by PFMC for the entire West Coast (Washington-Oregon-California). The rebuilding plan began in 1999 and set the target date of the start of 2009 for achieving the $B_{40\%}$ spawning stock size.

More recently, a new coastwide assessment for lingcod was conducted in 2000 (Jagielo et al 2000). The new assessment provides separate estimates of spawning stock biomass for the northern (LCN: US-Vancouver and Columbia) and southern (LCS: Monterey, Eureka, Conception) areas. Spawning stock size estimates have increased since 1997 in both areas, indicating progress toward the rebuilding target since the implementation of coastwide catch reductions (Figure 1). Recruitments are plotted by brood year in Figure 1a.

The present rebuilding analysis utilizes information from the most recent stock assessment and conforms to the SSC Terms of Reference for Groundfish Rebuilding Plans. This analysis provides new rebuilding trajectories for both the northern and southern areas that provide for lingcod rebuilding within the time frame originally established by PFMC in 1999.

Data and Parameters

This analysis uses the SSC Default Rebuilding Analysis software developed by Punt (2001). For each area, data inputs included: 1) spawning output by age (the product of the weight-at-age and % maturity-at-age vectors); 2) sex-specific natural mortality; 3) age specific weight (kg), selectivity, and numbers of fish for the year 2000; and 4) vectors of annual recruitment (age 2 fish) and spawning biomass estimates (1973-2000). Age specific data were input for ages 2-20+, with 20+ serving as an accumulator age. The population projection was configured to begin in 2001 with rebuilding occurring by the start of 2009 (year 10 from the original rebuilding start year of 1999). Catches were pre-specified for 2001, and were derived from the projections for the years 2002-2008.

Management Reference Points

Separate estimates of B_0 were computed using random draws from 1) the full time series of recruitment estimates (1973-1995), and 2) the time series of early recruitments (1973-1982) (Table 1). Distributions of the simulated B_0 estimates under these alternative recruitment scenarios indicated a marked difference for the northern area, but little difference for the southern area (Figure 2). For both areas, the full recruitment time series B_0 scenario was selected for the rebuilding projection analysis (Table 1 values shown in bold). Comparison of the spawning stock estimates for 2000 (Table 1) with the full recruitment time series estimates of B_0 indicate that the recent coastwide spawning population size is approximately 15% of the unfished population size.

The median time to rebuild at F=0 was determined by the previous lingcod rebuilding analysis to be 5 years, and the maximum time allowed to rebuild (T_{max}) was established by PFMC to be 10 years (by the start of 2009) (Jagielo 1999). The present analysis confirmed that rebuilding could occur within 10 years with no fishing; the median time to rebuild at F=0 was estimated to be 3.6 years for the northern area, and 4.8 years for the southern area.

Rebuilding Projections

Population projections were conducted using the "recruits" in lieu of the "recruits-per-spawner" option provided by Punt (2001). The basis for this choice was the lack of a credible spawner-recruit relationship for lingcod (Figures 3 and 4). This is evidenced particularly for the northern area (Figure 3), where the ratio of recruit/spawning output increased substantially from 1987-1993 -- a period where the trend in spawning stock size was decreasing (Figure 1). Recruitments for the LCN and LCS projections were randomly drawn from the values estimated from the most recent years (1986-1995) in the assessment (Jagielo et al 2000).

Performance of alternative rebuilding policies

Estimates of fishing mortality, median years to rebuild, and OY (mt) for 2002-2009 were computed for alternative probabilities of achieving the rebuilding target by start of 2009--50%, 60%, 70% and 80%--as well as the 40-10 and F=0 policies (Table 2). The bottom panel of Table 2 shows the coastwide rebuilding OYs for each policy, which represent the combination of northern and southern yields. These trajectories are also portrayed in Figure 7. For comparative purposes, Figure 7 also depicts the 2000 harvest and the 2001 OY. The 2002 OY associated with a 60% likelihood of rebuilding is slightly lower than the OY adopted for 2001. Plots of the probability ogives for each of the alternative policies, including F=0 and the 40:10 rule, are shown in Figures 5 and 6. Also shown in these figures are the median projected OYs through 2009, for each policy, and the trajectories of median ratios of spawner biomass to target biomass. For the alternative with 60% likelihood of rebuilding, Figure 8 portrays the variability in the ratio of spawner-to-target biomasses in the northern and southern areas. The median ratio is portrayed, along with the 5th, 25th, 75th, and 95th percentiles for the years 2001-2009. For figures relating to biomass, the year indices reflect the status at the beginning of the year.

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Tables and Figures

Table 1. Estimates of unfished spawning stock biomass (B_0), Bmsy proxy ($B_{40\%}$), and spawning stock size in 2000 (B2000) for the northern (LCN) southern (LCS) areas. Values in bold were used for rebuilding projections.

	Spawning Output (mt)				
	All Recruitments (1973-1995)		Early Recruitments (1973-1982)		Recent Estimate
	Unfished (B_0)	Target ($B_{40\%}$)	Unfished (B_0)	Target ($B_{40\%}$)	(B_{2000})
LCN	**22,882**	**9,153**	31,033	12,413	3,527
LCS	**20,971**	**8,389**	22,799	9,120	3,220

Table 2. Rebuilding projection results; Top: northern area (LCN), Middle; southern area (LCS), Bottom: LCN and LCS Combined.

LCN						
Fishing rate	0.0607	0.0531	0.051	0.0474	40:10 Rule	F=0
Prob to rebuild by Tmax	**50%**	**60%**	**70%**	**80%**	**55%**	**100%**
Median years to rebuild	7.0	6.6	6.1	5.9	6.7	3.6
OY (mt)						
2002	384	337	324	302	189	0
2003	429	379	365	341	284	0
2004	470	417	402	376	384	0
2005	502	447	432	405	473	0
2006	531	475	460	432	553	0
2007	561	504	487	459	621	0
2008	581	523	506	477	665	0

LCS						
Fishing rate	0.0667	0.061	0.0533	0.0472	40:10 Rule	F=0
Prob to rebuild by Tmax	50%	60%	70%	80%	68%	100%
Median years to rebuild	7.0	6.7	6.3	6.0	6.5	4.8
OY (mt)						
2002	262	240	211	187	91	0
2003	296	273	241	214	150	0
2004	345	319	283	253	232	0
2005	399	370	329	295	332	0
2006	448	416	371	334	434	0
2007	494	460	412	371	534	0
2008	536	500	448	405	644	0

Coastwide OY (mt)	**Prob to rebuild by Tmax:**					
Year	**50%**	**60%**	**70%**	**80%**	**40:10 Rule**	**F=0**
2002	646	577	535	489	280	0
2003	725	651	606	555	434	0
2004	815	735	685	629	616	0
2005	901	817	761	701	805	0
2006	979	891	831	766	987	0
2007	1,055	963	899	830	1,155	0
2008	1,117	1,022	954	882	1,309	0

Figure 1. Time series of female spawning stock biomass estimates (mt).
Source: Jagielo et al. 2000.

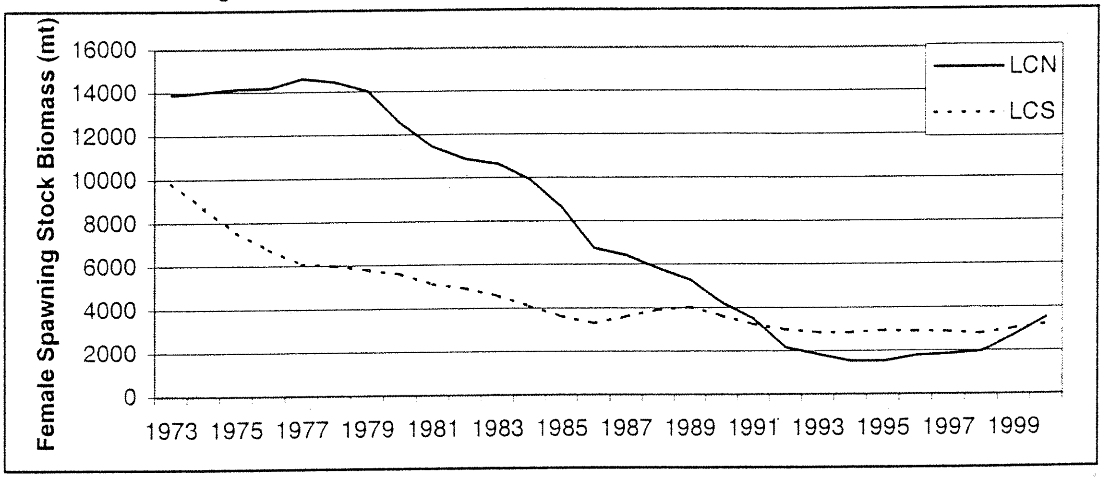


Figure 1a. Full recruitment time series by brood year (1971-1993) for LCN and LCS.

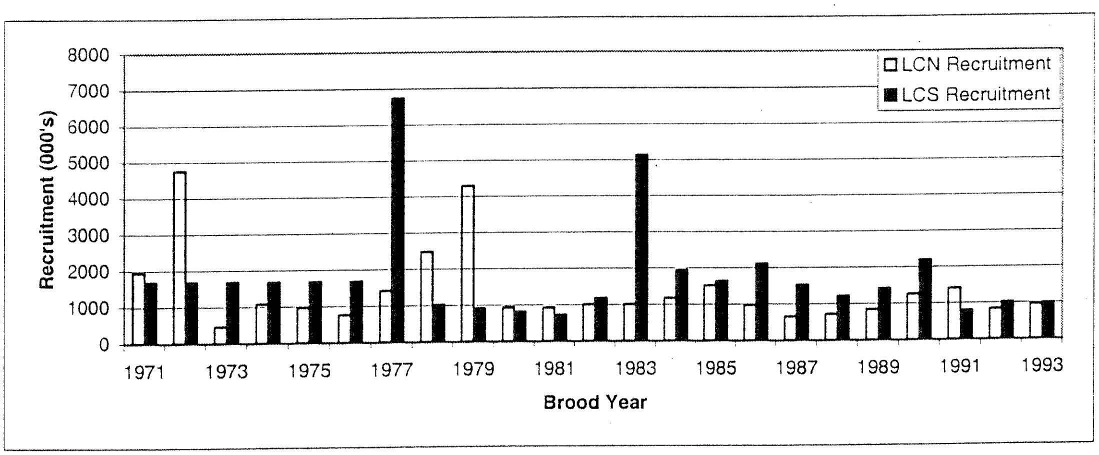
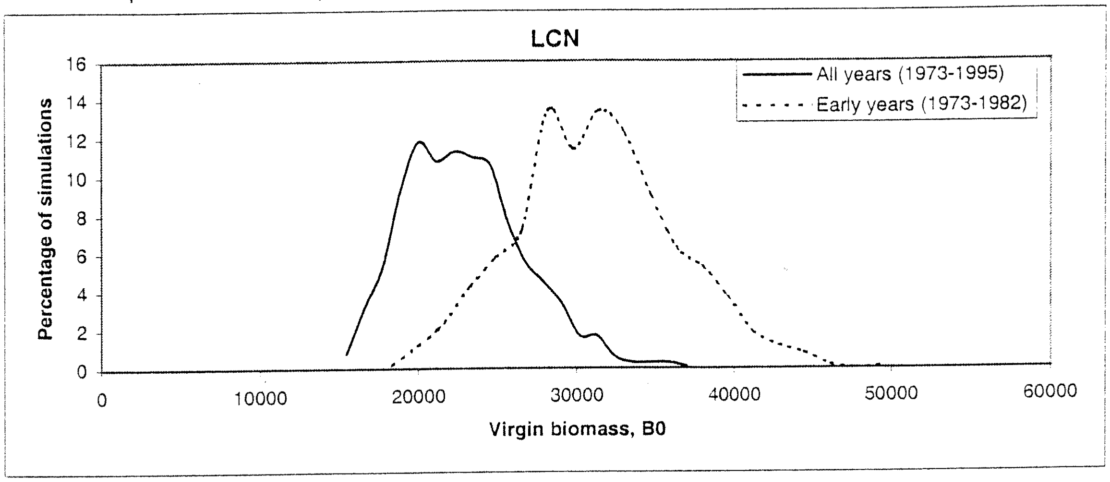


Figure 2. Distribution of Virgin Spawning Biomass (B_0) estimates for 1000 simulation runs.
Top: Northern area (LCN), Bottom: Southern area (LCS).



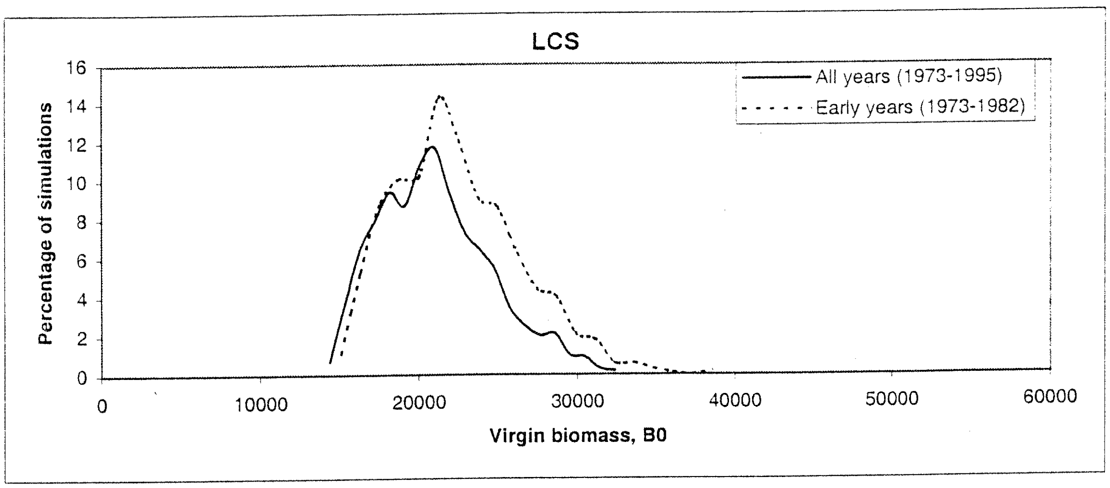


Figure 3. Recent northern area (LCN) recruitment and recruits/spawning output (R/S).

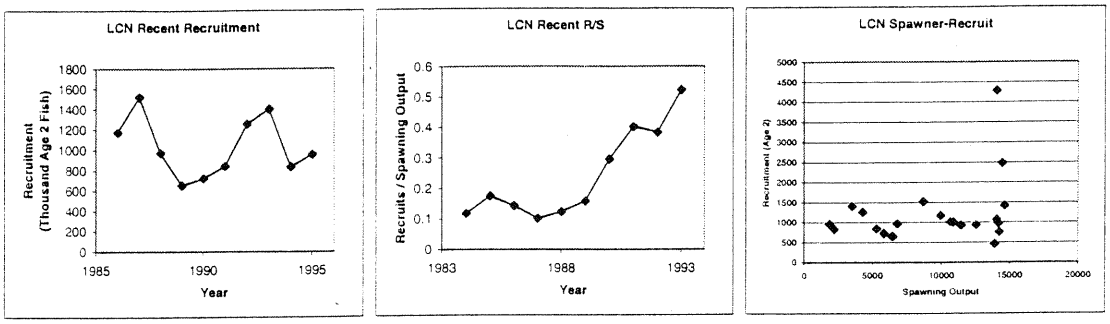


Figure 4. Recent southern area (LCS) recruitment and recruits/spawning output (R/S).

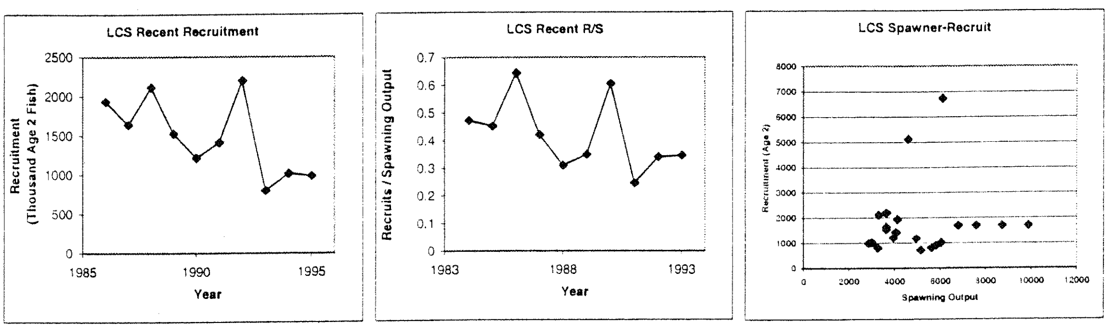


Figure 5.--Probability of limit attainment, median OY trajectories, and ratios of spawner biomass to target biomass, under six alternative harvest policies in the northern area (LCN).

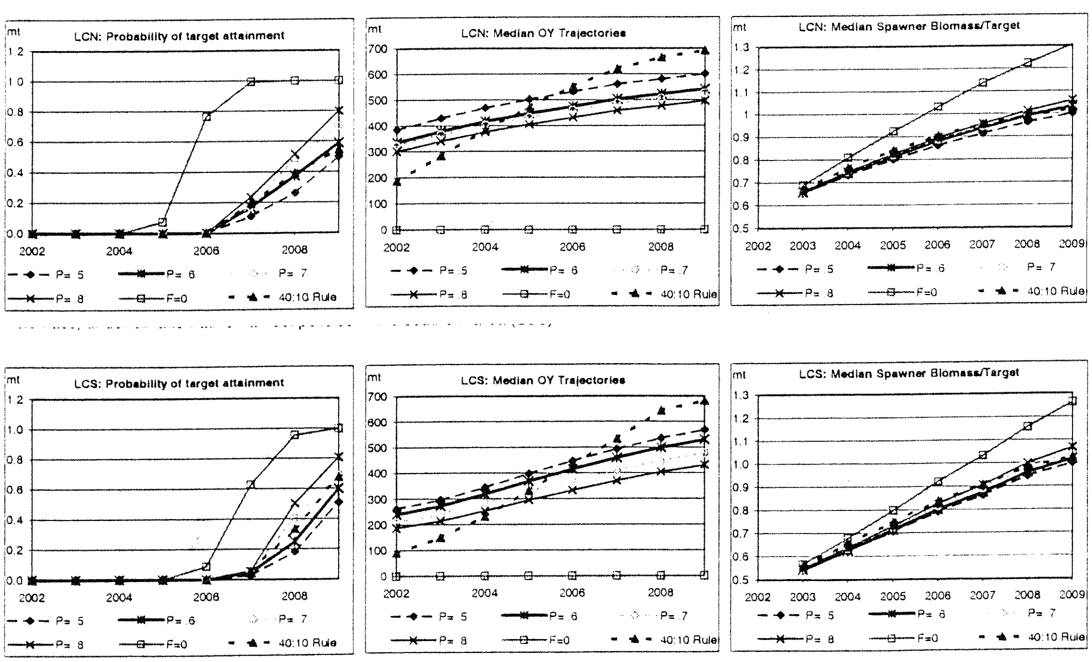


Figure 7.--Coastwide rebuilding OYs for lingcod, 2002-2008, based on the median projections, for six alternative harvest policies, and the 2000 harvest and 2001 OY.

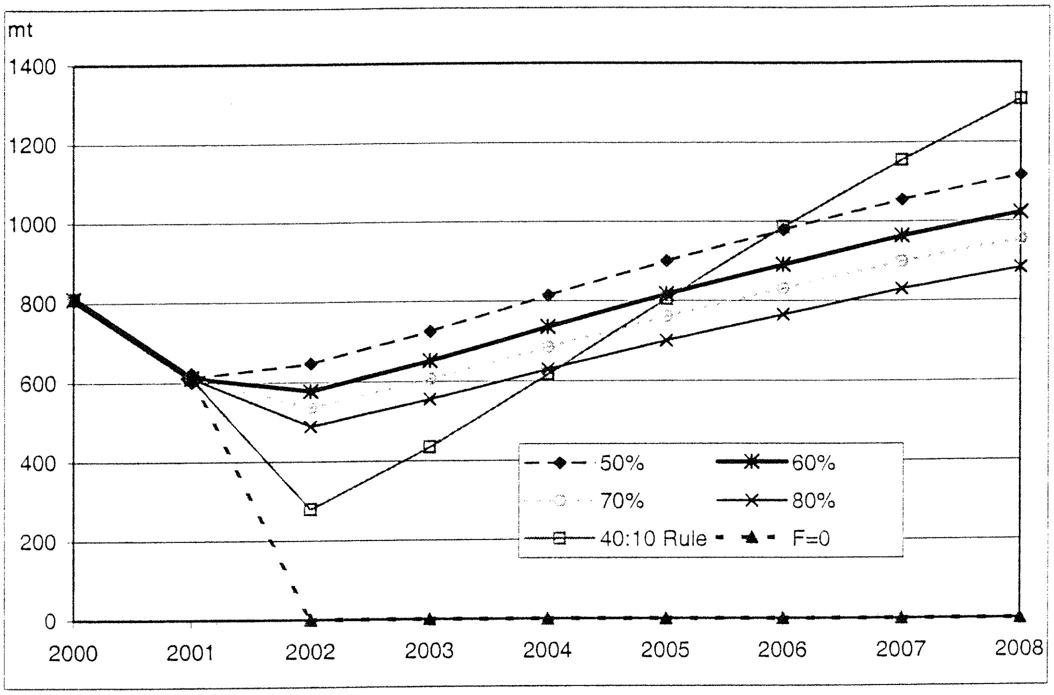
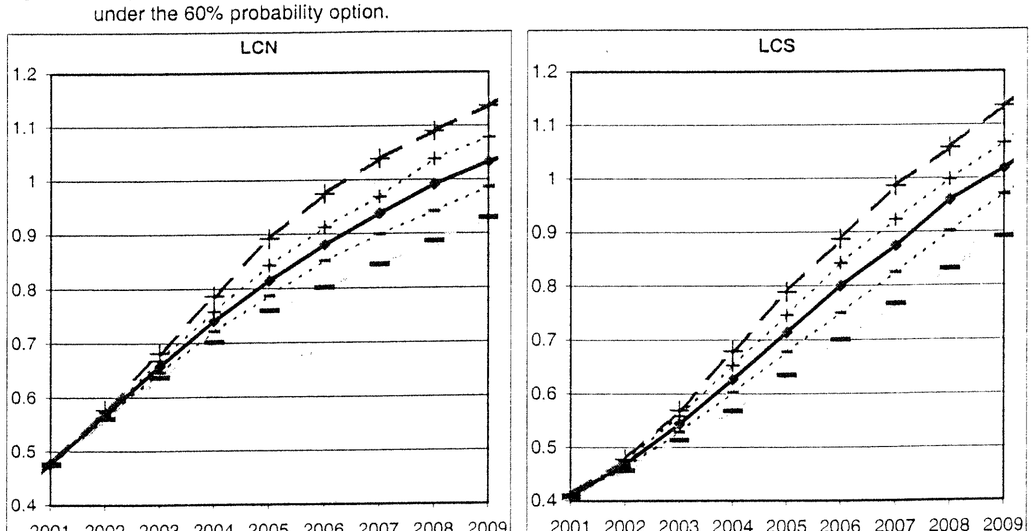


Figure 8.--Projected ratios of spawner biomasses to the targets, for the northern (LCN) and southern (LCS) areas under the 60% probability option.



Note: The central thick line represents the median ratio in each year. Other lines, from bottom to top represent the 5th, 25th, 75th, and 95th percentiles.

Appendix D-2 FMP Amendment Language

[to be completed before public review]

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TABLES

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TABLE 1-1. Current parameter/target estimates specified for rebuilding lingcod . Data from {Jagielo, 2000 #273} and {Jagielo, 2001 #274}.

Rebuilding Parameter/Target	Lingcod [1/]
T_0 (year declared overfished)	1999
T_{MIN} (minimum time to achieve B_{MSY} = mean time to rebuild at F = 0)	3.6 years N; 4.8 years S
T_{MAX} (maximum time to achieve B_{MSY})	10 years
P_{MAX} (P to achieve B_{MSY} by T_{MAX}) [2/]	60%
Most recent stock assessment	Jagielo *et al.* 2000
Most recent rebuilding analysis	Jagielo and Hastie 2001
B_0 (estimated unfished biomass)	22,882 mt N; 20,971 mt S
$B_{CURRENT}$ (current estimated biomass = X% of B_0)	3,527 mt N; 3,220 mt S in 2000
% Unfished Biomass	15% N & S in 2000
MSST (minimum stock size threshold = 25% of B_0)	5,720 mt N; 5,243 mt S
B_{MSY} (rebuilding biomass target = 40% of B_0)	9,153 mt N; 8,389 mt S
MFMT (maximum fishing mortality threshold = F_{MSY})	$F_{45\%}$; F = 0.12 N; F = 0.14 S
Harvest control rule [2/]	F = 0.0531 N; F = 0.061 S
T_{TARGET} [2/]	2009

[1/] West coast lingcod were assessed as two stocks: north (Columbia and U.S.-Vancouver INPFC areas) and south (Eureka, Monterey, and Conception INPFC areas).
[2/] Under *Council Interim Rebuilding*.

TABLE 2-1. Rebuilding parameters associated with lingcod rebuilding alternatives.

Alternative	F rate	Probability of rebuilding within T_{MAX}	Median year of reaching B_{MSY}
No Action	40:10 Rule	55% N 68% S	2009
Maximum Conservation	0.000 N & S	approaches 100%	2004
Maximum Harvest	0.0607 N 0.0667 S	50%	2008
Council Interim Rebuilding	*0.0531 N* *0.0610 S*	*60%*	2009
70%[1]	*0.0510 N* *0.0533 S*	*70%*	2009
80%[1]	*0.0474 N* *0.0472 S*	*80%*	2009

[1]While this intermediate level of harvest is not a structured alternative, associated rebuilding parameters are displayed to understand the relative difference of intermediate rebuilding scenarios.

TABLE 3.2-1. Biological reference points for lingcod .

Biological Reference Point	Value
Maximum age	*X* yrs females; *X* yrs male
Maximum length	*127* cm females; *95* cm males
Maximum weight	3.1 kg females; 1.2 kg male
Age at 50% maturity	5 yrs females; 3 yrs male
Length at 50% maturity	69 cm females; 50 cm males
Natural mortality rate (M)	0.18 females; 0.32 males

[Should other biological reference points be included in Table 3-1?]

TABLE 3.2-2a. Principal FMP groundfish species found on the U.S. west coast nearshore areas continental shelf north of Cape Mendocino, California.

Common name	Scientific name	Common name	Scientific name
Nearshore Species		Shelf Species	
Black rockfish	*Sebastes melanops*	Arrowtooth flounder	*Atheresthes stomias*
Blue rockfish	*Sebastes mystinus*	Canary rockfish	*Sebastes pinniger*
Brown rockfish	*Sebastes auriculatus*	Tiger rockfish	*Sebastes nigrocinctus*
Cabezon	*Scorpaenichthys marmoratus*	Vermillion rockfish	*Sebastes miniatus*
China rockfish	*Sebastes nebulosus*	Widow rockfish	*Sebastes entomelas*
Copper rockfish	*Sebastes caurinus*	Yelloweye rockfish	*Sebastes ruberrimus*
Lingcod	*Ophiodon elongatus*		
Kelp greenling	*Hexagrammos decagrammus*		
Quillback rockfish	*Sebastes maliger*		

TABLE 3.2-2b. Principal FMP groundfish species found on the U.S. west coast nearshore areas continental shelf north of Cape Mendocino, California.

Common name	Scientific name	Common name	Scientific name
Nearshore Species		**Shelf Species**	
Black rockfish	*Sebastes melanops*	California scorpionfish	*Scorpaena gutatta*
Blue rockfish	*Sebastes mystinus*	Canary rockfish	*Sebastes pinniger*
Brown rockfish	*Sebastes auriculatus*	Vermillion rockfish	*Sebastes miniatus*
Boccacio	*Sebastes paucispinis*	Widow rockfish	*Sebastes entomelas*
Cabezon	*Scorpaenichthys marmoratus*	Yelloweye rockfish	*Sebastes ruberrimus*
Chilipepper	*Sebastes goodei*		
Copper rockfish	*Sebastes caurinus*		
Cowcod	*Sebastes levis*		
Gopher rockfish	*Sebastes carnatus*		
Lingcod	*Ophiodon elongatus*		
Olive rockfish	*Sebastes serranoides*		
Treefish	*Sebastes serriceps*		

TABLE 3.3-1. Lingcod Commercial Trawl Trip Limits (pounds), 1995-2003. No trip limits in effect prior to 1995.

<table>
<tr><th></th><th>Jan.</th><th>Feb.</th><th>Mar.</th><th>Apr.</th><th>May</th><th>June</th><th>July</th><th>Aug.</th><th>Sep.</th><th>Oct.</th><th>Nov.</th><th>Dec.</th></tr>
<tr><td>1995</td><td>20,000</td><td>20,000</td><td>20,000</td><td>20,000</td><td>20,000</td><td>20,000</td><td>20,000</td><td>20,000</td><td>20,000</td><td>20,000</td><td>20,000</td><td>20,000</td></tr>
<tr><td>1996</td><td colspan="2">40,000</td><td colspan="2">40,000</td><td colspan="2">40,000</td><td colspan="2">40,000</td><td colspan="2">40,000</td><td colspan="2">40,000</td></tr>
<tr><td>1997</td><td colspan="2">40,000</td><td colspan="2">40,000</td><td colspan="2">40,000</td><td colspan="2">40,000</td><td colspan="2">40,000</td><td colspan="2">40,000</td></tr>
<tr><td>1998</td><td colspan="2">1,000</td><td colspan="2">1,000</td><td colspan="2">1,000</td><td colspan="2">1,000</td><td colspan="2">1,000</td><td colspan="2">1,000</td></tr>
<tr><td>1999</td><td colspan="3">1,500</td><td colspan="2">1,000</td><td colspan="2">1,000</td><td colspan="2">1,000</td><td>500</td><td>500</td><td>500</td></tr>
<tr><td>2000</td><td colspan="4">CLOSED</td><td colspan="6">400/month</td><td colspan="2">Closed</td></tr>
<tr><td>2001</td><td colspan="4">No Retention</td><td colspan="6">400/month</td><td colspan="2">No Retention</td></tr>
<tr><td>2002</td><td colspan="12">800/2 months</td></tr>
<tr><td>2003</td><td colspan="4">800/2 months</td><td colspan="4">1,000/2 months</td><td colspan="4">800/2 months</td></tr>
</table>

TABLE 3.3-2. History of lingcod minimum size limits (inches) and bag limits (number of fish), 1995-2003.

	1995	1996	1997	1998	1999	2000	2001	2002	2003
Minimum Size Limits (inches)									
Limited Entry	22	22	22	24	24	24 N. 26 S.	24	24	24
Open Access	NA	NA	NA	24	24	24 N. 26 S.	24	24	24
Recreational	22	22	22	22	22	24 N. 26 S.	24	24	24
Maximum Size Limits (inches)									
Recreational - Oregon						34			
Recreational Bag Limits									
Washington	3	3	3	3	2	2	2	2	2
Oregon and Northern California	3	3	3	3	2	2	2	1	2
California, south of 40° 10' N. lat.	5	5	5	3	2	2	2	2	2

TABLE 3.3-3a Bycatch rates by trawl fishery and two-month fishing period south of Cape Mendocino (40°10' N latitude) estimated for lingcod. From the Hastie (2002) predictive model used to estimate bycatch for the 2003 season.

2-mo.	Target	All	In depths shallower than:				In depths deeper than:			
per.	fishery	depths	50 fm	75 fm	100 fm	125 fm	150 fm	180 fm	200 fm	250 fm
1	Petrale						0.614%	0.000%		
2	Petrale						2.074%	0.000%		
6	Petrale						0.855%	0.000%		
1	Flatfish	0.131%	0.000%	0.154%	0.075%	0.071%	0.092%			
2	Flatfish	0.246%	0.142%	0.065%	0.166%	0.163%	0.138%			
3	Flatfish	0.746%	0.657%	0.658%	0.384%	0.297%	0.314%			
4	Flatfish	0.603%	2.697%	2.125%	0.322%	0.383%	0.050%			
5	Flatfish	0.512%	0.666%	0.141%	0.105%	0.201%	0.282%			
6	Flatfish	0.471%	0.736%	0.856%	0.714%	0.462%	0.044%			
1	DTS	0.012%					0.012%	0.000%		0.000%
2	DTS	0.008%					0.008%	0.000%		0.000%
3	DTS	0.053%					0.016%	0.000%		0.000%
4	DTS	0.053%					0.015%	0.000%		0.000%
5	DTS	0.083%					0.065%	0.000%		0.000%
6	DTS	0.038%					0.038%	0.000%		0.000%
1	Other	0.368%	0.074%	0.147%	0.257%	0.294%	0.074%	0.000%	0.000%	0.000%
2	Other	3.269%	0.654%	1.308%	2.288%	2.615%	0.654%	0.000%	0.000%	0.000%
3	Other	6.098%	1.220%	2.439%	4.268%	4.878%	1.220%	0.000%	0.000%	0.000%
4	Other	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
5	Other	0.840%	0.168%	0.336%	0.588%	0.672%	0.168%	0.000%	0.000%	0.000%
6	Other	0.858%	0.172%	0.343%	0.601%	0.686%	0.172%	0.000%	0.000%	0.000%
3	DTS	0.002%					0.000%	0.000%		0.000%
4	DTS	0.015%					0.000%	0.000%		0.001%
5	DTS	0.002%					0.000%	0.000%		0.000%
6	DTS	0.000%					0.000%	0.000%		0.000%
1	Other	0.010%	0.004%	0.006%	0.008%	0.010%	0.000%	0.000%	0.000%	0.000%
2	Other	0.010%	0.004%	0.006%	0.008%	0.010%	0.000%	0.000%	0.000%	0.000%
3	Other	0.010%	0.004%	0.006%	0.008%	0.010%	0.000%	0.000%	0.000%	0.000%
4	Other	0.010%	0.004%	0.006%	0.008%	0.010%	0.000%	0.000%	0.000%	0.000%
5	Other	0.010%	0.004%	0.006%	0.008%	0.010%	0.000%	0.000%	0.000%	0.000%
6	Other	0.121%	0.048%	0.073%	0.097%	0.115%	0.000%	0.000%	0.000%	0.000%

TABLE 3.3-3b Bycatch rates by trawl fishery and two-month fishing period south of Cape Mendocino (40°10' N latitude) estimated for lingcod. From the Hastie (2002) predictive model used to estimate bycatch for the 2003 season.

2-mo per.	Target fishery	All depths	In depths shallower than: 50 fm	75 fm	100 fm	125 fm	In depths deeper than: 150 fm	180 fm	200 fm	250 fm
1	DTS	0.030%	0.000%	0.000%	0.000%	0.000%	0.030%	0.000%	0.000%	0.000%
2	DTS	0.275%	0.000%	0.300%	0.000%	1.032%	0.272%	0.000%	0.000%	0.000%
3	DTS	0.651%	0.000%	1.594%	1.335%	5.156%	0.334%	0.000%	0.000%	0.000%
4	DTS	0.818%	0.000%	3.783%	4.651%	4.189%	0.206%	0.000%	0.000%	0.000%
5	DTS	1.175%	0.000%	4.609%	4.900%	6.557%	0.778%	0.000%	0.000%	0.000%
6	DTS	0.055%	0.000%	0.000%	0.000%	1.951%	0.052%	0.000%	0.000%	0.000%
1	Flatfish	0.214%	1.395%	1.303%	1.184%	1.611%	0.160%	0.000%		
2	Flatfish	1.493%	2.440%	2.752%	4.830%	6.215%	0.649%	0.000%		
3	Flatfish	1.558%	0.345%	0.953%	1.594%	2.095%	0.635%	0.000%		
4	Flatfish	2.123%	0.767%	1.383%	2.016%	2.546%	0.765%	0.000%		
5	Flatfish	2.370%	0.619%	1.905%	2.370%	2.971%	1.014%	0.000%		
6	Flatfish	1.080%	2.802%	3.653%	2.778%	2.816%	0.715%	0.000%		
1	Arrowtooth	0.030%					0.005%	0.000%		
2	Arrowtooth	0.200%					0.115%	0.000%		
6	Arrowtooth	0.030%					0.005%	0.000%		
1	Petrale	0.612%					0.551%	0.000%		
2	Petrale	1.752%					1.250%	0.000%		
6	Petrale	0.759%					0.532%	0.000%		
1	Midwater W/Yt	0.072%								
2	Midwater W/Yt	0.000%								
3	Midwater W/Yt	0.000%								
4	Midwater W/Yt	0.681%								
5	Midwater W/Yt	0.712%								
6	Midwater W/Yt	0.000%								
1	Other	1.650%	0.330%	1.238%	1.650%	1.650%	0.330%	0.000%	0.000%	0.000%
2	Other	0.500%	0.100%	0.375%	0.500%	0.500%	0.100%	0.000%	0.000%	0.000%
3	Other	0.850%	0.170%	0.638%	0.850%	0.850%	0.170%	0.000%	0.000%	0.000%
4	Other	2.900%	0.580%	2.175%	2.900%	2.900%	0.580%	0.000%	0.000%	0.000%
5	Other	3.150%	0.630%	2.363%	3.150%	3.150%	0.630%	0.000%	0.000%	0.000%
6	Other	1.950%	0.390%	1.463%	1.950%	1.950%	0.390%	0.000%	0.000%	0.000%

TABLE 4-1. Ranked relative effects of alternative lingcod rebuilding strategies of potential negative habitat impacts, the probability of rebuilding by T_{MAX}, and short term economic costs (1 is highest rank, 6 is lowest rank).

Alternative	Potential Negative Habitat Effects	Probability of Rebuilding by T_{MAX}	Short Term Economic Costs
No Action	1	4	4
Maximum Conservation	4	1	1
Maximum Harvest	2	3	3
Council Interim Rebuilding	3	2	2

TABLE 4.3-1. Projected total catch optimum yields (mt) for lingcod under different rebuilding probabilities and the default "40-10" policy. Actual catches shown for 1999-2001.

	No Action	***Maximum Harvest***	***Council Interim Rebuilding***		
Year	**"40-10"**	**50%**	**60%**	**70%**	**80%**
1999	807	807	807	807	807
2000	508	508	508	508	508
2001	611	611	611	611	611
2002	280	646	577	535	489
2003	434	725	651	606	555
2004	616	815	735	685	629
2005	805	901	817	761	701
2006	987	979	891	831	766
2007	1,155	1,055	963	899	830
2008	1,309	1,117	1,022	954	882

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
Seattle, WA 98115

APR 4 2003

Dr. Hans Radtke, Chairman
Pacific Fishery Management Council
7700 NE Ambassador Place, Suite 200
Portland, OR 97220-1384

Dear Dr. Radtke,

Last year, NOAA Fisheries informed the Council that we expected the Council to complete Amendment 16, including at least four rebuilding plans, in time to adopt the amendment and associated NEPA analyses (now a draft Environmental Impact Statement) for public review at its April 2003 meeting, with final Council approval scheduled to occur at the June 2003 meeting. This schedule would have resulted in NOAA Fisheries' approval of Amendment 16 in the fall of 2003. In October, 2002, this schedule was also provided to the court in the cases of Natural Resource Defense Council, Inc. v. Evans, Case No. C-01-0421 JL (N.D. Calif.), and Pacific Marine Conservation Council v. Evans, Case No. C-01-2506 JL (N.D. Calif.).

Over the winter, the Council's schedule for the DEIS slipped to the June 2003 meeting. Recently, NOAA Fisheries received another revised schedule from the Council indicating that the DEIS will not be completed until September 2003. As a result, NMFS's approval of the Amendment 16 would be pushed back until sometime in 2004. Under the revised schedule, the Council still intends to send Amendment 16 out for public review at the upcoming April 2003 meeting, and to adopt its final recommendation to NOAA Fisheries in June 2003.

The Council's revised schedule presents three distinct problems. First, it is inconsistent with the schedule that we presented to the court. Second, the Council will be adopting both a draft and final amendment without the benefit of a complete DEIS. Third, it also appears to be inconsistent with the Memorandum of November, 2001 from Bill Hogarth, Assistant Administrator for Fisheries, NOAA Fisheries, requiring that all the fishery management councils have completed NEPA analyses before them before they take final actions. Also, it is inconsistent with a concept that NOAA Fisheries is implementing through its Regulatory Streamlining Program, which is to align the regulatory process with the NEPA process.

In order to substantially comply with the schedule that we provided to the court, I strongly urge the Council to instruct the staff to place the very highest priority between the April and June Council meetings on completing the DEIS on Amendment 16 by the June 2003 Council meeting. If the Council intends to take final action in June, it should have the completed DEIS in front of it before taking a final vote. If this cannot be done, the final action should be delayed until the September meeting when the DEIS has been completed. If this occurs, we will be obliged to submit supplemental declarations to the court describing the situation, and be prepared to accept whatever consequences may ensue.

As another matter, I have been advised that the Council may not intend to prepare an additional FMP amendment for the remaining overfished species over the summer and fall of 2003 for adoption in late 2003 or early 2004, as we have also advised the court. I hope that this is not the case, and that the remaining rebuilding plans can proceed according to schedule.

In addition to my concerns with the timing of the rebuilding plans, I am also concerned that the proposed FMP amendment language does not fully reflect Bill Robinson's motion of last November to revise FMP language so that the FMP explicitly requires an observer program for the West Coast groundfish fleet. As you know, vessels are already required to carry observers under Federal regulations. However, NMFS is under Court order to ensure that an observer program is mandatory under the FMP. Therefore, NOAA Fisheries will make a motion under agendum E.5. to amend Section 6.5.1.2 of the FMP, which deals directly with observers as a monitoring tool, so that an observer program is clearly required by the FMP.

Sincerely yours,

for D. Robert Lohn
Regional Administrator

cc:
Eileen Cooney, GCNW
Rod McInnis, F/SWR

SCIENTIFIC AND STATISTICAL COMMITTEE REPORT ON GROUNDFISH FISHERY MANAGEMENT PLAN AMENDMENT 16 - REBUILDING PLANS

Dr. Kit Dahl provided an overview of Draft Amendment 16-1 to the groundfish fishery management plan (FMP) (Exhibit E.5, Attachment 2) with emphasis on modifications that have been incorporated since the last Scientific and Statistical Committee (SSC) review of the draft amendment (November 2002). The SSC focused on three of the issues delineated in Section. 2.1 of the Draft Amendment, namely:

Issue 1: The form and required elements of rebuilding plans.
Issue 2: The process for periodically reviewing rebuilding plans.
Issue 3: Defining events or standards that would trigger revision of a rebuilding plan.

In previous statements (September 2002 and November 2002), the SSC has emphasized that the Council should expect numerical details of rebuilding plans (e.g., B_{MSY} or B_0) to change over time – whether due to improved estimates of these parameters from updated stock assessments, the development of new models, or due to technical errors that were not discovered in the previous stock assessment review. The SSC recommended that the use of hard numbers in the rebuilding amendment be minimized and that revisions to rebuilding plans be tied more closely to the stock assessment cycle. In general, the preferred options in the current draft of the amendment are now closely aligned with the SSC recommendations.

The remaining point that could be clarified is the specification of control rules in the FMP amendment. In the current draft, it is not clear whether future harvest guidelines (for stocks under rebuilding) will be based on constant-F strategies or whether, in some cases, constant catch strategies will be acceptable. The SSC suggests that constant-F strategies be used in all cases, and this should be clearly stated in the amendment.

Mr. John DeVore reviewed Draft Amendment 16-2, Parts I through V (Exhibit E.5, Attachments 3 through 7). The remaining sections of Amendment 16-2 – Environmental Review (Part VI) and Combined and Cumulative Effects (Part VII) – were not available for SSC review. However, Mr. DeVore provided a status report on Part VII. The subsequent SSC discussion focused primarily on the newly incorporated "mixed stock exception" option (MSE) that will be incorporated into the draft amendment and, in particular, the Part VII "cumulative effects analysis" that will support it. Under the MSE option, bocaccio, canary, yelloweye, and widow rockfish rebuilding plans would be exempted from the usual rebuilding guidelines (e.g., there would be no requirement for rebuilding to B_{MSY} within T_{MAX} years). Prior to consideration of the MSE option, the SSC recommends:

1. Clearly defined criteria should be established for species to be exempted.
2. Widow rockfish should be removed from the candidate list unless future harvest of widow constrains the catch of other species.
3. The "cumulative effects analysis" should include the full suite of biological effects and economic benefits under the MSE option. As currently envisioned, stock size changes for groundfish stocks that are not in the overfished category are not incorporated into the analysis. Benefit tradeoffs, such as in exvessel revenue, are likely to be dominated by the non-overfished stocks.

These recommendations are of utmost importance should the Council desire to use the MSE option as its preferred option in finalizing the amendment at the June 2003 Council meeting. Further, the Council should note that the SSC will not be able to review the "cumulative effects analysis" prior to the June Council meeting.

PFMC
04/09/03

Exhibit E.5.e
Supplemental Motion for Agenda Item E.5. (Bill Robinson)
April 2003

In addition to the FMP amendatory language proposed in Appendix A to Draft Amendment 16-1 (Attachment 2 for E.5.,) the following amendatory language is moved:

In Section 2.1, "Goals and Objectives for Managing the Pacific Coast Groundfish Fishery," Goal #1 would be amended to read as follows –

"<u>Goal 1 – Conservation</u>. Prevent overfishing **and rebuild overfished stocks** by managing for appropriate harvest levels and prevent any net loss of the habitat of living marine resources."

Also in Section 2.1, Objective #3 would be amended to read as follows –

"<u>Objective 3</u>. For species or species groups ~~which are below the level necessary to produce maximum sustainable yield (MSY)~~ **that are overfished**, ~~consider rebuilding the stock to the MSY level and, if necessary,~~ develop a plan to rebuild the stock **to the MSY level.**"

In Section 4.5.3.4, "Implementation of Actions Required Under the Rebuilding Plan," insert the following sentence at the beginning of the first paragraph to read as follows –

"Approved rebuilding plans will be fully implemented such that harvest levels, management measures and other groundfish regulations are all consistent with those rebuilding plans."

In Section 6.5.1.2, "Observers," the first sentence of the second paragraph of this section would be revised to read as follows –

<u>6.5.1.2 Observers</u>

* * *

"The Regional Administrator ~~may~~ **will** implement an observer program through a Council-approved federal regulatory framework. Details of how observer coverage will be distributed across the West Coast groundfish fleet will be described in an observer coverage plan. NMFS will publish an announcement of the authorization of the observer program and description of the observer coverage plan in the *Federal Register*."

* * *

VESSEL MONITORING SYSTEM

Situation: The Council approved the formation of an Ad Hoc Vessel Monitoring System (VMS) Committee to be comprised of limited entry groundfish representatives from the three West Coast states, the Enforcement Consultants (EC), and the Groundfish Advisory Subpanel (GAP) chair. The Ad Hoc VMS Committee met for the first time at the Council office in Portland, Oregon on October 11, 2002 and drafted a range of alternatives for VMS implementation. The Council identified a preferred alternative at the October 28-November, 2002 meeting and recommended that NMFS, in consultation with the Ad Hoc VMS Committee, prepare a proposed rule for a pilot VMS program for implementation at some point in 2003.

The Ad Hoc VMS Committee reconvened at the Council office in Portland, Oregon on December 18, 2002 to review the Council recommendations, consider the content and language of the NMFS draft proposed rule, and discuss costs, performance, and features of VMS equipment.

A draft proposed rule and a draft Environmental Assessment (EA) are being prepared by NMFS, but have not been completed to the point of being released for public review and comment at the time of the Briefing Book preparation. It had been intended that the open public comment period for the proposed rule would coincide with the April Pacific Council meeting.

Since the draft proposed rule and supporting EA is not available for advance Council review at this time, NMFS will provide a progress update on its preparation status under this agendum.

Regardless of the status of a draft proposed rule and draft EA, a joint session of the GAP and EC on VMS is scheduled for Sunday, April 6, 2003 at 1:30 p.m. to discuss VMS issues in general and the results of the December 18, 2002 Ad Hoc VMS Committee meeting.

Council Action:

1. Consider the next steps in the VMS implementation process

Reference Materials:

1. Draft Summary Meeting Minutes of the Ad Hoc VMS Committee, December 18, 2002 (Exhibit E.6, Attachment 1).

Agenda Order:

a. Agendum Overview — Mike Burner
b. Reports and Comments of Advisory Bodies
c. Public Comment
d. **Council Action:** Consider the Next Steps in the VMS Implementation Process

PFMC
03/25/03

SUMMARY MEETING MINUTES

Ad Hoc Vessel Monitoring Committee

Pacific Fishery Management Council
West Conference Room
7700 NE Ambassador Place, Suite 200
Portland, OR 97220-1384
December 18, 2002

Wednesday, December 18 - 8:30 A.M.

A. Call to Order

1. Introductions

Members Present:

LTJG Gregg Casad, Enforcement Consultants, United States Coast Guard
CAPT Mike Cenci, Enforcement Consultants, Washington Department of Fish and Wildlife
LT Dave Cleary, Enforcement Consultants, Oregon State Police
Mr. Brian Corrigan, Enforcement Consultants, United States Coast Guard
Mr. Tom Ghio, Groundfish Advisory Subpanel, California Fixed Gear Representative
LT Jorge Gross, Enforcement Consultants, California Department of Fish and Game
Mr. Don Hansen, Vice Chair, Pacific Fishery Management Council
Mr. Marion Larkin, Groundfish Advisory Subpanel, Washington Trawl Representative
Mr. Dayna Mathews, Enforcement Consultants, National Marine Fisheries Service
Mr. Rod Moore, Groundfish Advisory Subpanel Chair
Ms. Becky Renko, National Marine Fisheries Service, Northwest Region
Mr. Kelly Smotherman, Groundfish Advisory Subpanel, Oregon Trawl Representative
Mr. Steve Springer, National Marine Fisheries Service, Law Enforcement
On conference call:
Mr. Brett Schneider, Enforcement Consultants, National Marine Fisheries Service

Others present:

Mr. Mike Burner, Council Staff Officer, Pacific Fishery Management Council
Ms. Eileen Cooney, National Oceanic and Atmospheric Administration, General Council
Mr. Joe Easley, Oregon Trawl Commission; Astoria, Oregon
Mr. Bud Fleming, F/V Lucky Strike, Limited Entry Trawler; Sequim, Washington
Ms. Lucia Hendriks, Newport Dory Fleet; Newport Beach, California
Mr. Alan Hightower, Limited Entry Trawler; Port Townsend, Washington
Mr. Steve Joner, Makah Tribe
Mr. Steve Kupillas, Oregon Department of Fish and Wildlife; Newport, Oregon
Mr. Ken Lawrenson, Marine Safety Office, United States Coast Guard
Ms. Katie McHugh, Environmental Defense; Oakland, California
Dr. Don McIsaac, Executive Director, Pacific Fishery Management Council
Mr. Niel Moeller, National Oceanic and Atmospheric Administration, General Council
Ms. Vicki Nomura, National Marine Fisheries Service, Fisheries Enforcement
Ms. Dana Potts, North American Collection and Location by Satellite (NACLS), Largo, Maryland
On conference call:
Mr. Paul Ortiz, National Oceanic and Atmospheric Administration, General Council

A. *Call to Order (continued)*

2. Approval of Agenda
3. Committee's Charge

Dr. Don McIsaac welcomed the group and expressed the Council's appreciation for the work of the Ad Hoc VMS Committee. Foreseeing continued VMS Committee activity into 2003, he requested that the members formally appoint a chairperson. Steve Springer was elected chair by voice vote. The Committee decided to conduct the meeting in an open format with questions and comments from all attendees taken readily throughout the agenda.

B. *Review of Council Recommendations from the November Council Meeting (9:00 A.M.)*

Mr. Mike Burner provided the following summary of Council action from the November meeting in Foster City California on October 31, 2002.

> *The Pacific Fishery Management Council (Council) adopted the following motion relative to the implementation of a Vessel Monitoring System (VMS) plan at the November 2002 council meeting. The Council recommends that NMFS, in consultation with the Ad Hoc VMS Committee, prepare a proposed rule for a pilot VMS program for implementation at some point in 2003.*
>
> *The proposed rule should include:*
>
> ***Monitoring System and Declaration Requirements:*** *The basic VMS transceiver and mobile communication system would be required equipment.*
>
> *A declaration for legal fishing incursions into Groundfish Conservation Areas (GCA) would be required for all federal groundfish limited entry, exempted trawl, and tribal trawl vessels; open-access line-gear would not be subject to the declaration requirements. Declarations would be required prior to leaving port and would remain in effect until the vessel changes its intent with another declaration.*
>
> ***Coverage:*** *Federal groundfish limited entry vessels that actively fish on the West Coast are required to carry an operating VMS unit.*
>
> ***Expenditures:*** *The council recommends that NMFS fully fund all VMS requirements, or, if that is not possible, any vessels which have incurred VMS expenses be eligible for reimbursement as federal funding becomes available.*
>
> ***Gear Type****: Only one groundfish gear type can be onboard when fishing in a GCA and no active fishing inconsistent with the regulations of the GCA may occur on the trip.*
>
> ***Gear Stowage*** *: When transiting a GCA, trawl gear must remain below deck or covered on the deck of a vessel, or the net must be disconnected from the trawl doors and the trawl doors hung on their stanchions.*
>
> *Note: The motion did not specify a recommended date, subsequent to final rule making completion, that VMS equipment would be required to be on-board vessels and enforcement of the regulation provisions would begin.*

It was noted that the Council recommendations are broad in scope and leave some issues to be resolved. In particular, several questions were raised regarding the declaration process, specific definitions were requested for phrases such as 'actively fish', and a need was identified for discussion on the rationale behind which vessels will be required to carry VMS units. It was stressed that the Council requested that NMFS, in conjunction with this Committee, resolve the details of implementation of this pilot VMS program and prepare a proposed rule for public review.

C. *Review and Discuss Proposed Rules and Draft Environmental Assessment*

Ms. Becky Renko prepared and provided for the group a draft proposed rule for review. The associated Environmental Assessment/ Regulatory Impact Statement/ Initial Regulatory Flexibility Analysis (EA) is nearly complete and rough drafts were made available to anyone in attendance by request. Reviewers of the EA were asked to send their comments to Ms. Renko at a later date. The group decided in the interest of time to first discuss questions and comments by major issue followed by a "page by page" review of the proposed rule to address specific details. These minutes capture the issues and questions raised during these discussions by major topic but, they do not attempt to record every suggested change to the language of the proposed rule. Those changes were recorded by Ms. Renko and will be reflected in the next draft of the rule.

<u>Declaration Requirements</u>

1. Generally, the goal is a declaration from any vessel whose activity in a GCA cannot otherwise be readily distinguished from illegal activity. For example, a limited entry midwater trawl vessel legally fishing in a GCA where bottom trawling is prohibited could appear from the air to be a trawl vessel fishing illegally. Likewise, a limited entry fixed gear vessel legally fishing for crab in a GCA where groundfish directed fixed gear is prohibited would be difficult to distinguish from an illegal vessel. These so called 'look alike' scenarios are the primary focus of the declaration program.
2. Declarations, like the GCA's, will need to be gear specific. A trawl vessel will be required to declare the one type of trawl gear to be used on the trip as well as the trawl restricted GCA where the legal incursion is intended to occur. Similarly, a limited entry fixed gear vessel will be required to declare if it intends to legally use fixed gear in a GCA area with fixed gear restrictions.
3. Vessels only transiting a GCA would not need to declare that intent so long as their activity appears (either visually or by plotted positions reported by satellite) to be consistent with transiting. Additionally, there are specific gear stowage regulations for transiting vessels (see Gear Requirements, page 4).
4. Declarations must be made prior to leaving port and vessels will be required to retain a confirmation report. While the declaration is in place, the vessel may have only the declared type of gear onboard and may not engage in any fishing activity that is inconsistent with the regulations for the declared GCA. Declarations would be required prior to leaving port and would remain in effect until the vessel changes its intent with another declaration.
5. The proposed rule will need to specify the approved methods for making a declaration (*i.e.* VMS transmission, facsimile, telephone, email).
6. The gear categories for the declaration report in the proposed rule need to be revisited. Principally, there was confusion about whether crab gear is considered open access gear. Open access gear usually refers to groundfish directed gear and does not include crab pots. New categories may be required to incorporate the variety of fisheries that many limited entry vessels participate in.

7. The proposed rule needs to specify exactly what information is required on a declaration report. Oregon and Washington implemented declaration systems at the end of 2002 and could help by relating what worked well and what did not.

<u>Coverage</u>

1. There was a discussion about which vessels would be required to carry VMS units. NMFS and the Committee members representing enforcement interests expressed a strong desire to follow the recommendation of the Council. The federal groundfish limited entry fleet is of a manageable size for the first year of VMS implementation and lands a substantial portion of the annual groundfish harvest.
2. Several participants had questions about the open access fleet not being required to carry VMS units. Open access vessels are often fishing in the same fisheries and areas as the limited entry vessels which are required to carry VMS. The West Coast groundfish fishery will be far and away the most complicated implementation of VMS in the nation and needs to be phased in. The Council and the states are currently working on ways to address issues of overcapitalization in the open access sector and VMS coverage will likely expand into this sector in the future.
3. The dory fleet from Newport Beach, California has requested an exemption from a VMS requirement primarily due to their limited range of activity and the complications of carrying a VMS unit on the relatively small and open boats. At this time, NMFS is interested in exploring ways to make VMS work for dory fishers rather than excluding them (see Downtime, Page 5).

<u>Expenditures</u>

1. Federal funding of VMS requirements have not been identified.
2. Dr. William Hogarth, Assistant Administrator for Fisheries at the National Marine Fisheries Service, National Oceanic and Atmospheric Administration (NOAA Fisheries), has spoken in favor of federal funding of this program.
3. VMS has been cited as an important tool in the defense of U.S. coasts under Homeland Security.
4. Capacity reduction is being considered for these fleets and some vessels will be required to install VMS units just prior to leaving the fishery, a waste of resources.

<u>Gear Requirements</u>

1. There needs to be some clarification of the gear requirements under the 2003 management measures. The current understanding from NMFS is that only one type of trawl gear can be onboard during any single fishing trip. NMFS and Council staff will review the Groundfish Management Team (GMT) recommendations and Council deliberations for clarification. Previous groundfish regulations allowed more than one type of trawl gear on board but restricted vessels to the lowest trip limit consistent with the fear carried. The GAP representatives on the Committee recommended that this police be continued.
2. The declaration requirements for legal incursion into otherwise restricted GCA's for the declared gear type require there be only one type of trawl gear onboard.
3. When transiting a GCA, trawl gear must remain below deck or covered on the deck of a vessel, or the net must be disconnected from the trawl doors and the trawl doors hung on their stanchions.

Drifting Into or Overnight Drifting within GCA’s

1. Questions were raised about vessels that may drift into a GCA while operators are working their gear. Will vessel operators be required to remain on the legal side of a management line at all times or can they drift across while working the gear?
2. Similarly, vessels may enter the trawl restricted GCA’s to overnight. If gear is disconnected or stowed as per gear regulations for transiting is the vessel in violation if it spends the night? Drifting in the zone is not transiting the zone. Can we address this with a separate declaration for night activity? (see number 4 below).
3. It was suggested that VMS may not be able to accommodate many fishing behaviors, traditions, or customs. Fishers may be required to alter more than gear operations such as finding safe anchorages in areas outside of GCA’s or adjusting tows or sets so that the vessel is assured of staying in legal waters as the gear is worked.
4. A definition for ‘transiting’ such as a required speed or a minimum time in a GCA was discussed. How could enforcement officials handle a vessel that seemed to linger or overnight in a GCA? One of three ways: 1) Dispatch a plane or vessel to investigate, 2) flag the VMS track for further investigation, or 3) modify the declaration system so that the vessel could notify NMFS of their intention. Could we establish a hotline or a two-way VMS notification of intent to overnight in closed area? Some felt that the transit regulations were not intended to include overnight drifting and the idea of a declaration system for overnight activity would be too cumbersome and complicated to operate and enforce.
5. The group agreed on establishing a mechanism for informing NMFS of unforeseen problems which may lead to a vessel being in a GCA. An example provided by fishers in the group was debris caught in the net that forces a vessel to drift while the net is freed. NOAA could provide a phone recording system that allows fishers to notify of trouble. In more dire circumstances, the VMS position data and the notification system could add a measure of safety.

Downtime

1. Does the unit need to be on at all times, can operator turn it on and off? The enforcement community, being burdened with the responsibility of ensuring the integrity of GCA’s, was in favor of VMS operation 365 days a year (see Reporting Requirements, below).
2. Vessel operators were interested in minimizing reporting costs by identifying periods when the vessel is not engaged in the groundfish fisheries such as trailer transit, prolonged fishing for non-groundfish species, or dry dock.
3. The dory fleets do not have constant power source and boats are often transported by trailer. Do we need new provisions for dory fleets to turn off the unit? Enforcement felt that the relatively low power requirements of VMS units could allow dory vessels to operate VMS 365 days a year unless that vessel was to be removed from the water for a long period of time.
4. The group agreed that the proposed rule should include language that allows vessel owners to notify NMFS of long term periods of inactivity for repairs or storage.

Definitions

1. ‘Actively Fish’ - Participation in any fishery out to 200 nautical miles off Washington, Oregon, and California (WOC)?
2. Need specific gear definitions, what is ‘open access’ gear (non-trawl groundfish gear)? Is crab or salmon gear open access gear? (*No?*) These definitions likely already exist and can be cited or repeated.

3. ‘Trip’ - generally considered vessel activity from port to port and is defined in groundfish regulations at 50 CFR 660.302 as “the period of time between landings when fishing is conducted”.
4. Is setting gear same as fishing? For example, if a vessel sets crab gear for another vessel on the way out to participate in a groundfish fishery is that vessel considered to be crab fishing?
5. ‘Transit’ - does this need to be defined in the proposed rule? Without a definition of ‘transit’ can a trawl vessel remain in the GCA indefinitely so long as the gear is properly stowed or disconnected?

<u>Reporting Requirements</u>

1. Frequency of position reporting has not been determined. Hourly reporting has been used for estimates of transmission costs but units have been tested and can report more frequently. There may also be a need for a less frequent report which confirms no movement of a vessel at port.
2. What is the rationale for requiring 365 days a year reporting for a vessel that is actively fishing in the WOC for only part of the year? The enforcement community, being burdened with the responsibility of ensuring the integrity of GCA’s, was in favor of VMS operation 365 days a year.
3. Vessels will need to notify NMFS upon activation of a new VMS transceiver and get a confirmation of proper function. Reactivation of a unit after service will require the same notification and confirmation procedure.
4. Currently, limited entry vessels that spend a large portion of the year in Alaska but return to fish within 200 nm of WOC will need to keep their VMS operating 365 days a year. There are examples from less complicated VMS programs where vessels that leave the fishery for long periods can get a waiver from the VMS requirement. This has not been established for this program.
5. Unlike any other fishery in the nation, the majority of vessels WOC participate in several fisheries and when they are engaged in non-groundfish fisheries the transmission costs are wasted.
6. Will the system be monitored in real time (24/7)? Yes, the system will be operating in real time but there may not be personnel staffing the equipment 24/7.

<u>VMS Units and Equipment</u>

1. Will there be a range of units to choose from? *Yes,* however, if federal funding is identified and NMFS funds the purchase of VMS transceiver units, NMFS would likely select a lower cost unit and contract with that vendor for a bulk price (see VMS Equipment and the Type-Approval Process, page 7)

2. Will there be an alarm that signals the operator that the unit is no longer functioning properly? Some units signal that unit is in sleep mode and then signals that power is off and the unit is operating on backup battery. If a VMS unit did not have an alarm and the vessel operator was unaware or malfunction, an ensuing investigation may discover why the unit failed; tampering, mechanical failure, vessel trouble or emergency. In other VMS programs, the USCG investigates lost signals as a safety issue.
3. Is sleep mode considered operating? Yes, and the power supply to the unit should be maintained.
4. Who is responsible for repairs and are they reliable? What does vessel do while unit is repaired, are replacement units available? NMFS needs to address this issue. In some other programs temporary units are provided during repairs. At this time, vessel operators are responsible for the cost of repairs.

5. Accuracy of units was reported by some attendees with experience with VMS as only being accurate within 100 meters which may not be adequate. Any unit approved for use will need to meet all of the national VMS standards including accuracy.

Confidentiality

1. Is data collected used for only enforcement or will data be used for other purposes such as fishery management? Yet to be determined. Will access to VMS data operate like PACFIN where a board decides how information is applied/shared? Currently, in other VMS programs, information is kept within enforcement. There are plans in WOC to share the information with USCG and the states. There may also be a desire to share the info with biologists/managers but that would not likely occur without confirming this intent with the Council and industry representatives. There were strong objections raised by the GAP representatives and public participants over allowing any information sharing beyond the confidentiality limits imposed by the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA). It was requested that language be included in the proposed rule requiring vessel owners/operators consent for use of data beyond enforcement. That type of language could not be committed to but perhaps the rule could include the language from the MSFCMA concerning confidentiality as requested by the GAP.

Enforcement

1. Will vessels be immediately ticketed if a vessel track is suspect or will an investigation occur first? An investigation would ensue.
2. Will VMS alone verify a violation or will visual confirmation be required? There are complexities for WOC groundfish fisheries that do not exist in other VMS programs around the nation. No other programs have declaration provisions for fishing activities in otherwise restricted areas. Ticketing issues need to be addressed.
3. Who's responsibility is the VMS requirement, the vessel operator or owner? Installation appears to be the responsibility of the owner. Operation of vessel and VMS is the responsibility of owner or operator. What about those who lease permits? Need to specify that owners of permitted vessels need to install units rather than permit owners. NMFS will look to other examples of fishery enforcement for who is responsible for fishery regulation infractions, operators, owners, or both.
4. Equitable enforcement of VMS requirements is desired. State vs federal or state by state enforcement of the same regulations can vary thereby creating unfair situations.
5. Timeliness of enforcement activity was also a concern. If there is an infraction, how long until the vessel operator is notified of a possible infraction or failure of the system? As a means to avoid long periods of time between identification of a possible problem and notification of the vessel, NMFS will strive to recommend that the national VMS steering group require two-way communication when they renew national VMS standards. NMFS will strive to minimize delays in notifying vessels of possible infractions. Shoreside contact information (*i.e.* fish plants, home ports) may help if a vessel cannot be directly contacted. Additionally, the vessel would likely be met upon return to port.

D. Results from Recent Vessel Tracking Trials

Mr. Steve Springer reported the preliminary results of recently conducted trials of two VMS transceiver units aboard the NOAA research vessel Miller Freeman during a training mission from Seattle to San Diego and back. Both units utilize geostationary INMARSAT satellites for transmission of position reports. One unit was an INMARSAT-D+ system now manufactured by

Japan Radio Corporation (JRC) and the other was an INMARSAT-C system manufactured by Thrane and Thrane. Several operating parameters were tested including varied time intervals between position reports. The trial was successful and both units performed as expected. The INMARSAT-C system is capable of a wide-range of programmable settings and would allow two-way email communication if a computer is added to the system. The cost of this unit, not including the computer, is roughly $1,800. INMARSAT-D+ system is less expensive at approximately $800 but, the unit is less flexible in its programmability and allows only ship to shore position report transmission. Both units have internal differential Global Positioning Systems (GPS) and sleep modes with communication costs around $0.04 per transmission or $1.00 per day with hourly reporting. NMFS is preparing a report of the trial results.

E. VMS Equipment and the Type-Approval Process

Mr. Steve Springer reported on the method and time line of the type-approval process to identify VMS units which meet NMFS standards and manufactures that can produce enough reliable units to meet the needs of the fleet. The first step is to get the NMFS VMS standards and type-approval forms published in the *Federal Register* and out to manufactures. This is expected to happen in mid-January, 2003. Vendors and manufactures are then given time to report, among other things, the specifications and capabilities of their respective VMS units. If their units meet the NMFS VMS standards, NMFS requests transceiver units for 90 day trials aboard vessels. A list of approved vendors/units which meet the requirements and pass the trials are ultimately provided to vessel operators/owners. If federal funding is identified and NMFS funds the purchase of VMS transceiver units, NMFS would likely select a lower cost unit and contract with that vendor for a bulk price. If vessel operators/owners are required to fund the VMS units they would have a variety of units to choose from but bulk pricing would not be feasible unless vessel owners made an arrangement to buy in bulk.

Units in the trial will likely be a mix of technologies currently being used in other fisheries and some that are new. Most of the systems on the market are “plug and play” making installation quick and easy. Concern was raised about equipment warranties and reliability. Mr. Springer was uncertain wether the type-approval process will require a minimal warranty. However, the type-approval forms will request information regarding warranties and he stated that, in his experience, manufactures have stood behind their equipment. Ms. Dana Potts of NACLS reported that their ARGOS systems have a one year warranty, cost around $2,000, are similar to INMARSAT units in size. Additionally, there are a variety of software packages for shoreside and onboard systems. Transmission costs are $5.00 per day and use is unlimited. There is a two-day backup battery if power is lost. The transceiver unit goes to sleep after 10 hours of no vessel movement and can transmit a confirmation of no movement at preprogrammed intervals. Ms. Potts provided brochures on the ARGOS system.

F. Next Steps in the Process/Future Meetings

Ms. Renko will revise the proposed rule and EA per discussions at this meeting. EA will be available in early January. The proposed rule is scheduled to be published in the *Federal Register* in early February with the public comment period running into April. There was discussion of holding another Ad Hoc VMS Committee meeting before the April Council meeting. It was decided that Ad Hoc VMS Committee members already planning to attend the March Council meeting on non-groundfish business will get together to assess progress. Under this scenario, implementation of the pilot VMS program is not likely before July or August.

It was requested that the issue of sharing data between federal and state enforcement agencies be resolved quickly. The state enforcement programs in the WOC are concerned about this issue and, they desire guaranteed full access to VMS information relative to vessels fishing off of their shores.

The Ad Hoc VMS Committee will likely meet at least once more in late 2003 to assess the performance of the 2003 pilot VMS program and to discuss future VMS programs.

ADJOURN

PFMC
3/21/2003

Exhibit E.6.b
Supplemental EC Report
April 2003

ENFORCEMENT CONSULTANTS REPORT ON
VESSEL MONITORING SYSTEM

The Enforcement Consultants (EC) met jointly with the Groundfish Advisory Subpanel to discuss the current status of the Vessel Monitoring System (VMS) program and implementing regulations. A number of issues were discussed that need to be addressed in writing by the EC.

The EC reviewed the letter from the Newport Dory Fleet. They expressed concerns regarding the need for small, durable VMS units, mobility and storage of the dory fleet while not fishing, and the cost and maintenance of the VMS units. NOAA Fisheries Enforcement reported that it recognizes and understands the unique equipment requirements of the dory fleet and believes it has identified a VMS unit which will fulfill these unique requirements. They are in the process of purchasing several units and look forward to working with the dory fleet on a test/demonstration project.

The GAP identified several issues which, if seriously considered and implemented by the Council, would virtually eliminate the ability of VMS and enforcement programs to act in concert to protect the integrity of the mainstay of the West Coast groundfish conservation – the Rockfish Conservation Areas (RCAs). The first issue involves identifying numerous activities which would involve vessels operating inside the conservation area with gear in the water due to currents, wind, breakdowns and safety, or drifting in areas at night at speeds that, due to wind and currents, would appear to VMS program officials to resemble fishing patterns and signatures. The EC recalls that in November the Council directed NOAA Fisheries and the Ad Hoc VMS Committee to draft a rule which would prohibit incursions into the RCA by vessels carrying trawl gear with one exception– to allow transiting the RCA in order to access the outer fishing areas lying west of the RCA. The proposed rule as currently drafted satisfies this requirement, and the EC does not wish to see additional exceptions considered regarding prohibitions on incursions into the RCA with trawl gear on board.

The second issue raised by the GAP suggests that limited entry vessels, currently required to have VMS units operate continuously, should be able to turn units on and off while fishing in the conservation areas, depending on the fishery. The EC believes that requiring VMS equipped vessels to keep their VMS units operational while engaged in West Coast fisheries maximizes the efficiency of the equipment and provides the best opportunity to prove that depth-based management is enforceable by demonstrating the whereabouts of vessels engaged in West Coast fisheries. We anticipate the VMS program will expand in future years. Implementing strategies that expand VMS and strive to minimize the need to send enforcement resources to sea are needed now. Suggestions that promote the ability of the West Coast fishing fleet to operate inside Conservation Areas while turning VMS units on and off on a large-scale adds more complexity to an already overly complex regulatory scheme making enforcement nearly impossible. Therefore, the EC does not support the GAP's position that requiring VMS equipped vessels to maintain their units in an "on" status while engaged in West Coast fisheries is a waste of resources. To the contrary, the EC believes requiring VMS units to remain "on" maximizes the benefits and enforcement efficiencies gained from the VMS program by minimizing the number of at-sea responses to suspected unauthorized incursions into the RCA.

A final issue involves extending the public comment period on the proposed regulations from 30 to 60 days. When depth-based management measures were being considered in 2002, the Council noted the importance of implementing VMS as early as possible in 2003. At the time, NOAA Fisheries reviewed the regulatory timelines and estimated a VMS system could be in place as early as June of 2003. The current estimate for final regulations and the required cooling off period puts full implementation of VMS off to early September. Extending the comment period another 30 days delays the program to October.

Acting on reports of information of unlawful fishing inside the Conservation Area under the cover of darkness, NOAA Fisheries and the U.S. Coast Guard put together an operation using a Jayhawk Helicopter with special night time surveillance equipment. The first flight proved our sources were correct -- the integrity of these closed areas is being compromised. This situation can only be addressed by implementing VMS as soon as possible.

PFMC
04/09/03

GROUNDFISH ADVISORY SUBPANEL STATEMENT ON VESSEL MONITORING SYSTEM

The Groundfish Advisory Subpanel (GAP) met jointly with the Enforcement Consultants to discuss the proposed rule on a Vessel Monitoring System (VMS). Unfortunately, the proposed rule has not yet been published, so the comments here are based on the report from the Ad Hoc VMS Committee, an old draft of the proposed rule, and the current thinking of enforcement personnel on how VMS would operate.

According to the schedule provided by NMFS, the proposed rule will be published in April and will have a 30- day comment period; the final rule will be published in June with a 60-day cooling off period, making the VMS requirement go into effect on September 1, 2003. The GAP strongly recommends the Council request NMFS to modify this schedule by extending the comment period to 60 days. This would allow the GAP, other advisory bodies, the Council, and the public to have the proposed rule in order to provide comments at the June meeting. It would also provide for an additional education effort at the September meeting, which is usually well attended by those who will be required to install VMS units. The GAP recommends that NMFS use the additional time to test and certify additional VMS unit types for use in the groundfish fishery.

The GAP identified a number of issues which need to be resolved and which are related here in no order of priority:

Cost and payment: The GAP's initial support for VMS was conditioned on the costs of the system - including VMS units and transmission costs - being borne by NMFS. The Council also endorsed having the system funded by the federal government; yet, at this point, no funds have been identified to cover those costs. The GAP is troubled by the fact that some of the wealthier fisheries, such as those in Alaska, have their VMS systems paid for, while the Pacific groundfish fishery will have to pay for its system themselves.

Drifting: As presently contemplated, a vessel which is not fishing or actively transiting the Rockfish Conservation Area (RCA) would be considered a violator. Members of the GAP and the public expressed concerns as to how this will affect vessels which are retrieving gear moved into the RCA by currents; vessels which suffer a temporary breakdown; and vessels which utilize the RCA for safety purposes to avoid commercial vessel traffic. The GAP believes that some accommodation should be made for nonfishing presence in the RCA.

Requiring an operable VMS unit when not engaged in the groundfish fishery: Many limited entry vessels also hold permits for, or engage in fishing in, nongroundfish fisheries including crab, shrimp, albacore, and salmon. Current proposals would establish a declaration system if those vessels are legally fishing in the RCA, yet would require those vessels to keep their VMS units operating and transmitting location information. The GAP believes this is discriminatory and a waste of resources, as it allows nongroundfish vessels engaged in identical activity to operate without a VMS unit, while limited entry vessels must maintain one.

The VMS system was recommended as a method for tracking vessels actively engaged in the groundfish fishery. Many view it as having devolved to a system designed to engage in electronic monitoring of certain vessels no matter what they are doing. Legitimate enforcement to monitor closed areas is one thing; Orwellian electronic surveillance is quite another, especially when the industry has to pay for the dubious privilege of being surveyed.

PFMC
04/09/03

Exhibit E.6.b
Supplemental GMT Report
April 2003

GROUNDFISH MANAGEMENT TEAM REPORT ON VESSEL MONITORING SYSTEM

At its February meeting, the Groundfish Management Team (GMT) was briefed by Ms. Becky Renko on the status of the proposed rule for implementing a vessel monitoring system (VMS). The VMS system will be used for tracking vessels under the depth-based management regime as adopted for 2003. GMT members were provided with a copy of the draft proposed rule and were asked to provide comment. The GMT offers the following comments and recommendations regarding the use of VMS in managing the Pacific Coast groundfish fishery.

VMS systems produce accurate and timely information of vessel fishing locations over large geographical areas. These data can be used to better understand individual vessel and fishing fleet distribution. Accurate and timely data on fishing fleet distribution are needed to assess how fishing effort shifts as a result of new management measures and for assessing the effectiveness of closed areas. The GMT recommends that VMS data be available to federal and possibly state managers and scientists to improve their understanding of the fishery. If necessary, the data could be aggregated and/or disassociated from a vessel's identification code to protect confidentiality.

The requirements for a declaration system, where skippers must declare their intent to fish in a conservation area with an allowed gear, are also contained in the draft proposed rule. The GMT was updated on the development of a telephone call-in system that will be used to submit federal declaration reports. The GMT believes that declaration reports will aid enforcement in monitoring compliance with the depth-based restrictions and supports the development of a federal declaration reporting system.

PFMC
04/09/03

Exhibit E.6.c
Supplemental Public Comment
April 2003

Pacific Fisheries Management Council
7700 NE Ambassador Place, Suite 200
Portland, Oregon 97220-1384

Janice Baker
3340 Nevada Ave.
Costa Mesa, CA 92626

RE: Vessel Monitoring Program

March 22, 2003

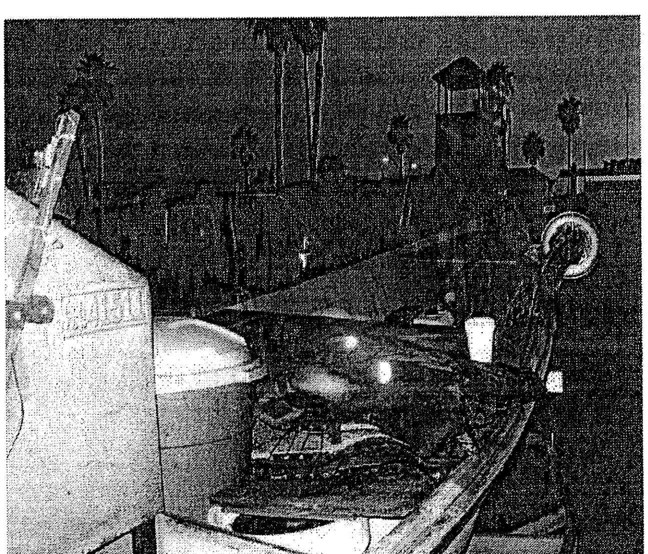
Dear Council Members:

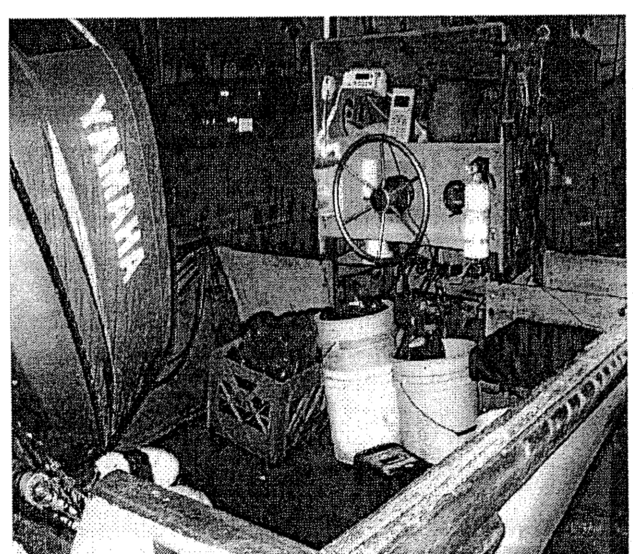
I am a member of the Newport Dory Fleet in S. Calif. We are a historical small vessel fleet (dory boats) and open-air fish market located on the beach next to the Newport Beach pier. Our fishermen launch their vessels through the surf between 1-3 am and normally arrive back on the beach between 6-9 am on a daily basis as weather permits. Our catches are sold to the public at our open-air fish market approximately 50-60 yards from the surf line.

Our groundfish fishermen have limited entry permits (small fleet permits) and will fall under the VMS program being developed for the West Coast region. I am aware of the enforcement nightmare created with the depth-based closures and after reading the latest VMS draft document being prepared for entry into the Federal Register it brought up many concerns about the VMS program and how it is defined and implemented for the Newport Dory Fleet. I recently discussed these issues with Jonathan Pinkerton, the United States VMS program Manager, and he said that these issues have not been adequately discussed but need to be. Here are some issues to consider if the Newport Dory Fleet is going to successfully participate in the West Coast groundfish VMS program.

1. ***Size and durability of the VMS units.***

Our vessels range 16 to 21 ft. in size powered with outboard engines and travel at 16-30 knots. This speed along with the design of the vessels causes a substantial amount of pounding, so a VMS unit would need to be durable enough to withstand the daily pounding it will get. Size of the unit is also a concern as there is very little space available when vessels are loaded for a daily fishing trip. Below are pictures a federal observer took that might make it clearer how limited on space our vessels are. A VMS unit needs to be small, durable, and waterproof, as there is no protection (cabin) from the elements of weather and moisture.

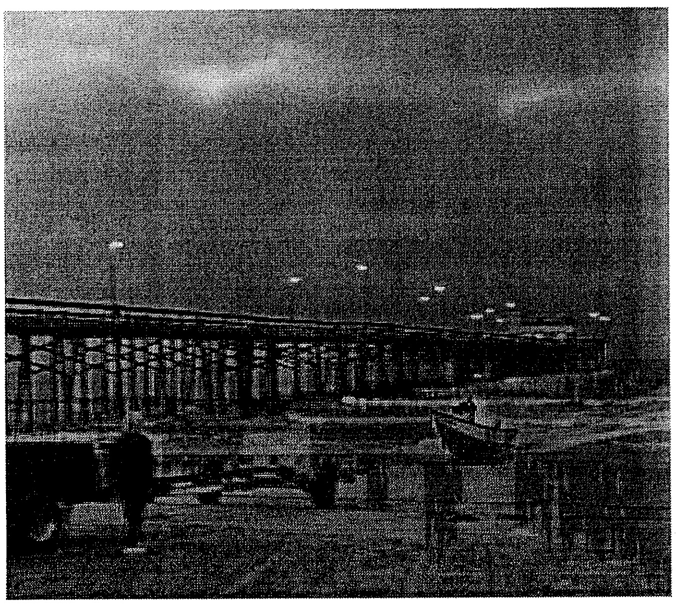

Loaded Dory vessel (bow)

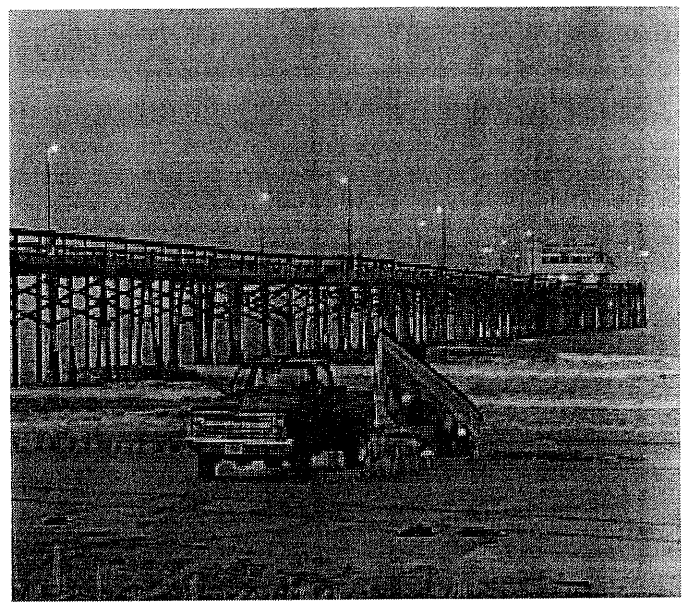


(stern)

2. *Vessel mobility and storage while not engaged in fishing activities.*

Dory fishermen trailer their vessels to and from their home every day they fish. This creates the problem of using a VMS that is activated when the vessel is mobile even if the mobility is not while the vessel is at sea. When we trailer our vessels home the movement would trigger the VMS system to start signaling and would be monitoring us to our homes. This is an invasion of our privacy as well as creates additional monitoring fees while not engaged in fishing. A mobility triggered VMS system would also be a power drain from the only battery on the vessel that is only recharged while the engine is running. Therefore, the Dory Fleet needs a VMS system that can be turned off when the vessel is not fishing, or be able to easily remove and store the system when the daily fishing activities are finished.





Vessels are mobile after fishing operations stop

3. *Cost and maintenance of the VMS units.*

Because the cost burden of VMS unit and its maintenance will likely be the responsibility of the vessel owner/operator, it is important that the VMS unit is cost effective and durable enough for Dory Fleet operations. If a VMS unit is not durable enough for routine dory fishing activities the unit will need to be repaired or replaced often. This will cause the Dory fishermen an on going financial hardship, as well as loss of fishing time each time a VMS system fails.

I ask the Council members to consider the Dory Fleets concerns and these specific issues while developing and adopting the West Coast VMS program.

Thank you,

Janice Baker
Newport Dory Fleet, CA

STANDARDS AND CRITERIA FOR APPROVING EXEMPTED FISHING PERMITS

Situation: Exempted fishing permits (EFPs) allow fishing activities that would otherwise be prohibited (Section 7.0 of the Groundfish Fishery Management Plan (FMP), Exhibit E.7, Attachment 1). As an example, EFPs provide a process for testing innovative fishing gears and strategies to substantiate 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 optimum yields (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. Additionally, concerns were expressed about the need to manage the EFP approval process in a more timely manner and based on more explicit scientific criteria. For these reasons, the Council is tasking the Groundfish Management Team (GMT) with recommending standards and criteria for approving EFPs.

The GMT has provided a rough draft of a Council Operating Procedure (COP) that prescribes a set schedule and other protocols for Council consideration in approving EFP applications (Exhibit E.7, Attachment 2). However, there are several unresolved issues in this draft. Further, the GMT has not discussed scientific criteria for evaluating EFPs based on their potential for influencing long-term sustainable management strategies.

It is anticipated the GMT will provide the Council with a supplemental statement at the April meeting with discussion points for further consideration. The attachments provided in this agendum are not GMT recommendations; they are designed to stimulate further discussion on these points.

The Council task at this point should be to consider the general scope and primary elements of the GMT's initial draft for a COP dealing with EFP applications and provide guidance on outstanding issues. The Council should also discuss the process for completing the development of this COP.

Council Action:

1. **Provide guidance on developing criteria and scientific standards for approving EFPs**

Reference Materials:

1. Section 7.0 of the Groundfish FMP (Exhibit E.7, Attachment 1).
2. Draft Council Operating Procedure: Protocol for Council Consideration of Exempted Fishing Permits (EFPs) for Pacific Coast Groundfish Fisheries (Exhibit E.7, Attachment 2).

Agenda Order:

a. Agendum Overview — John DeVore
b. Reports and Comments of Advisory Bodies
c. Public Comment
d. **Council Action:** Adopt a Criteria and Standards for Approving EFPs

PFMC
03/26/03

7.0 EXPERIMENTAL FISHERIES

Among the objectives of this FMP is to provide for the orderly development of the domestic groundfish fisheries, including promotion of new domestic fisheries, or otherwise contribute to effective management of the stock. In order to accomplish this objective, it is desirable to permit limited domestic experimental fishing (recreational or commercial) for groundfish species covered by this plan. This provision is intended to promote increased utilization of underutilized species, realize the expansion potential of the domestic groundfish fishery, and increase the harvest efficiency of the fishery consistent with the MSA and the management goals of this FMP. Experimental fishing will be conducted under exempted fishing permits (EFPs) issued under Section 303(b)(1) of the MSA.

The Regional Director may authorize, for limited experimental purposes, the direct or incidental harvest of groundfish managed under this FMP which would otherwise be prohibited. No experimental fishing may be conducted unless authorized by an EFP issued by the Regional Director to the participating vessel in accordance with the criteria and procedures specified in this section. EFPs will be issued without charge. An applicant for an EFP need not be the owner or operator of the vessel(s) for which the EFP is requested. Nothing in this section is intended to inhibit the authority of the Council or any other fishery management entity from requesting that the Regional Director consider issuance of EFPs for a particular experiment in advance of the Regional Director's receipt of applications for EFPs to participate in that experiment.

Criteria and procedures for the issuance of EFPs are:

1. Applicants must submit a completed application in writing to the Regional Director at least 60 days prior to the proposed effective date of the permit. The application must include, but is not limited to, the following information:

   a. The date of the application;
   b. The applicant's name, mailing address, and telephone number;
   c. A statement of the purposes and goals of the experiment for which an EFP is needed, including a general description of the arrangements for disposition of all species harvested under the EFP;
   d. Valid justification for why issuance of the EFP is warranted;
   e. A statement of whether the proposed experimental fishing has broader significance than the applicant's individual goals;
   f. For each vessel to be covered by the EFP:
      (1) vessel name;
      (2) name, address, and telephone number of owner and master;
      (3) Coast Guard documentation, state license, or registration number;
      (4) home port;
      (5) length of vessel;
      (6) net tonnage;
      (7) gross tonnage;
   g. A description of the species (target and incidental) to be harvested under the EFP and the amount(s) of such harvest necessary to conduct the experiment;
   h. For each vessel covered by the EFP, the approximate time(s) and place(s) fishing will take place, and the type, size and amount of gear to be used; and
   i. The signature of the applicant.

The Regional Director may request from an applicant additional information necessary to make the determinations required under this section.

2. The Regional Director will review each application and will make a preliminary determination whether or not the application contains all of the required information and constitutes a valid experimental program appropriate for further consideration. If the Regional Director finds any application does not warrant further consideration, he shall notify both the applicant and the Council in writing of the reasons for his decision. If the Regional Director determines any application warrants further consideration, he will publish a notice of receipt of the application in the *Federal Register* with a brief description of the proposal, and will give interested persons an opportunity to comment. The notice

may establish a cutoff date for receipt of additional applications to participate in the same or a similar experiment.

The Regional Director also will forward copies of the application to the Pacific Fishery Management Council, the United States Coast Guard, and the fishery management agencies of Oregon, Washington, California, and Idaho, accompanied by the following information:

a. The current utilization of domestic annual harvesting and processing capacity (including existing experimental harvesting, if any) of the target and incidental species;
b. A citation of the regulation or regulations which, absent the EFP, would prohibit the proposed activity; and
c. Biological information relevant to the proposal.

3. At a Council meeting following receipt of a complete application, the Regional Director may choose to consult with the Council and the directors of the state fishery management agencies concerning the permit application. The Council shall notify the applicant in advance of the meeting, if any, at which the application will be considered and invite the applicant to appear in support of the application if the applicant desires.

4. As soon as practicable after receiving responses from the agencies identified above, or after consultation, if any, in paragraph 3 above, the Regional Director shall notify the applicant in writing of his decision to grant or deny the EFP, and, if denied, the reasons for the denial. Grounds to deny issuance of an EFP include, but are not limited to, the following:

   a. The applicant has failed to disclose material information required, or has made false statements as to any material fact, in connection with his application; or
   b. According to the best scientific information available, the harvest to be conducted under the permit would detrimentally affect any species of fish in a significant way; or
   c. Issuance of the EFP would inequitably allocate fishing privileges among domestic fishermen or would have economic allocation as its sole purpose; or
   d. Activities to be conducted under the EFP would be inconsistent with the intent of this section or the management objectives of this FMP; or
   e. The activity proposed under the EFP could create a significant enforcement problem.

5. If the permit is granted, the Regional Director will publish a notice in the *Federal Register* describing the experimental fishing to be conducted under the EFP. The Regional Director may attach terms and conditions to the EFP consistent with the purpose of the experiment, including, but not limited to:

   a. The maximum amount of each species which can be harvested and landed during the term of the EFP, including trip limitations, where appropriate;
   b. The number, size, names, and identification numbers of the vessels authorized to conduct fishing activities under the EFP;
   c. The time(s) and place(s) where experimental fishing may be conducted;
   d. The type, size, and amount of gear which may be used by each vessel operated under the EFP;
   e. The condition that observers be allowed aboard vessels operated under an EFP;
   f. Reasonable data reporting requirements;
   g. Such other conditions as may be necessary to assure compliance with the purposes of the EFP consistent with the objectives of this FMP; and,
   h. provisions for public release of data obtained under the EFP.

6. Failure of a permittee to comply with the terms and conditions of an EFP shall be grounds for revocation, suspension, or modification of the EFP with respect to all vessels conducting activities under that EFP. Any action taken to revoke, suspend, or modify an EFP shall be governed by 50 C.F.R. Part 621, Subpart D.

PFMC
03/25/03

Exhibit E.7
Supplemental Attachment 3
April 2003

PROPOSED COUNCIL PROCESS FOR CONSIDERATION OF
EXEMPTED FISHING PERMITS

Year 1

June
- Preliminary exempted fishing permit (EFP) concepts for Year 2

September
- Draft EFP applications for Year 2
- EFP Application review by Groundfish Management Team (GMT), Groundfish Advisory Subpanel (GAP), and Scientific and Statistical Committee (SSC)
  - Proposals from individuals or non-government agencies must be presented to GMT in writing at least 2 weeks prior to September Council meeting; proposals from federal or state agencies may be presented at the September Council meeting
- Council consider approving for public review
- Release of EFP OY "set aside"

November
- Final EFP Applications for Year 2
  - Only those EFP applications that were considered in September may be considered in November; applications received after the September Council meeting for the following calendar year will not be considered
- EFP Application review (if revised) by GMT, GAP, and SSC
- Council consider recommending approval to NMFS

Year 2
- Process and schedule same as Year 1 for EFP proposals for Year 3

Year 3

June
- Preliminary report on EFP from Year 2 to GMT for consideration
- Preliminary EFP concepts for Year 4

September
- Final report on EFP from Year 2 to GMT, SSC, and Council
- Draft EFP applications for Year 4
- EFP application review by GMT, GAP, and SSC
  - Proposals from individuals or non-government agencies must be presented to GMT in writing at least 2 weeks prior to September Council meeting; proposals from federal or state agencies may be presented at the Sept Council mtg
- Council consider approving for public review
- Release of EFP optimum yield (OY) "set aside"

November
- Final EFP applications for Year 4
  - Only those EFP applications that were considered in September may be considered in November; applications received after the September Council meeting for the following calendar year will not be considered
- EFP application review (if revised) by GMT, GAP, and SSC
- Council consider recommending approval to NMFS

PFMC
04/10/03

Exhibit E.7
Supplemental GMT Report
April 2003

GROUNDFISH MANAGEMENT TEAM REPORT ON STANDARDS AND CRITERIA FOR APPROVING EXEMPTED FISHING PERMITS

In response to the Council's request, the Groundfish Management Team (GMT) developed a draft Council Operating Procedure that describes the standards and criteria for approving exempted fishing permits (Exhibit E.7., Supplemental Revised Attachment 2). These proposed standards and criteria are consistent with the Magnuson-Stevens Fishery Conservation and Management Act, the Council's West Coast groundfish fishery management plan, and draft National Marine Fisheries Service standards and protocols. The proposed standards and criteria include the following:

- Definition of exempted fishing permits (EFPs) and purposes for their use
- Description of the contents of a completed EFP application
- Review and approval process involving consideration of EFPs at the GMT, Scientific and Statistical Committee (SSC), and Council levels
- Suggested prioritization criteria for EFP applications
- List of questions the GMT will consider in reviewing EFP applications, including an evaluation of scientific data collection methods
- Other considerations regarding fishery-related violations of potential EFP participants
- Requirements for a preliminary report of the results and the data collected (including catch data) presented to the GMT at the June Council meeting following the implementation of the EFP, and a final written report that documents the data collection methodology and the results of the EFP to the Council and its advisory bodies in September

The GMT is recommending a proposed process and timeline for EFP review and consideration by the Council that consists of an annual two-meeting process at the September and November Council meetings (Exhibit E.7, Supplemental Attachment 3). The approach would include setting aside a portion of the optimum yields (OYs) for rebuilding species of concern as part of setting the acceptable biological catches (ABCs) and OYs in June; in the absence of EFP applications that meet the standards and criteria sufficient to take the portion of the OYs that have been set aside, there would be a release of those set asides back to the scheduled groundfish fisheries in September.

The GMT requests that the SSC also review EFP applications to evaluate the proposed data collection methodology to determine whether it is adequate to measure achievement of the EFP objectives.

The GMT recommends that the Council approve the draft Council Operating Procedure for the standards and criteria for approving EFPs, as revised, as well as the proposed process and timeline.

PFMC
04/10/03

COUNCIL OPERATING PROCEDURE: PROTOCOL FOR COUNCIL CONSIDERATION OF EXEMPTED FISHING PERMITS (EFPs) FOR PACIFIC COAST GROUNDFISH FISHERIES

DEFINITION

An exempted fishing permit (EFP) is a federal permit, issued by the National Marine Fisheries Service, which authorizes a vessel to engage in an activity that is otherwise prohibited by the Magnuson-Stevens Fishery Conservation and Management Act or other fishery regulations for the purpose of collecting limited experimental data. EFPs can be issued to federal or state agencies, marine fish commissions, or other entities, including individuals. An EFP applicant need not be the owner or operator of the vessel(s) for the EFP is requested *[NMFS Report, April 2002]*.

PURPOSE

The specific objectives of a proposed exempted fishery may vary. The Pacific Fishery Management Council's fishery management plan (FMP) for West Coast groundfish stocks provides for EFPs to promote increased utilization of underutilized species, realize the expansion potential of the domestic groundfish fishery, and increase the harvest efficiency of the fishery consistent with the Magnuson-Stevens Act and the management goals of the FMP *[PFMC West Coast Groundfish FMP, August 1990]*. However, EFPs are commonly used to explore ways to reduce effort on depressed stocks, encourage innovation and efficiency in the fisheries, provide access to constrained stocks while directly measuring the bycatch associated with those fishing strategies, and to evaluate current and proposed management measures *[GMT report, October 2002]*.

PROTOCOL

Submission

The Pacific Fishery Management Council and its advisory bodies (Groundfish Management Team [GMT] and Scientific and Statistical Committee [SSC]) should review EFP proposals prior to issuance; the GMT and SSC may provide comment on methodology and relevance to management data needs and make recommendations to the Council accordingly. The Groundfish Advisory Subpanel and the public may also comment on EFP proposals *[NMFS Report, April 2002]*. *Completed applications for EFPs from individuals or non-government agencies for Council consideration must be received by the Council for review, at least two weeks prior to the September Council meeting. Applications for EFPs from federal or state agencies must meet the briefing book deadline for the September Council meeting.*

Proposal Contents

EFP proposals must contain sufficient information for the Council to determine:

- There is adequate justification for an exemption to the regulations;
- The potential impacts of the exempted activity have been adequately identified; and
- The exempted activity would be expected to provide information useful to management and use of groundfish fishery resources. *[GMT report, October 2002]*

Therefore, applicants must submit a completed application in writing that includes, but is not limited to, the following information:

- Date of application
- Applicant's names, mailing addresses, and telephone numbers
- A statement of the purpose and goals of the experiment for which an EFP is needed, including a general description of the arrangements for the disposition of all species harvested under the EFP
- Valid justification explaining why issuance of an EFP is warranted

- A statement of whether the proposed experimental fishing has broader significance than the applicant's individual goals
- Number of vessels covered under the EFP
- A description of the species (target and incidental) to be harvested under the EFP and the amount(s) of such harvest necessary to conduct the experiment; this description should include harvest estimates of overfished species
- *A description of a mechanism, such as at-sea fishery monitoring, to ensure that the harvest limits for targeted and incidental species are not exceeded and are accurately accounted for*
- *A description of the proposed data collection and analysis methodology*
- For each vessel covered by the EFP, the approximate time(s) and place(s) fishing will take place, and the type, size, and amount of gear to be used
- The signature of the applicant *[PFMC West Coast Groundfish FMP, August 1990]*

NOTE: The GMT, SSC, and/or Council may request additional information necessary for their consideration.

<u>Review and Approval</u>

The GMT and SSC will review EFP proposals in September and make recommendations to the Council for action; the Council will consider those proposals for preliminary action. Final action on EFPs will occur at the November Council meeting. Only those EFP applications that were considered in September may be considered in November; EFP applications received after the September Council meeting for the following calendar year will not be considered.

EFP proposals must contain a mechanism, such as at-sea fishery monitoring, to ensure that the harvest limits for targeted and incidental species are not exceeded and are accurately accounted for. *Also, EFP proposals must include a description of the proposed data collection and analysis methodology used to measure whether the EFP objectives will be met.*

The Council will give priority consideration to those EFP applications that:

- Emphasize resource conservation and management with a focus on bycatch reduction
- Encourage full retention of fishery mortalities
- Involve data collection on fisheries stocks and/or habitat
- Encourage innovative gear modifications and/or development *[GMT report, October 2002]*

In its review, the GMT review will consider the following questions:

- Is the application complete?
- Is the EFP proposal consistent with the goals and objectives of the West Coast Groundfish FMP?
- Does the EFP account for fishery mortalities, by species?
- Are the harvest estimates of overfished species within the amounts set aside for EFP activities?
- Does the EFP meet one or more of the Council's priorities listed above?
- Is the EFP proposal compatible with the federal observer program effort?
- What infrastructure is in place to monitor, process data, and administer the EFP?
- *How will achievement of the EFP objectives be measured?*
- What is the funding source for at-sea monitoring?
- Has there been coordination with appropriate state and federal enforcement staff?

Other considerations:

- *Potential EFP participants (fishers and processors) who have violated past EFP provisions, have been convicted of a state or federal gross misdemeanor or felony of commercial fishery regulations within the last three years and/or for which there are documented fish receiving tickets that indicate misreported or under-reported groundfish landings may not be eligible to participate in EFPs. [GMT report, October 2002]*

<u>Report Contents</u>

The EFP applicant must present a preliminary report on the results of the EFP and the data collected *(including catch data)* to the GMT at the June Council meeting of the following year. A final written report on the results of the EFP and the data collected must be presented to the GMT, SSC, and the Council at the September Council meeting. This final report should include a summary of the work completed, an analysis of the data collected, and conclusions and/or recommendations. *Timely presentation of results is required to determine whether future EFPs will be recommended.*

Exhibit E.7.b
Supplemental EC Report
April 2003

ENFORCEMENT CONSULTANTS REPORT ON STANDARDS AND CRITERIA FOR APPROVING EXEMPTED FISHING PERMITS

The Enforcement Consultants (EC) propose the following changes to the draft Operating Procedures portion of the Standards and Criteria for Approving Exempted Fishing Permits (EFPs), Exhibit E.7, Attachment 2.

As it relates to Page 2, Review and Approval – Other considerations, change the wording to reflect:

EFP candidates or participants may be denied future related fishing opportunities under the following circumstances:

If the applicant/participant (fisher/processor) has violated past EFP provisions; or has been convicted of a crime related to commercial fishing regulations punishable by a maximum penalty range exceeding $1,000 within the last three years; or within the last three years assessed a civil penalty related to violations of commercial fishing regulations in an amount greater than $5,000; or, has been convicted of any violation involving the falsification of fish receiving tickets including, but not limited to, mis-reporting or under-reporting of groundfish. Documented fish receiving tickets indicating mis-reporting or under-reporting of groundfish will not qualify for consideration when fish reporting documents are used as part of the qualifying criteria for EFP's.

PFMC
04/09/03

GROUNDFISH ADVISORY SUBPANEL STATEMENT ON STANDARDS AND CRITERIA FOR APPROVING EXEMPTED FISHING PERMITS

The Groundfish Advisory Subpanel (GAP) met jointly with the Groundfish Management Team (GMT) to discuss the criteria they developed for evaluating exempted fishing permit (EFP) proposals and the process to be used for allocating fish to EFP programs.

In general, the GAP found the GMT's recommendations acceptable, with one exception. On page 2 of the GMT's Draft Council Operating Procedures (Supplemental Revised Attachment 2, Exhibit E.7) under "Other considerations," the GMT recommends that EFP applications be evaluated on the basis of enforcement concerns including "documented fish receiving tickets that indicate misreported or under-reported groundfish landings." In other words, an EFP applicant could be denied, because there was an unresolved dispute over two fishtickets - an event which is fairly common and which is usually resolved without any violation or serious penalty. The GAP believes this particular criterion is excessive and unnecessary. We understand that the Enforcement Consultants are developing alternative language, which ties potential denial of an EFP applicant to significant violations for which a severe civil or criminal penalty has been imposed after proper adjudication. This is a more reasonable approach that the GAP could endorse.

PFMC
04/10/03

Exhibit E.7.b
Supplemental SSC Report
April 2003

SCIENTIFIC AND STATISTICAL COMMITTEE REPORT ON STANDARDS AND CRITERIA FOR APPROVING EXEMPTED FISHING PERMITS

The Council's groundfish fishery management plan (FMP) provides for the issuance of exempted fishing permits (EFPs) by NMFS to promote the increased use of underutilized species, to realize the expansion potential of the domestic groundfish fishery, and to increase the harvest efficiency of the fishery consistent with the Magnuson-Stevens Act and the goals of the groundfish FMP. The Groundfish Management Team (GMT) has developed a draft set of protocols for EFP applications that is being considered for adoption as part of the Council's Operating Procedures (Exhibit E.7, Supplemental Revised Attachment 2, April 2003). Previously, the SSC had indicated a willingness to assist the GMT in evaluating scientific issues associated with EFP applications (Exhibit G.6.c, Supplemental SSC Report, November 2002).

The SSC discussed how it could be of greatest assistance to the GMT in evaluating EFP applications, considering that many submissions are designed to address a policy or management objective, and have little or no identifiable scientific purpose. Following that discussion the SSC concluded the following:

1. All EFP applications should first be evaluated by the GMT for consistency with the goals and objectives of the groundfish FMP and the Council's strategic plan for groundfish.

2. When a proposal is submitted that includes a significant scientific component that would benefit from SSC review, the GMT can refer the application to the SSC's groundfish subcommittee for comment.

3. In such instances, the groundfish subcommittee will evaluate the scientific merits of the application and will specifically evaluate the application's (a) problem statement, (b) data collection methodology, (c) proposed analytical and statistical treatment of the data, and (d) the generality of the inferences that could be drawn by the study.

PFMC
04/09/03

FINAL ACTION ON GROUNDFISH INSEASON MANAGEMENT

Situation: Tentative adjustments to the 2003 groundfish management measures will be adopted as necessary by the Council under agenda item E.3 on Wednesday, April 9. These tentative adjustment will be reviewed by the Groundfish Management Team (GMT) and the Groundfish Advisory Subpanel (GAP). The Council is to consider advice from the GMT, the GAP, and the public on additional recommended changes and adopt final inseason adjustments to the 2003 groundfish management measures as necessary.

Council Action:

1. Consider and adopt final inseason adjustments, if necessary.

Reference Materials:

1. Supplemental reports may be provided by the GMT and the GAP.

Agenda Order:

a. Agendum Overview — Mike Burner
b. Reports and Comments of Advisory Bodies
c. Public Comment
d. **Council Action:** Consider and Adopt Inseason Adjustments, if Necessary

PFMC
03/21/03

ENFORCEMENT CONSULTANTS REPORT ON FINAL ACTION ON GROUNDFISH INSEASON MANAGEMENT

The Enforcement Consultants (EC) reviewed the Groundfish Advisory Subpanel (GAP) and GMT statements related to inseason adjustments. The EC requests clarification of how management measures relate to B Platoon vessels. In the case of B Platoon vessels, we understand that trip limits lag by two weeks; however, confusion exists relative to how other management measures should be applied. One example is a restriction based on fishing depth. We raised this issue with the GAP, and they requested status quo until 2004.

The issue for the EC is that we would have to maintain two sets of lines for two weeks. Where these vessels may have incurred benefits when a fishing area was further restricted, under the 200 fathom curve scenario, they would actually lose opportunity.

The EC also understands that a change in depth regulation could occur mid-period, further confusing the situation.

PFMC
04/10/03

Exhibit E.8.b
Supplemental GAP Report
April 2003

GROUNDFISH ADVISORY SUBPANEL STATEMENT ON
FINAL ACTION ON GROUNDFISH INSEASON MANAGEMENT

The Groundfish Advisory Subpanel (GAP) met jointly with the Groundfish Management Team (GMT) to discuss inseason adjustments to the groundfish specifications. The GAP makes the following recommendations:

AREA AND TRIP LIMIT ADJUSTMENTS

North of 40°10': As soon as possible, but not earlier than May 1, 2003, move the western boundary of the Rockfish Conservation Area (RCA) to a line approximating 200 fathoms and the eastern boundary of the RCA to a line approximating 50 fathoms, as expressed by a series of straight lines connecting waypoints identified by latitude and longitude coordinates.

Beginning May 1, 2003, (May 15, 2003 for "B" Platoon vessels) until the line change is accomplished, the taking of Pacific groundfish by bottom trawls on limited entry vessels east of the 250 fathom line will be prohibited.

Beginning May 1, 2003 (May 15, 2003 for "B" Platoon vessels): the following trip limits will apply for large footrope limited entry trawl:
Dover sole - 31,000 lbs / 2 mos
Sablefish - 10,000 lbs / 2 mos
Longspine thornyheads - 14,000 lbs / 2 mos
Shortspine thornyheads - 2,800 lbs / 2 mos
Arrowtooth flounder - 200,000 lbs / 2 mos

Beginning at the time that the 50 fathom line is established, the following trip limits will apply for small footrope limited entry trawl:
Dover sole - 12,500 lbs / 2 mos
Sablefish - 3,000 lbs / 2 mos
Other flatfish - 20,000 lbs / 2 mos, no more than 10,000 lbs of which may be petrale sole
Arrowtooth flounder - 5,000 lbs / 2 mos

Beginning May 1, 2003, (May 15, 2003 for "B" platoon vessels) if small footrope gear is used at any time during the limit period, a vessel will be retricted to the small footrope limits during the entire cumulative period.

South of 40°10': As soon as possible, but not earlier than May 1, 2003, the western boundary of the RCA as it applies to fishing with bottom trawls will be a line approximating 200 fathoms, as expressed by a series of straight lines connecting way points identified by latitude and longitude coordinates.

During the periods of May 1 to June 30, 2003, and September 1 to October 31, 2003, (and the appropriate corresponding times for "B" Platoon vessels) the sublimit of petrale sole as a component of the other flatfish limit is increased to no more than 20,000 lbs / 2 mos

During the period July 1 to August 31, 2003, the taking of Pacific groundfish by bottom trawls on limited entry vessels east of this line will be prohibited.

During the period July 1 to August 31, (July 15 to August 15, 2003 for "B" Platoon vessels) the following limited entry trawl trip limits will apply:
Dover sole - 35,000 lbs / 2 mos
Sablefish - 12,000 lbs / 2 mos
Longspine thornyheads - 16,000 lbs / 2 mos
Shortspine thornyheads - 3,000 lbs / 2mos

The GAP wants to make clear this recommendation is being made only because we have no choice. The

Council's decision to require use of the revised bycatch model leads to no flexibility. The results of adopting this proposal will be felt by fishermen and processors who have already made fishing plans for this season, who are already gearing up for May, and who will suddenly be shut down with two week's notice. To further complicate matters, the lack of harvest in May of this year will mean the bycatch model has less data to use next year, so this could, in effect, wind up as a permanent closure.
We are now at the point where we are managing real people's lives with computer projections based on "virtual" fish. That is something that should not be allowed to happen.

SCIENTIFIC RESEARCH
The GAP recommends the Council direct NMFS to defer their planned southern California bocaccio hook-and- line survey scheduled for this year.

The GAP believes the approximately 1 metric ton of bocaccio set aside for cooperative research in southern California would be better utilized to help maintain fishing opportunities for both recreational and commercial fisheries for the remainder of the 2003 season.

Getting better data on bocaccio biomass is of paramount importance. However, a southern survey which anticipates taking only 1 metric ton of fish is totally inadequate considering the species distribution from the shore out to 150 fathoms.

When more fish becomes available, the southern bocaccio survey work should be given the highest priority.

OTHER MEASURES
During its discussion of inseason adjustments, the GAP considered several other proposals presented by GAP members, other Council advisory bodies, and members of the public. The GAP's recommendations are as follows:

Retention of rockfish by salmon troll vessels - Beginning May 1, 2003, north of 40°10', salmon troll vessels may retain 1 lb of yellowtail rockfish for every 2 lbs of salmon landed, with a cumulative limit of 200 lbs / month, both within and outside of the RCA. Retention of other groundfish species will be governed by groundfish open access cumulative limits and season and area restrictions.

The special provision for salmon troll vessels to retain yellowtail rockfish was made several years ago, but was inadvertently dropped when the 2003 annual specifications were published. The GAP agreed it should be continued, with the monthly cumulative limit reduced to match the groundfish open access limit. Representatives of the salmon troll fishery requested that similar exemptions be made for lingcod and other rockfish species. The GAP rejected the provision for lingcod since that species has been designated as overfished and is subject to rebuilding constraints. The GAP agreed that other rockfish could be incidentally taken, but retention be subject to the same rules governing other open access fisheries. This will prevent early attainment of open access harvest goals and prevent any re-allocation of other species from the open access fishery to the salmon troll fishery.

Minor corrections to RCA boundaries - several minor changes to RCA boundaries were discussed, including changes proposed by the Fishing Vessel Owners Association and a member of the GAP. Since some of these changes could result in bycatch impacts on species designated as overfished, the majority of the GAP agreed to support only those changes that were recommended by the GMT.

Recreational fishing for southern slope rockfish - the GAP considered a letter received from a recreational fishermen in California, requesting that recreational fishing for southern slope rockfish be allowed. The GAP opposed the request, because it would constitute a new fishery with unknown impacts on overfished species; would be extremely difficult to enforce; would go against the policy of providing greater nearshore opportunities for recreational fishermen in exchange for greater slope opportunities for commercial fishermen; could be detrimental to vessel safety; and could lead to additional incidental take of shelf rockfish.

Clarification of management line changes affecting "B" platoon vessels - The Enforcement Consultants and the GAP discussed how "B" platoon vessels should be treated when inseason adjustments are made to management line boundaries. The GAP notes that - for 2003 - vessels in the "B" platoon have already made fishing plans based on being able to operate under existing management lines during their entire cumulative period. Being forced to fish under new lines would be costly, and vessels cannot transfer to the "A" platoon once the fishing year begins. Since there are only 22 vessels registered under the "B" platoon and the Enforcement Consultants agreed they could - with some effort - enforce differential lines, the GAP recommended that for the 2003 season "B" platoon vessels be allowed to fish according to the management lines in existence at the start of their cumulative periods. For 2004, the GAP will consider whether the "B" platoon option should be allowed to continue.

The GAP notes that the uncertainty of when line changes may occur in May causes a further problem. The GAP suggests that - for the cumulative period beginning May 15, 2003 only - "B" Platoon vessels be allowed to fish at whatever line is in effect for the "A" Platoon vessels.

PFMC
04/10/03

GROUNDFISH MANAGEMENT TEAM REPORT ON INSEASON ADJUSTMENTS

The Groundfish Management Team (GMT) discussed various options for management measures for the trawl fishery, including implementing a 50-fathom depth restriction north of 40°10' beginning in May. The GMT received a number of concerns from industry relative to this restriction, including:

- Summer is the primary molting period for Dungeness crab. Molting crab are extremely soft-shelled and are vulnerable to trawl-induced mortality. Concentration of effort in the nearshore area could risk harm to the Dungeness crab resource. Gear conflicts between the trawl and Dungeness crab fisheries would also be intensified.
- The area inside of 50 fathoms is a nursery ground for a number of groundfish species. Concentrating the trawl fleet in this area could result in unanticipated harmful effects on these juvenile fish.
- While the canary bycatch rate inside of 50 fathoms is currently modeled upon catches of vessels historically used to fishing in the nearshore area, forcing vessels unfamiliar to fishing in this area to do so might result in an increase in this canary bycatch rate.

Additionally, the GMT notes that the states of California and Washington do not allow trawling inside of three miles, further increasing the concentration of trawl effort inside 50 fathoms. However, the GMT believes that the regulations can differ among states relative to the inshore opportunities.

The GMT also discussed other proposals for inseason adjustments and has the following recommendations:

Retention of Rockfish by Salmon Troll Vessels

The GMT concurs with the GAP recommendation regarding the retention of yellowtail rockfish in the salmon troll fishery, north of 40°10 only. When the GMT developed the estimated mortality of overfished rockfish species last fall (i.e., in the " bycatch scorecard"), there was a projected estimate of 1.6 mt of canary mortality for the salmon troll fishery. This estimate was viewed as unavoidable mortality while the salmon troll fishery was targeting salmon within and outside the Rockfish Conservation Area (RCA); therefore, the yellowtail retention allowance is not expected to result in increased impacts to canary rockfish.

Minor Corrections to RCA Boundaries

The GMT has reviewed the proposed changes to the coordinates for the fixed gear-RCA north of 40°10'. The GMT does not recommend implementing these changes as the coordinates would result in moving the line into depths shallower than 100 fathoms which would likely result in increased impacts to yelloweye and canary rockfish.

Recreational Fishing for Southern Slope Rockfish

The GMT opposes the proposal for a southern slope recreational fishery, primarily because bycatch mortalities for overfished rockfish that would result from this new fishery have not been accounted for.

Clarification of Management Line Changes for the "B" Platoon

The GMT again concurs with the GAP on this issue. It is our understanding that "B" Platoon vessels would be allowed to fish under the regulations that were in place for "A" Platoon vessels in period 2, until May 15th. The calculated bycatch projections for the trawl fleet in period 2 account for effort by the "B" Platoon vessels in the first two weeks of May.

EFPs

The GMT discussed the proposed exempted fishery permits (EFPs) that were approved by the Council for trawl north of 40°10'–specifically the Washington Trawl Arrowtooth EFP and the Oregon Selective Flatfish EFP. Both of these EFPs require at-sea monitoring and are subject to EFP caps for overfished rockfish. The EFP caps previously captured in the bycatch scorecard were based on projections with a smaller RCA. In both EFPs, all tows prosecuted within the trawl RCA are considered "directed flatfish tows," by default. As such, all canary rockfish caught within the RCA count against the EFP cap. In order to conduct these EFPs, the states of Washington and Oregon are proposing increasing the canary EFP caps.

The overall amount of canary rockfish set aside for EFPs in 2003 by the Council was 6.5 mt. The estimated amount of canary rockfish that is needed to conduct all of the Council-approved EFPs, including the new California nearshore flatfish EFP, is 8.5 mt. According to the GMT's best estimate of canary mortalities in all fishing sectors, all of these EFPs can be accommodated while staying within the canary rockfish OY of 44 mt without further restricting other fisheries. Therefore, the GMT recommends that the Council increase the EFP set aside for canary rockfish from 6.5 mt to 8.5 mt. The GMT believes that the information obtained through these EFPs will be valuable and could benefit the trawl fleet in the future.

Estimated mortality (mt) of overfished West Coast groundfish species by fishery in 2003.

Fishery	Bocaccio *1/*	Canary	Cowcod	Darkblotched	Lingcod 7/	POP	Whiting	Widow	Yelloweye
Limited Entry Groundfish									
Trawl- Non-whiting *2/*	9.1	8.5		107.5	73.8	97.6	1,800	1.8	1.5
Trawl- at-sea whiting 2a/		4.1		5.0	0.3	9.0	95,300	182.0	0.0
Trawl- shoreside whiting		0.5		1.5	0.2	0.2	50,900	30.0	
Fixed Gear	0.1	0.5	0.1		20.0				1.0
Recreational Groundfish									
WA		1.5			35.0				3.5
OR		9.3			105.0			4.0	3.7
CA (N)		0.5			195.0			1.0	0.1
CA (S)	5.0	2.7			20.0			0.0	0.4
Tribal									
Midwater Trawl		1.1		0.0	0.9	0.0	0	45.0	0.0
Bottom Trawl				0.0		0.0			
Troll		0.5		0.0	0.9	0.0			0.1
Fixed gear		0.7		0.0	3.4	0.0		0.0	3.0
Open Access									
Groundfish directed	0.2	0.3	0.0		50.0				0.5
CA Halibut	0.5	0.1	0.1	0.0	0.0	0.0	0	0.0	0.1
CA Gillnet *3/*	0.5								
CA Sheepshead *3/*									
CPS- wetfish *3/*	0.5								
CPS- squid *4/ 5/*									
Dungeness crab *3/*				0.0					
HMS *3/*		0.0	0.0	0.0					
Pacific Halibut *3/*	0.0	0.0		0.0	UR	0.0	0	0.0	0.5
Pink shrimp	0.1	0.5		0.0	0.5	0.0	1	0.1	0.1
Ridgeback prawn	0.1	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0
Salmon troll	0.2	1.6			0.3			0.0	0.2
Sea Cucumber	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0
Spot Prawn (trawl)									
Spot Prawn (trap)									
Research: Based on two most recent NMFS trawl shelf and slope surveys with expanded estimates for south of Pt. Conception									
	2.0	1.0		1.6	3.0	3.0	200	1.5	0.6
EFPs: *6/*									
CA: NS FF trawl	0.5	0.5	0.2						0.5
OR: selective FF trawl		**4.0**		3.1	13.0			1.0	1.2
WA: AT trawl		**3.0**		3.0	2.0	10.0		3.0	0.4
WA: dogfish LL		0.5		0.0	0.4	0.0	0	0.0	2.0

Estimated mortality (mt) of overfished West Coast groundfish species by fishery in 2003.

Fishery	Bocaccio *1/*	Canary	Cowcod	Darkblotched	Lingcod 7/	POP	Whiting	Widow	Yelloweye
WA: pollock		0.5		0.4	0.0	0.4	0	3.0	0.4
EFP Subtotal		**8.5**							
TOTAL	18.8	41.9	0.4	122.1	523.7	120.2	148200	272.4	19.8
2003 OY	< 20	44.0	2.4	172.0	651.0	377.0	148200	832.0	22.0

Shaded cells represent either NA- Not applicable; TR- Trace amount (<0.01 mt); UR- Not reported in available data sources.
1/ South of 40°10' N. lat.
2/ Using observer data, all landings are results of modeling GMT Option 1
2a/ Calculated using five-year average (1998-2002); includes tribal at-sea whiting
3/ Mortality estimates are not hard numbers, based on their GMT's best professional judgement.
4/ 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
5/ Expected landed catch only. Discard/total mortality estimates not available.
6/ The Council capped the 2003 canary rockfish set-aside for all the EFPs in combination at 6.5 mt to derive an expected total catch of 44 mt of canary rockfish in 2003.
7/ Lingcod total reflects total catch, not mortality

GMT trip limit recommendations

Proposed **groundfish trawl** trip limit changes for implementation May 1 (A-platoon)
[depth lines to be implemented as soon as possible]

North of 40°10'

Option 1

Move outside line N of 40°10' from 250 fm to 200 fm (does not supercede period 6 petrale opening)
Move inside line N of 40°10' from 100 fm to 50 fm (closed inside 250 fm until new line implemented)

	Poundage limits per 2-month period		
	Current period 3	New: periods 3 to period 6	If small footrope used anytime in period
Sablefish	7,000	10,000	3,000
Longspine	9,000	14,000	0
Shortspine	2,400	2,800	0
Dover sole	25,000	31,000	12,500
Arrowtooth	60,000	200,000	5,000
Other flatfish	100,000	100,000	20,000
Petrale sublimit	30,000	30,000 (deeper than 200 fm)	10,000

Raise yellowtail bycatch limit to 10,000 lb/2-months, subject to current percentage limits

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Option 2

difference between the 2 could potentially be less than 1 mt for canary - per Jim Hastie 4:34pm 4-10-03

Move outside line N of 40°10' from 250 fm to 200 fm (does not supercede period 6 petrale opening)
North of 40o10', close fishery shoreward of the outside line

	Poundage limits per 2-month period	
	Current period 3	New: periods 3 to period 6
Sablefish	7,000	10,000
Longspine	9,000	14,000
Shortspine	2,400	2,800
Dover sole	25,000	31,000
Arrowtooth	60,000	200,000
Other flatfish	100,000	100,000
Petrale sublimit	30,000	3~~1~~0,000 (deeper than 200 fm)

corrected per Dr. Hastie 4:58pm 4-10-03

It is expected that the new lines at 50 fm and 200 fm would be in place before the end of May.

closure for remainder of the year.

roposed **groundfish trawl** trip limit changes for implementation May 1 (A-platoon)
[depth lines to be implemented as soon as possible]

South of 40°10'

Move outside line N of 38° from 250 fm to 200 fm (does not supercede period 6 petrale opening)

South of ~~38o~~ 40°10', move outside line from 150 fm to 200 fm (does not supercede period 6 petrale opening)

South of 40°10', Close fishery shoreward of 200 fm in period 4

40°10' Correction made by Mike Burner 5:32pm (4-10-03)

	Poundage limits per 2-month period		
	Current period 3	New: periods 3, 5, 6	period 4 south of 38°
Sablefish	7,000	10,000	12,000
Longspine	9,000	14,000	16,000
Shortspine	2,400	2,800	3,100
Dover sole	25,000	31,000	35,000
Other flatfish	70,000	70,000	70,000
Petrale sublimit	10,000	20,000	20,000

COUNCIL MOTION ON INSEASON ADJUSTMENTS

Trip Limit and Mangement Line Changes

Groundfish trawl trip limit changes for implementation May 1 (A-platoon)
[depth lines to be implemented as soon as possible]

North of 40°10'

Move outside line N of 40°10' from 250 fm to 200 fm (does not supercede period 6 petrale opening)

Move inside line N of 40°10' from 100 fm to 50 fm (closed inside 250 fm until new line implemented)

	Poundage limits per 2-month period		
	Current period 3	New: periods 3 to period 6	If small footrope used anytime in period
Sablefish	7,000	10,000	3,000
Longspine	9,000	14,000	0
Shortspine	2,400	2,800	0
Dover sole	25,000	31,000	12,500
Arrowtooth	60,000	200,000	5,000
Other flatfish	100,000	100,000	20,000
Petrale sublimit	30,000	30,000 (deeper than 200 fm)	10,000

Raise yellowtail bycatch limit to 10,000 lb/2-months, subject to current percentage limits

---

South of 40°10'

Move outside line N of 38° from 250 fm to 200 fm (does not supercede period 6 petrale opening)

South of 38o, move outside line from 150 fm to 200 fm (does not supercede period 6 petrale opening)

South of 40°10', Close fishery shoreward of 200 fm in period 4

	Poundage limits per 2-month period		
	Current period 3	New: periods 3, 5, 6	period 4 south of 40°10'
Sablefish	7,000	10,000	12,000
Longspine	9,000	14,000	16,000
Shortspine	2,400	2,800	3,100
Dover sole	25,000	31,000	35,000
Other flatfish	70,000	70,000	70,000
Petrale sublimit	10,000	20,000	20,000

Retention of Rockfish by Salmon Troll Vessels

Beginning May 1, 2003, north of 40°10', salmon troll vessels may retain 1 lb of yellowtail rockfish for every 2 lbs of salmon landed, with a cumulative limit of 200 lbs / month, both within and outside of the RCA. Retention of other groundfish species will be governed by groundfish open access cumulative limits and season and area restrictions.

Minor Corrections to RCA Boundaries

The Council does not recommend the proposed changes to the coordinates for the fixed gear-RCA north of 40°10'.

Clarification of Management Line Changes for the "B" Platoon

The Council recommends that "B" Platoon vessels would be allowed to fish under the regulations that were in place for "A" Platoon vessels in period 2, until May 15th. For the cumulative period beginning May 15, 2003 only, "B" Platoon vessels be allowed to fish at whatever line is in effect for the "A" Platoon vessels.

Bycatch Scorecard

The Council approved the distribution of the bycatch amounts for all fishing sectors in the bycatch scorecard presented in Exhibit E.8.b, Supplemental GMT Report. The values in this bycatch scorecard reflect the changes adopted in this motion.

EFPs

The Council recommends that the EFP set aside for canary rockfish increase from 6.5 mt to 8.5 mt. This accommodates new canary bycatch caps of 4.0 mt and 3.0 mt in the Oregon Selective Flatfish Trawl and the Washington Arrowtooth Trawl EFPs, respectively. The Council believes that the information obtained through these EFPs will be valuable and could benefit the trawl fleet in the future.

PFMC
04/11/03

Council Motion, N of 40°10'. (4/10/03, 6pm)

Table 3 (North). Trip Limits and Gear Requirements[1/] for Limited Entry Trawl Gear North of 40°10' N. Latitude[2/]

Other Limits and Requirements Apply -- Read Sections IV. A. and B. NMFS Actions before using this table

		JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
	Rockfish Conservation Area[10/] (RCA): North of 40°10' N. lat.	100 fm - 250 fm (line modified to incorporate petrale sole fishing grounds)	100 fm - 250 fm	~~100 fm - 250 fm~~ **shoreline - 250 fm (50 fm -200 fm ASAP)**	~~75 fm - 250 fm~~ **50 fm - 200 fm**	~~100 fm - 250 fm~~ **50 fm - 200 fm**	~~100 fm - 250 fm~~ **50 fm - 200 fm** (line modified to incorporate petrale sole fishing grounds)
	Small footrope is required shoreward of the RCA; both large and small footropes are 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 may not have limited entry bottom trawl gear on board if that vessel also has trawl gear on board that is permitted for use within a RCA, including limited entry midwater trawl gear, regardless of whether the vessel is intending to fish within a RCA on that fishing trip. **See IV.A.(14)(iv) for details.**						
1	**Minor slope rockfish[3/]**	1,800 lb/ 2 months					
2	**Pacific ocean perch**	3,000 lb/ 2 months					
3	**DTS complex**						
4	Sablefish	6,000 lb/ 2 months		~~7,000~~ 10,000 lb/ 2 months **providing that only large footrope or midwater trawl gear is used to land any groundfish species during the entire limit period. If small footrope gear is used at any time in any area (North or South, inshore or offshore of RCA) during the entire limit period, then 3,000 lb/2 mo.**			~~6,000 lb/ 2 months~~ **same as May-Oct**
5	Longspine thornyhead	8,000 lb/ 2 months	9,000 lb/ 2 months	~~9,000~~ 14,000 lb/ 2 months **providing that only large footrope or midwater trawl gear is used to land any groundfish species during the entire limit period. If small footrope gear is used at any time in any area (North or South, inshore or offshore of RCA) during the entire limit period, then retention of thornyheads prohibited.**			~~7,000 lb/ 2 months~~ **same as May-Oct**
6	Shortspine thornyhead	2,300 lb/ 2 months	2,400 lb/ 2 months	~~2,400~~ 2,800 lb/ 2 months **providing that only large footrope or midwater trawl gear is used to land any groundfish species during the entire limit period. If small footrope gear is used at any time in any area (North or South, inshore or offshore of RCA) during the entire limit period, then retention of thornyheads prohibited.**			~~2,200 lb/ 2 months~~ **same as May-Oct**
7	Dover sole	26,000 lb/ 2 months		~~25,000~~ **31,000** lb/ 2 months **providing that only large footrope or midwater trawl gear is used to land any groundfish species during the entire limit period. If small footrope gear is used at any time in any area (North or South, inshore or offshore of RCA) during the entire limit period, then 12,500 lb/2 mo.**			~~26,000 lb/ 2 months~~ **same as May-Oct**
8	**Flatfish**						
9	All other flatfish[4/]	100,000 lb/ 2 months	100,000 lb/ 2 months, no more than 30,000 lb/ 2 months of which may be petrale sole **providing that only large footrope or midwater trawl gear is used to land any groundfish species during the entire limit period. If small footrope gear is used at any time in any area (North or South, inshore or offshore of RCA) during the entire limit period, then 20,000 lb/ 2 months, no more than 10,000 lb/ 2 months of which may be petrale sole.**				100,000 lb/ 2 months
10	Petrale sole	Not limited					Not limited
11	Rex sole	Included in all other flatfish					
12	Arrowtooth flounder	30,000 lb/ trip	~~60,000~~ 200,000 lb/ 2 months; ~~7,500 lb/ trip~~ **providing that only large footrope or midwater trawl gear is used to land any groundfish species during the entire limit period. If small footrope gear is used at any time in any area (North or South, inshore or offshore of RCA) during the entire limit period, then 5,000 lb/2 mo.**				~~30,000 lb/ trip~~ **same as May-Oct**
13	**Whiting[5/]**						
14	mid-water trawl	20,000 lb/ trip		Primary Season (mid-water trawl permitted in the RCA)		10,000 lb/ trip	
15	**Other Fish[9/]**	Not limited					
16	**Use of small footrope bottom trawl[7/] or mid-water trawl is required for landing all of the following species:**						
17	**Minor shelf rockfish and widow rockfish[3/]**	300 lb/ month		1,000 lb/ month, no more than 200 lb/ month of which may be yelloweye rockfish			300 lb/ month
18	**Widow rockfish**						
19	mid-water trawl - permitted within the RCA	CLOSED[6/]		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		CLOSED[6/]	12,000 lb/ 2 months
20	**Canary rockfish**	100 lb/ month		300 lb/ month		100 lb/ month	
21	**Yellowtail**						
22	mid-water trawl - permitted within the RCA	CLOSED[6/]		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			18,000 lb/ 2 months
23	small footrope trawl[7/]	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 ~~8,000 lb/ month~~ **10,000 lb/ 2 months**, no more than 1,000 lb of which may be landed without flatfish.					
24	**Minor nearshore rockfish**	300 lb/ month					
25	**Lingcod[8/]**	800 lb/ 2 months		1,000 lb/ 2 months		800 lb/ 2 months	

1/ Gear requirements and prohibitions are explained above. See IV. A.(14).

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

3/ 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.

4/ "Other" flatfish means all flatfish at 50 CFR 660.302 except those in this Table 3 with species specific management measures, including trip limits.

5/ The whiting "per trip" limit in the Eureka area shoreward of 100 fm is 10,000 lb/ trip throughout the year. Outside Eureka area, the 20,000 lb/ trip limit applies. See IV. B.(3).

6/ Closed means that it is prohibited to take and retain, possess, or land the designated species in the time or area indicated. See IV. A.(7).

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

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

9/ 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.

10/ 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 set out at IV. A.(19)(e), that may vary seasonally.

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

Council Motion, S of 40°10'. (4/10/03, 6pm)

Table 3 (South). Trip Limits and Gear Requirements[1/] for Limited Entry Trawl Gear South of 40°10' N. Latitude[2/]

Other Limits and Requirements Apply -- Read Sections IV. A. and B. NMFS Actions before using this table

	JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
Rockfish Conservation Area[10/] (RCA):						
40°10' - 38° N. lat.	50 fm - 250 fm (line modified to incorporate petrale sole fishing grounds)	60 fm - 250 fm	60 fm - 250 fm **[outside line to 200 fm ASAP]**	**shoreline - 200 fm**	60 fm - ~~250~~ **200** fm	60 fm - ~~250~~ **200** (line modified to incorporate petrale sole fishing grounds)
38° - 34°27' N. lat.	50 fm - 150 fm	60 fm - 150 fm	60 fm - 150 fm **[outside line to 200 fm ASAP]**	**shoreline - 200 fm**	60 fm ~~150~~ **200** fm **(line modified to incorporate petrale sole fishing grounds)**	
South of 34°27' N. lat.	100 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 **[outside line to 200 fm ASAP]**	**shoreline - 200 fm**	100 fm - ~~150~~ **200** fm along the mainland coast; shoreline - ~~150~~ **200** fm around islands **(line modified to incorporate petrale sole fishing grounds)**	

Small footrope is required shoreward of the RCA; both large and small footropes are 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 may not have limited entry bottom trawl gear on board if that vessel also has trawl gear on board that is permitted for use within a RCA, including limited entry midwater trawl gear, regardless of whether the vessel is intending to fish within a RCA on that fishing trip. **See IV.A.(14)(iv) for details.**

	JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
1 **Minor slope rockfish[3/]**						
2 40°10' - 38° N. lat.	1,800 lb/ 2 months					
3 South of 38° N. lat.	30,000 lb/ 2 months					
4 **Splitnose**						
5 40°10' - 38° N. lat.	1,800 lb/ 2 months					
6 South of 38° N. lat.	30,000 lb/ 2 months					
7 **DTS complex**						
8 Sablefish	6,000 lb/ 2 months		~~7,000~~ **10,000** lb/ 2 months	~~7,000~~ **12,000** lb/ 2 months	~~7,000~~ **10,000** lb/ 2 months	~~6,000~~ **10,000** lb/ 2 months
9 Longspine thornyhead	8,000 lb /2 months	9,000 lb/ 2 months	~~9,000~~ **14,000** lb/ 2 months	~~9,000~~ **16,000** lb/ 2 months	~~9,000~~ **14,000** lb/ 2 months	~~7,000~~ **14,000** lb/ 2 months
10 Shortspine thornyhead	2,300 lb/ 2 months	2,400 lb/ 2 months	~~2,400~~ **2,800** lb/ 2 months	~~2,400~~ **3,100** lb/ 2 months	~~2,400~~ **2,800** lb/ 2 months	~~2,200~~ **2,800** lb/ 2 months
11 Dover sole	26,000 lb/ 2 months		~~25,000~~ **31,000** lb/ 2 months	~~25,000~~ **35,000** lb/ 2 months	~~25,000~~ **31,000** lb/ 2 months	~~26,000~~ **31,000** lb/ 2 months
12 **Flatfish**						
13 All other flatfish[4/]	70,000 lb/ 2 months	70,000 lb/ 2 months, no more than ~~10,000~~ **20,000** lb/ 2 months of which may be petrale sole				70,000 lb/ 2 months
14 Petrale sole	No limit					No limit
15 Rex sole	Included in all other flatfish					
16 Arrowtooth flounder	No limit	1,000 lb/ 2 months				No limit
17 **Whiting[5/]**						
18 mid-water trawl	20,000 lb/ trip		Primary Season (mid-water trawl permitted within the RCA)		10,000 lb/ trip	
19 **Other Fish[9/]**	Not limited					
20 **Use of small footrope bottom trawl[7/] or mid-water trawl is required for landing all of the following species:**						
21 **Minor shelf rockfish, widow, and chilipepper rockfish[3/]**	300 lb/ month					
22 **Widow rockfish**						
23 mid-water trawl - permitted within the RCA	CLOSED[6/]					12, 000 lb/ 2 months
24 **Canary rockfish**	100 lb/ month		300 lb/ month		100 lb/ month	
25 **Bocaccio**	CLOSED[6/]					
26 **Cowcod**	CLOSED[6/]					
27 **Minor nearshore rockfish**	300 lb/ month					
28 **Lingcod[8/]**	800 lb/ 2 months		1,000 lb/ 2 months		800 lb/ 2 months	

1/ Gear requirements and prohibitions are explained above. See IV. A.(14).

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

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

4/ "Other" flatfish means all flatfish at 50 CFR 660.302 except those in this Table 3 with species specific management measures, including trip limits.

5/ The whiting "per trip" limit in the Eureka area shoreward of 100 fm is 10,000 lb/ trip throughout the year. Outside Eureka area, the 20,000 lb/ trip limit applies. See IV. B.(3).

6/ Closed means that it is prohibited to take and retain, possess, or land the designated species in the time or area indicated. See IV. A.(7).

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

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

9/ 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.

10/ 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 set out at IV. A.(19)(e), that may vary seasonally.

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

Council Motion, N of 40°10'. (4/10/03, 6pm)

Table 5 (North). 2003 Trip Limits for Open Access Gears North of 40°10' N. Latitude[1/]

Other Limits and Requirements Apply -- Read Sections IV. A. and C. NMFS Actions before using this table

		JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
	Rockfish Conservation Area[8/] (RCA):						
	North of 46°16' N. lat.	0 fm - 100 fm					
	46°16' N. lat. - 40°10' N. lat.	27 fm - 100 fm					
1	**Minor slope rockfish[2/]**	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 800 lb, not to exceed 3,200 lb/ 2 months					
4	**Thornyheads**	CLOSED[5/]					
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[3/]**						
10	**Whiting**	300 lb/ month					
11	**Minor shelf rockfish, widow and yellowtail rockfish[2/]**	200 lb/ month					
12	**Canary rockfish**	CLOSED[5/]					
13	**Yelloweye rockfish**	CLOSED[5/]					
14	**Cowcod**	CLOSED[5/]					
15	**Minor nearshore rockfish**	3,000 lb/ 2 months, no more than 900 lb of which may be species other than black or blue rockfish[4/]					
16	**Lingcod[6/]**	CLOSED[5/]		300 lb/ month			CLOSED[5/]
17	**Other Fish[7/]**	Not limited					
18	**PINK SHRIMP EXEMPTED TRAWL** *(not subject to RCAs)*						
19	North	**Effective April 1 - October 31, 2003:** 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.					
20	**PRAWN EXEMPTED TRAWL** *(not subject to RCAs)*						
21	North	Groundfish 300 lb/trip. Limits and closures 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 the overall groundfish "per trip" limit may not be multiplied by the number of days of the trip.					
22	**SALMON TROLL**						
23	North	Salmon trollers may retain and land up to 1lb 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. All other groundfish species are subject to the open access limits, seasons and RCA restrictions listed in the table above.					

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

2/ 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.

3/ "Other flatfish" means all flatfish at 50 CFR 660.302 except those in this Table 5 with species specific management measures, including trip limits.

4/ 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 percent by weight of all fish on board, whichever is greater, per vessel, per fishing trip.

5/ Closed means that it is prohibited to take and retain, possess, or land the designated species in the time or area indicated. See IV. A.(7).

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

7/ 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.

8/ 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 set out at IV. A.(19)(e), that may vary seasonally.

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

STATUS OF THE GROUNDFISH ESSENTIAL FISH HABITAT ENVIRONMENTAL IMPACT STATEMENT

Situation: The Council has been briefed on the NMFS decision to develop a Supplemental Environmental Impact Statement (SEIS) that will analyze alternatives for designating essential fish habitat (EFH) and minimizing the adverse effects of fishing on EFH. The NMFS project manager for the EFH SEIS will brief a joint session of the Scientific and Statistical Committee, Habitat Committee, Groundfish Advisory Subpanel, and Groundfish Management Team on Monday, April 7 regarding the status of the project and the results of the Ad Hoc Groundfish Habitat Technical Review Committee workshop held in Seattle, Washington on February 19-20, 2003. He will also provide an abbreviated overview under this agenda item.

Council Task:

1. Discuss and provide guidance to NMFS on further development of the Groundfish EFH SEIS.

Reference Materials:

1. Preliminary Recommendations of the Ad Hoc Groundfish Habitat Technical Review Committee (Exhibit E.9, Attachment 1).

Agenda Order:

a. Agendum Overview — Kit Dahl
b. NMFS Report — Steve Copps
c. Reports and Comments of Advisory Bodies
d. Public Comment
e. Council Discussion

PFMC
03/21/03

Preliminary Recommendations of the ad hoc Groundfish Habitat Technical Review Committee

1. The committee unanimously endorses the bayesian approach to modeling EFH/HAPC and adverse impacts but notes that a reasonable degree of caution is prudent at this point prior to the models being made final. Conclusive recommendations for utilizing the models as the foundation for policy decisions will be made after the committee reviews the final product.

2. The committee believes that the modeling process could proceed with the information that is currently available. However, it would be extremely worthwhile to make improvements to the data during the period of time it will take to fully develop and run the model. Specific suggestions are provided below.

3. The committee recommends that the next meeting occur in mid-May to monitor progress and review preliminary model runs.

Tasks

- Complete risk assessment models (EFH/HAPC designation and adverse impacts).
- Contract for interpretation of literature on fishing gear impacts to develop a "west coast perspective." The interpretation would provide a key input into the risk assessment.
- Groundtruth fishing effort data. Compare observer data and input from fishermen with results of Ecotrust fishing effort model.
- Develop GIS layer of priority non-fishing activities for cumulative effects portion of risk assessment model.
- Develop GIS layer of priority invertebrate distribution by mining survey and other relevant data.
- Overlay benthic habitat GIS with data layer that indicates data quality.
- Complete GIS data layer of baseline regulatory areas that are protective of habitat.
- Build the NOS Habitat Suitability Index into the risk assessment models.
- Complete EFH Appendix database.