Tribal Proposal Regarding 2002 Groundfish Harvests
Sept. 11, 2001

Mr. Chairman:

The tribes are proposing essentially status quo harvest limits for 2002 tribal fisheries. The Makah tribe has additional fisheries proposed in Exhibit C.3.c Supplemental Treaty Indian Harvest Levels.

The Council should adopt the following options for 2002 tribal fisheries:

Black Rockfish - The 2002 tribal harvest guidelines will be set at 20,000 pounds for the management area between the US/Canada border and Cape Alava, and 10,000 pounds for the management area located between Destruction Island and Leadbetter Point. As with the non-treaty regulations, for the management area between Cape Alava and Destruction Island, no tribal harvest restrictions are proposed.

Sablefish - The 2002 tribal set aside for sablefish will be set at 10 percent of the Monterey through Vancouver area OY.

Thornyhead rockfish - Tribal fisheries will be restricted to a 300 pound per trip limit for all fisheries. This trip limit will be for shortspine and longspine thornyheads combined.

Lingcod - Tribal fisheries will be restricted to a 300 pound per trip limit for all fisheries.

Canary rockfish - Tribal fisheries will be restricted to a 300 pound per trip limit for all fisheries.

Other rockfish species - The 2002 tribal longline restrictions regarding the landing of other rockfish species will operate under trip and cumulative limits. For other rockfish, tribal fisheries will operate under the same trip limits as the 2001 tribal fishery was structured, (except as indicated in Exhibit C.3.c Supplemental Treaty Indian Harvest Levels proposed by the Makah tribe). Because of the relatively small expected catches of the Treaty fisheries, the trip limits established at the beginning of the year will not be adjusted downward, nor will time restrictions be imposed, unless the harvest guidelines are achieved or unless in-season catch statistics demonstrate that the tribes have taken ½ of the harvest in the tribal area.

Pacific Whiting – For tribal Pacific whiting fisheries, I recommend that the Council adopt a tribal set aside of 27,500 mt (based on the ABC of 238,000 mt). However, the tribal set aside could change if a different OY is finally adopted.

HABITAT STEERING GROUP COMMENTS ON GROUNDFISH FISHERY MANAGEMENT PLAN ENVIRONMENTAL IMPACT STATEMENT

The Habitat Steering Group (HSG) received a briefing on the Groundfish fishery management plan (FMP) Environmental Impact Statement (EIS) from Mr. Jim Glock, National Marine Fisheries Service (NMFS). The HSG would like to commend staff for drafting the Scoping Summary Report which we believe provides a clear description of the purpose of the EIS, the scoping process itself, and the issues which were identified during the process.

It is our understanding that, at a minimum, the EIS must address essential fish habitat issues which could include the development of Habitat Areas of Particular Concern (HAPCs), marine reserves, and proposals to address fishing gear impacts on habitat. The HSG would like to reiterate its support for these habitat protection initiatives and would like to participate in their development. The HSG understands the Council may appoint a committee made up of advisory group members which would review and select the alternatives to be included in the draft EIS. If this is the case, the HSG requests representation on that committee.

The HSG also requests that Council staff provide an all-inclusive list of proposed alternatives for the EIS for our review and consideration.

PFMC
09/12/01

Exhibit C.11.b
Supplemental GAP Report
September 2001

GROUNDFISH ADVISORY SUBPANEL STATEMENT ON GROUNDFISH FULL RETENTION MEASURES

The Groundfish Advisory Subpanel (GAP) received a report from Mr. Brian Culver on behalf of the Ad Hoc Full Retention Committee, detailing the results and recommendations of the committee's first meeting.

The GAP agrees with the ad hoc committee recommendation that full retention continue to be given a priority in Council workload. The GAP also echoes the committee's observation that it is premature to develop full retention measures immediately, but rather that the Council should wait until after the results of the ongoing exempted fishing permits which involve full-retention measures are available. This will give the Council better guidance on how to structure a pilot full retention program.

The GAP continues to endorse the concept of full retention and recommends the ad hoc committee continue its work.

PFMC
09/13/01

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., BLDG. 1
BIN C15700
Seattle, Washington 98115-0070

Exhibit C.1
Attachment 1
September 2001

AUG 2 2001

Mr. James Lone
Pacific Fishery Management Council
7700 NE Ambassador Place
Portland, OR 97220

Dear Jim:

I am writing to inform you that I have approved Amendment 14 to the Pacific Coast Groundfish Fishery Management Plan (FMP). As you know, Amendment 14 creates a permit stacking program for limited entry, sablefish endorsement holders in the Pacific coast groundfish fishery and increases the duration of the fishery. NMFS expects that Amendment 14 will significantly increase safety in the fishery, allow individual fishery participants to more fully use their existing vessel capacity, and reduce overall capacity in the fixed gear fishery.

A proposed rule to implement Amendment 14 was published on June 8, 2001 (66 FR 30869), and we expect to have the final rule effective by August 1, 2001. The final rule announces the 2001 primary sablefish season, which begins on August 15, 2001, and ends on October 31, 2001. For 2002 and beyond, NMFS will propose further regulatory changes to implement Amendment 14. These additional changes include: scheduling the primary sablefish season for April 1 through October 31; persons, partnerships, and corporations owning sablefish endorsed limited entry permits would be required to document the ownership interests in those permits; only vessels that meet historic frozen sablefish landing requirements would be allowed to process sablefish at sea; persons who own sablefish endorsed limited entry permits who did not own sablefish endorsed permits on November 1, 2000, would be required to be on board their vessels while those vessels are participating in the primary sablefish fishery; vessels landing sablefish against their primary season cumulative limits would be required to report in to enforcement officers before making any sablefish landings; participants would be charged a fee to cover the management of this program.

Amendment 14 introduces a complex group of new management provisions to the limited entry, fixed gear sablefish fishery. In 2004-2005, NMFS plans to review the effects of Amendment 14 on sablefish management and the sablefish fishery. In particular, the agency wishes to evaluate how Amendment 14 has affected vessel participation in the primary sablefish and other limited entry fixed gear fisheries, the effect of the owner-on-board requirement, and the effect of the provision that only individual humans may own permits.

NMFS appreciates the Council's efforts in improving vessel safety in this fishery. We also look forward to working with the Council on future capacity reduction programs.

Sincerely,

for Donna Darm
Acting Regional Administrator

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic an Atmospheric Administration
National Marine Fisheries Service
Sustainable Fisheries Division
7600 Sand Point Way N.E., Building. 1
Seattle, WA 98115-0070

DATE: September 7, 2001

TO: DISTRIBUTION

FROM: F/NWR2 - Becky Renko

SUBJECT: PRELIMINARY Report #7 -- 2001 Pacific Whiting Fishery

This report consolidates preliminary state, federal, and tribal data for the 2001 Pacific whiting fishery off Washington, Oregon, and California. The catcher/processor and mothership fisheries started on May 15. The shore-based season in most of the Eureka area (between 42°- 40°30' N. lat.) began on April 1, the fishery south of 40° 30' N. lat. opened April 15, and the primary shore-based fishery north of 42° N. lat. began on June 15. The primary season for the shore-based sector ended at noon August 21 and per-trip limits have been reimposed.

On August 31, 2001 NMFS received notification from the tribal fishery participants indicating that 10,000 metric tons (mt) of the tribal allocation was not expected to be harvested before the end of the fishing year. As a result, NMFS intends on reapportioning the 10,000 mt of surplus whiting from the tribal allocation to the catcher/processor, mothership, and shore-based sectors. This reapportionment will be disbursed in the same proportions as each sector's allotted portion of the commercial OY.

	Allocation		•Catch (mt)	Thru (date)	Status	Percent of allocation taken
	Percentages	Metric Tons				
California (south of 42 N lat.)	(5% shore alloc'n, included in WOC shore allocation)	3,421	2,305	8/21	CA season started 4/1; 5% alloc'n, per-trip limits resume 1200 8/21	
Oregon	--	NA	50,412	8/21	started 0001 hrs 6/15, per-trip limits resume 1200 8/21	
Washington	--	NA	14,757	8/21	started 0001 hrs 6/15, per-trip limits resume 1200 8/21	
WOC shoreside	42% commercial OY	**68,418**	**67,474**			98.6%
Mothership (n. of 42 N. lat.)	24% commercial OY	**39,096**	**35,823**	7/15	started 0001 hrs 5/15	91.6%
Catcher/processor (n. of 42 N. lat.)	34% commercial OY	**55,386**	**35,827**	9/6	started 0001 hrs 5/15	64.7%
Total nontribal	commercial OY (86% OY)	162,900	139,124		--	85.4%
Tribal (Makah)	14% OY	**27,500**	**0**	9/6		0.0%
Total	OY=optimum yield	190,400	139,124		--	73.1%

• Catch includes discards from at-sea processors; weigh-backs from shore-based catcher vessels; and small amounts landed under the 20,000-pound trip limit between the seasons. The data for at-sea processing (catcher/processors and motherships) are preliminary and are based on reports from NMFS-certified observers. Data for shoreside processors also are preliminary and are provided by each State to NMFS for the purpose of monitoring the fishery. Preliminary data for the Makah fishery will be from a NMFS-trained observer. All weights are round weight (the weight of the whole fish before processing) or round-weight equivalents. One metric ton is 2,204.6 pounds.

Exhibit C.2.b
PSMFC Letter
September 2001

PACIFIC STATES MARINE FISHERIES COMMISSION

45 S.E. 82ND DRIVE, SUITE 100, GLADSTONE, OREGON 97027-2522
PHONE (503) 650-5400 FAX (503) 650-5426

RECEIVED
JUL 27 2001
PFMC

July 23, 2001

Dr. William Hogarth
National Marine Fisheries Service
1335 East-West Highway
Silver Springs, MD 20910

Dear Bill

Thank you for the meeting in San Francisco. As a follow-up we ask for something in writing to insure we all understand where we go from here. What we got back in an email from Maury Osborne is not the direction that I heard you provide at that meeting. As I recall, you indicated that you had set aside $50,000 and that you would direct that it be used on the West Coast to develop an in-season recreational fisheries data program. We would be a test case. We even talked about having the meetings on the West Coast bringing people from D.C. We talked about the fact that we can now provide in-season information to the council from Washington and Oregon but we need help in California. What we got back is a proposed meeting, which seems to be designed to show how MRFSS can work for you especially if you don't use quotas. I do not believe that the proposed meeting as described by Maury is what we need. Lets focus on the problem of providing timely and accurate recreational data for the managers. The council and the states have spent years-discussing management options and we all know the pros and cons.

We all know that the MRFSS was not designed to provide in season capabilities. That's what we need, so let's figure out how to get there.
I believe my understanding of what we discussed is correct and I hope we can move forward very soon. If something has changed, we would like and opportunity to talk to you.

Once again thank you for listening and I look forward to a complete understanding of how we will work together on solving this important problem.

Randy Fisher

Briefing Paper

Exhibit C.2
Attachment 1
September 2001

PACIFIC FISHERY MANAGEMENT COUNCIL

CHAIRMAN
Jim Lone

EXECUTIVE DIRECTOR
Donald O. McIsaac

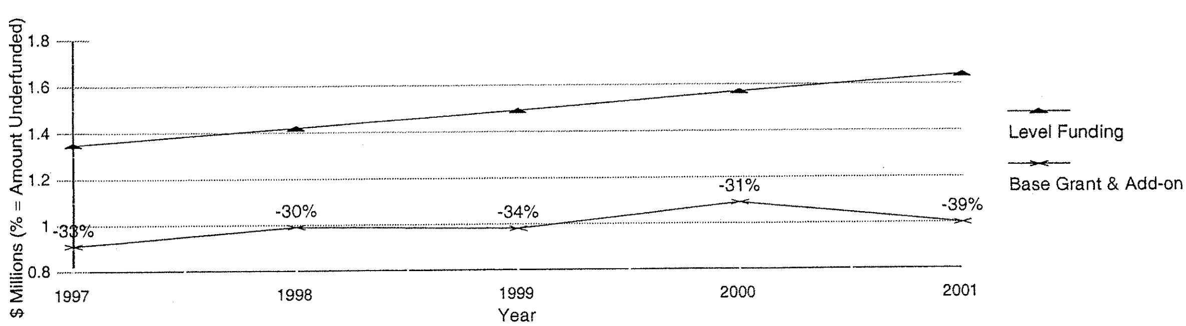
Funding Needs for RecFIN/MRFSS

What is needed and why?

1. **RESTORATION OF YEAR-ROUND FIELD SAMPLING**
2. **IN-SEASON AND MORE ACCURATE CATCH ESTIMATES**
3. **NEW APPROACHES TAILORED TO THE WEST COAST**

1. RecFIN NEEDS $240K TO RESTORE YEAR-ROUND SAMPLING

There is a significant and growing gap between level (inflation adjusted) and actual funding for the RecFIN/MRFSS project



- ♦ The funding gap has substantially deteriorated the RecFIN program's ability to gather field data to support the MRFSS. A list of past program cutbacks is attached.
- ♦ The least harmful cutback to keep the program within its 2001 budget appears to be complete discontinuation of November-December field sampling.
- ♦ RecFIN needs $240K added to its base grant in order to maintain year-round field sampling and its ability to make estimates of total annual catch and effort.

Briefing Paper

2. INSEASON & MORE ACCURATE ESTIMATES

- ♦ Current sampling levels provide estimates usable for management only when data for an entire year is aggregated.

- ♦ Complete annual data lags the management decisions by one to two years (e.g. for 2002, management measures will be set with partial information on the effects of the regulatory changes implemented for 2001).

- ♦ Recreationally targeted species are now being declared overfished
  - Rebuilding and associated recreational allocations have resulted in a dramatic increase in the need for inseason catch estimates.
  - While statisticians advise not using current inseason estimates, the estimates indicate significant violation of the sport allocation for some species will likely occur again in 2001 (see attachment).

- ♦ Rapidly changing regulatory regimes reduce managers' ability to project harvest using past years' data.

- ♦ The commercial fishery is managed inseason. The alternatives to recreational inseason management appear to be untenable; either
  (1) severely restrict recreational fisheries to account for previous year's overages, or
  (2) distribute a significant portion of the conservation burden to the commercial sector.

- ♦ Recreational information is needed on a smaller geographic scale for assessment of community level impacts and marine protected area analysis.

Briefing Paper

3. NEW APPROACHES ARE NEEDED FOR DATA COLLECTION ON THE WEST COAST

- The level of accuracy for estimates of catch of West Coast species appears to be less than what is needed for management of the fisheries and public confidence in the data is very low.

- Progress is being made as new methods are developed. In particular, the charter vessel survey pilot study for California and the potential for using state electronic license databases as a sampling frame hold promise for increasing public confidence in estimates.

- A review of current methods is urgently needed in order to determine whether there are better ways to meet the information needs for Federal and state management of West Coast species. This review should include identification of the optimal design for generating inseason catch estimates. In particular, non-MRFSS alternatives for generating inseason estimates for the groundfish fishery need to be evaluated.

- $50K is needed to fund committee work to design an adequate program capable of generating inseason estimates and meeting other data needs.

Briefing Paper

Attachment

Adjustments through 2000:

Program: reduced seasonal help, eliminated funds for sampling design effort
California: put samplers on part time, eliminated employee benefits, reduced sample size by 10% compared to 1996
Oregon: laid off two samplers for two months a year, state absorbed some travel expenses, reduced sample size by 5% compared to 1996
Washington: moved experienced samplers out of MRFSS sampling positions, cut new data entry person, reduced sample size by 30% compared to 1996
New Budget Impacts: in addition to normal cost increases, California now requires overtime be paid on a daily basis (1.5*wage for hours in excess of 8 hrs; and 2* wage for hours in excess of 12 hrs)

Recent Data Problems:

In 2000:

- The preliminary estimate for **bocaccio** catch for Jan-Apr was 74 mt (38 mt south of Mendocino).
- The annual recreational allocation was 45 mt (south of Mendocino).
- Industry concern over the estimate lead to the identification of problems in the sample.
- Later, the Jan-Apr estimate was revised downward to 52 mt.
- The CDFG Jan-Apr estimate based on logbook information was 40 mt.
- The MRFSS estimated catch through the end of the year was 122 mt.

In 2001:

- The preliminary estimate for the **canary rockfish** catch for Jan-Feb is 16 mt.
- The annual recreational allocation is 44 mt (coastwide).
- Based on the pattern for last year the projected catch for 2001 would be about 80 mt, almost twice the allocation.
- Given last year's experience, the Council is reluctant to adjust based on the preliminary estimate.
- The **bocaccio** catch also appears to be high for Jan-Feb, 2001.

MAKAH TRIBAL COUNCIL

P.O. BOX 115 • NEAH BAY, WA 98357 • 360-645-2201

IN REPLY REFER TO:

MEMORANDUM

TO: Donna Darm
Acting Northwest Regional Administrator
National Marine Fisheries Service

FROM: Dave Sones, Director of Natural Resources
Makah Tribe

RE: Treaty Groundfish Fisheries for 2002

DATE: September 7, 2001

Pursuant to 50 C.F.R. § 660.324(d), the Makah Indian Tribe requests that provision be made for harvest of groundfish by Pacific coast treaty Indian tribes in 2002 as follows:

1. **Sablefish.** The Indian treaty allocation of sablefish should continue to be 10% of the U.S. harvest guideline.

2. **Pacific Whiting.**

   a. **Whiting Allocation.** If Makah is the only tribe seeking an allocation of Pacific whiting, the Indian treaty allocation of Pacific whiting should continue to be governed by Makah's allocation proposal, which was approved by the Court in *United States v. Washington*, Subproceeding 96-2. If other tribes seek an allocation of Pacific whiting, the allocation should accommodate the needs of each tribe, consistent with treaty allocation principles.

   b. **Incidental Catch.** Except for prohibited species, all fish incidentally harvested by Makah tribal members in the Makah treaty fishery for Pacific whiting should continue, to the extent required by Tribal law, to be forfeited to the Makah Tribe. The Makah Indian Tribe and the Northwest Regional Office of the National Marine Fisheries Service should continue to implement appropriate mechanisms to account for all fish sold and all fish discarded or forfeited to the Tribe under this provision.

3. **Black Rockfish.** Treaty harvests of black rockfish should continue to be subject to the regulations at 50 C.F.R. § 660.324(j).

4. **Slope Rockfish.**

   a. **Incidental Harvests During Directed, Fully Competitive Fisheries for Halibut and Sablefish.** To provide for full retention and full utilization during directed, fully competitive treaty fisheries for halibut and sablefish, there should be no limit on retention of incidental harvests of slope rockfish by treaty fishermen.

b. **Other Harvests.** Except as provided in a, treaty fishermen should be subject to trip limits on their retention of slope rockfish, which will be determined on the basis of final harvest levels for these species, expected effort, and other relevant factors. The Tribe should be permitted to require overages to be forfeited to the Tribe.

5. **Shelf Rockfish.**

a. **Incidental Harvests During Directed, Fully Competitive Fisheries for Halibut and Sablefish.** To provide for full retention and full utilization during directed, fully competitive treaty fisheries for halibut and sablefish, there should be no limit on retention of incidental harvests of shelf rockfish by treaty fishermen.

b. **Other Harvests.** Except as provided in a, treaty fishermen should be subject to trip limits on their retention of shelf rockfish, which will be determined on the basis of final harvest levels for these species, expected effort, and other relevant factors. The Tribe should be permitted to require overages to be forfeited to the Tribe.

6. **Nearshore Rockfish.**

a. **Incidental Harvests During Directed, Fully Competitive Fisheries for Halibut and Sablefish.** To provide for full retention and full utilization during directed, fully competitive treaty fisheries for halibut and sablefish, there should be no limit on retention of incidental harvests of nearshore rockfish by treaty fishermen.

b. **Other Harvests.** Except as provided in a, treaty fishermen should be subject to trip limits on their retention of nearshore rockfish, which will be determined on the basis of final harvest levels for these species, expected effort, and other relevant factors. The Tribe should be permitted to require overages to be forfeited to the Tribe.

7. **Yellowtail and Other Mid-water Rockfish.** To accommodate an expected effort of 3 to 4 vessels, the Tribe proposes the following regulation of harvests by treaty fishermen of these species:

a. **Aggregate Trip Limit.** Treaty fishermen should be subject to an aggregate trip limit for these species of 30,000 pounds per vessel per two-month period. Treaty fishermen should not be permitted to carryover portions of the trip limit that are not used in any two-month period.

b. **Tribal Adjustment of Aggregate Trip Limit.** The Tribe should be able to adjust the aggregate trip limit to minimize incidental catches of canary rockfish and widow rockfish, provided the average aggregate trip limit per vessel per two-month period does not exceed 30,000 pounds. For example, if incidental catches were low during the initial two-month period, the Tribe could raise the aggregate trip limit to 45,000 pounds for that period and reduce it to 15,000 pounds in a later two-month period.

c. **Trip Limits for Canary Rockfish and Widow Rockfish.** Treaty fishermen should be subject to a trip limit for canary rockfish of 300 pounds per trip, and a trip limit for widow rockfish that is the same as the limited entry trip limit for widow rockfish.

d. **In Season Adjustments.** In the event treaty fishing effort exceeds the anticipated 3 to 4 vessels, these trip limits should be adjusted in season.

8. **Lingcod.** Treaty fishermen should be subject to a harvest limit of 300 pounds per day per vessel and a limit of 900 pounds per week per vessel of lingcod. This proposal is designed to prevent

treaty fishermen from targeting lingcod, but to permit them to retain incidental harvests, including harvests on multiple-day trips.

9. **Bottom Trawl.** To accommodate a limited evaluation fishery using bottom trawl gear, with up to 3 vessels, the Tribe proposes the following regulations:

   a. **Sablefish Allocation.** The Tribe should be permitted to allocate a portion of its individual tribal share of the overall treaty allocation of sablefish to the Tribe's bottom trawl evaluation fishery. Once Makah treaty fishermen using bottom trawl gear have harvested the sablefish allocated to the fishery, the Tribe's treaty bottom trawl fishery should close.

   b. **Trip Limits for Targeted Species.** Treaty fishermen using bottom trawl gear should be subject to the trip limits applicable to the limited entry fishery for Pacific cod, Petrale sole, English sole, Rex sole, Arrowtooth flounder, and other flatfish.

   c. **Gear.** The Tribe will require that treaty fishermen use Council-approved bottom trawl gear.

10. **Observer Program.** The Tribe will develop and implement an observer program to monitor and enforce the limits proposed above.

Advocates for Wild, Healthy Oceans

Seattle Field Office
9705 SW 188th St.
Vashon, WA 98070

206.463.9345 Telephone
206.463.9345 Facsimile
www.oceanconservancy.org

Formerly the Center for
Marine Conservation

Exhibit C.3.e
Public Comment
September 2001

RECEIVED
AUG 2 7 2001
PFMC

Mark Powell
Pacific Fish Conservation Manager
August 22, 2001

The Ocean Conservancy

Dr. Don McIsaac
Executive Director, Pacific Fishery Management Council
7700 NE Ambassador Place
Portland, OR 97220-1384

Re: Pacific groundfish bycatch and discard assessment

The Ocean Conservancy (formerly the Center for Marine Conservation) respectfully submits these comments on the issue of discarded bycatch of canary rockfish and other species of Pacific groundfish, especially the "overfished" species that are under rebuilding. The Ocean Conservancy is a nonprofit organization with more than 120,000 members who are committed to protecting ocean environments and conserving the global abundance and diversity of marine life, including over 20,000 members on the west coast. We have been actively involved in this issue for several years through participation on the Groundfish Advisory Subpanel and the Habitat Steering Group and we have commented previously on bycatch as well as groundfish management issues.

Request

The Pacific Council and NMFS should immediately begin estimating discard using scientific survey data or on the co-occurrence of groundfish species. This type of approach is necessary because existing discard estimates are based on outdated information and likely to produce highly inaccurate results. Current discard estimates are flawed because they only relate discards to landings of the same species. The problem is demonstrated by the following example: **if fishers discarded all canary rockfish that were caught, the current PFMC approach would estimate zero discard because there would be zero landings of canary rockfish**.

Summary

Pacific groundfish discard assumptions are now so out of date that they can produce results that make no sense. For example, **if fishers discard all of the canary rockfish they catch, discard would be 100% but the PFMC would assume no canary rockfish were discarded because none were landed**. This problem arises because canary rockfish discard is assumed to be about 1 canary rockfish for every 5 canary rockfish landed, so as landings decline the assumed discard declines. At this extreme, the PFMC discard assumptions are of little value for fisheries management. Unfortunately, this extreme may be all too real. As the Groundfish

Management Team (GMT) has pointed out on more than one occasion, incentives exist that encourage fishers to discard even legal catches of canary rockfish.[1]

The lack of accurate discard information has become a critical problem for Pacific groundfish fisheries. The Pacific Fishery Management Council's advisory panels have stated clearly that current discard estimates lack credibility, and unmeasured discard threatens the success of rebuilding plans for overfished species (see discussion below). The observer program now under development will be a partial solution at best because of sparse coverage of the fleet, a dependence on uncertain government funding, and the 2-3 years required to begin producing useful results.

Improved discard information is needed immediately to evaluate new groundfish management strategies that were implemented with little opportunity for scientific review. If these fishing strategies fail, then greatly increasing discards of depleted species is the likely result, and mortality that exceeds mortality targets. The Pacific Council's advisory panels have expressed concern about the potential for increased discarding of groundfish under current regulations (see discussion below).

There is a data source available that can be used immediately to estimate bycatch systematically and objectively for most species of Pacific groundfish. The trawl surveys done by NMFS provide co-occurrence data for nearly all groundfish caught in commercial fisheries, and this can be used for bycatch estimates. To estimate bycatch of depleted species during fisheries for a selected species that is more abundant, hauls with successful catch of the selected species can be identified and bycatch of other species can be estimated as a fraction of the "target" species. A sensitivity analysis can be used to fine-tune the choice of hauls to use in bycatch estimates. A preliminary analysis suggests that this approach can produce useful and reasonable estimates of bycatch of depleted species during fisheries that target more abundant species.

The issue of extrapolation in making discard estimates

The issue of "extrapolation" in making discard estimates requires serious consideration. Some have objected to the use of scientific survey data because it requires extrapolation from different gear types and different fishing strategies. However, extrapolation is not unique to the use of scientific survey data. Some type of extrapolation is necessary to make discard estimates for Pacific groundfish because there is not 100% observation of fishing activities. Thus, since extrapolation can not be avoided, it is essential to identify which extrapolations are likely to produce acceptable risks and which are likely to produce unacceptable risks.

While the extrapolation necessary to use scientific survey data is a concern, other extrapolations currently used by the PFMC appear more likely to create unacceptable risks. In particular, the assumption that discards are a fixed % of landings of the same species makes a very risky extrapolation because it could lead to serious underestimates of fisheries-caused mortality, as explained below. For species under rebuilding, it is critically important to avoid making large underestimates of fisheries-caused mortality. The need to move beyond discard

[1] Groundfish Management Discussion paper on "full retention" of groundfish species. Exhibit F.9, GMT Report, April 2000 PFMC meeting. Bycatch full retention options. Exhibit F.9, Situation Summary, April 2001 PFMC meeting.

estimates that are only linked to landings of the same species was clearly stated by the the PFMC's Scientific and Statistical Committee (SSC): "the current procedure for estimating discard as a fraction of the total catch of a target species is no longer applicable to today's fishery."[2]

Surprisingly, the most recent examination of discard estimation for Pacific rockfish fails to evaluate whether using a fixed % of landings of the same species is the best way to estimate discards.[3] Instead, it focuses on the narrower question of which % of landings is the most appropriate estimate. Some data were examined which relate discards of one species to landings of other species, but the 8/20/2001 draft of the paper does not discuss the possibility of developing formal discard estimates that are linked to landings of co-occurring species that are still the target of a directed fishery. Instead, this paper apparently concludes that there is no problem with current discard estimates because the catch of depleted species such as canary rockfish are only a few % of the catch of more abundant species such as arrowtooth flounder. Unfortunately, because limits for depleted species such as canary rockfish are so low, even a few % catch of these depleted species can be a problem during fisheries for more abundant species such as arrowtooth flounder.

The PFMC's current discard estimate uses what is probably the most questionable possible extrapolation. The current discard estimate predicts discards of species under strict rebuilding plans based on extrapolation from fishing practices when such strict limits were not in place. Once catch limits have been lowered to promote rebuilding, there is a severe potential penalty for landings that exceed these limits. Fishermen are well aware that excess landings could lead to fishery closures. Thus, there is a strong incentive to avoid landing species with low limits under rebuilding plans. The Groundfish Management Team has made this point quite clearly: "the GMT believes there is a great incentive for fishers not to retain canary rockfish out of fear the optimum yield will be reached early and the fishery closed."[4] Thus, the current discard estimate relies on a highly questionable extrapolation that ignores current incentives and can lead to dramatic underestimates of discards of species under rebuilding.

The current discard estimate also makes other problematic extrapolations because it is based on overages of widow rockfish during both midwater trawling and bottom trawling in the late 1980s. Thus, the current discard estimates rely on extrapolations across species, across decades, across gear types, and across major differences in fishing strategies. Use of other data sources such as logbooks and the Oregon voluntary observer program (EDCP program) also require extrapolations of various types because they use some hauls selected to "represent" the fishing strategy under examination.

The following table illustrates how severe the discard estimation errors would be if current incentives identified by the GMT led fishers to discard more than 16% of canary rockfish landed. The table shows discards (in pounds) and errors (in pounds and %) for varying rates of discarding, from 0% to 100% of total catch. **Note the last two rows in the table. If fishers follow incentives to discard even legal catches of canary rockfish, then dramatically**

[2] Scientific and Statistical Committee statement on preliminary harvest levels and other specifications for 2001. Exhibit G.6.e, Supplemental SSC Report, September 2000 PFMC meeting.
[3] Evaluation of existing Sebastes discard assumptions and possible alternatives. Jim Hastie, 8/20/2001 draft
[4] Bycatch full retention options. Exhibit F.9, Situation Summary, April 2001 PFMC meeting.

increasing discards of canary rockfish would be identified by the PFMC as declining discards of canary rockfish. This error is especially significant because the magnitude of the error is large, and the high level of discards are totally missed by the PFMC discard assessment methods.

Table 1: Example of the errors that would be present in PFMC discard estimates under varying levels of discarding of canary rockfish.

actual discard (% of total catch)	canary catch (lbs)	actual landings (lbs)	actual discard (lbs)	PFMC discard estimate (lbs) (using 16% of landings)	error in discard estimate (lbs)	error in discard estimate (as % of total canary catch)
0	1000	1000	0	160	(160)*	(16%)*
16	1000	840	160	134	26	2.6%
50	1000	500	500	80	420	42%
100	1000	0	1000	0	1000	100%

* errors in brackets are overestimates of discards, all other errors are underestimates of discards

Bycatch estimation using NMFS survey data

A review of co-occurrence ratios to identify likely bycatch problems would provide a badly-needed scientific review of some new fishing strategies that have been implemented by the Pacific Council. At present, there is no discard estimate available for the new fishing strategies implemented to rebuild depleted groundfish species. Thus, the Pacific Council is essentially managing blindly, with no way to evaluate and control overfishing and discards. This point has been made repeatedly by the Council's Groundfish Management Team (GMT) and Scientific and Statistical Committee (SSC). For example, the GMT and SSC both stated in March 2000 that the "continued absence of a comprehensive, total catch monitoring program is a serious defect in the current management program."[5]

One strategy that requires a thorough scientific review is the Pacific Council's reliance on reductions in landing limits to allow depleted species to rebuild. If depleted species are still caught and discarded during fisheries that target other species, then reduced landing limits will not be a successful rebuilding strategy. The best way to provide an immediate scientific review of this and other new fishing strategies is by using co-occurrence ratios to predict likely discard levels.

NMFS survey data must be used carefully to provide useful bycatch estimates, because survey methods differ substantially from commercial fishing operations. One concern is the random choice of survey sites which results in unproductive hauls. To eliminate unproductive hauls, survey hauls should only be used for bycatch estimates if they effectively caught "target" species. Another concern is that gear differences such as mesh size of nets makes some

[5] Groundfish Management Team statement on bycatch and incidental catch of rockfish. GMT Report G.5.(1). March 2000 PFMC meeting. Scientific and Statistical Committee comments on bycatch mortality for rockfish. Supplemental SSC Report G.5. March 2000 PFMC meeting.

extrapolation across gear types necessary in predicting bycatch during commercial fishing. The significance of these and other factors is discussed above and compared to current discard estimation procedures.

Objections to the use of scientific survey data to estimate discards were more valid in years past when discarded bycatch resulted from trip limit overages or other factors unique to fishing operations. Now, however, bycatch of depleted species results from the unavoidable presence of species with low catch limits in habitats where more abundant species are legally pursued. This type of bycatch is strictly a result of the co-occurrence of target species together with species that fishermen are trying to avoid. The NMFS survey data is the best available estimate of co-occurrence, and thus can provide a valid and useful estimate of the likelihood of bycatch in today's Pacific groundfish fisheries.

Examples of bycatch estimation using NMFS survey data

Catch ratios were compared for some species commonly caught together, to provide some sample estimates of bycatch rates using National Marine Fisheries Service (NMFS) survey data. This example is only designed to illustrate the approach, and other criteria and assumptions could be used. The goal of these examples is to demonstrate that it is possible to estimate bycatch of depleted species relative to landings of other, more abundant species that are still the target of fisheries.

The first example uses National Marine Fisheries Service (NMFS) survey data to estimate bycatch of canary rockfish during fishing for arrowtooth flounder. For each year of survey data, two selection criteria were used. First, the best hauls of arrowtooth flounder were selected as most likely to represent fishing that targets arrowtooth flounder. Second, hauls were eliminated from the analysis if canary catch exceeded arrowtooth catch, to represent avoidance of high canary bycatch. From these data, a canary "bycatch" ratio was obtained by dividing canary catch by arrowtooth catch. The data are reported for the top 25 arrowtooth hauls and the top 100 arrowtooth hauls. Bycatch estimates are provided for each survey year treated individually, and for the mean of all survey years.

Table 2a: Estimate of canary rockfish bycatch as % of catch of arrowtooth flounder.

	1977	1980	1983	1986	1989	1992	1995	1998	mean
top 25 hauls for arrowtooth *	3.9	2.6	2.4	2.4	2.8	7.0	0.4	6.9	3.5
top 100*	4.6	2.9	4.3	2.5	3.1	6.2	1.1	5.7	3.8

* hauls excluded from analysis if canary catch exceeded arrowtooth catch

The second example uses NMFS survey data to estimate bycatch of bocaccio (rockfish) in the fishery for chilipepper (rockfish).

Table 2b: Estimate of bocaccio bycatch as % of catch of chilipepper.

	1977	1980	1983	1986	1989	1992	1995	1998	mean
top 25 hauls for chilipepper *	1.4	19	8.1	8.3	2.0	0.9	1.8	0.5	5.2
top 100*	3.5	19	8.0	8.5	2.9	0.9	1.9	0.7	5.6

* hauls excluded from analysis if bocaccio catch exceeded chilipepper catch

The third example uses NMFS survey data to estimate bycatch of bocaccio during fishing that targets yellowtail rockfish.

Table 2c: Estimate of bocaccio bycatch as % of catch of yellowtail rockfish.

	1977	1980	1983	1986	1989	1992	1995	1998	mean
top 25 hauls for yellowtail*	4.1	3.5	2.0	2.6	1.6	1.2	1.0	0.3	2.1
top 100*	4.4	3.9	2.4	2.3	1.6	1.7	1.0	0.4	2.2

* hauls excluded from analysis if bocaccio catch exceeded yellowtail catch

These examples illustrate the utility of the NMFS survey data; it can be used to estimate bycatch of any species during fishing activities that target any other species. The draft rebuilding plans for bocaccio and canary rockfish state that their goal is to eliminate targeting of these depleted species. Under this management approach, bycatch must be recognized as resulting from fishing activities that target other species, and bycatch estimates should link bycatch to the level of catch of the target species. This would be a substantial improvement over existing estimates which "are no longer applicable to today's fishery" according to the Council's SSC, because they continue to link bycatch only to landed catch of the same species. This outdated approach fails to acknowledge changes in the fishery that have occurred since the 1980s when the study was done which forms the basis for current bycatch estimates.

Evidence of the need for improved discard estimates

Current discard estimates no longer applicable to today's fishery

The Pacific Council's technical advisory panels have stated clearly that current discard estimates lack credibility. The first problem is that discard for most species of Pacific groundfish is assumed to be a fixed % of the landed catch of the same species. This assumption makes little sense for species with very low limits that are only caught incidentally during fishing that targets other species. This point has been made by the Pacific Council's Scientific and Statistical Committee (SSC). For example, in September 2000 the SSC stated that: "the current procedure for estimating discard as a fraction of the total catch of a target species is no longer applicable to today's fishery."[6]

[6] Scientific and Statistical Committee statement on preliminary harvest levels and other specifications for 2001. Exhibit G.6.e, Supplemental SSC Report, September 2000 PFMC meeting.

Canary rockfish discard provides a good illustration of this discard problem. Canary discard is estimated as 16% of the landed catch of canary, despite extremely low landing limits that discourage targeting of canary. Under these circumstances, the landed catch or canary may be reached early in a fishing trip and all further catch of canary would be discarded. The draft canary rockfish rebuilding plan describes which fishing activities are expected to result in mortality of canary rockfish:

> "The proposed rebuilding program is intended to rebuild the stock while allowing minimal fishing impacts from recreational fisheries, commercial fisheries targeting non-groundfish species, and commercial species targeting groundfish in areas and with methods that are expected to have little impact on the canary stock."[7]

The rebuilding plan clearly acknowledges that canary rockfish mortality is expected to occur in fisheries targeting species other than canary rockfish. Indeed, the rebuilding plan indicates that targeting of canary rockfish should not occur: "In the short term, all groundfish and non-groundfish fishers will need to avoid canary rockfish as much as possible in order to keep catch to the target level." There is no justification for estimating canary discard as 16% of landed catch of canary. Instead, estimates of total mortality for canary rockfish should be based on canary discard rates in the other fisheries expected to catch canary rockfish and total effort in these other fisheries.

Discard incentives undermine mortality estimates and rebuilding

A further difficulty is created by the possibility that even legal catches of depleted species of groundfish may now be discarded to avoid exceeding very low catch limits now in place. The SSC has addressed this problem in a statement from September 2000: "fishers may become reluctant to land any catch of rockfish stocks with OY levels of just a few 100 tons to ensure landings do not exceed OY."[8] In addition, the GMT has addressed this problem more than once. For example, the GMT statement in April 2000 says that: "the small harvest targets required by some of the current rockfish rebuilding plans may be creating incentives for fishers not to land even their legal catches."[9] The GMT reiterated this point in April 2001:

> "With respect to canary rockfish in particular, the GMT believes there is a great incentive for fishers not to retain canary rockfish out of fear the optimum yield will be reached early and the fishery closed."[10]

The result of these problems is that total mortality in the groundfish fisheries can not be estimated. The GMT addressed this problem in March 2000, and again in April 2001:

> "The Council directed the GMT to provide an evaluation or estimation of discard rates that might be applied during 2000 in order to account for total fishing mortality of some rockfish categories. The GMT would like to provide such an analysis but must again point out we lack the tools to estimate bycatch/discard. Therefore, the

[7] Initial Rebuilding Plan for West Coast Canary Rockfish, *Sebastes pinniger*. Pacific Fishery Management Council. April 2001.
[8] Scientific and Statistical Committee statement on preliminary harvest levels and other specifications for 2001. Exhibit G.6.e, Supplemental SSC Report, September 2000 PFMC meeting.
[9] Groundfish Management Discussion paper on "full retention" of groundfish species. Exhibit F.9, GMT Report, April 2000 PFMC meeting.
[10] Bycatch full retention options. Exhibit F.9, Situation Summary, April 2001 PFMC meeting.

GMT cannot advise the Council whether the management measures implemented for 2000 will achieve the desired reduction in total mortality. This is especially true with respect to catches of rockfish..."[11]

"The GMT is growing more and more concerned about the inability to know whether we are achieving the harvest levels required by the rebuilding plans."[12]

How serious is the problem of poor discard estimates? Both the GMT and the SSC have referred to this problem as a "serious defect." The GMT said:

"The rockfish discard information we are using today applies only to trawl gear and is based on information collected in the 1980s. Fishermen and others have already questioned the applicability of this information to current fisheries, and the substantial management changes for 2000 make its continued use even more suspect...The continued absence of a comprehensive, total catch monitoring program is a serious defect in the current management program."[13]

The final statement in this critique was endorsed by the SSC:

"The SSC endorses the GMT statement that "...continued absence of a comprehensive, total catch monitoring program is a serious defect in the current management program."[14]

These comments from the Pacific Council's advisory panels clearly document the lack of information on total fisheries-caused mortality of Pacific groundfish. Without this information, it is not possible to evaluate whether rebuilding targets are being met, and whether overfishing of depleted species has been stopped.

Existing scientific studies do not support current discard estimates

Current discard estimates are in conflict with existing scientific studies of discard in Pacific groundfish fisheries. This problem has arisen because discard estimates have not been updated to reflect the known problem of increased discard that results from decreased period limits. The two scientific studies that are often cited as the basis for discard estimates provide a clear demonstration of this problem.

The bycatch and discard mortality assumed for canary and some other rockfish species is 16% of the landed catch. This assumed discard level is apparently derived from the "Pikitch study," which was published in 1988 (using data from 1985-1987) .[15] The 16% discard assumption is apparently based on the finding that fishermen caught 116 percent of their harvest limits of widow rockfish during the study period and thus 16% of the catch was discarded. However, the Pikitch study identifies a complicating factor; discard rates were higher when

[11] Groundfish Management Team statement on bycatch and incidental catch of rockfish. GMT Report G.5.(1). March 2000 PFMC meeting.
[12] Bycatch full retention options. Exhibit F.9, Situation Summary, April 2001 PFMC meeting.
[13] Groundfish Management Team statement on bycatch and incidental catch of rockfish. GMT Report G.5.(1). March 2000 PFMC meeting.
[14] Scientific and Statistical Committee comments on bycatch mortality for rockfish. Supplemental SSC Report G.5. March 2000 PFMC meeting.
[15] Pikitch, Ellen K., Daniel L. Erickson, and John R. Wallace. An Evaluation of the Effectiveness of Trip Limits as a Management Tool. Nov. 1988. NMFS Northwest and Alaska Fisheries Center Processed Report 88-27.

relatively small trip limits were in place. Reductions in trip limits since 1988 seriously undermine the applicability of the 16% discard derived from the Pikitch study.

To examine more closely the applicability of the results of the Pikitch study, we reviewed discard rates across a variety of trip limits for bottom trawl catches of all species examined in the study. For trip limits of 10,000 lbs or higher, discards ranged from near 0% to over 40%. For trip limits below 10,000 lbs, discard rates ranged from 7% to over 90%. The data in the Pikitch study do not support an assumption of 16% for the current fishery with very low trip limits. Instead, discard rates of at least 50% and perhaps approaching 100% are more likely for trip limits below 1,000 lbs, similar to the current canary trip limits of 50-300 lbs. The discard % measurement used in this study is the portion of the catch that was discarded, so 100% discard means the entire catch was discarded.

The Pikitch study is not alone in finding that discard rates increased as vessels approached period catch limits (one month or two month limits, similar to "trip" limits). An analysis by the National Marine Fisheries Service of data collected by the Oregon Enhanced Data Collection Program and presented to the Council by Rick Methot at a meeting in fall 2000 also showed that discarding increased as vessels approached cumulative period limits[16].

> "The greatest tendency was for the highest levels of discard to occur in trips that had a low remaining cumulative limit at the end of that trip. In some cases, this will occur as a vessel accidentally overshoots its intended catch of a target species. In other cases, this will occur as a vessel accidentally catches some of a species after it has attained its limit for that species but continues to fish for other species in the assemblage that tend to occur with the first species."

This analysis was done for species with period limits much higher than current canary rockfish period limits. The species in this study with the lowest period limits is shortspine thornyhead. Discard rates for shortspine thornyhead averaged 29% and for some trips were substantially higher. During this study, period limits (often 1-2 months) for shortspine were 1,000-4,000 lbs, and typical limits were 2,000-3,000 lbs per period (although there was one month with a limit of 0 lbs). Such limits are substantially higher than typical canary limits of 50-300 lbs per cumulative limit period (often 1-2 months). These data suggest that discards of canary rockfish (and other rockfish) are substantially higher than the assumed 16% because the current groundfish fishery is always operating close to period limits.

Thank you for considering these comments. Please do not hesitate to contact me if you have any questions or if I can be of any further assistance.

Mark Powell

Mark Powell

[16] Methot, Richard, Thomas Helser, James Hastie. A Preliminary Analysis of Discarding in the 1995-1999 West Coast Groundfish Fishery. Report presented to the Pacific Fishery Management Council.

Under Exhibit C.3.e Rod Moore Public Comment
Supplemental Public Comment Speaking Notes
9-12-01

REVENUE IMPACT OF SABLEFISH MANAGEMENT OPTIONS

1. Data on 2000 non-whiting groundfish purchases and sales obtained from 4 WCSPA member companies with facilities in CA, OR, and WA

2. WCSPA groundfish landings = 50% of total groundfish landings by weight (per PacFIN data)

3. WCSPA sablefish landings = 59% of total sablefish landings by weight

4. Extrapolating, gross ex-processor value of non-whiting groundfish in 2000 = **$106,486,514**

5. Ex-processor value of sablefish in 2000 = **$27,622,452**

6. GMT proposed landed catch amounts for 2002:

   High = 43% reduction from 2000 sablefish landings = **($11,877,654)**

   Ramp Down = 49% reduction from 2000 = **($13,535,001)**

   Low = 59% reduction from 2000 = **($16,297,246)**

7. Loss as percentage of total 2000 gross ex-processor value:

   High = **11%**

   Ramp Down = **12.7%**

   Low = **15.3%**

8. As comparison point, Senate Appropriations Committee mark for West Coast Groundfish Research in FY 2002 = **$5,010,000**

Exhibit C.3
Attachment 4
September 2001

Evaluation of existing *Sebastes* discard assumptions and possible alternatives
Draft for discussion, 8/20/2001
Prepared by Dr. James Hastie
Northwest Fisheries Science Center

For most Sebastes, the PFMC currently employs an assumed discard mortality of 16% based on a 1985-87 study of trawl fishery discards, summarized in Pikitch, et al., (NWAFC Processed Report 88-27).

The study observed 5 major fishing strategies (page 6), which were: 1) bottom rockfish trawling (BRF), using roller gear; 2) midwater trawling (MID); deepwater Dover sole trawling (DWD), using a mix of gears, generally outside of 100 fathoms; 4) nearshore-mixed trawling (NSM), using mud (small footrope) gear primarily to target flatfish, and 5) shrimp trawling (SHP), for pink shrimp. The survey sampled 1,470 tows during 139 trips, from June 1985 to December 1987, over a range of tow locations from roughly Cape Blanco, in Oregon, to the Canadian border..

In the text of the report, widow rockfish is the only rockfish species for which discard rates are discussed. On page 9, ratios of estimated total catch-to-landings are reported for 1985,1986, and 1987 as being 1.19, 1.13, and 1.15, respectively. The average across these three years is 1.157, which forms the basis for the 16% discard rate employed by the Council, for widow, as well as other *Sebastes* species. On page 7of the report, the effect of trip limit changes is noted: an estimated discard rate of 5.7% with a limit of 30,000 lb per week, and 52.3% with a limit of 3,000 lb per week.

Additional discard results are presented in Table 3 (page 21) of the report, by species, gear, and limit size. Two of the gear categories in the table correspond to strategies previously identified: midwater and shrimp trawls. Additionally, there is a bottom groundfish trawl category, which it is believed represents a combination of results for the BRF, DWD, and NSM strategies. Bottom trawl discard rates for yellowtail rockfish ranged from 6% to 9%, depending on limit size, and from less than 1% to 8% for POP.

In recent criticism of the PFMC's continued use of a 16% discard assumption, considerable attention has focused on the sensitivity of discard percentages in the Pikitch results to reductions in trip limit size. Since the analysis of widow rockfish in that study forms the basis for the PFMC's current practice, the 52.3% rate observed with very small limits has been suggested as a better alternative.

In evaluating the appropriateness of the current 16% discard assumption for canary and bocaccio, it is important to assess the relevance of the difference in discard rates that is associated with alternative trip limits amounts during the study period. Several key issues should be considered in evaluating the applicability of results--such as the 52.3% widow discard rate--to the current fishery. These include: gear usage on observed trips vs. that in the current fishery, alternative shelf target opportunities available during low-limit periods, changes in relative biomass of species over time, and comparative sample size between observed trip-limit regimes during the study period.

The predominant gear for on-bottom targeting of widow, and most other, rockfish, would have been some form of roller gear, which allows greater access to rocky habitat than the small footrope gear now required for landing any rockfish caught on the shelf. Within the study, the nearshore-mixed strategy, targeting primarily flatfish, represents the best analogy to the current small footrope fishery. However, the discard rates presented in the report represent a combination of all bottom trawl modes of fishing on the shelf. Figure 2 (page 24) does indicate that rockfish comprised a very small percentage of the total catch (~3-4%) in those NSM tows.

In order to address this issue directly, data from the Pikitch study were obtained, and tows where "mud gear" was using in a "nearshore-mixed" strategy were examined separately, with regard to coincident catch rates of shelf *Sebastes* species, in general, and widow and canary rockfish in particular.

Table 1 shows a summary of catch for the 261 tows meeting this criterion, and also for a "flatfish-target" subset (137) of these tows, where at least 500 lb of flatfish was caught and flatfish comprised at least 70% of the total retained catch. In the larger group, 79% of tows had no canary catch, with a higher percentage (89%) in the flatfish-target group. Of the 912 lb of canary which was discarded in all 261 tows, 877 lb was attributed to a single tow. And, although the "reason for discard" was recorded for many tows in the study, no response is recorded for this tow. Regardless, since the total amount of *Sebastes* caught during the trip on which this tow occurred was less than 1,500 lb, and the Sebastes limit at the time was 25,000 lb once per week, it appears likely that this discard resulted from size-related or other market factors and not limit attainment. It should be noted that greater processor acceptance of smaller rockfish and the mandated use of larger mesh trawl gear (described above) have likely lowered the incidence of size-related discards since the Pikitch study was conducted.

Excluding this tow, the canary discard rate was 4% for flatfish tows and 1% for the larger set of nearshore-mixed tows. The coincident catch rate of canary, relative to the weight of all retained flatfish, ranges from 0.9% to 0.3%, depending on whether the large discard tow is included. This range is consistent with rates determined from examination of more recent logbook data, and considered in the development of 2001 flatfish limits. Beyond canary, there were no catches of widow or yellowtail rockfish in any of the nearshore-mixed, "mud-gear" tows. This also underscores the differences in rockfish encounters between this strategy and the other bottom trawl strategies which contributed to the overall 16% discard estimate for widow rockfish. These results suggest that, even during a period when trip limits would have allowed the retention of large amounts of rockfish, fishermen targeting flatfish with small footrope gear had minimal encounters with rockfish species, including canary.

These results suggest that, even during a period where rockfish limits would have allowed the retention of large amounts of rockfish, fishermen targeting flatfish with small footrope gear had minimal encounters with rockfish species, including canary.

The second issue is the magnitude of alternative rockfish fishing opportunities that were available during the portions of these years in which the 3,000 lb per trip limits were in place for widow rockfish. Table 2 summarizes rockfish trip limits during 1985-87. Limits for widow rockfish were lowered during September-December in 1985, and during October-December in 1986-87. During these periods, however, limits for other rockfish species remained, in general, very similar to their levels earlier in each year. Limits for the *Sebastes* complex were as high as 40,000 lb per trip in the southern management area, and 30,000 lb once per week in the northern area. Additionally, there were no landing limits on lingcod during these years. Therefore, it is likely that significant fishing effort <u>utilizing roller gear</u> continued to be directed towards species in rocky habitat during these periods of reduced widow limits. With continuing opportunity to target all other rockfish species, it is not surprising that discard rates increased dramatically during these periods.

In contrast, during the 2000 fishery, the small footrope limits for minor shelf rockfish did not exceed 1,000 lb per month throughout the year. Other shelf limits included widow rockfish (1,000 lb per month), yellowtail rockfish in the north (1,500 lb per month), POP (500-2,500 lb per month), bocaccio (300-500 lb per month), canary rockfish (100-300 lb per month), chilipepper rockfish (3,750 lb per month), and lingcod (0-400 lb per month). Thus, not only was the gear during the study more suitable for on-bottom targeting of most rockfish than that with which shelf rockfish can be landed currently, the opportunities that existed for targeting other rockfish species when widow limits were low are not comparable to the present trip limit regime. When the limit for a single component species of an assemblage is lowered, relative to the remainder of the assemblage, it is reasonable to conclude that discard of the single species will tend to increase. However, when all limits within the assemblage are reduced, in concert, it is considerably more difficult to infer that, for any of the species, individually, the mere presence of a lower limit will result in a higher discard rate.

A third consideration involves changes in relative biomasses since the Pikitch study. Flatfish now represent the bulk of on-bottom trawling effort on the shelf. And flatfish abundance is currently believed to have been relatively stable, and perhaps even increased, since the mid-1980s. On the other hand, recent assessments suggest that the current exploitable biomass of canary rockfish is less than one-third of what it was during the mid-1980s. Other rockfish species currently viewed as "overfished" have experienced similar, if not greater, declines over this period. In addition to changes in gear restrictions and targeting opportunities, such changes in relative abundance suggest that rockfish encounter rates in other shelf target small-footrope fisheries should be lower now than during the Pikitch study period.

The final issue is one of sample sizes for the findings reported by Pikitch, et al. The 3,000-lb widow limit was in place for just 5 ½ months of the 36-month study period, and there is also usually less fishing effort in the last few months of the year. In 1985-86, the months with high widow limits averaged over 3,400 mt of rockfish landings, while the months having a 3,000 lb widow limit average roughly 2,300 mt of rockfish landings. The report does not specify the number of samples taken during each quarter, but if the samples sizes were generally proportional to the total trips taken during each, the discard rate calculated for the high widow limit would have been based on a considerably larger number of observations. Even if the same number of trips were observed during each quarter, the high-widow-limit discard rate would have been based on 4 ½ times the observations underlying the low-limit discard rate.

Alternative sources of information

The Groundfish Management Team has spent considerable effort reviewing logbook information in order to develop realistic estimates of the degree to which rockfish species of concern are incidentally caught with other target species. However, the usefulness of these data suffers from the lack of discard information and the dramatic recent changes in management of shelf fisheries. Prior to 1999, limits for rockfish were much higher, and roller gear could be used to target them. In most cases, the data do not clearly identify whether roller gear was used. More recent logbooks reflect the new footrope requirements, but the very presence of lower retention limits, absent estimates of discards, means that the true rockfish co-occurrence rates with small-footrope gear cannot be extracted.

Initial analysis of data from the Enhanced Data Collection Project (EDCP) during 2000 focused primarily on discard in the DTS fishery. However, across all observed tows, discard rates were calculated for a number of species, and presented to the Council in September 2000 (Methot, et al.). Among these, the observed discard rate for widow rockfish was 1%, for canary 12%, for yellowtail 20%, and for lingcod 10%.

In August 2001, a review of bycatch and discard rates was conducted for a subset of EDCP observations, whose species composition was suggestive of a mixed shelf flatfish strategy. This subset contained 105 tows from 1996-98, in depths less than 500 meters, where retained flatfish comprised at least 70% of all retained poundage, and some poundage of flatfish species other than Dover sole was retained. A summary of these tows is presented in Table 3. No canary or widow rockfish were caught in any of these tows, and total catches for yellowtail and lingcod were 202 lb and 1,703 lb, respectively, compared with 147,000 lb of flatfish. This yielded coincident catch rates of 0.1% and 1.2%, respectively, for yellowtail and lingcod. Obviously, the discard rates for canary and widow were 0%, since none were caught; discard rates were 13% and 9% for yellowtail and lingcod , respectively. Although these results reflect a limited sample size, they reinforce conclusions from analysis of the Pikitch data, regarding low encounter rates of rockfish in targeted shelf flatfish fisheries.

The NMFS Shelf Trawl Survey has been suggested as a source of information regarding the co-occurrence of rockfish and other, target species. If validated, these data could be used to evaluate whether current assumptions, based on imperfect logbook data, are reasonable. However, the use of survey data for such purposes has numerous shortcomings, as well. Perhaps foremost is the difference between the random design for selecting survey tow locations and the siting decisions of fishers, faced with a matrix of regulatory/market limits and differential prices among species. If the survey were to provide a reasonable approximation of species mix in the fishery, it would suggest that commercial fishing is an activity where the choices fishers make have little impact on their success or species mix. If fishers were truly unable to affect their likelihood of success, then we would expect to see totally random patterns of success and species mix across vessels. Instead, we see many vessels that are able to specialize in certain species, and we see some vessels/operators that consistently out-perform or under-perform other members of the fleet.

Few data sources are available for evaluating the degree to which the species mix observed in the survey corresponds to commercial catches in the same area. The Oregon Enhanced Data Collection Project (EDCP) provides one such opportunity. A shelf survey was conducted in one of the EDCP project years, 1998, in which a significant number of tows were observed. Based on the location observed trips during that year, a range bounded by 42.5° N. Lat. and 44.3° N. Lat. was identified for comparing the composition of tows targeting the Dover-thornyhead-sablefish (DTS) complex. The top-40 DTS survey tows within that area were compared with 13 observed commercial tows made in depths less than 500 meters, in which at least 70% of the total poundage was comprised of DTS species. Results of that comparison are summarized in Table 4.

For the three principal target species examined--Dover sole, shortspine thornyheads, and sablefish--the ratios of species weight to DTS weight are quite different between the survey and fishery. Dover represented 64% of the commercial DTS catch, but only 38% of DTS species in the survey. Conversely, sablefish comprised more than half of the survey DTS, but less than one-quarter of the commercial catch. Shortspine accounted for 12% of the commercial catch, but less than 6% of DTS in the survey. The co-occurrence of three non-DTS species--canary and yellowtail rockfish and lingcod--was also examined. Although small amounts of these species were caught in the selected survey tows, the survey ratios were consistently higher than their counterparts from the commercial fishery.

Another important difference between survey and fishery tows is the mesh size of the gear used. The survey uses trawl nets with much smaller mesh than are used in the commercial fishery. As a result, the survey gear will retain a higher percentage of small rockfish than the commercial fishery.

Other factors which could contribute to divergence between survey and fishery species composition differences in tow duration, tow speed, time of day, and season of the year.

Further examination of survey data

Acknowledging the shortcomings of the shelf survey, data from 1977-98 were reviewed with respect to two potential areas of bycatch concern: canary rockfish while targeting arrowtooth, and bocaccio while targeting chilipepper. Table 5 summarizes the amounts of arrowtooth and canary caught in survey tows which had the 25-, 50-, and 100-largest amounts of arrowtooth, annually. The top-100 group includes tows with less than 10 kg per half-hour tow, which would not represent economically viable densities for conducting a target fishery. The top-50 group may also include some, though far fewer, tows for which this would be a concern. In the four surveys since 1989, the ratio of canary weight to arrowtooth weight in the top-25 and top-50 arrowtooth tows has ranged from less than 1% to 7%.

However, the single largest catch of canary routinely accounted for 20-40% of the canary caught in all group tows. The highly skewed nature of the distribution of these tow weight-ratios is illustrated in Table 6. In most years, the median tow ratio was equal to, or close to, zero, even in cases such as the top-25 group for 1980, where the ratio of weights from all tows was 44%. In nearly all cases, the overall ratio was greater than the 75th percentile value among individual tows, and in several cases, greater than the 90th percentile.

The lower panel in Table 6 explores the effect of assuming that the targeting ability of fishers allows them to avoid the highest concentrations of canary. The top-50 arrowtooth hauls are used as the base, and compared with the 90% subset (45 tows) which contained the least amount of canary. The overall ratio is reduced by more than 50% in every year, and the average over the last 4 surveys drops from 4.1% to 1.4%.

A similar analysis was conducted for the ratio of bocaccio observed in the highest chilipepper tows. The fact that there were far fewer positive tows of chilipepper than arrowtooth is evident in that top-50 and top-100 groups include tows with essentially no chilipepper. Even the top-25 group has a low of 2 kg per half-hour tow in 1983. Focusing on the top-25 group, the change in relative biomasses of the two species is reflected in the dramatic reduction in species ratios between the first four surveys (all greater than 30% bocaccio, with a mean of 58%) and the last four (none greater than 7%, with a mean of 3%). As with canary, the single largest tow of bocaccio accounted for a large fraction of the group total (averaging 44%, over the last four surveys).

The distribution of individual tow ratios differs from the canary-arrowtooth case, in that the median values range as high as 50% in the early survey years. However, the median has not exceeded 2% in the last four surveys, averaging less than 1%. Similar to canary, the ratios of total species weights exceed the 75th percentile values of the annual tow distributions in about half the years.

Table 1.--Coincident catch rates of flatfish and Sebastes species observed during the Pikitch discard study (1985-87) for tows made with "Mud gear" (no rollers) using a "Nearshore-mixed" strategy, and the subset of those where at least 500 lb of flatfish were caught and flatfish comprised at least 70% of the retained catch.

	All nearshore-mixed strategy, "mud gear" tows	Flatfish tows
Numer of tows	261	137
# without canary	207	122
% without canary	79.3%	89.1%
All flatfish, Sebastes, sablefish, & lingcod		
Retained + discard	360,915	255,315
Retained [1] (lb)	265,326	182,924
% retained	73.5%	71.6%
All flatfish		
Retained + discard (lb)	292,613	202,748
Flatfish retained (lb)	213,076	143,151
% retained	72.8%	70.6%
All *Sebastes* species		
Retained + discard (lb)	18,700	2,544
% of retained flatfish	7.0%	1.8%
Sebastes discard (lb)	2,947	1,178
Sebastes discard/catch	16%	46%
- excluding the largest single canary discard tow		
Retained + discard (lb)	17,813	1,657
% of retained flatfish	6.7%	1.2%
Sebastes discard (lb)	2,060	291
Sebastes discard/catch	12%	18%
Canary rockfish		
Retained + discard (lb)	5,676	1,352
% of retained flatfish	2.1%	0.9%
Canary discard (lb)	912	907
Canary discard/catch	16%	67%
- excluding the largest single canary discard tow		
Retained + discard (lb)	4,789	465
% of retained flatfish	1.8%	0.3%
Canary discard (lb)	25	20
Canary discard/catch	1%	4%
Widow rockfish		
Retained + discard (lb)	181	14
% of retained flatfish	0.1%	0.01%
Widow discard (lb)	0	0
Widow discard/catch	0%	0%
Yellowtail rockfish		
Retained + discard (lb)	2,405	447
% of retained flatfish	0.9%	0.3%
Yellowtail discard (lb)	0	0
Yellowtail discard/catch	0%	0%

Table 2.--Comparison of trip limits for other rockfish species available during periods with small widow rockfish limits, 1985-87.

	January	February	March	April	May	June	July	August	September	October	November	December
1985												
Widow			30,000 lb trip lim; 1 trip/wk							3000 lb/trip; no lims on freq.		
POP -North	20% total trip wt (no lb lim)				Lesser of: 5,000 lb / trip or 20% total trip wt					5,000 lb / trip or 20% total trip wt		
***Sebastes* -North**		30,000 lb/wk				4/28: 15,000 lb/wk			15,000 lb/wk	10/6: 20,000 lb once/wk;		
***Sebastes* -South**			40,000 lb/trip, no freq lims							40,000 lb/trip, no freq lims		
Yellowtail -North	10,000 lb once/wk					4/28: 5,000 lb/wk				5,000 lb/wk		
1986												
Widow					30,000 lb/wk					3000 lb/trip; no lims on freq.		
POP -North			Lesser of: 10,000 lb / trip or 20% total trip wt							10,000 lb trip / lim or 20%		Vanc. closed
***Sebastes* -North**			25,000 lb/wk					8/31: 30,000 lb/wk			30,000 lb/wk	
***Sebastes* -South**				40,000 lb/trip, no freq lims							40,000 lb/trip	
Yellowtail -North				10,000 lb/wk					12,500 lb/wk		12,500 lb/wk	
1987												
Widow				30,000 lb/wk; max. 1 ldg/wk > 3000 lb							5,000 lb/wk	
POP			Coastwide: lesser of 5,000 lb/trip or 20% total trip wt							5,000 lb/trip or 20% total trip wt		
***Sebastes* -North**					25,000 lb once/wk						25,000 lb once/wk	
***Sebastes* -South**					40,000 lb/trip						40,000 lb/trip	
Yellowtail -North			10,000 lb/wk					7/22: 7,500 lb/wk			7,500 lb/wk	

Notes: Yellowtail limits were specied as sub-limits of the *Sebastes*-North limits. There were also no limits on lingcod landings during these years.

Table 3.--Bycatch and discard of rockfish and lingcod in 1996-98 trawl fishery tows, observed as part of the Enhanced Data Collection Project, in depths shallower than 500 meters, where retained flatfish species comprised at least 70% of all retained species, and some flatfish other than Dover sole was retained.

	Retained flatfish poundage				
	All species	Dover	Petrale	Arrowtooth	Other flatfish
Retained pounds	147,438	77,173	39,688	10,337	20,240
# of tows	105	94	66	55	64

	Bycatch and discard of selected rockfish species and lingcod			
	Widow rockfish	Yellowtail rockfish	Canary rockfish	Lingcod
Total pounds	0	202	0	1,703
% of retained flatfish	0.0%	0.1%	0.0%	1.2%
# of tows	0	3	0	40
% of all tows with species		2.9%		38.1%
Retained pounds	0	175	0	1,549
# of tows	0	2	0	35
% of all tows: species retained		1.9%		33.3%
Discarded pounds	0	27	0	154
Discard rate		13.3%		9.1%
# of tows	0	1	0	7
% of all tows: species discarded		1.0%		6.7%

Note: observations ranged from 42.4° N. Lat to 48° N. Lat, with roughly 60% occurring from 43-45° N. Lat.; and from depths of 40 m to 500 m, with 30% falling in each of the ranges: 148-200 m and 260-350 m.

Table 4.--Comparison of catch poundage ratios between several species and three combined DTS species (Dover sole, sablefish, shorspine thornyhead), between the top-40 DTS tows of the 1998 shelf trawl survey and the 13 observed 1998 DTS tows in the Oregon EDCP project shallower than 500 meters, in the area bounded by 42.5° N.Lat. and 44.3° N. Lat.

	25th percentile	Median	75th percentile	90th percentile	Largest ratio	Ratio of species wt. to DTS wt.	species lbs in all included tows	smallest tow	largest tow
Dover % of DTS total kg									
Shelf survey	40.5%	64.8%	85.1%	97.4%	100.0%	37.6%	7,431	30	687
EDCP observed tows	42.0%	76.6%	96.3%	96.7%	96.8%	63.9%	13,987	300	2,303
Sablefish % of DTS total kg									
Shelf survey	10.0%	25.4%	53.1%	73.0%	98.1%	56.8%	11,208	0	2,857
EDCP observed tows	3.7%	23.4%	41.6%	52.2%	63.5%	23.9%	5,233	39	1,248
Shortspine % of DTS total kg									
Shelf survey	0.0%	3.2%	7.9%	18.2%	32.8%	5.6%	1,106	0	201
EDCP observed tows	0.0%	5.8%	9.3%	29.0%	47.0%	12.3%	2,684	0	1,009
Canary % of DTS total kg									
Shelf survey	0.0%	0.0%	0.0%	2.9%	45.2%	0.3%	55	0	22
EDCP observed tows	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0
Yellowtail % of DTS total kg									
Shelf survey	0.0%	0.0%	0.1%	10.6%	162.8%	0.9%	168	0	52
EDCP observed tows	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0
Lingcod % of DTS total kg									
Shelf survey	0.0%	0.0%	0.0%	2.0%	6.7%	0.3%	68	0	29
EDCP observed tows	0.0%	0.0%	0.0%	0.5%	0.8%	0.1%	19	0	10

Note: EDCP tows were selected if at least 50% of the tow was comprised of DTS species.

Table 5.--Comparison of amounts of arrowtooth flounder and canary rockfish for sets of hauls determined by the amount of arrowtooth, for individual survey years.

	1977	1980	1983	1986	1989	1992	1995	1998
Top-25 hauls of arrowtooth								
Arrowtooth flounder								
Sum of kg	4,462	2,887	3,264	3,513	11,938	2,221	6,854	5,952
Smallest haul in group	55	49	42	99	133	34	93	92
Canary rockfish								
Sum of kg	304	1,282	738	83	331	155	30	408
as a % of arrowtooth	6.8%	44.4%	22.6%	2.4%	2.8%	7.0%	0.4%	6.9%
Largest haul in group	133	1,070	282	77	122	41	13	86
% of sum in largest haul	44%	83%	38%	92%	37%	26%	42%	21%
Top-50 hauls of arrowtooth								
Arrowtooth flounder								
Sum of kg	5,450	3,729	4,031	5,394	14,268	2,819	8,319	7,517
Smallest haul in group	30	23	23	54	70	18	32	50
Canary rockfish								
Sum of kg	492	1,285	1,062	390	388	189	85	442
as a % of arrowtooth	9.0%	34.5%	26.3%	7.2%	2.7%	6.7%	1.0%	5.9%
Largest haul in group	133	1,070	282	271	122	41	33	86
% of sum in largest haul	27%	83%	27%	70%	31%	22%	39%	19%
Top-100 hauls of arrowtooth								
Arrowtooth flounder								
Sum of kg	6,622	4,367	4,863	7,208	16,141	3,389	9,286	8,783
Smallest haul in group	17	7	11	25	24	8	12	15
Canary rockfish								
Sum of kg	621	1,996	1,869	685	1,504	214	100	501
as a % of arrowtooth	9.4%	45.7%	38.4%	9.5%	9.3%	6.3%	1.1%	5.7%
Largest haul in group	133	1,070	496	271	794	41	33	86
% of sum in largest haul	21%	54%	27%	40%	53%	19%	33%	17%

Table 6.--Selected moments of the distribution of canary weights as percentages of arrowtooth weights in individual hauls.

	1977	1980	1983	1986	1989	1992	1995	1998
Top-25 hauls of arrowtooth								
25th percentile	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.8%
Median	0.0%	0.0%	0.4%	0.0%	0.3%	0.0%	0.0%	2.3%
75th percentile	3.5%	4.3%	4.2%	0.0%	2.2%	2.8%	0.0%	7.8%
90th percentile	43.7%	28.1%	165.9%	1.9%	17.7%	59.7%	1.9%	31.9%
Maximum	163.4%	875.1%	190.0%	50.7%	78.2%	71.8%	4.0%	71.7%
Ratio of total weights	6.8%	44.4%	22.6%	2.4%	2.8%	7.0%	0.4%	6.9%
Top-50 hauls of arrowtooth								
25th percentile	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Median	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.1%
75th percentile	9.7%	0.0%	4.8%	0.0%	2.2%	7.3%	0.0%	6.1%
90th percentile	32.9%	7.1%	71.4%	6.8%	7.4%	26.8%	2.9%	16.1%
Maximum	226.1%	875.1%	1003.0%	290.3%	78.2%	71.8%	58.2%	71.7%
Ratio of total weights	9.0%	34.4%	26.3%	7.2%	2.7%	6.7%	1.0%	5.9%

Comparison of average canary co-occurrence in the top-50 arrowtooth tows and the subset of that group containing the 90% of the observations with the lowest absolute amount of canary

	1977	1980	1983	1986	1989	1992	1995	1998
All top-50 arrowtooth hauls								
Sum of arrowtooth kg	5,450	3,729	4,031	5,394	14,268	2,819	8,319	7,517
Sum of canary kg	492	1,285	1,062	390	388	189	85	442
Ratio of total weights	**9.0%**	**34.5%**	**26.3%**	**7.2%**	**2.7%**	**6.7%**	**1.0%**	**5.9%**
Sub-group of 45 tows (90%) with the lowest amount of canary								
Arrowtooth								
Sum of kg	5,099	3,210	2,936	4,886	12,122	2,325	5,982	6,763
% of all top-50 hauls	94%	86%	73%	91%	85%	82%	72%	90%
Smallest haul in group	30	23	23	54	70	18	32	50
Smallest haul in top-50	30	23	23	54	70	18	32	50
Canary								
Sum of kg	75	17	95	13	66	53	12	178
Ratio of total weights	**1.5%**	**0.5%**	**3.2%**	**0.3%**	**0.5%**	**2.3%**	**0.2%**	**2.6%**
% of all top-50 hauls	15%	1%	9%	3%	17%	28%	14%	40%
Largest haul in group	12	5	25	4	11	7	3	30
Largest haul in top-50	133	1,070	496	271	794	41	33	86

Table 7.--Comparison of amounts of chillipepper and bocaccio rockfish for sets of hauls determined by the amount of chillipepper, for individual survey years.

	1977	1980	1983	1986	1989	1992	1995	1998
Top-25 hauls of chillipepper								
Chillipepper								
Sum of kg	7,473	2,868	3,182	2,570	6,383	7,599	4,707	6,671
Smallest haul in group	47.6	6.8	2.0	3.4	68.9	7.5	29.8	18.6
Bocaccio								
Sum of kg	2,857	967	2,948	1,719	129	476	202	30
as a % of chillipepper	38.2%	33.7%	92.6%	66.9%	2.0%	6.3%	4.3%	0.5%
Largest haul in group	2,057	286	2,222	1,426	34	326	119	7
% of sum in largest haul	72%	30%	75%	83%	26%	69%	59%	24%
Top-50 hauls of chillipepper								
Chillipepper								
Sum of kg	8,140	2,901	3,195	2,593	7,315	7,648	5,040	6,825
Smallest haul in group	11.3	0.0	0.0	0.0	16.6	0.6	3.7	1.4
Bocaccio								
Sum of kg	3,205	1,046	3,061	1,749	5,216	487	213	48
as a % of chillipepper	39.4%	36.1%	95.8%	67.4%	71.3%	6.4%	4.2%	0.7%
Largest haul in group	2,057	286	2,222	1,426	4,577	326	119	12
% of sum in largest haul	64%	27%	73%	82%	88%	67%	56%	24%
Top-100 hauls of chillipepper								
Chillipepper								
Sum of kg	8,289	2,901	3,195	2,593	7,458	7,655	5,076	6,838
Smallest haul in group	0.7	0.0	0.0	0.0	0.2	0.0	0.0	0.0
Bocaccio								
Sum of kg	4,059	1,106	3,186	1,851	5,546	487	229	70
as a % of chillipepper	49.0%	38.1%	99.7%	71.4%	74.4%	6.4%	4.5%	1.0%
Largest haul in group	2,057	286	2,222	1,426	4,577	326	119	12
% of sum in largest haul	51%	26%	70%	77%	83%	67%	52%	17%
Selected moments of the distribution of bocaccio weights as percentages of chillipepper weights in individual hauls.								
Top-25 hauls of chillipepper								
25th percentile	3%	9%	1%	3%	0%	0%	0%	0%
Median	8%	50%	25%	8%	1%	0%	2%	0%
75th percentile	12%	105%	100%	35%	7%	2%	4%	2%
90th percentile	64%	121%	985%	60%	12%	54%	8%	17%
Maximum	218%	741%	3340%	961%	18%	2283%	399%	22%
Weighted mean	38.2%	33.7%	92.6%	66.9%	2.0%	6.3%	4.3%	0.5%

Exhibit C.4.d
Supplemental GAP Report
September 2001

GROUNDFISH ADVISORY SUBPANEL STATEMENT ON GROUNDFISH STRATEGIC PLAN IMPLEMENTATION

The Groundfish Advisory Subpanel (GAP) received a report from Council staff regarding the meeting of the Council's Ad Hoc Groundfish Strategic Plan Implementation Oversight Committee (SPOC) and offers the following comments on that Committee's report.

Open Access Restrictions: The GAP agrees with the SPOC recommendation to delay work on this issue until after the Council's October meeting. However, the issue should remain on the Council's workload list.

Trawl Permit Stacking: The GAP agrees this should be a high priority for Council workload, as it is unclear whether buyback legislation will be enacted and funded in this Congress. While the GAP recognizes there may not be time to convene a meeting of the permit stacking committee before the Council's October meeting, work should begin soon thereafter.

Marine Reserves: The GAP offered extensive comments on marine reserves and Council response under agenda item D.1 and will not repeat them here.

Allocation: The GAP unanimously repeats its request that the Council engage in a formal allocation process rather than the ad hoc approach that has been taken to date. Continued restrictions on species that are harvested by all gear types and both commercial and recreational fisheries make it imperative a formal allocation take place.

Multi-year Management: The GAP believes the Council should explore this approach to management as a means of providing some continuity for the fisheries. However, a multi-year approach must include a mechanism to adopt recent scientific information, especially in cases where there are significant questions of stock assessment results.

PFMC
09/12/01

DRAFT SUMMARY MINUTES
Ad Hoc Groundfish Strategic Plan Implementation Oversight Committee

Pacific Fishery Management Council
Teleconference

August 30, 2001

Call to Order

The Strategic Plan Implementation Oversight Committee (SPOC) meeting was called to order by Dr. Don McIsaac. He provided introductory comments and discussed the objectives of the meeting. The SPOC reviewed and amended the agenda (see Attachment). Opportunity for public comment was provided during each agendum.

Members in Attendance
Mr. Robert Alverson, Fishing Vessel Owners Association
Mr. Phil Anderson, Washington Department of Fish and Wildlife
Mr. LB Boydstun, California Department of Fish and Game
Mr. Ralph Brown, Pacific Fishery Management Council
Mr. Jim Golden, Oregon Department of Fish and Wildlife
Mr. Bill Robinson, National Marine Fisheries Service

Others in Attendance
Mr. Greg Bargman, Washington Department of Fish and Wildlife
Mr. Steve Bodnar, Coos Bay Trawler's Association
Mr. Burnell Bohn, Oregon Department of Fish and Wildlife
Ms. Eileen Cooney, National Oceanographic and Atmospheric Administration - General Counsel
Lt. Brian Corrigan, US Coast Guard
Mr. Brian Culver, Washington Department of Fish and Wildlife
Mr. John DeVore, staff, Pacific Fishery Management Council
Mr. Steve Freese, National Marine Fisheries Service
Mr. Jim Glock
Mr. Gerald Gunneri, Coos Bay Trawler's Association
Mr. Peter Huhtala, Pacific Marine Conservation Council
Mr. Jim Lone, Chair, Pacific Fishery Management Council
Ms. Michelle Longo Eder
Dr. Donald McIsaac, Executive Director, Pacific Fishery Management Council
Ms. Michele Robinson, Washington Department of Fish and Wildlife
Mr. Jim Seger, staff, Pacific Fishery Management Council
Ms. Cyreis Schmitt, National Marine Fisheries Service
Mr. Chuck Tracy, staff, Pacific Fishery Management Council
Mr. Dan Waldeck, staff, Pacific Fishery Management Council
Mr. Mike Waltrip, Coos Bay Trawler's Association
Mr. Jack Whitmore, Coos Bay Trawler's Association

Meeting Summary

Recent Court Decision

Ms. Cooney reviewed the recent court decision in the lawsuit brought by the Natural Resources Defense Council (NRDC) against National Marine Fisheries Service (NMFS). The lawsuit focused on the assumed discard rates for bocaccio and lingcod, public review of the annual groundfish management specifications, appropriateness of Amendment 12 to the groundfish fishery management plan, the mixed-stock exception, and National Environmental Policy Act (NEPA) compliance. The court ruled in NRDC's favor on most claims except for the "ripeness" of NRDC's argument against the mixed-stock exception, noting the exception has not been used in management of the fishery.

NMFS is formulating their response to the court's decision, and will provide additional guidance to the Council prior to the October/November Council meeting. For the near term, NMFS and the Council will need to reconsider and provide better documentation for how bycatch estimates are determined; provide prior notice and public comment opportunity on the annual management specifications; and ensure that rebuilding plans comply with the statutory requirement (i.e., rebuilding plans will be either a fishery management plan, plan amendment, or regulations).

The SPOC discussed the ramifications of the court decision, notably what it meant for development of 2002 management provisions. The SPOC asked if the Council would need to simply consider more than two alternatives, versus consideration of all reasonable alternatives as required by NEPA. Ms. Cooney emphasized that a thorough record of decision making is needed that demonstrates how the annual management specifications (including bycatch/discard estimates) are developed. This would include discussion of the alternatives considered and why recommended alternatives are preferred over others.

Public Comment – none

Capacity Reduction

Permitting in the Open Access Fishery

Mr. Boydstun provided the following report to the SPOC:

> The third meeting of the Open Access Permitting Committee (OAPC) took place by teleconference on July 31 between 2 and 4:30 p.m.
>
> This third meeting was for the purpose of: 1) reviewing our work to date and 2) deciding what to do next.
>
> Thus far, the subcommittee has produced 1) a report of our thoughts and recommendations stemming from our first two meetings, 2) a draft problem statement, and 3) a draft history of the Open Access (OA) fishery. In addition, Dr. Hastie has produced an analysis of various fishery qualification criteria for directed fishery vessels (non-trawl). Our work through May was reviewed at the June Pacific Fishery Management Council (PFMC) meeting. Our main recommendations presented at that meeting were: 1) the OA initiative should be considered for formal plan development following the permit stacking initiative, and 2) the OAPC should continue to meet and address issues peripheral to the formal plan development process, which we do not expect to commence until next April, at the earliest.
>
> In our third meeting, we again reviewed discussed Dr. Hastie's analysis and discussed the inclusion of additional qualification criteria.
>
> We next discussed further describing the histories of the respective OA sectors. In that regard, it was agreed that we need to bring together an historical record of groundfish catches by the respective OA sectors and including target species catches in the case of fisheries that incidentally harvest groundfish. This record should be stratified by time and area. Species stratification will be important, but it must be recognized that catch records for many critical or key species are not available except for recent years. We discussed completing this analysis by next April but that we will need to put this item on the back burner until after the November PFMC meeting. Dr. Hastie suggested that when we do get together that we come prepared to direct him, as a group, how we would like to have the data generated. This would be preferable to each state developing its own data set.
>
> Mr. Jim Seger suggested, and the group concurred, that B and C permits should hereafter be referred to as O and I permits, respectively. Also under this agenda item the group discussed limiting vessels

to one or the other permit type and restricting vessels to the use of specific gear types. However, the group agreed there is a myriad of options in this regard.

Under the allocation agenda item, it was agreed OA allocation can proceed without OA permitting, but that OA permitting will require allocation. How we go about allocating between gear types and sectors may be the most important yet difficult part of this initiative.

Near the end of our agenda Mr. Anderson, Mr. Bohn and I gave a summaries of where the respective states are with regard to recent and planned future management of their states' groundfish fisheries. I refer you to the meeting minutes for these reports. The meeting minutes also provide summaries of the public comments.

Finally, Dr. McIsaac reminded the group of our budgetary constraints and that we need to discuss how we plan to fund our strategic plan initiatives. He suggested we have that discussion at the next PFMC meeting.

The SPOC discussed the meeting summary of the OA subcommittee. It was noted that the Strategic Plan enjoins that OA fisheries targeting groundfish and those incidentally taking groundfish fisheries be limited. For directed OA fisheries, this could be accomplished through license limitation. However, for fisheries that take groundfish incidentally (e.g., pink shrimp fishery, salmon troll, halibut longline, exempted trawl), catch would be limited through allocation rather than license limitation.

Public Comment – The Washington Troller's Association noted their opposition to a "C" permit for groundfish incidentally caught in other fisheries. They do not see a need for the permit as it does not limit entry.

The SPOC deliberated on their advice to the Council. It was stressed that allocation will be a critical step in developing license limitation for OA fisheries. To that end, it was suggested that development of a historical analysis of participation and harvest in OA fisheries is needed. It was also stressed, that while development of a permit for incidental take of groundfish in other fisheries will be complicated, this option should not be foreclosed as the Strategic Plan specifically calls for its consideration.

The SPOC endorses the OAPC report and recommends the following to the Council:

- *Dr. McIsaac should provide a report on funds available for Strategic Plan implementation at the October/November Council meeting;*
- *As the Council determines workload priorities, they should consider a meeting of the OA subcommittee after the October/November Council meeting;*
- *Contingent on workload, Dr. Hastie should continue development of an historical analysis of participation and catch in OA fisheries using guidance provided by the OA subcommittee;*
- *Consideration of "C" permit will be revisited after development of historical analysis.*

The SPOC notes that, while workload priorities and staff resources limit time available for development of OA license limitation, increasing constraints on available harvest and increasing pressure on nearshore fisheries (i.e., as shelf fisheries are constrained) necessitate that capacity reduction of the OA fishery should remain a priority for the Council.

Buyback Legislation

Mr. Brown reviewed congressional activity on the West Coast groundfish fishery buyback legislation. He noted progress on the House bill, which may pass this session. The outlook is less promising on the Senate side, West Coast groundfish interests are seeking support for the Senate bill.

Public Comment – none.

Trawl Permit Stacking

It was noted that in June the Council affirmed the SPOC recommendation to form a trawl permit stacking development team. However, due to workload, the development team did not meet between June and September 2001. The SPOC noted that, while it had been placed "below the line" in terms of workload priority, trawl permit stacking remains a very critical Strategic Plan issue. Several members of the SPOC stressed that trawl permit stacking should receive high priority and move forward as soon as possible. For the next several months, NMFS and Council staff will be focused on annual specifications for the groundfish fishery. However, it may be possible for the development team to meet for initially scoping what it would take to develop a trawl permit stacking program. Progress on trawl permit stacking will require the Council to balance the suite of Council workload items (both groundfish and non-groundfish fisheries).

Public Comment – Several members of the public strongly recommended that trawl permit stacking go forward, noting that the development team should begin scoping the issues.

The SPOC recommends that trawl permit stacking be strongly emphasized as a high priority. Moreover, work on development of the trawl permit stacking program should be given due consideration as the Council sets it workload priorities at the September meeting.

Marine Reserves

Mr. Seger reviewed the status of several marine reserves initiatives. He named the individuals recommended by each Council advisory body for the a newly formed marine reserves steering group. The steering group is charged with aiding the Council and its advisory bodies in reacting to external marine reserve proposals. The steering group will be formalized at the September Council meeting and is scheduled to meet prior to the October/November Council meeting.

Public Comment – One member of the public stressed that, relative to other Strategic Plan initiatives, marine reserves should be a low priority. He noted that the SPOC had prioritized marine reserves lower than other initiatives that are not being worked on (e.g., trawl permit stacking).

The SPOC has no specific recommendations on substantive marine reserve issues. However, to ensure full participation and representation for each advisory body, the SPOC recommends the Council provide each steering group representative the ability to designate an alternate (from their respective advisory body). The number of times a representative could designate an alternate should not be limited.

For reference, the SPOC reminds the Council of the Strategic Plan implementation priorities adopted by the Council, noting that the marine reserves item is lower in priority than several other key items:

Rank	**Item** (section in Strategic Plan)
1.a	Buyback – all gears (C. 3.g)
1.b	Trawl permit stacking (A.3.e)
2	Observers – develop full program (A.5)
3	Review and improve groundfish management process (C.8)
4	Fixed gear permit stacking – sablefish (A.3.d)
5	Open access limited entry (A., C. 3.a,b,c)
6	Allocation
7	Marine reserves (A.6.)
8	Nearshore rockfish delegation (A.1.d)
9	Implement harvest policy recommendations (A.2.a-e)
10	Fixed gear spp endorsements & stacking – non-sablefish
11	Explore regulations to (1) reduce bycatch and (2) access allocations
11	Explore regulatory incentives (regs/gear) to minimize impacts on habitat

Allocation

Mr. Anderson reviewed the Ad Hoc Allocation Committee meeting summary, focusing on their recommendations for 2002. He also noted that several of this year's fisheries have gone faster than anticipated (e.g., canary rockfish). New assessment information prompted the Groundfish Management Team to recommend lower 2002 optimum yields for several species; sablefish, Dover sole, widow rockfish, darkblotched rockfish, and yelloweye rockfish. Yelloweye rockfish will be very constraining.

The recommendations of the Ad Hoc Allocation Committee include:

A. Management Principles

1. Management measures must have a high probability of keeping total mortalities within the harvest ceiling.
2. When making a trip adjustment for a specific species, adjust the trip limits for each species taken in the complex as required to minimize discard mortality.
3. Consider and adjust, if appropriate, the bycatch assumptions for each of the species taken in commercial and recreational fishing strategies.

B. Data Quality

1. Analyze and, if appropriate, incorporate estimates derived from the new California/MRFSS CPFV Effort Program ASAP.
2. Reconcile and incorporate the Oregon Sampling Program data into the RecFIN database by 2002.

C. Allocation

1. The Committee endorses the current (2001) set asides of species taken in both commercial and recreational fisheries.

2. Recreational set asides:
lingcod: 320
canary: 44 (including 22 Mendocino south)
bocaccio: 52 (Mendocino south)
yelloweye: total (recreational plus commercial) 4-11
   - Manage commercial fisheries for discard mortality (2 mt)
   - Manage recreational fisheries for minimal incidental catch (2-9 mt).

   nearshore rockfish:
   - North: 575 (2001), 800 (2002)
   - South: 550 (2001), 400 (2002)

D. Alternate Management Strategies

1. Consider shorter timeframes for each fishing sector (e.g., longline, trawl, OA) that results in an increase in the economic benefit to the fishing industry and that minimizes bycatch mortalities.
2. Consider additional EFPs that provide individual fishers opportunities to harvest higher quantities of healthy species while staying within specified bycatch limits of depressed species with an observer on board.

E. Major Management Challenges

1. Keeping recreational harvests within harvest guidelines (e.g., bocaccio, yelloweye).
2. Managing the yellowtail and widow rockfish complex.
3. Accounting for effort shifts in recreational and commercial fisheries from the shelf to nearshore species.

4. Managing the shelf line fishery, including the DTL fishery, to stay within rockfish harvest levels (e.g., yelloweye, sablefish allocation [primary v. DTL]).
5. Providing economically viable trip limits while maintaining a year round fishery.
6. Document rationale used to support discard rates (e.g., 16% for bocaccio).
7. Reducing harvest capacity.

Public Comment – none.

Mr. Brown reported on an industry meeting to discuss allocation issues. He noted the major issues identified at their meeting are very similar to the Ad Hoc Allocation Committee findings. A report of this meeting will be provided to the Council in September.

The SPOC discussed their recommendation to the Council. *The SPOC believes the Ad Hoc Allocation Committee recommendations are consistent with the Strategic Plan.*

Multi-Year Management

Dr. McIsaac discussed the possibility of reinitiating development of a multi-year management cycle. He noted that several other Council use multi-year management, and it may address concerns raised in the recent NRDC lawsuit. The SPOC discussed the feasibility of multi-year management given the current stock assessment cycle and complexity added by the review of rebuilding plans.

Public Comment – none.

The SPOC recommends a subcommittee of the SPOC be formed to reinitiate discussions of multi-year management. Given current workload, this meeting could not occur until after the October/November meeting. It was noted that a revolutionary approach to groundfish management may be necessary to reduce current strain and provide for future improvements.

Adjournment

The SPOC meeting adjourned at approximately 12 P.M., Thursday, August 30, 2001.

PFMC
09/11/01

ATTACHMENT 1

AMENDED AGENDA
Ad Hoc Groundfish Strategic Plan Implementation Oversight Committee

Pacific Fishery Management Council
7700 NE Ambassador Place, Suite 200
Portland, Oregon 97220
(503) 326-6352
August 30, 2001

Public comment will be accepted during each agenda item at a time determined by the chair.

THURSDAY, AUGUST 30, 2001 – 9 A.M.

A.	***Introductory Remarks***	Don McIsaac
B.	***Review and Approve Agenda***	Don McIsaac
C.	***Recent Court Decision***	Eileen Cooney
D.	***Capacity Reduction***	
	1. Permitting in the Open Access Fishery	LB Boydstun
	2. Other Initiatives (Buyback Legislation, Trawl Permit Stacking)	
D.	***Marine Reserves***	Jim Seger
E.	***Allocation***	
	1. Ad Hoc Allocation Committee Recommendations	Phil Anderson
	2. Report of Industry Meeting	Ralph Brown
	3. SPOC Consideration of Allocation Issues	
F.	***Other Business***	
	1. Multi-Year Management	Don McIsaac
G.	***Report to Council***	

ADJOURN

PFMC
08/30/01

HABITAT STEERING GROUP REPORT ON THE REBUILDING PLAN MATRIX FOR GROUNDFISH SPECIES DECLARED OVEFISHED AND REBUILDING PLANS

1. Habitat Steering Group (HSG) Comment on Rebuilding Plan Matrix (Exhibit C.5 Attachment 1)

The HSG reviewed and discussed the matrix and would like to commend Council staff for organizing this information. As part of the discussion the HSG members expressed the following concerns:

- Only 23 of 83 Council-managed groundfish species have been assessed and of the 23, 8 (including yelloweye rockfish) have been designated as overfished. This is indicative of a larger picture of ecosystem and management problems.
- Because of the diversity of geographic and bathymetric distributions of these species, it is imperative the Council embrace a regional conservation strategy.
- The new direction identified in the Groundfish Fishery Strategic Plan lays the groundwork for the long-term commitment to the recovery of these stocks critical to the regional fisheries. Fish and habitat protection and restoration is essential to this long-term recovery.

The HSG recognizes the increasing complexity of groundfish management. However, we feel it necessary to reiterate the need for an ecosystem approach to management and habitat protection. To that end, the HSG urges the Council and NMFS to move forward in designating Habitat Areas of Particular Concern (HAPC), identifying the effects of gear on habitat, and developing marine reserves. Many HSG members want to strongly emphasize the potential role of marine reserves in recovery of overfished species. This tool, in conjunction with other fishery management strategies, will provide long-term insurance for ecosystem protection and species recovery.

2. HSG Comment on Rebuilding Plans (Exhibit C.5 Attachment 2)

The HSG reviewed the latest draft of the canary rockfish rebuilding plan and makes the following comments:

First, we would like to commend Council staff on their effort to incorporate HSG requests for data into the latest draft of the canary rockfish rebuilding plan. We provide the following comments.

The HSG requests:

1. Section 3.5.1 on page 12, "Important Habitat Areas" be expanded to include more specific habitat type and location information such as could be provided by, but not limited to, the Geographic Information System (GIS) information proposed for development.
2. A section describing "trophic interactions" be included in all rebuilding plans.
3. Information discussing the use of marine reserves as a management tool for rebuilding overfished stocks exist as a distinct section in all rebuilding plans.
4. The GIS information proposed in this document be completed and included prior to final approval.
5. As stated in our June report to the Council, fish communities and habitat now untrawlable due to the large footrope restriction should be monitored to document the effect on canary rockfish and its habitat.

Finally, given the increasing number and complexity of rebuilding plans and resulting increase in staff workload, the HSG recommends the creation of a committee to coordinate the development and review of the rebuilding plans. Advantages of forming this committee include dissemination of the workload associated with these plans as well as an increased ability to assemble and utilize all available information in a timely manner.

PFMC
09/12/01

Exhibit C.5.b
Supplemental SSC Report
September 2001

SCIENTIFIC AND STATISTICAL COMMITTEE REPORT ON REBUILDING PLANS

The Scientific and Statistical Committee (SSC) reviewed the canary rockfish rebuilding plan and recently completed rebuilding analyses for lingcod, Pacific ocean perch, and darkblotched rockfish.

Mr. John Devore briefed the SSC on the status of the canary rockfish rebuilding plan (Exhibit C.5, Attachment 2). He noted that at the Council's June meeting, adoption of the plan was delayed pending incorporation of new material regarding canary rockfish habitat requirements and estimation of total catch (i.e., landings plus discard). Also, since the SSC had not provided comment on the plan in June, the Council asked the SSC to examine the revised document in its entirety. The SSC reviewed the plan largely with respect to its content, as the format of the document is expected to change if any fishery management plan amendment or regulation is required for adoption.

The canary rebuilding plan is intended to serve as a template for rebuilding plans for other species. SSC comments regarding the plan are as follows:

- The canary plan accurately reflects the technical content of the canary rebuilding analysis. With respect to format, the SSC recommends key results of the rebuilding analysis, with pertinent tables and figures, appear in the main body of the plan, and that the entire rebuilding analysis, including all technical details, be consolidated into a single addendum.

- Section 4.2.2.6 of the plan ("Monitoring Fishing Mortality and Discard Assumptions" - p. 26) does a good job of documenting measures being taken to estimate and reduce canary discards and the rationale for such measures.

- Several important aspects of the plan - including the rebuilding period (p. 31), harvest limits during the rebuilding period (p. 32) and bycatch control strategies (p. 33) - were affected by consideration of impacts on fishing communities. However, other than a reference to the existence of demographic information on the Council's website (p. 19), very little information regarding coastal communities is provided in the plan. The SSC recommends that potential impacts on coastal communities be documented in the plan itself.

- Further work on the rebuilding plan in terms of regulatory analysis of options will be required if the Council intends to submit the plan as an FMP amendment or regulation. Section 3 describes the commercial and recreational fisheries for canary rockfish and documents the effect of regulatory restrictions on those fisheries in recent years. Such information can provide a useful starting point for addressing Regulatory Flexibility Act and other requirements for socioeconomic analysis of rebuilding options.

- While a regulatory analysis of the canary rebuilding plan would pertain only to canary, the number of groundfish stocks in need of rebuilding has a cumulative effect on the industry that would not be reflected in any single rebuilding plan. Mr. Devore indicated the possibility of a "bridging document" that would describe such cumulative effects. The SSC supports preparation of such a document.

- Generally speaking, the resources required to prepare regulatory analyses for all rebuilding plans will make it difficult to complete rebuilding plans for overfished stocks within the required one year time frame.

  The SSC also reviewed new rebuilding analyses for lingcod, Pacific ocean perch and darkblotched rockfish, and makes the following observations concerning each:

- Lingcod - Mr. Tom Jagielo presented an updated rebuilding analysis based on the most recent 2000 coastwide stock assessment, which utilized the rebuilding software developed by Dr. Andre Punt (Exhibit C.5, Attachment 6). That computer program was created to standardize rebuilding calculations and to ensure stock projections conform to the SSC's guidelines for conducting rebuilding analyses. The new lingcod analysis used recruitments from all years to establish the rebuilding biomass target, consistent with B_0 depending on environmental conditions, and recent recruitments for projecting the population forward; both decisions are supported by the SSC. This work represents an update to a pre-existing rebuilding analysis, although the rebuilding time horizon remains unchanged. The stock is expected to rebuild to the target biomass level ($B_{40\%}$) within the remaining allowable time period (7 years). The GMT's 2002 total catch optimum yield (OY) recommendation (577 mt) is based on a 60% probability of stock rebuilding by the year 2009.

- Pacific ocean perch - Dr. Richard Methot presented results of an updated rebuilding analysis by Drs. Andre Punt and Jim Ianelli (Exhibit C.5, Attachment 5) that is based on the 2000 stock assessment completed by Ianelli et al. As with lingcod, this analysis utilizes the Punt rebuilding software and is framed to ensure that rebuilding is completed within the original time frame alloted (i.e., 2042). The SSC notes that in this instance the rebuilding target ($B_{40\%}$) is based upon spawner-recruit parameter estimates from the assessment model, rather than a time series of recruitments, although recruitments from the period 1965-1998 were used to project the population forward; both decisions are supported by the SSC. The range of 2002 total catch OY recommendations presented by the GMT (290 mt, 350 mt, and 410 mt) is based on probabilities of stock recovery equal to 80%, 70% and 60%, respectively. However, there is concern that revisions to foreign catch estimates of Pacific ocean perch, which should soon be available, will reduce the estimate of stock size and, consequently, the above OY values.

- Darkblotched rockfish - Dr. Richard Methot presented results of a new rebuilding analysis for this species (Exhibit C.5, Attachment 8) that is based on an update of the 2000 stock assessment conducted by Dr. Jean Rogers. At the June 2001 meeting, the SSC recommended the 2000 slope survey data be included in the darkblotched model to incorporate the best available scientific information in the rebuilding analysis of this stock. The new analysis, which did not involve changes to the model's structure, indicates the stock is more depleted than originally estimated (i.e., 14% of unfished biomass) and that recruitment in recent years has been markedly less than in the 1970s. Like lingcod, the preferred rebuilding analysis utilized all recruitments for establishing the rebuilding target but used recent recruitments for projection purposes. Likewise, all computations were completed using the Punt software package. The range of 2002 total catch OY recommendations presented by the GMT (157 mt, 168 mt, and 181 mt) is based on probabilities of stock recovery equal to 80%, 70%, and 60%, respectively.

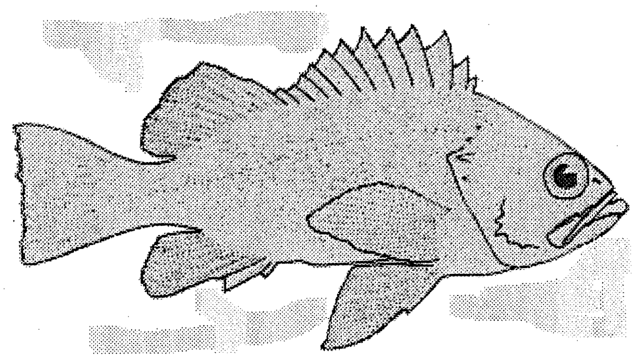
The SSC concludes that each of the three rebuilding analyses is technically sound and captures the range of yields that are likely under the various rebuilding scenarios examined.

PFMC
09/12/01

Exhibit C.5
Attachment 2
September 2001

Pacific Fishery Management Council

Revised Rebuilding Plan
for
West Coast Canary Rockfish, *Sebastes pinniger*



Rebuilding Plan and Environmental Assessment
of the Anticipated Biological, Social,
and Economic Impacts of the Rebuilding Plan
for West Coast Canary Rockfish

August, 2001

LIST OF PREPARERS

This document was prepared by Mr. Jim Glock, with assistance from Dr. Richard Methot (National Marine Fisheries Service Northwest Fisheries Science Center, Seattle), Ms. Yvonne deReynier (National Marine Fisheries Service Northwest Regional Office), Ms. Becky Renko (National Marine Fisheries Service Northwest Regional Office), Dr. Jim Hastie (National Marine Fisheries Service Northwest Fisheries Science Center, Seattle), Mr. Chuck Tracy (Pacific Fishery Management Council), Mr. Jim Seger (Pacific Fishery Management Council), and Mr. John DeVore (Pacific Fishery Management Council).

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

EXECUTIVE SUMMARY

Two assessments of the canary rockfish (*Sebastes pinninger*) stock off the West Coast (Washington, Oregon and California) were prepared in 1999. These assessments concluded both the northern and southern portions of the stock were below the overfished threshold established for this stock. Consequently, in November 1999, the Council recommended management measures to reduce fishing on this stock in order to initiate rebuilding. In January 2000, the National Marine Fisheries Service (NMFS) informed the Council that this stock was declared "overfished" pursuant to the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act). When a stock is declared to be overfished, a rebuilding plan must be developed within one year. Rebuilding plans must be consistent with the Magnuson-Stevens Act, including the National Standards, the National Environmental Policy Act (NEPA), and other relevant federal laws.

The current spawning biomass is estimated to have fallen to between about 7% and 20% of the unfished abundance. If all fishing were immediately stopped, including all bycatch in fisheries for other species, the Council believes the stock would recover to its maximum sustainable yield stock size in 24 to 119 years. These estimates are based on a range of current biomass estimates and a range of future reproductive success. The optimistic estimate of 24 years is based on the assumption that either recruitment will immediately increase to an intermediate level (782 thousand fish), or that recruits per spawner (R/S) values over the rebuilding period will remain similar to those in 1996 to 1998. The Council believes it is more realistic to expect some lower recruitment levels like those in the early 1990s. For example, if R/S levels over the rebuilding period are similar to the average levels observed over a longer historical period, rebuilding time frames of 74 to 119 years are likely. The Council chose a median recruitment scenario between the high and low R/S scenarios. Under the median recruitment scenario, the northern stock would be expected to rebuild from its current level to the target level in 41 years with no fishing.

The mean generation time for canary rockfish is estimated to be 17 years. The National Standard Guidelines authorize establishment of rebuilding periods up to the minimum time (i.e., zero fishing) plus one mean generation. Thus, the maximum allowable time to rebuild is 58 years. In 52% of the simulations in the rebuilding analysis, a constant catch of 73 mt per year resulted in rebuilding of the northern portion of the stock in 57 years. The analysts advised the Council the southern portion of the stock could support an additional 20 mt harvest each year. The Council endorsed this analysis, and this plan specifies the rebuilding period for canary rockfish to be 57 years, with a constant annual catch of 93 mt (which is the sum of 73 mt for the northern portion of the stock and 20 mt for the southern portion). The Council intends to reconsider this plan as soon as information on recent recruitment success becomes available from the next NMFS groundfish survey, probably in 2002. If recent recruitment is less than assumed in the median recruitment scenario, the annual catch limit will be reduced.

The assessment for the northern portion of the stock indicates it declined to the overfished threshold about 1987 and has declined since then. The southern portion of the stock was overfished prior to 1965. This overfished condition appears to have resulted from a combination of poor recruitment and fishing in excess of sustainable rates. Large historical catches in both areas essentially "mined" the biomass that had accumulated over a long period of time. That large initial biomass was built during a period of recruitment that was substantially greater than the levels that occurred since 1965. Even with this high pre-historical recruitment, the southern portion of the stock was below the overfished threshold by 1965. In the northern area, the decline was slower. In the southern area, the stock continued to produce moderate levels of recruitment in spite of low spawning biomass and high fishing mortality rates. In the northern area, recruitment continued to decline through 1995.

The southern portion appears to be resilient and is expected to increase rapidly under reduced fishing pressure. In contrast, reproduction in the northern area is extremely low and barely above the level that would allow the stock to recover even without fishing.

The Council considered a variety of issues relating to the rebuilding program, and also alternatives and initial management measures to implement the program and begin the rebuilding process. The four basic areas of consideration were: (1) Goals and Objectives of the Rebuilding Plan, (2) Target Biomass, (3) Rebuilding Period, and (4) Harvest Rate Policy.

The proposed actions included in this rebuilding plan are intended to rebuild the canary rockfish stock. The rate of rebuilding, and thus the time expected to rebuild the stock, is highly dependent on recruitment of juvenile canary rockfish to the population. The proposed harvest rate strategy is expected to rebuild the stock, with a 52% probability, to the B_{msy} level in 57 years. In addition, a combination of time/area closures, gear restrictions, commercial trip limits and recreational management measures is expected to keep fishing mortality within the proposed limit. Alternatives considered would be expected to achieve the rebuilding goals more quickly or more slowly. Those that would rebuild the stock more quickly would impose substantially greater impacts on fishers, fishing communities, and associated industries. Those that would rebuild more slowly would increase the risk of not achieving the rebuilding goals and objectives.

The proposed rebuilding program is intended to rebuild the stock while allowing minimal fishing impacts from recreational fisheries, commercial fisheries targeting non-groundfish species, and commercial fisheries targeting groundfish in areas and with methods that are expected to have little impact on the canary stock.

1.0 PURPOSE AND NEED FOR ACTION

The groundfish fisheries in the Exclusive Economic Zone (EEZ) (3 to 200 nautical miles offshore) adjacent to Washington, Oregon, and California are managed under the Pacific Coast Groundfish Fishery Management Plan (FMP). The FMP was developed by the Pacific Fishery Management Council (Council) under the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act). The FMP was approved by the Secretary of Commerce (Secretary) and became effective in 1982. The Council has prepared fourteen amendments to the FMP, thirteen of which have been approved or partially approved. Amendments 11 and 12 addressed the Magnuson-Stevens Act requirements relating to rebuilding overfished stocks. Amendment 11 established criteria for determining when a stock is overfished.

Assessments of the northern and southern portions of the canary rockfish stock were prepared in 1999. Both assessments concluded the stock is below its overfished threshold. Consequently, in November 1999, the Council recommended management measures to drastically reduce fishing on this stock in order to initiate rebuilding. In January 2000 the National Marine Fisheries Service (NMFS) informed the Council that the canary rockfish (*Sebastes pinninger*) stock is "overfished" according to the definitions in the FMP and the National Standard Guidelines for the Magnuson-Stevens Act. When a stock is declared to be overfished, a rebuilding plan must be developed within one year.

This rebuilding plan is intended to comply with the legal requirements relating to the rebuilding of overfished stocks (Appendix C: Magnuson-Stevens Fishery Conservation and Management Act and Groundfish Fish Management Plan Regulatory Language Pertinent to the Canary Rockfish Rebuilding Plan). A rebuilding plan is a guide for the Council and Secretary that provides goals, targets and a description of the management measures necessary to achieve the rebuilding goals. Actions taken to amend the FMP or implement other regulations governing the groundfish fisheries must meet the requirements of Federal laws and regulations. As specific regulations and management measures are developed to implement this rebuilding plan, the Council and Secretary will ensure their consistency with the rebuilding plan, the FMP, and all relevant Federal laws and regulations.

1.1 Requirements for Stock Rebuilding

Stock rebuilding requirements are specified by Section 304 of the Magnuson Stevens Act. A stock is considered overfished when the best available science determines that female spawning biomass has declined to less than 25% of its virgin biomass. A stock is considered successfully rebuilt when subsequent assessment indicates the female spawning biomass has increased to at least 40% of its virgin biomass. Allowable rebuilding time frames and considerations for adopting management measures to achieve stock rebuilding are also specified in the Magnuson-Stevens Act and the FMP.

1.2 National Standard Guidelines

Rebuilding plans and regulations to implement them must be consistent with the National Standards of the Magnuson-Stevens Act. In general, the National Standards of the Magnuson-Stevens Act specify the federal marine fisheries management guidelines to conserve fishery resources by preventing overfishing, minimizing bycatch and total mortality of bycatch, and by using the best available science to base conservation and management measures. The National Standards also mandate consideration of economic impacts and fair treatment of fishermen and fishing communities as well as human safety at sea when adopting conservation and management measures.

1.3 Technical Guidance on Rebuilding

The National Standard 1 guidelines indicate that once biomass falls below the minimum stock size threshold, then remedial action is required "to rebuild the stock or stock complex to the MSY level within an appropriate time frame." Guidance for determining the adequacy and efficacy of rebuilding plans was prepared by Restrepo et al. (1998). This guidance manual does not have the force of law, but instead provides technical details for stock assessment scientists.

1.4 FMP Stock Rebuilding Provisions

Section 5.0 of the FMP describes the annual specifications for stock rebuilding (Appendix C). The specifications and provisions include the required structure and content of rebuilding plans, how acceptable biological catch (ABC) and optimum yield (OY) are calculated and applied when adopting management measures designed to accomplish stock rebuilding, Council considerations when developing rebuilding plans, and the process for developing and approving rebuilding plans.

1.5 Definitions from the FMP

Amendment 11 brought definitions in the FMP into conformance with definitions in the Magnuson-Stevens Act and National Standard Guidelines. The following definitions in the FMP are used throughout this rebuilding plan:

Acceptable Biological Catch (ABC) is a biologically based estimate of the amount of fish that may be harvested from the fishery each year without jeopardizing the resource. It is a seasonally determined catch that may differ from MSY for biological reasons. It may be lower or higher than MSY in some years for species with fluctuating recruitment. The ABC may be modified to incorporate biological safety factors and risk assessment due to uncertainty. Lacking other biological justification, the ABC is defined as the MSY exploitation rate multiplied by the exploitable biomass for the relevant time period.

Maximum sustainable yield (MSY) is an estimate of the largest average annual catch or yield that can be taken over a significant period of time from each stock under prevailing ecological and environmental conditions. It may be presented as a range of values. One MSY may be specified for a group of species in a mixed-species fishery. Since MSY is a long-term average, it need not be specified annually, but may be reassessed periodically based on the best scientific information available.

MSY stock size is the long-term average size of the stock or stock complex, measured in terms of spawning biomass or other appropriate units, that would be achieved under an MSY control rule in which the fishing mortality rate is constant. The proxy typically used in this fishery management plan is 50% of the estimated unfished biomass, although other values based on the best scientific information are also authorized.

Optimum yield (OY) is the amount of fish which will provide the greatest overall benefit to the U.S., particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems, is prescribed as such on the basis of the maximum sustainable yield from the fishery as reduced by any relevant economic, social, or ecological factor; and in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the maximum sustainable yield in such a fishery.

Overfished describes any stock or stock complex whose size is sufficiently small that a change in management practices is required to achieve an appropriate level and rate of rebuilding. The term generally describes any stock or stock complex determined to be below its overfished/rebuilding threshold. The default proxy is generally 25% of its estimated unfished spawning biomass; however, other scientifically valid values are also authorized.

Overfishing is fishing at a rate or level that jeopardizes the capacity of a stock or stock complex to produce MSY on a continuing basis. More specifically, overfishing is defined as exceeding a maximum allowable fishing mortality rate. For any groundfish stock or stock complex, the maximum allowable mortality rate will be set at a level not to exceed the corresponding MSY rate (F_{msy}) or its proxy (e.g., $F_{50\%}$).

2.0 ALTERNATIVES, INCLUDING THE STATUS QUO AND PROPOSED ACTION

The range of potential alternative management and rebuilding strategies for canary rockfish are presented in this section. Analyses of alternatives are presented in Section 5.0.

2.1 Goals and Objectives of the Rebuilding Plan Alternatives

Alternative 1. Status quo. No rebuilding plan would be adopted for canary rockfish.

Alternative 2 (adopted by the Council). Establish a rebuilding plan for canary rockfish. The rebuilding plan will provide goals and objectives, strategies, targets, checkpoints and guidance for rebuilding the canary rockfish stock to a healthy and productive level.

> The goals of the canary rockfish rebuilding program are to (1) achieve the population size and structure that will support the maximum sustainable yield within the rebuilding period; (2) establish a long term management program that has a high probability that total annual fishing mortality of canary rockfish will not exceed the specified amounts; (3) foster public education programs about the need to rebuild the canary rockfish population, and how individuals can help; and (4) protect the quantity and quality of habitat necessary to support the stock at healthy levels in the future. These goals and objectives are derived from Section 5.3.6.1 of the FMP, which was developed under Amendment 12 (Appendix C).

2.2 Target Biomass Alternatives

Alternative 1. Status quo. The Council's 40-10 precautionary policy default proxy for target biomass (B_{MSY}) for stocks with a low biomass is $B_{40\%}$.

Alternative 2 (adopted by the Council). Target biomass would be set at 6,000 mt.

The canary rockfish stock will be considered to be rebuilt when the female spawning biomass ($B_{40\%}$) for the northern portion of the stock is in the range of about 6,000 mt to 13,600 mt. The lower value (6,000 mt) is calculated based on the assumption that female canary rockfish die from natural mortality at a faster rate than males, and the difference becomes greater with age. The upper value (13,600 mt) is based on the assumption that female canary rockfish die at a more constant rate (i.e., are subject to a constant mortality rate) but become more difficult to catch as they get older. The Council found no compelling information that older female canary rockfish are "hiding" rather than dying, and adopted 6,000 mt as the target female spawning biomass. This is $B_{40\%}$, which is the default rebuilding OY level developed under Amendment 11 to the FMP, found in Section 5.3.5. The entire range is analyzed in Appendix A, "Rebuilding Analysis for Canary Rockfish."

Alternative 3. Target biomass would be set at 13,600 mt.

2.3 Rebuilding Period Alternatives

For the Council's initial rebuilding target of 6,000 mt, stock assessment authors developed a range of alternatives based on different stock recruitment assumptions as to whether future recruitment would reflect different periods in the stock's history. The rebuilding period alternatives are fundamentally based on these different stock recruitment assumptions. Section 4.1 of this document analyzes five different recruitment assumptions.

Alternative 1. Status quo. No rebuilding period would be set.

Alternative 2. A rebuilding period of 23 years would be set. In 1987-1991, the stock's mean recruitment per spawner level was moderate and a rebuilding period based on assuming future recruitment per spawner similar to that period would be about 23 years absent fishing mortality.

Alternative 3. A rebuilding period of 41 years would be set. This rebuilding period is based on a medium recruitment scenario where recruitment is sampled from recruitments observed in 1978-1997, with 1996-1997 reduced 25% from initial estimates and fishing mortality is eliminated.

Alternative 4 (adopted by the Council). A rebuilding period of 57 years would be set. The Council adopted a recruitment assumption based on the stock's mean recruitment from 1978-1997, with the recruitments from 1996 and 1997 reduced by 25%. This adopted recruitment assumption would result in a rebuilding period of 41 years absent fishing mortality, with an additional 16 years (mean generation of 17 years minus 1 year), for a total rebuilding period of 57 years.

Alternative 5. A rebuilding period of 64 years would be set. This rebuilding period is based on a low recruitment scenario where recruitment is sampled from mean recruitment observed 1978-1997, with 1996-1997 reduced 50% from initial estimates and fishing mortality is eliminated.

Alternative 6. A rebuilding period of 74 years would be set. This rebuilding period depends on an immediate increase to the recruits/spawner level observed 1978-1986.

Alternative 7. A rebuilding period of 119 years would be set. In 1978 - 1995, the stock's mean recruitment level was relatively low and a rebuilding period based on assuming future recruitment similar to that period would be about 119 years absent fishing mortality.

2.4 Harvest Rate Policy Alternatives

In previous years, when directed fisheries for canary rockfish were allowed, harvest levels (OYs) were set in accordance with the standard ABC/OY method in the FMP. That method applies the MSY harvest rate (or a proxy value, currently $F_{50\%}$) to the estimated biomass, and then making an adjustment based on the ratio of current to historic abundance.

Alternative 1. Status quo. Harvest levels would be based on the $F_{50\%}$ harvest rate (the current MSY proxy), as adjusted by the default OY control rule in the FMP. The default OY rule is commonly referred to as the "40-10" adjustment.

Alternative 2 (adopted by the Council). The annual harvest level will be 93 mt coastwide for the first two years of the rebuilding program, based on recruitment in 1996-1998 assumed to be 75% of the level estimated in the assessment (i.e., 75% of an average of 1.1-1.8 million per year). In 2003 the constant harvest level may be recalculated based on updated estimates of recent recruitment and/or revised estimates of future recruitment, consistent with rebuilding plan goals.

Alternative 3. Set the annual harvest as a fixed fraction of the population for the duration of the rebuilding period. This would allow increased harvest as the population rebuilds.

Alternative 4. Prevent all direct and indirect harvest of canary rockfish, leaving only natural mortality to determine stock size.

Alternative 5. Prohibit all directed fishing for canary rockfish and all retention of any canary rockfish caught incidentally to other fishing strategies.

Alternative 6. The annual harvest level will be 185 mt coastwide, based on scenario 2 in the rebuilding analysis. The rebuilding period, based on the highest recruitment assumption, is estimated to be 45 years with a 51% likelihood of success. This is the most optimistic set of assumptions under scenario 2.

2.5 Alternatives Rejected as Not Compliant with the Magnuson-Stevens Act

The Magnuson-Stevens Act requires that overfished stocks be rebuilt within ten years, except in limited cases such as where the biology of the stock or other environmental conditions prevent it. The canary rockfish stock assessment and rebuilding analysis indicate this stock cannot be rebuilt within 10 years due to its extremely low abundance and low stock productivity. The maximum rebuilding time authorized by the National Standard Guidelines would be 58 years; any alternatives that would not allow the stock to rebuild within that time would be inconsistent with the Magnuson-Stevens Act. While alternative harvest rate policies, such as F_{msy}, might eventually rebuild the stock, the likelihood of success within 58 years is far below 50%.

The Magnuson-Stevens Act also requires that conservation burdens and benefits be fairly distributed among participants. Alternatives that would have given exclusive harvest opportunity to either the recreational or commercial sector would be inconsistent with this requirement.

2.6 Alternatives Outside Council Jurisdiction

A major source of canary rockfish incidental catch, at least in some years, occurs in the pink shrimp trawl fishery. The pink shrimp fishery is managed by the states of Washington, Oregon, and California, and the Council has no direct management authority. The Council discussed methods to control shrimp fishing activities, such as requiring all vessels to use bycatch reduction devices (finfish excluders). The Council could develop an FMP for the pink shrimp fishery as a means of establishing such management authority. Absent an FMP, the Council's authority is limited to prohibiting retention and sale of groundfish taken incidentally by vessels fishing for pink shrimp.

3.0 DESCRIPTION OF THE AFFECTED ENVIRONMENT

3.1 Biology and Status of the Canary Rockfish Stock

Canary rockfish occur from northern Baja California (Mexico), to the western Gulf of Alaska. Historically, this species was fairly abundant throughout its range. Canary rockfish are considered a middle shelf-mesobenthal species. Canary rockfish have a depth range from the surface (juveniles) to 274 m, but primarily inhabit waters 91-183 m deep. Very little is known about the early life history strategies of canary rockfish, but limited research indicates larvae are strictly pelagic (near the ocean surface) for a short period of time, begin 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. Canary rockfish tend to move to deeper waters as they age. Larvae can be captured over a wide area, from 13-306 km offshore, and pelagic juveniles occur mostly beyond the continental shelf. Young-of-the-year rockfish can also be found in tide pools. In central California, newly settled canary rockfish are first observed at the seaward, sand-rock interface and farther seaward in deeper water(18-24 m). They are often observed hovering above sand or small rock piles.

Canary rockfish inhabit shallow water when they are young and deep water as adults. Canary rockfish are associated with pinnacles and hard drop-offs. They are also found near, but usually not on the bottom, often associating with yellowtail, widow, and silvergray rockfish. Canary rockfish are most abundant above hard bottoms. There is a major population concentration of canary rockfish off Oregon between latitude 44°30' and 45°N. In the southern part of its range, the canary rockfish appears to be a reef-associated species. Adult canary rockfish are primarily restricted along the continental shelf from 250 fathoms (1,500 feet/ 457 meters), inshore to 25 fathoms (150 ft/ 46 m).

Adult canary rockfish 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. Fertilization and embryo development take place within the body of the mother. Egg production is correlated with size; the number of eggs increases from about 260,000 in a 19 inch female to about 1,900,000 in a female 26 inches long. 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 assume a planktonic life style in the upper 100 m of the water column. Female canary rockfish generally grow faster and reach slightly larger sizes than males, but it appears males generally live considerably longer than females. Maximum age data indicate the two genders are capable of reaching nearly 70 years of age, but very few females greater than 30 years old have been observed in the sample data from Washington and Oregon.

The most recent assessment of the portion of the canary rockfish stock in the northern area (Columbia and U.S. Vancouver INPFC areas) indicated that a long-term decline has continued, and female spawning biomass has fallen below the overfished threshold (Crone et al. 1999). A corresponding assessment of the southern portion of the stock reached similar conclusions about population trend and depleted status, although the time frame was somewhat different (Williams et al. 1999). Based on these stock assessments and advice from its scientific advisors, the Council determined the canary rockfish resource off the coasts of Washington, Oregon, and California is overfished, as defined by the FMP (**Figure 3-1**. The current spawning biomass is estimated to have fallen to between about 7% and 20% of the coastwide unfished abundance, with the best estimate 8.7%.

3.2 Important Life History Factors that Affect Rebuilding

Several canary rockfish life history factors will affect the rate of rebuilding and the types of management measures that may be necessary. First, and probably most important, is the inherent productivity of the species. The northern portion of the West Coast stock appears to have a very low recruits per spawner (R/S) ratio, and in many years may not be capable of maintaining abundance levels even with zero fishing mortality. This is likely driven by environmental conditions and perhaps the abundance of competitive species. Warm water conditions have prevailed since 1977, but recent years have been cool. Recent

NMFS surveys have encountered numbers of juvenile canary rockfish, an indication of greatly improved spawning success. Future surveys will verify this observation. Also, the absence of older adult female canary rockfish in survey and fishery catches makes it difficult to determine both the true population and spawning success.

3.3 Summary of 1999 Stock Assessments

Landings and survey data indicate an absence of older female canary rockfish, and two possible explanations for this are explored in the northern assessment. The first possibility (scenario 1) is that females die from natural mortality at a faster rate than males, and the difference becomes greater with age. The second possibility (scenario 2) is that female canary rockfish die at a more constant rate (i.e., are subject to a constant mortality rate) but become more difficult to catch as they get older. At this time, the scientific community is uncertain which explanation is correct; the 1996 and 1999 Stock Assessment Review (STAR) Panels concluded both assumptions were equally valid. However, the two explanations lead to significantly different conclusions with respect to current abundance and the status of the stock compared to unfished conditions. Under scenario 1 (females die younger), current spawning biomass is estimated to be 949 mt for the northern area, which is 6.8% of the unfished spawning biomass. Under scenario 2 (female canary rockfish don't die young, but don't get caught), the northern population is in significantly better shape, with current spawning biomass estimated at 6,663 mt, which is 22.9% of the unfished spawning biomass. In either case, the canary rockfish stock is below 25% of the unfished biomass and therefore overfished.

The southern assessment was the first ever for that portion of the geographic range of the stock. The southern model performed better under the assumption of constant natural mortality than under the assumption of increasing mortality with age for females. Under base case conditions, the current spawning biomass in the southern area is estimated to be 529 mt, which is 7.7% of the unfished spawning biomass.

In 1999, the Groundfish Management Team (GMT) combined the results of the two assessments as shown in **Table 3-1**. Assuming scenario 1 for the northern assessment is correct, the coastwide spawning biomass is 1,478 mt (949+529), which is 7.1% of unfished spawning biomass. Under scenario 2 for the northern assessment, the coastwide spawning biomass is 7,192 mt (6,623+529), which is 20% of unfished spawning biomass).

Canary rockfish exhibit extremely low productivity (level of recruits per spawner) which has contributed to their decline in the northern area and impedes their recovery. There is tremendous uncertainty in these rebuilding projections due to extremely low levels of recruits per spawner (R/S) during 1987-1995 and high, but very uncertain, levels in 1996-1998.

A further uncertainty is due to the observation that the southern area of the stock appears to have greater productivity (higher R/S at low spawning biomass). Rough calculations based upon combining northern and southern information are more consistent with the optimistic rebuilding scenario. A new assessment and updated rebuilding analysis that examines the northern and southern data in a holistic manner will be conducted as soon as possible after the trawl survey in summer 2001 provides a new data point.

3.4 Basis for Determination the Stock is Overfished

Section 5.3.3 of the FMP (Determination of Precautionary Thresholds), describes the precautionary threshold as the biomass level at which point the harvest rate will be reduced to help the stock return to the MSY level. 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.

Section 5.3.4 (Determination of Overfished/Rebuilding Thresholds) provides additional information, indicating the overfished/rebuilding threshold and may also be written as

$B_{rebuild}$ = x% * mean R * SP(F=0)

The default overfished/rebuilding threshold for category 1 groundfish is 25% of $B_{unfished}$. The Council may establish different thresholds for any species based on information provided in stock assessments, the SAFE document, or other scientific or groundfish management-related report. For example, if B_{msy} is known, the overfished threshold may be set equal to 50% of that amount. 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 5% and 10% of the average unfished level.

In the case of canary rockfish, two assessments were prepared to describe the range of the stock within the area under Pacific Council jurisdiction. The northern assessment provides the basis for the rebuilding analysis.

Northern area - The northern area assessment (scenario 1) indicates that in the era prior to 1967, the mean level of annual recruitment was 2,872 thousand age 1 fish. This level of recruitment would produce a female spawning biomass of 22,376 mt if unfished, but the average annual catch was 1,000 mt, which reduced female biomass to 16,811 mt at the beginning of the modeled period in 1967. Average annual recruitment during the period from 1967 to 1977 was 1,859 thousand fish, which is used as the estimate of "virgin" recruitment. This lower recruitment level, combined with the average annual catch of 1,845 mt during this period, reduced spawning biomass to 13,757 mt by 1978. From 1978 to 1986, average annual recruitment was 1,621 thousand fish; annual catch averaged 2,860 mt; and spawning biomass declined to 6,613 mt by 1987. This level is barely above the overfished threshold. Over the period 1987-1995, recruitment declined precipitously to an average of only 622 thousand fish. The Council adopted quotas during this period that reduced annual catch to approximately 1,000 mt per year. However, due to the low recruitment during this period, female spawning biomass continued to decline to only 949 mt by 1999.

Under the second scenario for female mortality, recruitment and adult biomass trajectories in the north also follow a downward pattern, but the current biomass would be near 25% of the initial biomass. Prior to 1967, the mean annual level of recruitment was 2,744 thousand age 1 fish. This level of recruitment would produce a female spawning biomass of 44,991 mt if unfished, but the historical average catch of 1,000 mt reduced female spawning biomass to 34,210 mt at the beginning of the modeled period in 1967. (Female biomass per recruit is lower in scenario 1 because of higher female natural mortality compared to that in scenario 2.) Average recruitment during the period from 1967 to 1977 was 1,763 thousand fish, which is used as the estimate of "virgin" recruitment level. This lower recruitment level and an average catch of 1,845 mt reduced spawning biomass to 27,683 mt in 1978. Average recruitment during the period from 1978-1986 was 1,634 thousand fish; catch averaged 2,860 mt; and spawning biomass declined to 16,859 mt in 1987. From 1987 to 1995, recruitment declined precipitously to an average of only 802 thousand fish. Due to the low recruitment, female spawning biomass continued to decline to 7,157 mt in 1999, which is near the overfished threshold of 25% of initial biomass.

Southern Area - In the era prior to 1965, the mean level of recruitment was 1,060 thousand age 1 fish. This level of recruitment would produce a female spawning biomass of 11,657 mt if unfished. The average catch of 1,495 mt during 1950-1965 reduced female spawning biomass to 697 mt at the beginning of the modeled period in 1965. This is only 10% of the "virgin" or unfished spawning biomass level (6,850 mt) calculated from a long-term average recruitment of 617 thousand recruits.

Recruitment over the 1965-1977 period averaged only 473 thousand fish. This lower recruitment level and a much lower average catch of 620 mt allowed spawning biomass to recover to 1,280 mt in 1978, which is still below 25% of the "virgin" level.

Over the period 1978-1986, recruitment increased to 620 thousand fish; catch increased to 773 mt; and spawning biomass declined to 381 mt in 1987. Over the period 1987-1995, recruitment continued to average 620 thousand fish and average catch was 486 mt. Female spawning biomass continued to decline to 261 mt in 1993. The biomass has increased to 400 mt recently, but is still below the overfished threshold.

Many rockfish species are long-lived and have low reproductive rates, which means an unfished population is an accumulation of many old individuals as well as young fish. When older fish are removed from the population, it takes many years to replace them and replenish the biomass. Fishing on an unfished biomass is similar to mining or harvesting old-growth forest, because removal of the large, older fish reduces the stock biomass quickly, and replacement of those fish takes many years. Even a low rate of fishing can exceed the natural rate of replenishment. Typically, as a fish population shrinks, the rate of recruitment per spawner (R/S) increases because there is less competition for the available food and habitat. If the population declines too much, the rate of recruitment can decline due to factors such as increased predation or competition from other species. In the case of canary rockfish, high historical catches in both the northern and southern areas effectively mined an accumulated biomass that was built by substantially higher recruitment levels than those observed during the period covered by the assessments. Even though pre-historical recruitment was relatively high, the southern area's stock had already declined below the overfished threshold by 1965. In the northern area, the decline was slower. In the southern area, the stock continued to produce moderate levels of recruitment in spite of low spawning biomass and high fishing mortality rates. In the northern area, recruitment continued to decline through 1995. By the 1990s, each area was producing only 600-800 thousand recruits per year. However, the southern area appears to do it from a much smaller spawning biomass than in the north.
The high current R/S in the southern area indicates a resilient stock that would be expected to increase rapidly if fishing pressure were much reduced. In contrast, the current R/S in the northern area is extremely low and barely above the natural mortality rate. Thus, even without any fishing the stock will be very slow to recover.

3.5 Essential Fish Habitat (EFH)

The Magnuson-Stevens Act defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." 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. The groundfish FMP groups the various EFH descriptions into units called "composite" EFHs. This approach focuses on ecological relationships among species and between the species and their habitat, reflecting an ecosystem approach in defining EFH. Seven major habitat types were adopted as the basis for such assemblages or "composites":

1. Estuarine - Those waters, substrates and associated biological communities within bays and estuaries of the EEZ, from mean higher high water level (MHHW, which is the high tide line) or extent of upriver saltwater intrusion to the respective outer boundaries for each bay or estuary as defined in 33 CFR 80.1 (Coast Guard lines of demarcation).

2. Rocky Shelf - Those waters, substrates, and associated biological communities living on or within ten meters (5.5 fathoms) overlying rocky areas, including reefs, pinnacles, boulders and cobble, along the continental shelf, excluding canyons, from the high tide line MHHW to the shelf break (~200 meters or 109 fathoms).

3. Non-rocky Shelf - Those waters, substrates, and associated biological communities living on or within ten meters (5.5 fathoms) overlying the substrates of the continental shelf, excluding the rocky shelf and canyon composites, from the high tide line MHHW to the shelf break (~200 meters or 109 fathoms).

4. Canyon - Those waters, substrates, and associated biological communities living within submarine canyons, including the walls, beds, seafloor, and any outcrops or landslide morphology, such as slump scarps and debris fields.

5. Continental Slope/Basin - Those waters, substrates, and biological communities living on or within 20 meters (11 fathoms) overlying the substrates of the continental slope and basin below the shelf break (~200 meters or 109 fathoms) and extending to the westward boundary of the EEZ.

6. Neritic Zone - Those waters and biological communities living in the water column more than ten meters (5.5 fathoms) above the continental shelf.

7. Oceanic Zone - Those waters and biological communities living in the water column more than 20 meters (11 fathoms) above the continental slope and abyssal plain, extending to the westward boundary of the EEZ.

Canary rockfish composite EFH is classified as rocky shelf, continental slope/basin for adult stage and parturition; neritic, oceanic for larval stage and small juvenile stage. There is inadequate information to define EFH for large juvenile stage and mating stage.

3.5.1 Important Habitat Areas

Important habitat areas are specific areas or habitat types within EFH that play an important role in the life cycle of a species. Adult canary rockfish inhabit areas associated with pinnacles, sharp drop-offs, and other hard bottom features of the middle continental shelf. They are usually found near, but not on the bottom (PFMC 1998). A WDFW analysis of trawl logbooks indicated most catch of canary rockfish occurred in depths of 50-150 fathoms (**Figure 3-2**). A Geographic Information System (GIS) based description of hard bottom areas at those depths is being developed, which will help identify important habitat areas for the adult life stage and parturition of larval of canary rockfish. An analysis of Oregon trawl log book data identified traditional rockfish grounds based on rockfish CPUE, but were not specific to canary rockfish (**Figure 3-3**; Hannah and Freeman 2000).

3.5.2 Habitat and Human Impacts

The level of human impact on canary rockfish habitat has not been documented. Potential fishing-related impacts to the habitat could take the form of lost or discarded fishing gear, dumping of fish processing waste from fish processing vessels, or direct disturbance of the sea floor from contact by trawl nets, longlines, and fish traps.

While the effects of fishing on canary rockfish habitat have not been directly investigated, there is some research exploring how gear affects habitat. Auster and Langton (1999) reviewed a wide range 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 (Friedlander et al. 1999; Freese 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 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 of a trawl gear. Epifaunal invertebrates and boulders are structural components of fish habitat. 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 showed results similar to mobile gear, such that some types of epibenthos were dislodged. Quantitative studies of acute and chronic effects of fixed gear on habitat have not been conducted (Auster and Langton 1999).

In addition to fishing activities, humans have many direct and indirect effects on fish habitat. While non-fishing human impacts have not been directly assessed on canary rockfish habitat, a study of flatfish in

Sound, Washington indicated that anthropogenic stressors included chemical contaminant exposure and alteration of nearshore nursery habitats (Johnson et al. 1998). The New England Fishery Management Council compiled a list of human-induced threats to fish habitat that may be used as a guide to factors affecting groundfish species off the west coast. Oil, heavy metals, acid, chlorine, radioactive waste, herbicides and pesticides, sediments, greenhouse gases, and ozone loss are thought to be chemical factors that affect fish habitat. Biological threats can include the introduction of non-indigenous species, stimulation of nuisance and toxic algae, and the spread of disease. Human activities that may physically threaten fish habitat are dredging and disposal, mineral harvesting, vessel activity, shoreline alteration, and debris (Wilbur and Pentony 1999).

3.6 The Human (Socioeconomic) Environment

Humans use fish in a variety of ways including as a food source, a resource base for businesses and jobs, recreation, and religious symbols. For some people, even the knowledge and certainty that a species or type of human community will continue to exist constitutes a valued part of their environment. Various types of values that humans place on fish and on human economic and social structures associated with fishing are affected by changes in fishing policy.

The impacts on the human environment may be assessed at a number of levels including

1. Individuals that participate directly in fishing and fishery support activities.
2. Communities of association among fishery participants and related waterfront support activities (e.g. processors and gear manufacturers).
3. The geographic range of the social communities.
4. Individuals who value visiting the human communities or partake in non-consumptive observation of the natural environment.
5. Individuals outside the geographic area that have no direct interaction with the fish or communities but value the existence of the fish, the fishing community, or the ensemble of communities of association that make up the geographic area.
6. Individuals affected by the role of fish as an economic commodity (broad market level effects).

The primary form of information on the Socioeconomic environment is harvest related statistics. There is little information available about the characteristics of the individual participants and their social relationships than about harvest. Information on the characteristics of the participants would allow us to look more at communities of association and how those communities fit within geographic communities. The following information on West Coast fisheries provides a simple look at the aggregated activities of individuals.

3.6.1 Commercial Groundfish Fisheries

3.6.1.1 General Description

Pacific coast groundfish fisheries are generally year-round, multi-species fisheries that take place off the coasts of Washington, Oregon, and California. Most of the commercial groundfish harvest is taken by trawl, longline, and trap (or pot) vessels operating as limited entry fisheries. The limited entry program was established in 1994. Several open access fisheries take groundfish incidentally or in small amounts; participants in those fisheries may use, with some restrictions, longline, vertical hook-and-line, troll, pot, setnet, trammel net, shrimp and prawn trawl, California halibut trawl, sea cucumber trawl and other gears.

In most years during the past decade or so, the groundfish fishery was the most valuable commercial fishery on the West Coast (based on exvessel value), occasionally rivaled by the Dungeness crab fishery. However, in recent years both landings (tonnage) and value have declined substantially. In 2000, total landings in the groundfish fishery (including whiting), are projected to be about 25% lower than 1994, on a coastwide basis, and 2001 is expected to be substantially lower than 2000. Over the 1994-2000 period, lingcod catch declined 93% while total rockfish declined 70%. Pacific whiting declined just under 19% (**Table 3-2**). The total landed value of the harvest declined even more sharply by 33% since 1994 (**Table 3-3**). On a proportional basis, the value and volume of landings in the south declined more than in the north, but in absolute terms the declines in the north have been substantially larger. Rockfish have been on a consistent downward trend in both volume and value since 1995 (**Figures 3-4 and 3-5**). In 1998, there was a major decline in the volume of other groundfish species landed, and the economic effect of that decline was compounded by reduced prices.

In 1999, 1,485 vessels participated in the open access groundfish fishery (**Table 3-4**). There has generally been a downward trend in the number of vessels participating in the open access fishery with a precipitous decline in 1998 after a slight increase in 1997 (**Figure 3-6a**). Open access vessels depending on groundfish for more than 50% of their income were on a general declining trend while those less dependent on groundfish were increasing until 1998. The vast majority of open access vessels earn less than $5,000 of revenue from groundfish (**Figure 3-7a**). The open access fishery tends to be more dependent on the rockfish component of the groundfish fishery than the limited entry fleet.

The commercial salmon fleet, which is classified as part of the groundfish open access sector, has been on a declining trend in recent years (**Table 3-5**). However, in 1999 salmon fishing improved substantially, resulting in substantial increases in total and average revenue per vessel. In 2001, salmon fishing is again expected to improve substantially.

The pink shrimp fishery is also classified as part of the open access sector (**Table 3-6**), and the open access share of groundfish north of Cape Mendocino was based primarily on historical groundfish catch in this fishery. Many vessels that participate in the shrimp trawl fishery have groundfish limited entry permits. When participating in the pink shrimp fishery, they must abide by the same rules as vessels that do not have limited entry permits. In 1981, the three coastal states established uniform coastwide regulations for the pink shrimp fishery. The season runs from April 1 through October 31. Pink shrimp may be taken for commercial purposes only by trawl nets or pots. Most of the pink shrimp catch is taken with trawl gear with minimum mesh size of 1-3/8 inches between knots.

Allowances are provided for the retention of incidental harvest of ocean food fish in the pink shrimp fishery. The incidentally retained harvest of groundfish ran about 3% of total catch in 1999 and 2% in 2000 (based on partial data for 2000, **Table 3-7**). Amounts of incidental catch varied by geographic region and whether the vessel was participating in the open access or limited entry segments of the groundfish fishery. In general, there were higher levels of retention in the limited entry segment of the fishery. The regulations for 2000 allowed the retention of 500 pounds of groundfish per day fishing, not to exceed the poundage of shrimp and not to exceed 2000 pounds per trip, and not to exceed any open access limits for the groundfish fishery. Dover sole and whiting were allowed to exceed the target species poundage but not the 2,000 pounds per trip limit.

In 1999, 89% (438 vessels) of the vessels with limited entry permits participated in the groundfish fishery (**Table 3-4**). Excluding the at-sea processing vessels, there were 490 vessels with Pacific coast groundfish limited entry permits, of which approximately 53% were trawl vessels, 40% were longline vessels, 6% were pot vessels, and 2% were vessels that have endorsements for more than one type of gear. The number of vessels actively participating in the commercial groundfish fishery has generally declined in recent years. The number of active vessels in the limited entry fishery from 1994-1999 declined 16%, compared to a 19% decline in the open access fleet. Each groundfish limited entry permit is endorsed for a particular gear type, and that gear endorsement cannot be changed, so the distribution of permits between gear types is fairly stable. Limited entry vessels tend to be substantially larger producers than open access vessels (**Figure 3-7b**).

Limited entry trawlers focus their efforts on many different species, with the largest landings by volume (other than Pacific whiting) from the following species: Dover sole, sablefish, thornyheads, widow rockfish, and yellowtail rockfish. There are 55+ rockfish species managed by the Pacific coast groundfish FMP and, taken as a whole historically, rockfish landings represented the highest volume of non-whiting landings in the Pacific coast commercial groundfish fishery. In addition to these mixed-species fisheries, there is a distinct mid-water trawl fishery that targets Pacific whiting. Pacific whiting landings are substantially higher in volume than any other Pacific coast groundfish species. In 1998, by weight, whiting accounted for approximately 85% of all commercial shore-based groundfish landings. Longline and pot vessels primarily target sablefish but some longline vessels also target on a mix of species in the rockfish complex.

With the exception of that portion of the Pacific whiting catch that is processed at sea, virtually all other Pacific coast groundfish catch is processed at shore-based processing plants along the Pacific coast. By weight, 1998 commercial groundfish landings were distributed among the three states as follows: Washington, 13%; Oregon, 69%; California, 13%. By value, 1998 commercial groundfish landings were distributed among the three states as follows: Washington, 15%; Oregon, 43%; California, 42%. The discrepancies between the Oregon and California portions of the landings are expected because Oregon processors handle a relatively high percent of the shore-based whiting landings, a high volume, low value fishery. Conversely, California fishers land more of the low volume, high value species as a proportion of the total state-wide catch than Oregon fishers. Vessel owners and captains employ a variety of strategies to fill out a year of fishing. Fishers from the northern ports may fish in waters off of Alaska, as well as in the West Coast groundfish fishery. Others may change their operations throughout the year, targeting on salmon, shrimp, crab, or albacore.

The major goal of management of the groundfish fishery throughout the 1990s was to prevent overfishing while achieving the OYs and providing year-round fisheries for the major species or species groups. For 2000, growing awareness of reduced productivity of the groundfish resource made it apparent that the goal of a year-round fishery was no longer achievable for a number of species. A new management strategy, which diverts effort off the rocky sea floor of the continental shelf, was initiated in 2000 to rebuild overfished species, especially canary rockfish. The measures resulted in lower OYs, reduced seasons, trawl gear restrictions and more restrictive trip limits for shelf and nearshore species. This management program, with generally tighter restrictions, was extended through 2001.

3.6.1.2 Regional Comparisons

Open Access: During the period of 1994-1999, active groundfish open access vessels (those with over $5,000 of landings) in Puget Sound, along the Washington Coast, and areas south of Yachats, Oregon, tended to be more dependent on groundfish than those along the central and northern Oregon coast. Vessels operating out of Washington tended to be more dependent on sablefish and those operating along the southern Oregon coast and in California, which tended to rely more on rockfish (**Table 3-8**). Open access vessels from Bodega Bay to Oxnard California tended to be particularly reliant on rockfish. This southern area showed general downward trends in the number of participants from 1994-1999. North of this area there have been fluctuations without any clear trends, though in 1998 and 1999 there were fewer participants in most areas except the southern Oregon coast. Participation in the open access fishery is more flexible than participation in the limited entry fishery; open access vessels are more likely to move between fisheries from year to year, or to try a new economic venture altogether. Thus, open access fleet size may be used as one (very rough) gauge of the overall economic viability of the fishery.

Limited Entry Fixed Gear Vessels: For limited entry fixed gear vessels, the geographic pattern of reliance on rockfish tends to be similar to the open access fishery with greater reliance on rockfish generally occurring in the area from Bodega Bay south (**Table 3-9**). Over recent years, the number of active vessels in this fleet has tended to be relatively stable along the central and southern Oregon coast. An increase has occurred along the northern Oregon coast. Along other areas of the coast there has been some fluctuation from 1994-1999 with the number of participating vessels first increasing then decreasing. There may be some relationship between this pattern and the imposition of the fixed gear sablefish endorsement program in 1997. The fixed gear sablefish endorsement program prevented the shift of additional fixed gear limited entry vessels into the lucrative sablefish fishery, based on landings history through 1994.

Limited Entry Trawl Vessels: Trawl vessels fishing out of Puget Sound and along the Washington coast tend to have a level of dependence on groundfish comparable to limited entry fixed gear vessels fishing out of the same areas (**Table 3-10**). Along the northern and central Oregon coast and northern California coast, the trawl vessel level of dependence in most years is substantially greater than for fixed gear vessels. Along the central California coast (Bodega Bay to Santa Cruz), the level of trawl vessel reliance on groundfish has varied from year to year compared to limited entry fixed gear vessels. Trawl vessel dependence on groundfish along the southern California coast (Santa Cruz to Oxnard) is generally less than for fixed gear vessels. With respect to rockfish, the pattern of trawl reliance is different than for fixed gear and open access vessels. In general, trawl vessels from Washington through the central Oregon coast and along the north Central California coast tend to rely more on rockfish, and trawl vessels fishing along other areas of the California coast tend to rely less on rockfish.

Tribal Fishers: Besides these non-tribal commercial fisheries, members of the Makah, Quileute, Hoh, and Quinault 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.

3.6.1.3 Distribution of Canary Rockfish Among Commercial Sectors

Prior to 1993, canary rockfish was a major component of commercial rockfish landings in Washington and Oregon, behind only widow and yellowtail rockfish. From 1992 to 1994, Washington landings dropped from 815 mt to 286 mt to 148 mt, roughly 12% of the 1989 level (**Figure 3-8**). In Oregon, the major decline occurred one year later, with landings dropping from 1,610 mt to 740 mt to 560 mt from 1993 to 1995. In California, where canary rockfish is a smaller (but still important) component of the commercial rockfish complex, landings remained relatively stable.

Based on the data in **Table 3-11**, the commercial sector was the major harvester of canary rockfish from 1993 through 1999, taking 84% to 95% each year. There is a generally declining trend, however, with the highest percentage (95%) taken in 1993 and the lowest (84%) in 1999. Preliminary information from 2000 indicates commercial landings of canary rockfish were less than the amount landed by recreational fishers, and the target for 2001 is an equal sharing (50:50) of the available catch.

Within the commercial fleet, limited entry groundfish trawl vessels took the largest share of the canary rockfish harvest, but that has declined substantially in recent years (**Table 3-12**). Limited entry non-trawl gears took an increasing share each year, up to 10% in 2000. Open access vessels other than shrimp trawl vessels took a generally declining share each year, dropping from 20% in 1997 to 9% in 2000. The shrimp trawl fleet (limited entry and open access vessels combined) rocketed to 22% in 2000, primarily due to the dramatic decline in limited entry trawl landings from 1998 (894 mt) to 2000 (30.7 mt).

3.6.2 Recreational Groundfish Fisheries

3.6.2.1 General Description

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.

Recreational fishing in the open ocean has been on a downward trend (**Figure 3-9**). Data for 1994-1997 is incomplete, thus the downward trend may be more than indicated by the available Marine Recreational Fisheries Statistical Survey (MRFSS) data. Part of this decline is likely the result of shorter salmon seasons and smaller bag (retention) limits. Some effort shift from salmon to groundfish likely occurred, but the primary effect was likely to slow the overall decline in recreational fishing.

Recreational salmon harvest occurs from both charter and private fishing vessels (**Table 3-13**). Estimates are not available for the amount of non-salmon incidental harvest by fishers targeting salmon. Such harvest would be subject to limits that apply to recreational groundfish harvest.

The proportion of ocean angling trips in which rockfish were taken or targeted unsuccessfully increased in 1999 compared to 1998 (**Figure 3-10**). Rockfish is a target or incidental catch in a substantial portion of the West Coast ocean recreational fishery. On average (1994-1999), 43% of all recreational ocean angling trips are taken on private and rental vessels, 25% are taken on party and charter vessels and the remaining trips are taken from the beach, banks, or manmade objects such as piers.

3.6.2.2 Regional Comparisons

More recreational trips are taken in southern California than in northern California, Oregon or Washington, **Table 3-14** and **Figure 3-11**. The proportion of trips taken on party/charter vessels is generally greatest in Washington, followed by southern California, Oregon and northern California. Consistent data across years for 1994-1999 is available only for southern California. These data show a steady decline in ocean recreational angling trips. In general trips in 1999 were below 1998 levels for all regions of the coast. Most of the reduction occurred for private vessels in Washington, Oregon, and southern California, and for beach/bank fishing in northern California.

While the proportion of trips taken on party/charter vessels was greatest in Washington, the proportion of those surveyed that owned their own boat for recreational saltwater fishing was also greatest in Washington (57% compared to 38% in the next highest region, Oregon). Recreational fishers in most regions tend to have household incomes of between $45,000 and $60,000. The proportion of fishers earning less than this amount was greater in Oregon than in other regions. Anglers in Washington spend more on replacement or purchase of new equipment than other areas of the coast and yearly tax payments were greatest for individuals in southern California.

Recreational fishing activities follow a similar seasonal pattern along the entire coast, although there are regional variations. Summer is the most important time for recreational ocean fishing, with the peak occurring in July and August throughout the coast. In northern Oregon, recreational fishing does not really show a peak, but rather is fairly steady from May through October. In all areas, the fewest trips are taken during November and December.

3.6.2.3 Harvest of Canary Rockfish

The recreational sector historically took a small portion of the coastwide canary rockfish catch, about 5 - 10%. This increased to 15% in 1999 and exceeded the commercial landed catch in 2000, primarily due to the severe restrictions on commercial fishers that year. Most of the recreational catch in 2000 was taken in California. In 2001 and 2002, the Council has set a target of achieving a 50:50 sharing of the canary rockfish catch. To achieve this, a substantial reduction in recreational catch will be necessary, and the Council and the states have implemented several measures to achieve the necessary reduction. For example, recreational anglers in each state are restricted to two canary rockfish per day, and California has established seasonal closures and hook limits. Angler education programs will undoubtedly be necessary in order to avoid accidental catch of canary rockfish.

3.6.3 Groundfish Buyers

3.6.3.1 General Description

Groundfish buyers include processing plants, buying stations and vessels that hold buyers licenses and sell directly to wholesale markets. There was a jump in the number of groundfish buyers in 1998-1999. This jump is associated primarily with buyers handling a small amount of groundfish (less than $5,000 in exvessel value) with a low level of dependence (the first column of **Table 3-15**). Recently, the number of large operations (those handling product valued at over $500,000 at the exvessel level) declined from the 125-134 range observed from 1994-1997 to 80-107 for 1998-1999. Declines occurred both for those buyers more dependent on groundfish (over 50% of their purchases are groundfish in terms of exvessel value) and those that are less dependent on groundfish. From 1994-1999, groundfish comprised between 71% and 75% of the purchases of large buyers with over 50% of their purchases from groundfish. However, the rockfish component of these purchases dropped substantially beginning in 1997.

3.6.3.2 Regional Comparisons

For most areas of the coast, the total numbers of buyers active in 1998 and 1999 was within the range of those active in the previous four years (from 1994-1997, **Table 3-16**). Along the Oregon, Washington and north-central California coasts there was a decline from 1998 to 1999. For the central and southern regions of California, there were increases from 1998-1999. Most of the volatility in numbers of buyers occurs in the smaller size classes, those purchasing less than $10,000 exvessel value groundfish in a year (note: smaller groundfish buyers may include large seafood buyers that buy only small quantities of groundfish). The number of larger buyers (over $500,000 in exvessel purchases) in most areas was generally within the range observed from 1994-1997 and for Washington and the northern Oregon coast there was an increase from 1998 to 1999. However, for the southern Oregon coast, north-central California and south-Central California (Santa Cruz to Oxnard) the numbers were lower than the 1994-1997 range. For the central Oregon coast the number of large buyers was constant from 1998 to 1999.

For buyers in Puget Sound, a greater percentage of purchases are groundfish than for buyers along the Washington coast. Buyers along the Oregon coast tend to be relatively consistent with one another in terms of the percentage of their purchases of groundfish. Groundfish comprise a greater proportion of the purchases of Oregon buyers than for buyers along the Washington coast but a lesser proportion than buyers in Puget Sound. Groundfish purchases comprise a greater portion of the catch for buyers in north and north-central California. Along the south-central and southern California coast, groundfish as a proportion of purchases tends to be more comparable to the Oregon coast.

The rockfish component of the groundfish purchases tends to increase as one moves from north to south with exceptions at the extreme ends of this range. From 1994-1997, the rockfish component of Puget Sound groundfish purchases was similar to those of northern California. In 1998 and 1999 the rockfish component of the Puget Sound purchases declined to levels comparable to northern Oregon. In south-central and southern California, the rockfish component of groundfish purchases tends to be somewhat lower than to the north.

3.6.4 Communities

Fishing communities, as defined in the Magnuson-Stevens Act, include not only the people who actually catch the fish, but also those who share a common dependency on directly related fisheries-dependent services and industries. In commercial fishing, this may include boatyards, fish handlers and processors, and ice suppliers. In recreational fishing, this may include tackle shops, small marinas, lodging facilities that cater to out-of-town anglers, and tourism bureaus that advertise charter fishing opportunities. Another component of fishing communities is the people employed in fishery management and enforcement.

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 and habitat types, seasonal patterns, and target species. While each community is unique, there are many similarities. For example, all face danger, safety issues, dwindling resources, and a multitude of state and federal regulations.

Individuals make up unique communities with differing cultural heritages and economic characteristics. Examples include the Ballard community in Seattle with heavy Scandinavian influences, a Vietnamese fishing community of San Francisco Bay, and an Italian fishing community of southern California. Also included in these considerations are the Native American communities with an interest in the groundfish fisheries. These tribal communities are primarily found along the northwest coast. 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.

Demographic information on geographic communities at the county level has been compiled for a general baseline description of West Coast fishing communities. This information has been made available to Council members, may be downloaded from the Council web site (www.pcouncil.org) and is incorporated herein by reference.

3.6.5 Historical Management of Canary Rockfish

The primary management measures for controlling groundfish catches are the annual harvest levels, which include acceptable biological catch (ABC) and optimum yield (OY) specifications. Several types of management measures have been employed to keep catches from exceeding the specified limits (**Table 3-17**). Some measures are set in the FMP, and some are frameworked in the FMP and established through federal regulatory or notice procedures. Framework provisions allow for management measures to be adjusted as necessary, in some cases very quickly. Some of the more important management measures for commercial fisheries include definitions of legal trawl gear, including the minimum mesh size specification, and trip limits, which are limits on the amounts of fish that may be taken and retained, landed and sold in a specified time period and/or area. These are typically adjusted through the year as necessary in response to fleet participation and landings rates. For the recreational fishery, the primary management measures have been bag limits and seasons.

3.6.5.1 Historical Catch Specifications and Landings

The ABC levels for canary were first set in the FMP when it was implemented in the early 1980s. ABC values typically applied to the Vancouver, Columbia and Eureka areas, with an overall ABC equal to the total for these three areas. Initial ABCs were 800 mt, 1,300 mt, and 600 mt, respectively, for the three areas with a total of 2,700 mt (**Table 3-18**). In 1985, the Columbia ABC was increased to 2,100 mt and the total to 3,500 mt. In 1991, the Columbia ABC was reduced to 1,500 mt and the total to 2,900 mt. For the first time, a harvest guideline (3,500 mt) was established in 1991 (at that time it was permissible to set harvest levels above ABC). The harvest guideline was discontinued from 1992 through 1994, with ABC remaining at 2,900 mt. In 1995, based on a new stock assessment, the ABC for the combined Vancouver-Columbia area was reduced to 1,000 mt and the Eureka ABC to 250 mt. The Vancouver-Columbia harvest guideline was set at 850 mt. This was extended until 1997, when the Vancouver-Columbia ABC was marginally increased to 1,220 mt and the harvest guideline to 1,000 mt. An ABC of 85 mt was established for the Eureka-Monterey-Conception area for the first time, with no harvest guideline. In 1998, the northern ABC was set at 1,045 mt and the total catch harvest guideline also at 1,045 mt. For the first time, a discard adjustment was made, resulting in a landed catch harvest guideline of 878 mt. In 1999, the term "harvest guideline" was replaced by the term "optimum yield (OY);" the northern ABC remained at 1,045 mt, but the total catch OY was set at 857 mt, including anticipated discards. The landed catch harvest guideline for commercial fishers, after anticipated recreational catch and estimated commercial discards were deducted, was 689 mt. In 2000, the coastwide ABC was reduced to 287 mt and the total catch OY was reduced to 200 mt.

Since the mid-1990s, when an OY was first specified for canary rockfish, an assumed discard estimate of 16% has been applied. It should be noted that landings data reflect only the portion of the catch that is retained and landed. Additional unrecorded amounts are discarded for regulatory, economic or other reasons. The Council has acknowledged that without adequate estimates of bycatch, it will not be possible to accurately monitor progress towards rebuilding and to determine the effectiveness of management measures.

3.6.5.2 Commercial Management Measures

Prior to 1995, canary rockfish was managed as a generic component of the *Sebastes* complex along with most other rockfish; there were no federal management measures for commercial fisheries (trip limits or other measures) specific to canary rockfish. On January 1, 1995, the cumulative trip limit of canary rockfish for limited entry vessels was set at 6,000 pounds per month, coastwide. There was no specified limit for the open access sector, although the limited entry limit was also binding on vessels operating in the open access fishery. The limited entry cumulative limit was increased to 9,000 pounds per month on August 1 in order to better achieve the harvest guideline. An equivalent limit of 18,000 pounds per two-months was in effect during 1996 and was reduced to 14,000 pounds per two months for most of 1997. In 1998, the limited entry cumulative limit was 15,000 pounds per two months until October 1, when it was reduced to 500 pounds per month. In 1999, the cumulative limit management system was revised, and the average monthly limit reduced to 3,000 pounds for limited entry vessels. Also in 1999, the open access (non-trawl) sector was assigned a separate limit of 1,000 pounds per month coastwide, for the first time. On April 1, the open access cumulative limit was increased to 2,000 pounds.

In 2000, management of canary rockfish was changed dramatically in response to the 1999 stock assessments, with most management measures implemented by emergency regulations. The intent of management measures was to prevent fishing in canary rockfish habitat, which is primarily rocky areas on the continental shelf. The *Sebastes* complex was divided into nearshore, shelf and slope components based primarily on how the fish are typically caught. For limited entry trawl gear, trawl footrope configuration was the primary factor used to distinguish vessel cumulative landing limits. In order for a vessel to use bottom trawl gear in areas where the sea floor is rocky, the trawl net must be protected to prevent it from snagging and tearing. Vessels typically have strung large rollers (including vehicle tires) on the footrope and fastened protective material to the bottom of the net. Without those modifications, trawl gear is virtually useless in rocky areas. Emergency regulations specified that vessels using bottom trawls with large footropes (larger than 8 inches diameter) were not allowed to land shelf rockfish and certain flatfish. Vessels using small diameter footropes were allowed to land incidental amounts of some shelf rockfish species, including canary rockfish. Only 100 - 300 pounds per month of canary could be landed. Limited entry fixed gear vessels were subject to limits similar or identical to those of trawl vessels, including 100-300 pounds of canary rockfish per month. The open access limit was 50 pounds per month.

3.6.5.3 Recreational Management

Prior to 2000, recreational bag limits did not specify canary rockfish, but rather set a limit on all rockfish species. In 2000, recreational bag limits for Oregon and California specified that not more than three canary rockfish could be caught and kept per day. Washington recreational fishers were restricted to two canary rockfish per day. Recreational bag limits were generally reduced in 2001.

During the decade of the 1990s, the estimated annual recreational catch remained fairly constant at about 90 - 120 mt. During the same period, commercial landings declined by 50% to 75% as tighter constraints were imposed on the fishery (**Table 3-11**). In 2000, commercial landings totaled only 52 mt, less than 10% of the 1999 level and only 2% of the level during the early 1990s. These commercial data should be viewed with an element of caution: they reflect landed catch, not total catch.

4.0 ELEMENTS OF THE CANARY ROCKFISH REBUILDING PLAN

NMFS concurred with the Council's finding and on January 1, 2000 advised the Council it had designated the West Coast canary rockfish stock as overfished. That designation requires the Council to prepare a rebuilding plan within one year. A rebuilding plan consists of: (1) a rebuilding analysis that estimates the potential rate of rebuilding the stock, including a technical analysis of stock productivity, an estimate of B_{msy}, forecasts of future population growth and estimation of the time for the stock to rebuild under various assumptions; (2) the management plan to achieve the population size and harvest levels indicated in the rebuilding analysis, including goals and objectives and how progress will be monitored; and (3) the management measures necessary to maintain catch at or below the designated levels.

4.1 Rebuilding Analysis

A preliminary rebuilding analysis for canary rockfish was prepared in August 2000 by Dr. Richard Methot, NMFS Northwest Fishery Science Center (Appendix A), and an addendum was prepared in December 2000(

Appendix B). The analysis focused primarily on the 1999 assessment of the northern portion of the West Coast canary rockfish stock (Crone et al. 1999).

4.1.1 Time to Rebuild in the Absence and Presence of Fishing

The minimum time necessary for this stock to recover to its maximum sustainable yield stock size, in the absence of all fishing-related mortality, ranges from 23 to 119 years. The optimistic level of 23 years is based on the possibility of either: (1) an immediate increase in recruitment to the median level observed during the more productive period of 1987-1991, or (2) an increase in recruits per spawner (R/S) values to the high level estimated for 1996-1998. More realistic scenarios are based on lower recruitment levels in 1996-1998 and R/S levels observed over a longer period (**Table 4-1**). These scenarios produce rebuilding time frames of approximately 74 years, and one result (re-sampling from 1978-1995) shows a median time to rebuild of 119 years. Based upon the median recruitment scenario, the northern stock would be expected to rebuild from its current level to the target level in 41 years with no fishing. With a mean generation time of 17 years, the allowable time to rebuild is calculated to be 58 years. A constant catch of 73 mt per year would allow the stock to rebuild in 57 years in 52% of the simulations. This rebuilding plan specifies the rebuilding period for canary rockfish to be 57 years.

A central question that contributes to the uncertainty in the current status and rebuilding potential of this stock is the mortality rate of adult female canary rockfish. Female canary rockfish make up substantially less than 50% of adult population samples, both in the commercial catch and research surveys. If this is a true reflection of the adult population, female rockfish must have a higher natural mortality rate, die younger on average, and have less opportunity to reproduce. In this case, the population is calculated to be about 7% of the unfished population size. If older female canary rockfish are really present in the population, but somehow are better at avoiding capture by commercial fishers and research surveys, then those (hidden) females continue to reproduce. In that case, the population is calculated to be about 20%-23% of the unfished population size.

The major factor that will control the rebuilding rate is the rate of recruitment of young fish into the population. Over the period of 1987 - 1995, the rate of recruitment was too low to replace the fish that died of natural causes. If this low reproduction rate were to continue, rebuilding could be delayed indefinitely. It will be extremely difficult to achieve the harvest reductions necessary to achieve the rebuilding goals and meet the rebuilding schedule. The following analysis is based on a constant catch level throughout the rebuilding period, meaning the catch levels proposed for 2001 must be maintained for several decades. Major restructuring of the commercial groundfish fisheries will be necessary, including development of methods to reduce bycatch of canary rockfish in non-groundfish fisheries (such as the trawl fishery for pink shrimp and the salmon troll fishery). Recreational fishers will also need to actively avoid canary rockfish, which will likely mean not fishing for rockfish species that are found in association with canary rockfish, and perhaps refraining from fishing in large areas of the continental shelf. When canary rockfish become more abundant, it will become more difficult to avoid incidental catch and mortality, and further restrictions may be necessary in order to keep catches from exceeding harvest levels established for rebuilding.

Even scientific sampling of the canary rockfish population could hinder recovery efforts. Fishery scientists will need to get as much information as possible from the fish caught by recreational and commercial fishers. The Council may wish to consider a mandatory retention provision, with recreational and/or commercial fishers required to turn in all canary rockfish to state or federal agencies for scientific processing. In addition, scientific sampling programs may need to develop alternative survey methods, rather than trawl surveys, to sample all areas inhabited by canary rockfish.

4.1.2 Target Biomass and Rebuilding Period

Before a rebuilding program can be designed or implemented, managers must identify a goal, or biomass target, that will allow determination of when rebuilding is complete and the stock has returned to, or is maintaining, a healthy condition. This biomass target is used to establish management measures to guide the rebuilding process. The biomass target is a level of stock abundance at which harvesting of the resources can be sustained on a continual basis at the level necessary to support MSY. The biomass rebuilding target is applicable only during the rebuilding phase of the management plan, and would signal recovery of the stock to a healthy condition.

In the case of canary rockfish, the target female spawning biomass ($B_{40\%}$) for the northern portion of the stock is in the range of about 6,000 mt to 13,600 mt, depending on whether fishery selectivity is asymptotic (Scenario 1 in the analysis) or dome shaped (Scenario 2). The rebuilding time period is based on 6,000 mt as the initial target (**Figure 3-12**). A constant catch of 73 mt per year is projected to rebuild the canary rockfish stock in 57 years in 52% of the simulations. This rebuilding plan specifies the rebuilding period for canary rockfish to be 57 years.

As described above, there is a great deal of uncertainty about the rate of future rebuilding, resulting in a wide range of potential rebuilding periods. **Figure 3-12** shows the range of biomass trajectories and rebuilding periods calculated by the rebuilding model.

4.2 Management Under the Rebuilding Plan

A rebuilding plan is an agreed upon set of decisions and management measures which are intended to meet the identified goals. The goals of the canary rockfish rebuilding program are to: (1) achieve the population size and structure that will support the maximum sustainable yield within 58 years; (2) establish a long term management program that has a high probability that total annual fishing mortality of canary rockfish will not exceed the specified amounts; (3) foster public education programs about the need to rebuild the canary rockfish population, and how individuals can help; and (4) protect the quantity and quality of habitat necessary to support the stock at healthy levels in the future. The rebuilding plan envisions an OY of 88-93 mt for at least the 2000-2002 period.

To achieve these rebuilding goals, the Council established the following objectives: (1) set harvest levels that will achieve the established rebuilding schedule; (2) establish measures such as gear restrictions, bag limits, and commercial landing limits that will reduce canary rockfish bycatch in fisheries; (3) monitor the condition of the stock at least every two years to ensure the goals and objectives are being achieved; (4) identify any important habitat areas and implement measures to ensure their protection; and (5) promote public education regarding these goals, objectives and the measures intended to achieve them.

Chapter 5 of the FMP addresses preparation and implementation of rebuilding plans and management measures. Specifically, the FMP states that the Council will develop a rebuilding plan and submit its recommendations to NMFS in the same manner as the annual management process. Once approved, a rebuilding plan will remain in effect for the specified duration or until a revision of the plan is approved by the Secretary. The Council intends to implement management measures for rebuilding plans through the annual specifications process or federal rulemaking procedures, as is done with other management measures.

To monitor the effectiveness of a rebuilding plan, managers need rigorous information to assess population size and structure, total fishing mortality, and important habitat. The following section describes the management measures that will be taken to implement and monitor the effectiveness of the canary rockfish rebuilding goals over time.

4.2.1 Stock Assessment and Monitoring Rebuilding Progress

The Magnuson-Stevens Act requires NMFS to review the effectiveness of each rebuilding plan and whether it has achieved the intended results (such as specified catch levels and biomass trajectories) at least every two years. The Council anticipates these reviews will result in additional information that will be used to revise and/or update the rebuilding plan. The best available science for monitoring and evaluating the effects of the recovery strategy will be used.

Stocks under rebuilding must be monitored closely so adjustments can be made if the rebuilding milestones are not being met for any reason. Groundfish trawl surveys conducted by the NMFS are the primary source of information on long-term trends in abundance of canary rockfish as well as several other species found on the continental shelf. Since 1997, Northwest Fisheries Science Center (NWFSC) scientists have worked to provide better data for stock assessments and to improve the scientific assumptions on which those assessments are based. In addition, new statistical methods have been applied to address the uncertainty in fishery logbook data which is used in assessments.

Standard NMFS bottom trawl surveys have been a major data source for canary rockfish stock assessments and will be important sources of information to track rebuilding. In the future, these surveys will be especially important because gear restrictions and trip limits severely limit the information on stock abundance that can be obtained from commercial fishery data. Improvements in survey coverage will be important to better track stock abundance. Historical bottom trawl surveys have not been able to sample on very rocky habitats, so they may give an incomplete picture regarding the status of canary rockfish which are common in such habitats. New technologies such as remotely operated vehicles and submersibles are making it possible to conduct quantitative visual surveys in these untrawlable habitats. Recent work by NMFS and collaborators on the Heceta Bank off Oregon demonstrates the high potential for this methodology. Future analyses will be able to blend these trawl and non-trawl data to provide a more complete, habitat-based assessment of canary rockfish.

Efforts continue to be taken to better understand catchability and to examine gears that may be more suitable for assessments in rocky habitats. The Alaska Fisheries Science Center and Washington Department of Fish and Wildlife recently conducted a pilot study to determine if submersible survey methods could be used to assess trawl survey catchability and provide a meaningful comparison of fish densities between trawlable and untrawlable habitats. Such efforts hold promise of improving on traditional groundfish survey techniques, and NMFS is committed to fund such research for the purpose of refining and validating assumptions used in stock assessment models.

The NWFSC also continues work on the development of a commercial fishing logbook which is intended to increase the amount and uses of fishery dependent data, aid in data verification, and improve access to data.

4.2.2 Maintaining Fishing Mortality Within Rebuilding Parameters

The Council intends to implement specific management measures for rebuilding plans through the annual specifications process or federal rulemaking procedures. As with other groundfish species, canary rockfish total fishing mortality (retained +discard) will be managed using the best available information and managed so total mortality does not exceed the OY.

4.2.2.1 Harvest Rates

The preliminary harvest strategy for canary rockfish is to maintain a constant annual harvest limit for the duration of the rebuilding period. This strategy is one of several the Council considered and is an attempt to balance the need to reduce harvest to the extent practicable and the needs of fishers and fishing communities. A common harvest strategy used for West Coast groundfish stocks is a constant catch rate, rather than a constant amount; however, such a rate would result in an OY of zero to about 20 mt in the initial years and a larger OY as the stock rebounds.

The Council believes it would be nearly impossible to eliminate all fishing mortality, and attempts to do so would undoubtedly result in closure of all groundfish fishing on the continental shelf and reduction of non-groundfish fisheries that take canary rockfish as bycatch. The constant catch amount adopted by the Council assumes young canary rockfish will recruit to the population at a rate higher than the average for the past 20 years, but at a lower rate than in the past 5 years or so. This decision was based on initial observations of higher recruitment in 1998 and 1999, but with the understanding that confirmation of higher recruitment is imperative. If upcoming NMFS groundfish surveys fail to detect substantial recruitment, the Council intends to reduce the annual harvest amount in order to allow the stock to rebuild as projected.

4.2.2.2 Harvest Sharing Plans and Allocations

In recent years, commercial harvest of canary rockfish has been substantially reduced through a series of restrictions on trip limits and other measures. Management of the recreational fisheries was unaffected until 2000, when bag limit and season reductions were imposed. However, the estimated recreational canary rockfish catch did not respond as anticipated; the catch remained similar to previous years. Due to the difficulty in predicting the response to restrictive management measures, along with other factors such as widespread public outcry, the Council concluded further reduction of the recreational catch would be much more difficult to achieve than reduction of commercial landings. The Council considered direct allocation between commercial and recreational sectors and may decide this will be beneficial in the future. However, in the short term, the Council will attempt to set harvest guidelines or catch projections for the recreational fishery and attempt to manage the commercial fishery to the remainder of the OY.

Catch and bycatch of canary rockfish in non-groundfish commercial fisheries (such as the pink shrimp and salmon troll fisheries) are also difficult to predict and control. The Council considered the advantages and disadvantages of allocating amounts to various non-groundfish fisheries, either in aggregate or individually. However, without direct monitoring and/or management authority over non-groundfish fisheries, it is difficult for the Council to control the amount of canary rockfish taken. Instead, in the short term, the Council has chosen to anticipate catch levels in non-groundfish fisheries, deduct those amounts from the available total, and restrict commercial groundfish operations to the remainder. The Council's strategic plan for the groundfish fisheries indicates minimal bycatch needs in non-groundfish fisheries may take priority over directed catch opportunities in groundfish fisheries. The Council will continue to evaluate the tradeoffs as it develops a long term strategy.

This rebuilding plan envisions a constant catch of 88-93 mt per year. In the short term, all groundfish and non-groundfish fishers will need to avoid canary rockfish as much as possible in order to keep catch to the target level. As canary rockfish abundance increases as the stock recovers, it is likely to expand into areas of former abundance, and fishers will have more difficulty avoiding bycatch. Therefore, it is likely that more restrictive management measures will be necessary. In addition, the share taken by recreational fishers and commercial non-groundfish fisheries will likely increase. This would result in greater restriction on certain groundfish fisheries, perhaps in the form of geographic restrictions, shorter seasons, or gear modification requirements.

4.2.2.3 Modification of Open Access and Limited Entry Allocation Shares

Amendment 12 to the FMP authorizes the Council and NMFS to temporarily suspend or modify allocations of overfished species and associated species in order to facilitate the rebuilding process and to fairly distribute the conservation burdens. Canary rockfish are taken in a variety of open access fisheries, both directed and non-directed on groundfish. Directed open access fisheries for groundfish include trolled line gear, rod and reel, vertical longlines, and set longlines. Non-directed fisheries that take canary rockfish include the pink shrimp and salmon troll fisheries. Several vessels with limited entry permits also participate in the pink shrimp fishery; all groundfish landed by these vessels are included in the limited entry total.

The Council evaluated landings data from all commercial fisheries where canary rockfish have been recorded on state landing tickets to determine which fisheries are currently impacting this overfished stock. The incidental catch amounts of canary rockfish were then adjusted based on the optional management approaches under consideration. One strategy in developing management options was to start with the most valuable fisheries believed to take canary rockfish purely incidentally, such as the pink shrimp and whiting fisheries. Then additional fisheries were added one by one until the total expected canary rockfish catch reached the limit. **Table 4-2** summarizes the results of this exercise.

One result could be that open access fisheries may need more than the share specified in the limited entry section of the FMP. For example, in the "lowest option" in **Table 4-2**, open access fisheries would take about 35% of the commercial canary rockfish allowance, rather than the 12.3% allocation. In the "highest option," about 40% (about 9 of 22 commercial tons) would be allocated to open access fisheries. If OY were larger, it is likely the open access share would be closer to 12%; in some cases, it could be lower.

4.2.2.4 Bycatch Reduction Measures

Amendment 13 to the FMP, which NMFS approved on December 21, 2000, addressed the bycatch requirements of the Magnuson-Stevens Act through evaluation of standardized reporting methodologies and bycatch reduction measures. The main sources of bycatch of canary rockfish are believed to be fishing with trawl gear and hook-and-line gear (both commercial and recreational) on the continental shelf, especially in rocky habitat areas. The pink shrimp fishery, which uses small mesh trawl gear, is a major source of canary rockfish bycatch.

The Council recommended several gear restrictions for managing the commercial and recreational fisheries in 2000 and 2001. Several measures were implemented by emergency regulation for the 2000 fisheries; Amendment 13 authorized implementation of gear restrictions through the annual specification procedures for 2001. For the commercial trawl fishery, the Council divided the rockfish complex into three categories based on how they are typically caught. The categories are nearshore rockfish, shelf rockfish, and slope rockfish. The Council also specified that several groundfish species found primarily on the continental shelf may not be landed by any vessel using trawls with footropes larger than eight inches in diameter. Also, the lower sections of the net may not have any material added to protect it from damage or snagging by rocks or other components of the ocean floor. These provisions are believed to have effectively eliminated trawling in rocky areas inhabited by canary rockfish, lingcod, and associated species. An analysis by ODFW (Hannah and Freeman 2000) indicated that a significant decrease in trawl activities in rocky shelf areas (**Figure 3-3**).

The Council has approved several experimental fishing permits (EFP) to test gear and fishing techniques designed to reduce Canary bycatch while allowing access to other species.

For the recreational fishery, the Council specified that California anglers may not use more than two hooks in times and areas when the recreational season for rockfish is open. Previously there were no federal restrictions on the number of hooks a sport fisher in California could use, although State regulations limited anglers to not more than three hooks per rod. The use of multiple hooks frequently results in more than one fish being caught at a time, especially when anglers encounter dense schools of feeding rockfish. If canary rockfish were encountered, an angler could easily exceed his one fish daily limit. Accidental catch of most rockfish results in high mortality due to decompression and temperature shock. The reduction in the number of hooks is intended to reduce the likelihood that an angler would accidentally catch more than the specified bag limit of canary or other depleted rockfish.

The Council also recommended that the West Coast states establish gear requirements for pink shrimp trawl vessels; specifically require the use of bycatch reduction devices (commonly called finfish excluder devices) to prevent capture of canary rockfish. The Council has no direct authority over the pink shrimp fishery, but is authorized to allow shrimp fishers to retain amounts of groundfish taken incidentally. Vessels using these devices would be allowed to land incidental amounts of groundfish captured when fishing for pink shrimp. Vessels not using such devices would be prohibited from retaining and landing any groundfish. Shrimp fishers have testified to the Council that an incidental groundfish catch allowance is important to their financial success.

As canary rockfish abundance increases over time, recreational and commercial fishers will be more and more likely to encounter these fish. However, the rebuilding plan envisions a constant amount of catch, including bycatch, each year until the stock is fully recovered. In order to maintain total catch at 88 - 93 mt per year, it is likely that more restrictive measures will be necessary. Those will undoubtedly require less fishing in areas where canary rockfish occur. The Council will need to evaluate the most effective ways to achieve this with minimum disruption to commercial and recreational fishers.

4.2.2.5 Time/Area Management

Washington Department of Fish and Wildlife analyzed data recorded in trawl logbooks to demarcate canary rockfish distribution, which indicated that most trawl catch of canary rockfish occurred in a relatively narrow depth range from 50 fathoms to 150 fathoms (**Figure 4-2**). The distance from shore and width of this of this portion of the continental shelf vary substantially along the coast. These irregularities make it very difficult to design an effective and enforceable area closure. The Council's Enforcement Consultants and GAP attempted to design an area closure that would match the contours of this portion of the shelf without including too much additional area or excluding too much of the important habitat. They concluded that an area bounded by straight lines would not achieve the desired results, citing enforcement and compliance issues.

4.2.2.6 Monitoring Fishing Mortality and Discard Assumptions

Monitoring of fishing mortality is critical to the success of rebuilding canary rockfish, yet continues to be problematic. Sources of fishing-related mortality of groundfish in general and canary rockfish specifically are landed catch, which is well accounted with commercial fish receiving tickets and recreational fishery sampling programs, and discarded bycatch, which is not well accounted. Reliable information on discarded catch in the present fishery is needed to assess and account for total fishing mortality (retained +discarded catch). If discard estimates are too low, then harvest allocations may be set too high, and the long-term health of the stock may be jeopardized.

Over time, the Council introduced trip limits for a greater number of species taken in the domestic fisheries. Effort increased in the domestic fishery, and trip limits became more restrictive to control harvest rates. The Council realized that managing a variety of species under trip limits could lead to increased rates of discards for some species. Bycatch and discards can result from a regime of multiple trip limits because a fisher might target an assemblage of species, and then find that in order to catch the full limit on one species, he has to exceed the limit on another species, discarding the excess. To address this issue, the Council shifted away from per trip limits, converting most to monthly cumulative limits by the 1994 season. Cumulative limits were preferable to per trip limits because a fisher could accumulate species at different rates over different trips, without having to discard fish each trip because of exceeding per trip limits. In an effort to further reduce the likelihood that fishermen would have to discard overages of particular species within a multi-species fishery, the Council began extending the cumulative limit period length to two months for most major species throughout most of the 1997 season.

In addition to these efforts to modify the trip limit regime to reduce discards, the Council used several regulatory measures to reduce incidental catch of juvenile fish that would be discarded as unmarketable. In the early 1990s, the Council experimented with different combinations of gear regulations, first requiring larger trawl mesh sizes in net codends, and then moving to requirements for larger mesh sizes throughout trawl nets. By 1995, bottom trawl nets were required to have a minimum of 4.5 inch mesh, double-walled (lined) codends were prohibited, and the use of chafing gear was restricted (60 FR 13377, March 13, 1995, codified at 50 CFR 660.322.) All of these measures were intended to give smaller-size fish the opportunity to escape from the trawl net, reducing the likelihood that those fish would be caught and then discarded.

Additional gear restrictions were also introduced during the 2000 fishery. Previously, fishers had been allowed to use footropes equipped with large rollers--often truck tires--to target shelf rockfish species residing in high-relief habitat. Beginning in 2000, trawl landings of shelf rockfish were prohibited if large footrope trawls (gear with footropes or rollers greater than 8 inches in diameter) were onboard the vessel; small amounts of shelf rockfish bycatch were allowed to be landed if footropes less than 8 inches in diameter were onboard; and, higher limits were provided for targeting healthy shelf rockfish stocks when only midwater nets were onboard. Although the effect of these gear requirements on bycatch of depleted rockfish species has yet to be validated through observation, a review of tow locations from 1999 and 2000 trawl logbooks does suggest that many areas where canary rockfish were previously caught are no longer being trawled (Hannah and Freeman 2000; **Figure 3-3**).

Cumulative limits for minor shelf rockfish were set at minimal levels for all gear groups, in order to reduce incidental catch of canary and bocaccio rockfish, and lingcod. During 2000, these restrictions resulted in less than 10% of the commercial OYs for minor shelf rockfish being landed, in both the southern and northern areas. The fishery is projected to utilize a similar percentage in 2001, and an even lower percentage in 2002, in order to protect yelloweye rockfish.

Logbook data have been used by the Council's Groundfish Management Team (GMT) in estimating coincident catch rates of depleted rockfish species that may occur during the prosecution of small-footrope fisheries for species such as flatfish. However, interpretation of these data is complicated by the absence of recorded discards, as well as changes in gear usage, unreliable recording of the gear type used prior to 2000, and substantial changes in retention limits, and thus targeting opportunities, for many species. Although considerable inference and filtering of these data, and input from fishers, is required to develop coincident catch rates that reflect the current fishery, these rates are grounded in the best available information regarding fishing practices. They have been used to develop trip limit recommendations for target species, through assessment of the expected, associated catches of depleted species, and comparison of those amounts with limit opportunities for the depleted species. As a result, shelf flatfish fisheries which previously had no management limits, now have overall flatfish limits, in conjunction with lower sub-limits on species which have exhibited higher historic coincident catch of depleted rockfish species. These types of analyses, as well as the knowledge of fishers, have also been used to craft seasonal variations in limit opportunities, in an effort to harvest healthy stocks when they can be most cleanly targeted. An example of this would be the structure of Dover sole limits. Dover sole reside primarily in deeper slope areas throughout the winter, and are distributed through the continental shelf during the summer. This migrational pattern factored into the scheduling of larger trip limits for Dover sole at the beginning of the year than during the summer, in order to reduce impacts on depleted shelf rockfish such as canary rockfish.

Prior to the 2001 fishing season, the domestic commercial groundfish fishery off the west coast had not been subject to routine at-sea monitoring by scientific observers. However, two studies, which included fishing vessels carrying observers on a voluntary basis, have provided information on catch rates and discards under the prevailing trip limits. The first study included observations during the 1985-87 seasons (Pikitch, et al., 1988). Observations for the second study (Enhanced Data Collection Project, EDCP) occurred about ten years later, beginning in late 1995 and continuing through 1998.

In the Pikitch report, widow rockfish is the only rockfish species for which discard rates are discussed. Ratios of estimated total catch-to-landings are reported for 1985,1986, and 1987 as being 1.19, 1.13, and 1.15, respectively, representing an average of 1.157 across these three years. Since 1991, this 16% rate has been employed by the Council as an estimate for discarded widow rockfish, as well as an increasing number of other *Sebastes* (rockfish) species. Over time, as the number of rockfish species with assessments has increased, the Council has removed additional species from the generic *Sebastes* complex, and assigned individual OYs incorporating this discard rate. For example, the Council first specified an OY for canary rockfish individually in 1994, and management has incorporated an assumed discard rate at or near 16% since.

In recent years, excess fleet capacity and declining trends for many groundfish stocks have forced the Council to lower cumulative limits substantially, in order to preserve year-round supplies of groundfish to harvesters and processors while constraining catches to allowable levels. This pattern of trip limit reductions has led some to question the current appropriateness of the 16% discard estimate, which was derived from a period in which limits were far higher. In 2001, the GMT re-evaluated the appropriateness of the current 16% discard assumption for *Sebastes* species in general, and depleted species in particular, as it relates to observations described in the Pikitch study. Several key issues were considered including: gear usage on observed trips vs. that in the current fishery, alternative shelf target opportunities available during low-limit periods, and changes in relative biomass of species over time.

The restriction on trawl gear foot rope diameter has eliminated most of the gear that accounted for canary rockfish bycatch in the Pikitch study. Within the Pikitch study, the nearshore-mixed strategy, targeting primarily flatfish with smaller footrope gear, represents the best analogy to the current shelf fishery. Estimates of Canary discard from those gear types ranged from 1% to 4%. These results suggest that, even during a period when trip limits would have allowed the retention of large amounts of rockfish, fishermen targeting flatfish with small footrope gear had minimal encounters with rockfish species, including canary rockfish.

Not only was much of the gear used during the Pikitch study more suitable for on-bottom targeting of most rockfish than that with which shelf rockfish can be landed today, the opportunities that existed for targeting other rockfish species when widow limits were low are not comparable to the present trip limit regime. When the limit for a single component species of an assemblage is lowered, relative to the remainder of the assemblage, it is reasonable to conclude that discard of the single species will tend to increase. However, when all limits within the assemblage are reduced in concert, it is considerably more difficult to infer that, for any of the species individually, the mere presence of a lower limit will result in a higher discard rate.

A third consideration involves changes in relative biomasses since the Pikitch study. Flatfish now represent the bulk of on-bottom trawling effort on the shelf. And flatfish abundance is currently believed to have been relatively stable, and perhaps even increased, since the mid-1980s. On the other hand, recent assessments suggest that the current exploitable biomass of canary rockfish is less than one-third of what it was during the mid-1980s. Other rockfish species currently viewed as "overfished" have experienced similar, if not greater, declines over this period. In addition to changes in gear restrictions and targeting opportunities, such changes in relative abundance suggest that rockfish encounter rates in other target, small-footrope fisheries on the shelf should be lower now than during the Pikitch study period.

The later EDCP study was also focused on the fishery off Oregon, with some observations off northern California and Washington. Data from this study were analyzed during 1999 and 2000, and a preliminary report of findings presented to the Council in September of 2000. Because the major focus of vessels participating in the voluntary study was Dover sole, shortspine and longspine thornyhead, and sablefish (DTS) species, the first analytical efforts focused on these four species. The analysis went beyond a simple calculation of discard rates on observed trips, to the development of models that projected discard amounts for all trawl trips in which DTS species were landed, based upon DTS volume and the amount of individual limits that remained at the time of each trip. The projected fleet discards were then combined with documented landings to estimate overall trawl discard rates for the four species. The Council promptly incorporated these new assumed discard rates in their recommendations for landed-catch OYs for the 2001 season. Further examination of the EDCP data with regard to rockfish bycatch and discard in shelf flatfish fisheries is anticipated, though has not yet been initiated. However, across all observed tows, discard rates were calculated for a number of species. Among these, the observed discard rate for widow rockfish was 1%, for canary 12%, for yellowtail 20%, for lingcod 10%, and for shortspine 20%.

4.2.2.7 Mortality in the Commercial Fishery

With the exception of the mid-water trawl fishery for Pacific whiting, most commercial groundfish vessels sort their catch at sea and discard rockfish catch that is in excess of cumulative trip limits, unmarketable, or in excess of annual allocations. Landed or retained catch is monitored by the individual state run fish ticket programs in Washington, Oregon, and California. Because a portion of the catch is discarded at sea, there is no opportunity for NMFS or the states to monitor total catch (retained plus discarded catch) at onshore processing facilities. To monitor harvest allocations, assumed discard rates are used for many species taken in the commercial fisheries, including canary rockfish. Further discussion on current discard rates and the discards assumptions can be found in section 4.2.2.6 above. For some portions of the commercial fishery total catch data is collected through at-sea observer sampling programs or exempted fishing permits which require participants to retain all incidental catch.

Since 1991, observers have been placed on a voluntary basis aboard offshore catcher/processors and processing vessels in the Pacific whiting fishery. The whiting observers have gathered data that has been used to estimate total catch of or target and incidentally caught species, including canary rockfish. NMFS is currently seeking approval of a rule that would require mandatory observer coverage on all at-sea processing vessels in the Pacific whiting fishery.

Since 1992, vessels in the shore based Pacific whiting fishery have been issued exempted fishing permits (EFPs) which allows sorting to be delayed until the vessel offloads its catch at a shore-based processing facility. This has been a voluntary full retention program which allows state biologists to collect of total catch data from target and incidentally taken catch from fish that would otherwise been discarded at sea, including canary rockfish.

To address data deficiencies in total catch data, the Council and NMFS has moved forward on the development of a coastwide observer program for all limited entry and open access groundfish vessels that deliver catch to shore-based processors. Regulations to support the program became effective on May 24, 2001. The NWFSC deployed the first observers in August 2001. Although limited in number, the observers will gather data that will be used to estimate fleet-wide total catch, bycatch and discard associated with different fisheries, and fish stocks. During 2001, approximately 20-25 observers were to be deployed with 75% of the coverage occurring in the limited entry trawl fishery. The remaining 25% of the coverage will be used to collect data in other fisheries. Catch and discard data from this program could be available as soon as 2002 to validate the discard assumptions used in the rebuilding plan for portions of the trawl fleet.

The Council is considering mandatory retention of all shelf and slope rockfish, which may prove effective in accounting for the total fishing-related mortality of canary rockfish with adequate verification, such as video systems for monitoring full retention or observer data to compare to vessel collected data. Accountability of rockfish catch in excess of prescribed landing limits would enable accurate estimation of total mortality. NMFS has issued an exempted fishing permit to the State of Washington intended to refine incidental catch rates for canary rockfish in the northern flatfish fishery by fishing location, and collect information to assess the feasibility of full retention requirements. The NWFSC intends to begin testing alternative monitoring systems in 2001, including video recordings, as an alternative to the human observer.

4.2.2.8 Mortality in the Recreational Fishery

Recreational catch data will continue to be obtained from recreational fishery sampling programs and commercial passenger fishing vessel (CPFV) logbook data.

4.2.2.9 Habitat Identification and Protection

As stated in section 3.5.1, adult canary rockfish inhabit areas associated with pinnacles, sharp drop-offs, and other hard bottom features of the middle continental shelf. They are usually found near, but not on the bottom. Distribution of rockfish in triennial and slope trawl surveys indicate a higher abundance off Oregon and Washington than off California, with most encounters occurring in depths of 50-150 fathoms (PFMC 1998).

The primary management measures for minimizing adverse effects of fishing gear on EFH, and for protection of important canary rockfish habitat are fishing gear restrictions. Prior to 2000, large foot rope trawls with roller gear and/or chafing gear were used to bounce over tough rock piles in search of rockfish. Beginning in 2000, use of such gear to land shelf rockfish, including canary rockfish has been prohibited. The restriction functionally eliminates such gear from much of the important canary rockfish habitat. Based on a graphical analysis of trawl log book information by ODFW, the restriction has significantly shifted trawl effort away from traditional rockfish grounds (**Figure 3-3**; Hannah and Freeman 2000). A Geographic Information System (GIS) overlay of bottom trawl locations on important canary rockfish habitat is being developed by NMFS and the States which will identify the percentage of bottom trawls that were initiated in important canary rockfish habitat before and after the foot rope restriction to assess the effect of that regulation on important canary rockfish habitat.

Numerous research programs and analyses are currently being funded by NMFS and the States to identify habitat and map species distribution by various stages of life history. This information will be used to identify which habitat is susceptible to degradation, and determine how fishing practices can be modified to minimize risk to habitats. A wide variety of existing data, including data from geological surveys, commercial fishing logbooks and fish receiving tickets are being used to identify distribution and habitat.

The designation of Habitat Areas of Particular Concern (HAPC) may provide some additional protection for canary rockfish habitat. An HAPC is a specific area within designated EFH that is intended to focus conservation priorities on an area that plays a particularly important role in the life cycle of federally managed fish species. The Council is currently working with NMFS as part of the Groundfish Fishery Management Plan Environmental Impact Statement (EIS) to develop a framework for identifying, evaluating, and designating HAPC. The identification of important habitat areas (Section 3.5.1) may provide valuable input into the development of specific HAPC.

The Council's Groundfish Fishery Strategic Plan (PFMC 2000) identifies marine reserves as a potential tool for contributing to groundfish conservation efforts. Parrish et al. 2001 indicated that marine reserves also have potential for contributing to the rebuilding of overfished stocks such as canary rockfish. Modeling scenarios indicate that the primary mechanism would be from catch reduction, but that increased production from larger, more fecund individuals associated with protected habitat would also be likely.

4.2.3 Interaction with Other Overfished Species and Conservation Measures

The geographic and habitat distribution of canary rockfish overlaps those of lingcod and southern bocaccio rockfish, both of which also inhabit the continental shelf and have been declared overfished. Commercial lingcod catches are generally highest in the depth range of 70-150 m, which is shallower than the primary range of canary rockfish. Bocaccio is classified as a middle shelf-mesobenthal species, inhabiting depths between 50 and 300 meters. Most common depths are 100 to 150 meters over the outer continental shelf. The southern bocaccio stock extends from Mexico north to about Cape Mendocino, California, and thus overlaps the southern portion of the canary rockfish range. Management measures to reduce the take of lingcod, especially measures that reduce fishing in rocky areas of the continental shelf, are also likely to benefit canary rockfish. In California, bag limits to reduce targeting on bocaccio may also reduce catch of canary rockfish. The degree of benefit from such measures is unknown.

The Council may take in to account measures designed to recover one species when making recommendations for another. Taken to their logical conclusion, such strategies are the basis for ecosystem management. However, if such overlapping measures are modified or discontinued for one species or habitat type, reassessment and modification of rebuilding strategies for the other species that were benefitting from those measures will be necessary.

4.2.4 How Management Measures Will be Implemented

Chapter 5 of the FMP addresses preparation and implementation of rebuilding plans and management measures. Specifically, the FMP says 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. The Council anticipates management measures for rebuilding plans will be implemented in the same manner as other management measures, either through the annual specifications process or federal rulemaking procedures.

4.3 Implementation of the Management Measures in 2000 and 2001 to Initiate Rebuilding

The Council adopted an OY of 93 mt for 2001 and 2002, of which 5 mt will be reserved for scientific research, and 88 mt will be shared equally between recreational and commercial fisheries. The Council recommended management measures for recreational and commercial fisheries for 2001 and prepared an analysis (EA/RIR) to accompany those recommendations. The Council specified these measures will be for two years only, at which time a new stock assessment will be prepared and evaluated. The Council intends to revisit this rebuilding plan and make any necessary revisions at that time.

5.0 ANALYSIS OF IMPACTS

5.1 Goals and objectives of the rebuilding plan

Under the status quo, no rebuilding plan would be adopted for canary rockfish. This alternative is not viable because it does not meet the requirements of federal law. Although the canary rockfish stock might rebuild under this alternative, there would be no clear and cohesive plan to accomplish rebuilding. Management measures would be developed in an ad hoc manner.

The only viable decision for the Council is to establish a rebuilding plan for canary rockfish. Under Alternative 2, the Council rebuilding plan would include goals and objectives based on those listed in Section 5.3.6.1 of the FMP. Specifically, the goals of the canary rockfish rebuilding program would be to:

> (1) achieve the population size and structure that will support the maximum sustainable yield within the rebuilding period, (2) establish a long term management program that has a high probability that total annual fishing mortality of canary rockfish will not exceed the specified amounts, (3) foster public education programs about the need to rebuild the canary rockfish population, and how individuals can help, and (4) protect the quantity and quality of habitat necessary to support the stock at healthy levels in the future.

5.2 Target Biomass

The rebuilding analysis estimates the $B_{40\%}$ female spawning biomass for the northern portion of the stock is in the range of about 6,000 mt (Alternative 2) to 13,600 mt (Alternative 3), depending on whether fishery selectivity is assumed to be asymptotic or dome-shaped. Scientists are unsure whether female canary rockfish have a higher natural mortality rate than males, or whether they move to habitat areas where fishers and research surveys cannot catch them at the same rate. The Council endorsed Alternative 2 (6,000 mt, Scenario 1) due to the absence of convincing evidence the older female canary rockfish actually exist but somehow escape capture. Further research and analysis may result in changing this initial estimate, or in determining B_{msy}.

Alternative 3 would set the target biomass at 13,600 mt. This biomass target is based on the assumption that older female canary rockfish are alive but for some reason caught at a much lower rate, giving the appearance their mortality rate is higher. Also, the analysis assumes only a fraction of the adult population is being sampled by the fishery and by research surveys, so the biomass estimate must be inflated to compensate. This leads to a larger estimate of current stock size, and also that the population has not been reduced as seriously as indicated by scenario 1.

5.3 Rebuilding Period

The Magnuson-Stevens Act requires the time period for rebuilding the fishery shall:

> (i) be as short as possible, taking into account the status and biology of any overfished stocks of fish, the needs of fishing communities ... and the interaction of the overfished stock of fish within the marine ecosystem; and (ii) not exceed 10 years, except in cases where the biology of the stock of fish, other environmental conditions ... dictate otherwise;

According to the rebuilding analysis for scenario 1 (adopted by the Council), the minimum time for the canary rockfish population to rebuild is 29 to 114 years, with the best estimate 41 years. The long period is due to the extremely depressed condition of the stock and the expected low level of recruitment in the future. The Council considered the needs of fishing communities in determining the length of the program. Specifically, the Council chose to lengthen the recommended rebuilding period by adding one mean generation time. This will allow fishers to catch a minimal number of canary rockfish, rather than prohibiting all fishing mortality. To implement a zero-impact strategy, the Council would need to prohibit all groundfish fishing (both commercial and recreational) in canary rockfish habitat areas. In addition, non-groundfish fisheries that take canary rockfish incidentally (i.e., bycatch fisheries) would also need to be curtailed. This would require either preemption of state management authority or development of an FMP for other fish species that inhabit the outer continental shelf. The rebuilding period of 57 years is based on 6,000 mt as the target biomass and the assumptions that current biomass is 8.7% of the unfished level and future recruitment will be at a moderate level. The rebuilding rates are based on random resampling of recruits per spawner (R/S) observed in 1978-1999. For the years 1996-1998, recruitment was set at 75% of the level initially estimated in the stock assessment (labeled MR for medium recruitment). This 75% level is intermediate between the 100% level (HR) and the 50% level (LR) presented as alternatives in the stock assessment. In terms of absolute recruitment, the 75% level is intermediate between the moderate recruitment level observed during the early 1980s and the low level observed during 1987-1995.

It is impossible to accurately predict future recruitment, and the best that scientists can do is make a best guess based on what has occurred in the past. Canary rockfish recruitment has been inconsistent, ranging from low levels that barely maintain the population, up to higher levels that could support more rapid rebuilding. For most of the years covered by the assessment, recruitment was low, but the last three years in the sequence appear substantially higher, perhaps unnaturally high. Typically, it takes several years to verify year-class (recruitment) strength, and verification of recent recruitment has not yet occurred. The Council did not want to ignore recent recruitment, in part because it offers a ray of hope the stock will rebuild. Also, there is evidence the ocean environment for canary rockfish and other groundfish has improved in recent years. Specifically, recent average ocean temperature is cooler than it has been since 1976. This ocean temperature should be beneficial to rockfish reproduction, and is consistent with the initial estimates of recruitment in the stock assessment. If we knew for certain that future recruitment will be low (less than this intermediate level), the conclusion would be that the stock will not recover unless harvest is reduced to about 13 mt per year. Some model runs indicate the stock would not recover even if humans inflict zero mortality on the canary rockfish stock, unless recruitment improves. If we knew for certain that future recruitment will be high (near the estimated recent levels), harvests could be up to 150 mt and the stock would still rebuild in 42 years. If future recruitment is similar to the low levels of the late 1980s to mid 1990s, the recovery rate would be even lower than estimated for scenario 1. Not more than 15 mt of mortality could be sustained by the population without further depressing the stock. On the other extreme, if recruitment is near the high end, harvest could be set at 185 mt and the stock would have a 51% likelihood of rebuilding in 45 years.

The Council's proposed rebuilding period is reasonable. In 2001, NMFS will conduct another groundfish survey that should help verify the strength of recent recruitment. If recruitment in 1996-2000 is observed to be near the initial estimates, the rebuilding period would be shorter than expected. If recent recruitment is lower than the initial estimates, the rebuilding period would be longer.

5.4 Harvest Rate Policy

In previous years, when directed fisheries for canary rockfish were allowed, harvest levels (OYs) were set in accordance with the standard ABC/OY method in the FMP. That method applies the MSY harvest rate (or a proxy value, currently $F_{50\%}$) to the estimated biomass, and then making an adjustment based on the ratio of current to historic abundance.

Alternative 1, the default method, would set harvest levels based on the $F_{50\%}$ harvest rate (the current MSY proxy), as adjusted by the default OY control rule in the FMP. Alternative 2 (adopted by the Council) sets the harvest level at 93 mt coastwide for the first two years of the rebuilding program and potentially for the entire 57 year rebuilding period. Realistically, however, this will be recalculated in 2002 for 2003. Alternative 3 would set the annual harvest as a fixed fraction of the population for the duration of the rebuilding period. This would allow increased harvest as the population rebuilds. Alternative 4 would prevent all harvest of canary rockfish, leaving only natural mortality to determine stock size. Alternative 5 would prohibit all fishing for canary rockfish and all retention of any canary rockfish caught incidentally to other fishing strategies. Alternative 6 would set the OY at 185 mt (plus an adjustment for the southern portion of the stock), based on scenario 2 and optimistic assumptions of future recruitment.

Alternative 1 was rejected because it sets OY at zero when the population is below 10% of initial biomass. Thus, in the short term, all fishing would be prohibited, including all incidental harvest. The Council could not accept this due to the severe impacts on fishing communities that would suffer not only the loss of canary rockfish landings and other shelf groundfish, but also the loss of non-groundfish landings such as pink shrimp. An additional impediment is that the Council lacks management authority to control the pink shrimp fishery, as well as other commercial non-groundfish fisheries that take incidental amounts of canary rockfish. Alternative 4 suffers the same problem. Alternative 3 (fixed fraction) is similar, but would allow a minimal take of canary rockfish in the short term. This option was rejected because the allowable harvest of canary rockfish would be only about 20 mt, and this also was viewed as an unacceptable burden on fishing communities. Alternative 5 would be less severe than Alternatives 1 and 4 but would still impose an unacceptable burden on fishing communities and would not necessarily keep harvest low enough to allow rebuilding. It would allow incidental fisheries to continue, and reduce directed fisheries as necessary to keep total catch to the specified levels. Alternative 6 would allow the largest harvest of the alternatives. If the model this alternative is based on is correct (or most nearly correct), the harvest of 185 mt per year would allow rebuilding within the designated period, and commercial and recreational fisheries would be better able to prosecute other shelf groundfish stocks. However, if the low recruitment assumption is correct, harvest of 185 mt for even a few years would greatly depress the stock. The Council adopted Alternative 2 because it allows for minimal harvest in the short term and, if harvest can be kept constant over the years, the stock is expected to rebuild in the specified time period. Alternative 2 allows less than half the harvest of Alternative 6 and is thus much more risk-averse. However, Alternative 2 anticipates a constant annual harvest; as the stock rebuilds, this constant harvest amount will translate into a smaller and smaller fraction of the total population. It is possible future losses by the commercial and recreational fisheries would exceed the short term costs. The Council considered this a viable compromise, stating the known short term cost to fishing communities would be extreme, while it is possible the impact on the stock would be minimal. That is, the Council believes a harvest of less than 93 mt cannot be achieved without elimination of at least a portion of the commercial fishing industry, perhaps a substantial portion. On the other hand, if the estimates of increased recruitment are verified, the stock is in substantially less danger than otherwise indicated. The Council was unwilling to take the chance of eliminating recreational and commercial fisheries. The Council specifically stated its intention to review the rebuilding analysis and recalculate harvest in 2003 based on updated estimates of recent recruitment and/or revised estimates of future recruitment resulting from the NMFS survey.

5.4 Bycatch Controls Strategies

The main sources of bycatch of canary rockfish are believed to be trawl gear (commercial) and hook-and-line gear (both commercial and recreational) on the continental shelf, especially in rocky habitat areas. The pink shrimp fishery, which uses small mesh trawl gear, is a major source of canary rockfish bycatch.

The current management regime reflects substantial restrictions implemented for commercial and recreational fisheries in 2000 and 2001. These include bag limit reductions in waters off each of the three coastal states, time/area closures for recreational fishers in waters off California, commercial trawl gear restrictions to make fishing impractical in rocky areas of the continental shelf, and substantially reduced trip limits for commercial trawl and hook-and-line vessels. In addition, time/area closures are established for commercial hook-and-line vessels in California, concurrent with recreational closures. An alternative strategy, which would establish broad time/area closures to eliminate fishing where canary rockfish are likely to be encountered, was rejected due to the severe impacts on fishing communities.

The Council also considered a strategy to reduce canary rockfish bycatch which requires pink shrimp trawl vessels to use bycatch reduction devices (commonly called finfish excluder devices) if they intend to land incidental amounts of groundfish captured when fishing for pink shrimp. Vessels not using such devices would be prohibited from retaining and landing any groundfish. The Council did not adopt this option because it would not necessarily reduce the incidental catch of canary rockfish, but would likely increase the percentage of groundfish bycatch (i.e. all groundfish caught by vessels without excluders would be discarded). Instead, the Council requested the states of Washington, Oregon, and California to consider state regulations to require such devices. If excluders are required by state law, canary rockfish incidental catch will most likely be reduced.

An alternative strategy being considered for groundfish species in general is full retention of bycatch in commercial groundfish fisheries. This strategy, applied to canary rockfish rebuilding, would prohibit target fishing for canary rockfish, but would require that all canary rockfish captured be retained and landed for counting. This alternative, if all vessels complied, would ensure full accounting for nearly all canary rockfish mortality by the commercial sector. Compliance is a major concern because, if canary rockfish landings exceed the commercial harvest ceiling, commercial groundfish closures would be inevitable. Thus, commercial vessel operators could feel substantial pressure to discard fish rather than retain them. An observer program or other monitoring program would be necessary to evaluate compliance.

Catch restrictions were implemented in 1999 to begin rebuilding the canary rockfish stock. The OY was reduced to 200 mt in 2000, and substantial landings restrictions (that meet the criteria of Alternative 2) were imposed on the commercial fleet. The effect was dramatic: commercial landings dropped more than 90% (**Figure 5-1**). ODFW undertook a comparison of trawl logbooks from 1999 and the first part of 2000 to determine if trawl vessel fishing locations changed. The preliminary results indicated trawl vessels avoided many rocky areas on the continental shelf, as anticipated, with a commensurate drop in canary rockfish catch. The amount of actual catch reduction is less clear because there is no system to record or observe discarded amounts of groundfish. Not all canary rockfish caught by commercial fishers in 2000 were landed (and perhaps not during 1999). The Council's Groundfish Management Team (GMT) has expressed concern that commercial fishers may be discarding all or nearly all of their canary rockfish catch, even the amounts they could legally retain and sell. The GMT is concerned the fleet may believe it is better to throw all the canary rockfish away than to risk reaching the OY early, which would trigger additional restrictions and potential closure of the entire fishery. It is clear that verification of total catch is necessary in order to monitor the effectiveness of the rebuilding program and the management measures used to achieve it. Absent a monitoring system, the Council and NMFS will have to develop alternative methods to ensure that total catch does not exceed 93 mt or whatever harvest ceilings might be set in the future.

Alternative 2 does not require exactly the same bycatch reduction measures be continued indefinitely. When an effective onboard observation program has improved the estimates of incidental catch, measures can be fine-tuned to improve effectiveness of bycatch reduction measures and potentially reduce the social and economic impacts on the commercial fleet.

5.5 Interaction with Other Overfished Stocks and Rebuilding Plans

The geographic and habitat distribution of canary rockfish overlaps those of lingcod and southern bocaccio rockfish, both of which also inhabit the continental shelf and have been declared overfished. Commercial lingcod catches are generally highest in the depth range of 70-150 m, which is shallower than the primary range of canary rockfish. Bocaccio is classified as a middle shelf-mesobenthal species, inhabiting depths between 50 and 300 meters. Most common depths are 100 to 150 meters over the outer continental shelf. The southern bocaccio stock extends from Mexico north to about Cape Mendocino, California, and thus overlaps the southern portion of the canary range. Management measures to reduce the take of lingcod, especially measures that reduce fishing in rocky areas of the continental shelf, are also likely to benefit canary rockfish. In California, bag limits to reduce targeting on bocaccio may also reduce catch of canary rockfish. The degree of benefit from such measures is subject to conjecture.

6.0 CONSISTENCY WITH THE FMP AND OTHER APPLICABLE LAWS

6.1 Consistency with the FMP

The Pacific Coast Groundfish FMP states that

> "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. A new rebuilding plan or revision to an existing plan proposed by the Council will generally 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."

All management actions recommended by the Council are evaluated for consistency with the goals, objectives and procedures of the FMP.

<u>Goals and Objectives of the FMP</u>

The Council is committed to developing long-range plans for managing the Pacific Coast groundfish fisheries that prevent overfishing and loss of habitat, yet provide the maximum net value of the resource, and achieve maximum biological yield. The Council has prepared this rebuilding plan, consistent with the requirements and standards of the FMP. The status quo alternative (no rebuilding plan) is inconsistent with the resource conservation and utilization goals and standards of the FMP, as well as the requirement to prepare rebuilding plans for overfished groundfish stocks.

<u>Goal 1- Conservation:</u> Prevent overfishing by managing for appropriate harvest levels, and prevent any net loss of the habitat of living marine resources.

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

The target biomass and rebuilding period alternatives 2 and 3 are consistent with this objective. However, preferred Alternative 2 is a more risk-averse approach, and assumes the stock is more depressed than Alternative 3. Alternative 1 would establish an ad-hoc approach that lacks the certainty of the other alternatives.

All of the harvest rate policy alternatives (1-6) would establish harvest specifications consistent with the Council's resource responsibilities. Alternative 1 follows the default OY methodology in the FMP, and would result in zero harvest for several years until the population reaches 10% of the initial biomass. Alternative 4 also sets harvest at zero and would keep it there for the duration of the rebuilding period. In the short term, these two alternatives would result in the fastest initial steps toward rebuilding. Alternative 4 would continue the zero harvest policy and result in the fastest rebuilding. Alternative 1 may be the second fastest, but this would depend on whether the proposed total catch levels are actually achieved (bycatch amounts must be considered as well). Alternative 5 could result in a faster rebuilding program than Alternative 1 if bycatch is kept near zero throughout the period. Alternative 6, by allowing the largest harvests in the short term, runs the greatest risk of impeding the rebuilding process. However, if the assumptions are correct, rebuilding would occur within the required time frame. Preferred Alternative 2 runs a moderate risk of impeding the rebuilding period if the most pessimistic assumptions prove to be true. However, a built in re-evaluation in 2003 reduces the risk; stock assessment advisors assured the Council that harvest of 98 mt for two years would slightly delay rebuilding, at worst.

<u>Objective 3</u>. 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.

Alternative 1 under "Goals and Objectives of the Rebuilding Plan" (status quo) would not be consistent with this FMP objective. The preferred alternative is consistent with 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.

FMP Section 6.6.3. The Council may use any of the following management measures to minimize adverse effects on EFH from fishing, if there is evidence that a fishing activity is having an identifiable adverse effect on EFH ...

- Fishing gear restrictions
- Time/area closures
- Harvest limits
- Other

Deleterious impacts of fishing gear on the EFH of Pacific coast groundfish have not been documented, although there is substantial evidence that impacts occur in other areas, and that in some cases the impacts may be significant (Sumaila et al. 2000). The management measures recommended by the council in this rebuilding plan are consistent with identification and protection of canary rockfish habitat. The foot rope diameter restriction functionally excludes trawl gear from most important canary rockfish habitat (4.2.4.5). Establishing a framework for designating Habitat Areas of Particular Concern will allow identification and protection of important canary rockfish habitat (4.2.4.5). Development of habitat based survey methods will also help identify important canary rockfish habitat (4.2.8). Research into the impacts of fishing gear on benthic habitat will provide information that can be used to evaluate the need for further habitat protection measures.

Goal 2 - Economics

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**.

Harvest rate policy Alternative 1 follows the default OY methodology in the FMP, and would result in zero harvest for several years until the population reaches 10% of the initial biomass. Alternative 4 also sets harvest at zero and would keep it there for the duration of the rebuilding period. In the short term, these two alternatives would result in massive closures of the commercial groundfish fishery and would require elimination of certain non-groundfish fisheries as well. Alternative 4 would continue this zero harvest policy for the entire rebuilding period; when the canary stock recovers, there would be little left of the commercial groundfish fishing sector except participants who operate in the narrow nearshore belt or deepwater fisheries. Alternative 3, which sets harvest at a fixed fraction, would also result in near elimination of the groundfish fishery on the continental shelf for a period of years. However, as the stock recovers and biomass builds, harvest levels would increase (similar to Alternative 1). Alternative 5 by itself would not affect fishing as much; vessels would not be allowed to fish for or keep any canary rockfish. However, they could continue to fish as usual and just discard all canary rockfish. There is a social cost related to economic impact of discarding valuable fish. There is also a social cost about the morality of killing fish that are needed by the canary rockfish population in order to rebuild. The greater the bycatch/discard rate, the longer these social impacts would continue. However, fishing and marketing opportunities for other species would be available, consistent with this FMP objective. Alternative 6 would allow the largest harvest of the six alternatives, and result in the greatest opportunity to pursue a year-round fishery for rockfish and other species. However, if the optimistic assumptions prove to be false, Alternative 6 runs the greatest risk of total, long-term closure for a longer period than any other alternative. Alternative 2 (preferred) balances the short term risk to the fishing industry and year-round fishing and the stock rebuilding needs. It provides for non-groundfish fisheries to continue nearly at status quo levels. In these ways, it is superior to the other alternatives.

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

Bycatch Control Strategy alternatives 1 and 3 address the use of gear restrictions. Alternative 1 envisions the use of restrictions on the type of bottom trawl gear (footrope and chafing gear) and recreational hook limits, which reduce the need for other management measures. Alternative 3 addresses gear requirements to reduce bycatch in the pink shrimp fishery. Each of these alternatives would reduce the need for broad area closures, shorter seasons, or other measures that could be used to reduce harvest of canary rockfish.

Goal 3 - Utilization

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.

Bycatch Control Strategy Alternatives 1 and 2 address this objective. Under Alternative 1 (status quo), the minor rockfish species are combined into groups of interrelated species, and trip limits are set in rough proportion to how the fish are caught. Trawl footrope requirements address the rockfish assemblages as well. By requiring the use of small footropes, most shelf rockfish (including canary rockfish) are protected from harvest by trawl gear. Alternative 2 would take a different approach, closing broad areas where canary rockfish occur. However, many non-associated species, particularly healthy flatfish stocks, would likely be unavailable for harvest. If canary rockfish occurred in distinct, well-defined locations, Alternative 2 might be an effective management approach.

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.

The same discussion of Alternatives 1 and 2 for FMP objective 10 apply here. Bycatch Control Strategy Alternative 4 would reduce discard by requiring all canary rockfish to be retained. However, it is likely that sale of these fish would be prohibited, and thus they would be considered bycatch under the definitions of the Magnuson-Stevens Act and FMP. The basic trip limit management approach requires fishers to discard all fish in excess of the specified limits, which encourages discard, especially if compared to a management system that would require fishers to retain all fish they catch.

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.

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.

Goals and Objectives Alternative 2 (the preferred alternative) and Harvest Policy Alternative 2 (preferred) consider the tradeoffs between short term impact on fishing communities, recreational fishers and commercial fishers, and impacts on the canary rockfish resource. By setting an OY of 93 mt for two years (Harvest Policy Alternative 2), a minimal level of fishing will be allowed. Under the default OY control rule in the FMP (Harvest Policy Alternative 1), the annual harvest of canary rockfish would be set at zero because the stock is below 10% of its unfished level. No harvest, or a very small harvest, would be allowed for a number of years. After a number of years, harvest levels would gradually increase as the stock recovers. However, due to elimination of most commercial fishing activities on the continental shelf for a period of years, much of the commercial groundfish industry would likely have been eliminated also. Recreational groundfish fishing opportunities would also be nearly eliminated, the exception being in nearshore waters and in southern California (south of the canary rockfish distribution).

6.2 Likely Impacts on Other Management Measures and Other Fisheries

Harvest reductions that would be imposed by all the Harvest Rate Policy alternatives would continue the trend of reduced groundfish fishing opportunities for the commercial fishing sector. Under Alternatives 1, 3 and 4, commercial groundfish fishing on the continental shelf would be substantially eliminated, and fishers would respond either by leaving the fishing industry or searching for alternative fishing opportunities. Three primary alternatives are the pink shrimp trawl fishery, the Dungeness crab pot (trap) fishery, and the albacore hook-and-line fishery. Increased participation in the pink shrimp fishery could easily result in increased bycatch of canary rockfish. However, if the canary rockfish OY were set at zero, efforts to eliminate bycatch in the pink shrimp and other shelf fisheries would have to be considered. Such restrictions could also affect salmon fishing opportunities, potentially pushing the fishery into deeper water beyond the range of canary rockfish.

6.3 Economic Impacts, Particularly on the Cost to the Fishing Industry

The economic impacts and costs to the industry have been addressed in sections 5.1, 5.2, 5.3, and 5.4.

6.4 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Act provides parameters and guidance for federal fisheries management, requiring that the Councils and NMFS adhere to a broad array of policy ideals. Overarching principles for fisheries management are found in the Act's National Standards. In crafting rebuilding plans for overfished stocks and fisheries management regimes to implement those plans, the Councils and NMFS must balance their recommendations to meet these different national standards.

The Council's recommendations were driven by Section 304 (e) of the Act, which requires that Councils rebuild species that have been designated as overfished.

"Goals and Objectives of the Rebuilding Plan" Alternative 1 and "Target Biomass land Rebuilding Period" Alternative 1 do not meet this mandate.

Managing to protect canary rockfish while also allowing the fisheries to have access to healthy stocks has been a challenging goal for the Council and has illustrated some of the conflicts that arise from trying to meet several different National Standards in one regulatory package. The following National Standards were of particular concern to the Council as it worked on the rebuilding plan and initial implementing management measures:

National Standard 1 requires 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." Harvest Rate Alternative 5 would not prevent overfishing, but only prohibit retention, the primary reason for its rejection. Alternatives 1, 2, 3, and 4 would prevent overfishing, but Alternative 2 is the most balanced alternative for achieving the optimum yield from healthy stocks while still protecting canary rockfish.

National Standard 2 requires the use of the best available scientific information. In every case, the Council adheres to this standard. However, too often the best available scientific information is inadequate for informed decision making. Therefore, the Council generally follows a risk-averse path.

National Standard 6 requires that "Conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches." "Goals and Objectives of the Rebuilding Plan" Alternative 1 does not establish a rebuilding plan, and therefor does not meet this standard. However, Alternative 2 does, as the initial implementation measures demonstrate. This is particularly evident in the state-specific management measures for recreational fisheries adopted in the 1999-2000 and 2000-2001 annual specifications processes. Under the initial rebuilding plan implementation measures, each state brings recreational fishery management measures to the Council that are designed to match the needs of the fisheries in those states, and to recognize the different effects that different State fisheries have on overfished species. Commercial management measures have also been designed to account for the differences in fishing activities in various parts of the coast.

While the Council's primary goal in crafting specifications and management measures for 2001 was to protect overfished species, it did so with an eye to how those measures would affect the various fisheries that incidentally take overfished species. Protecting canary rockfish from incidental capture was particularly challenging, as this species can be taken in almost every West Coast fishery: at-sea whiting, state-managed pink shrimp trawl fisheries, salmon troll fisheries, directed commercial groundfish fisheries, and recreational fisheries. Management measures for 2001 are intended, in part, to distribute the burdens of canary rockfish protection among these fleets, while still ensuring that these fleets have some access to the their target stocks, where those stocks are viable.

National Standard 8 provides protection to fishing communities: "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."

Each of the rebuilding time periods under consideration are extended to provide a degree of relief to fishing communities. However, harvest rate policy alternatives 1, 3, 4, and 5 would essentially close down most commercial fishing on the continental shelf for a period of at least a few years. These alternatives were rejected due to their impacts on West Coast fishing communities and associated industries.
Implementing rebuilding measures for West Coast groundfish has been difficult on the Socioeconomic structure of fishing communities. In January 2000, the Secretary of Commerce declared West Coast groundfish fisheries to be a "federal fishery failure." There are two components that need protection in a federal fishery failure, the depleted fish stocks and the fishing communities that have traditionally depended on those stocks. For fishing communities to survive and thrive, West Coast groundfish stocks must be healthy. Where fish stocks are not healthy, the Council must consider even more carefully the economic burdens created by its policies. The 2001 annual specifications and management measures, which are consistent with this proposed canary rockfish rebuilding plan, are intended to provide as much access to healthy groundfish and non-groundfish stocks as possible while protecting overfished stocks. Numerous management measures have been recommended to soften the burden of rebuilding on fishing communities, particularly including area-specific regulations for recreational fisheries and for some of the smaller commercial fisheries.

National Standard 9 requires that conservation and management measures minimize bycatch and minimize the mortality of bycatch. As discussed above, measures to protect overfished species are essentially designed to prevent vessels from directed and incidental catch of those species, and where incidental catch is unavoidable, to allow some minimal retention. Recreational and commercial hook-and-line fisheries shelf rockfish have recently been closed for several months in central California to protect those species from incidental capture. The states have been asked to introduce fish excluder devices in the pink shrimp fisheries to reduce rockfish bycatch. For deepwater species, the Council recommends using updated bycatch rates for longspine and shortspine thornyheads, and for sablefish. These updated rates are expected to better reflect the actual encounter rates in the fishery. All of these measures are expected to either minimize bycatch and bycatch mortality, or to better account for unavoidable bycatch.

Essential Fish Habitat (EFH)

The Magnuson-Stevens Act defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." EFH for WOC groundfish is further defined in Amendment 11 to the Pacific Coast FMP as "the entire EEZ and marine coastal waters inshore of the EEZ." NMFS guidelines (62 FR 66553, December 19, 1997) state that "adverse effects from fishing may include physical, chemical, or biological alterations of the substrate, and loss of, or injury to, benthic organisms, prey species and their habitat, and other components of the ecosystem..." The proposed action under each alternative would allow commercial fishers to land several groundfish species only if they use trawl gear that is ineffective in rocky areas inhabited by canary rockfish and other depleted species. This should result in reduced impacts on the physical environment, particularly the rocky shelf strata. None of the alternatives are expected to have significant adverse impacts on EFH.

6.5 Paperwork Reduction Act (PRA)

None of the alternatives require collection-of-information subject to the PRA.

6.6 Endangered Species Act (ESA)

NMFS issued Biological Opinions under the ESA on August 10, 1990, November 26, 1991, August 28, 1992, September 27, 1993, May 14, 1996, and December 15, 1999 pertaining to the effects of the groundfish fishery on chinook salmon (Puget Sound, Snake River spring/summer, Snake River fall, upper Columbia River spring, lower Columbia River, upper Willamette River, Sacramento River winter, Central Valley, California coastal), coho salmon (Central California coastal, southern Oregon/northern California coastal, Oregon coastal), chum salmon (Hood Canal, Columbia River), sockeye salmon (Snake River, Ozette Lake), steelhead (upper, middle and lower Columbia River, Snake River Basin, upper Willamette River, central California coast, California Central Valley, south-central California, southern California), and cutthroat trout (Umpqua River, southwest Washington/Columbia River). The biological opinions have concluded that implementation of the FMP for the Pacific Coast groundfish fishery is not expected to jeopardize the continued existence of any endangered or threatened species under the jurisdiction of NMFS, or result in the destruction or adverse modification of critical habitat. NMFS has re-initiated consultation on the Pacific whiting fishery associated with the Biological Opinion issued on December 15, 1999. During the 2000 whiting season, the whiting fisheries exceeded the chinook bycatch amount specified in the Biological Opinion's incidental take statement's incidental take estimates, 11,000 fish, by approximately 500 fish. The re-initiation will focus primarily on additional actions that the whiting fisheries would take to reduce chinook interception, such as time/area management. NMFS expects that the re-initiated Biological Opinion will be complete by May 2001. During the re-initiation, fishing under the FMP is within the scope of the December 15, 1999 Biological Opinion, so long as the annual incidental take of chinook stays under the 11,000 fish bycatch limit. The biological opinions have concluded that implementation of the FMP for the Pacific Coast groundfish fishery is not expected to jeopardize the continued existence of any endangered or threatened species under the jurisdiction of NMFS, or result in the destruction or adverse modification of critical habitat. This action is within the scope of these consultations.

6.7 Marine Mammal Protection Act (MMPA)

Under the MMPA, marine mammals whose abundance falls below the optimum sustainable population level (usually regarded as 60% of carrying capacity or maximum population size) can be listed as "depleted". Populations listed as threatened or endangered under the ESA are automatically depleted under the terms of the MMPA. Currently the Stellar sea lion population in the WOC is listed as threatened under the ESA and the fur seal population is listed as depleted under the MMPA. Incidental takes of these species in the Pacific coast fisheries are well under the annual PBR. None of the proposed management alternatives are likely to affect the incidental mortality levels of species protected under the MMPA.

The WOC groundfish fisheries are considered category III fisheries where the annual mortality and serious injury of a stock by the fishery is less than or equal to 1 percent of the PBR level. Under all the alternatives, it is likely that information regarding the incidental take of marine mammals in the groundfish fishery will continue to be limited.

6.8 Coastal Zone Management Act (CZMA)

Section 307(c)(1) of the Federal Coastal Zone Management Act (CZMA) of 1972 requires all federal activities which directly affect the coastal zone be consistent with approved state coastal zone management programs to the maximum extent practicable. Under the CZMA, each state develops its own coastal zone management program which is then submitted for federal approval. This has resulted in programs which vary widely from one state to the next. Because the proposed action is to prevent overfishing and achieve the OY for the available groundfish resource, the Council believes that it is consistent with each state's coastal management program.

6.9 Executive Orders 12866 and 13132

None of the recommended changes to annual specifications and management measures for 2001 would be a significant action according to E.O. 12866. This action will not have a cumulative effect on the economy of $100 million or more nor will it result in a major increase in costs to consumers, industries, government agencies, or geographical regions. No significant adverse impacts are anticipated on competition, employment, investments, productivity, innovation, or competitiveness of U.S.-based enterprises.

None of the alternative actions would have federalism implications subject to E.O. 13132.

Table 6. Summary of Potential Impacts from Alternative Actions

	Goals and Objectives Alternatives	Target Biomass and Rebuilding Period Alternatives	Harvest Rate Policy Alternatives	Bycatch Control Strategy Alternatives
	Substantial Impacts Expected?	Substantial Impacts Expected?	Substantial Impacts Expected?	Substantial Impacts Expected?
Coastal Zone	No	No	No	No
Public Health and Safety	No	No	No	No
Unique Geographical Characteristics	No	No	No	No
Historical/Cultural Impacts	No	No	No	No
Endangered/Threatened Species	No	No	No	No
Uncertainty or Unique/Unknown Risks	No	No	No	No
Existing Habitat Protection Laws	No	No	No	No
Essential Fish Habitat	No	No	No	No
Marine Mammals	No	No	No	No
Seabirds	No	No	No	No

7.0 CONCLUSIONS OR FINDINGS OF NO SIGNIFICANT IMPACT

This action would establish a rebuilding plan for canary rockfish in accordance with the Pacific Coast Groundfish Fishery Management Plan. The rebuilding plan will provide guidance in the development and implementation of management measures until the canary rockfish stock has fully recovered or until this rebuilding plan is amended in accordance with the FMP. To implement the rebuilding plan, annual fishery specifications and the management measures designed to rebuild this overfished stock will be established. Harvest levels of canary rockfish will be achieved through constraining direct and incidental mortality, while achieving as much of the OYs as practicable for healthier groundfish stocks managed under the FMP. Under Magnuson-Stevens Act requirements for protecting overfished species, managing to keep directed and incidental catch of overfished species at levels that will allow those species to rebuild their populations has become the Council's first priority for setting annual specifications and management measures for all West Coast groundfish. For 2001, commercial landings limits and recreational bag limits have been reduced, and time/area closures have been expanded. These fisheries have been operating under protective measures for several years.

Based on the biological, physical and socioeconomic impacts of the alternatives that have been assessed in this document, it has been determined that implementation of the proposed rebuilding plan would not significantly affect the quality of the human environment. Therefore, the preparation of an environmental impact statement for the proposed action is not required by Section 102 (2) (C) of the National Environmental Policy Act or its implementing regulations.

Assistant Administrator for Fisheries, NOAA | Date

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TABLE 3-1 Acceptable biological catch (ABC)/optimum yield (OY) results from combining northern and southern assessments for canary rockfish.

	Northern Assessment		Southern Assessment	Combined Assessments			
	Scenario 1	Scenario 2		Scenario 1	Scenario 2		
Unfished spawning biomass	13,998	29,107	6,850	20,848	35,957		
Current spawning biomass	949	6,663	529	1,478	7,192		Average of the two assessments
% unfished spawning biomass	6.8%	22.9%	7.7%	7.1%	20.0%		
$F_{40\%}$ Yield	214	**283**	73	287	**356**	ABC -upper	322
40-10 multiplier	0%	43%	0%	0%	33%		
$F_{40\%}$ 40-10 Yield	0	122	0	0	119		59
$F_{45\%}$ 40-10 Yield				0	**102**	OY - upper 51	

NOTE: The default ABC harvest rate is now $F_{50\%}$, so this table overestimates ABC and OY.

TABLE 3-2. Groundfish landings (mts) for 1994-1999 and projected landings for 2000, by species group and management area.

Area/Species	1994	1995	1996	1997	1998	1999	2000	Percentage Change From 94-00	97-00	99-00
Coastwide										
Sablefish	7,579	7,905	8,317	7,942	4,372	6,645	4,300	-43%	-46%	-35%
Pacific whiting	248,815	174,771	191,355	230,468	231,358	223,926	200,935	-19%	-13%	-10%
Lingcod	1,904	1,467	1,557	1,568	349	357	130	-93%	-92%	-64%
Dover sole	9,359	10,565	12,187	10,117	8,004	9,137	8,500	-9%	-16%	-7%
Other flatfish	8,186	7,672	7,173	8,103	7,457	9,710	6,500	-21%	-20%	-33%
Longspine Thornyhead	4,385	5,411	4,596	3,935	2,249	1,791	1,700	-61%	-57%	-5%
Shortspine Thornyhead	3,282	1,946	1,798	1,453	1,213	808	650	-80%	-55%	-20%
Thornyheads (Mixed)	382	197	138	109	49	46	50	-87%	-54%	9%
Total thornyheads	8,049	7,554	6,533	5,498	3,511	2,645	2,400	-70%	-56%	-9%
Nearshore rockfish	734	690	616	693	608	438	260	-65%	-62%	-41%
Shelf rockfish	17,699	16,771	16,461	13,436	10,339	8,195	5,880	-67%	-56%	-28%
Slope rockfish	4,033	3,600	3,628	3,408	4,160	1,375	730	-82%	-79%	-47%
Unsp. rockfish	1,063	918	962	746	1,144	806	80	-93%	-89%	-90%
Total rockfish	31,578	29,533	28,200	23,780	19,762	13,458	9,350	-70%	-61%	-31%
Other groundfish	3,297	1,972	2,449	2,185	1,915	1,489	1,800	-45%	-18%	21%
Total groundfish	310,717	233,885	251,236	284,162	273,218	264,724	231,515	-25%	-19%	-13%
Total excluding whiting	61,902	59,114	59,882	53,695	41,860	40,797	30,580	-51%	-43%	-25%
Monterey and Conception INPFC Areas										
Sablefish	1,224	1,820	2,160	1,822	833	1,151	689	-44%	-62%	-40%
Pacific whiting	3	1	71	1	2	0	5	38%	431%	881%
Lingcod	462	376	355	372	98	84	19	-96%	-95%	-77%
Dover sole	3,094	4,351	4,564	3,844	1,844	2,184	1,789	-42%	-53%	-18%
Other flatfish	1,674	1,874	1,906	2,006	1,366	1,490	902	-46%	-55%	-39%
Longspine Thornyhead	813	1,350	1,081	1,041	616	564	498	-39%	-52%	-12%
Shortspine Thornyhead	823	665	701	487	350	266	198	-76%	-59%	-25%
Thornyheads (Mixed)	110	191	137	93	48	35	21	-81%	-78%	-40%
Total thornyheads	1,746	2,206	1,920	1,622	1,014	865	718	-59%	-56%	-17%
Nearshore rockfish	400	383	331	322	299	199	90	-77%	-72%	-55%
Shelf rockfish	4,157	4,499	3,826	4,233	2,804	1,505	580	-86%	-86%	-61%
Slope rockfish	1,197	1,273	1,435	1,499	2,378	283	130	-89%	-91%	-54%
Unsp. rockfish	155	63	187	98	151	224	40	-74%	-59%	-82%
Total rockfish	7,655	8,425	7,699	7,773	6,646	3,076	1,558	-80%	-80%	-49%
Other groundfish	372	492	1,195	718	651	453	390	5%	-46%	-14%
Total groundfish	14,484	17,339	17,950	16,536	11,439	8,439	5,352	-63%	-68%	-37%
Total excluding whiting	14,481	17,338	17,879	16,535	11,438	8,438	5,347	-63%	-68%	-37%
Vancouver-Columbia-Eureka INPFC Areas										
Sablefish	6,355	6,085	6,157	6,120	3,539	5,494	3,611	-43%	-41%	-34%
Pacific whiting	248,812	174,769	191,284	230,467	231,356	223,926	200,933	-19%	-13%	-10%
Lingcod	1,442	1,091	1,202	1,196	251	273	111	-92%	-91%	-59%
Dover sole	6,265	6,214	7,622	6,273	6,160	6,952	6,711	7%	7%	-3%
Other flatfish	6,512	5,798	5,267	6,097	6,092	8,220	5,598	-14%	-8%	-32%
Longspine Thornyhead	3,572	4,061	3,515	2,894	1,633	1,228	1,202	-66%	-58%	-2%
Shortspine Thornyhead	2,459	1,282	1,097	966	863	541	451	-82%	-53%	-17%
Thornyheads (Mixed)	272	6	1	15	1	11	29	-89%	87%	159%
Total thornyheads	6,303	5,348	4,613	3,876	2,497	1,780	1,682	-73%	-57%	-5%
Nearshore rockfish	335	306	285	371	309	239	170	-49%	-54%	-29%
Shelf rockfish	13,542	12,272	12,635	9,203	7,535	6,690	5,300	-61%	-42%	-21%
Slope rockfish	2,836	2,326	2,193	1,909	1,782	1,092	600	-79%	-69%	-45%
Unsp. rockfish	908	855	775	649	993	582	40	-96%	-94%	-93%
Total rockfish	23,923	21,108	20,501	16,007	13,116	10,383	7,792	-67%	-51%	-25%
Other groundfish	2,924	1,480	1,253	1,467	1,264	1,037	1,410	-52%	-4%	36%
Total groundfish	296,233	216,546	233,286	267,626	261,778	256,285	226,166	-24%	-15%	-12%
Total excluding whiting	47,421	41,776	42,002	37,160	30,422	32,359	25,233	-47%	-32%	-22%

TABLE 3-3. Real ex-vessel revenue ($1,000s, 2000=1) from groundfish for 1994-1999 and projected revenue for 2000, by species group and management area.

Area / Species	1994	1995	1996	1997	1998	1999	2000	Percentage Change From 94-00	97-00	99-00
Coastwide										
Sablefish	15,319	25,510	27,579	29,195	11,732	17,405	11,597	-24%	-60%	-33%
Pacific whiting	20,507	19,311	17,373	27,944	18,744	18,976	19,027	-7%	-32%	0%
Lingcod	1,934	1,618	1,714	1,740	591	639	325	-83%	-81%	-49%
Dover sole	6,767	8,255	8,855	6,857	6,236	6,759	6,491	-4%	-5%	-4%
Other flatfish	6,835	7,678	7,238	7,595	6,182	6,662	7,278	6%	-4%	9%
Longspine Thornyhead	7,895	12,656	8,963	6,658	3,336	3,127	3,396	-57%	-49%	9%
Shortspine Thornyhead	5,670	5,107	4,087	2,970	2,277	1,944	1,653	-71%	-44%	-15%
Thornyheads (Mixed)	755	495	378	357	169	112	134	-82%	-63%	19%
Total thornyheads	14,320	18,258	13,429	9,985	5,782	5,183	5,183	-64%	-48%	-0%
Nearshore rockfish	1,879	2,059	1,928	1,875	1,862	1,830	1,586	-16%	-15%	-13%
Shelf rockfish	16,128	15,855	14,516	12,186	10,207	7,966	6,002	-63%	-51%	-25%
Slope rockfish	3,469	3,403	3,146	2,661	3,432	1,126	738	-79%	-72%	-34%
Unsp. rockfish	1,197	1,064	1,260	917	1,396	1,271	267	-78%	-71%	-79%
Total rockfish	36,993	40,639	34,278	27,625	22,679	17,376	13,777	-63%	-50%	-21%
Other groundfish	1,895	1,732	1,950	2,019	2,253	1,943	2,063	9%	2%	6%
Total groundfish	90,250	104,743	98,987	102,976	68,417	69,760	60,558	-33%	-41%	-13%
Total excluding whiting	69,743	85,432	81,613	75,032	49,673	50,784	41,531	-40%	-45%	-18%
Monterey and Conception INPFC areas										
Sablefish	1,993	4,960	6,294	5,916	1,978	2,572	1,767	-11%	-70%	-31%
Pacific whiting	4	4	6	2	2	0	1	-76%	-43%	184%
Lingcod	541	474	468	470	197	192	65	-88%	-86%	-66%
Dover sole	2,186	3,293	3,206	2,497	1,390	1,590	1,264	-42%	-49%	-21%
Other flatfish	1,991	2,269	2,330	2,338	1,545	1,585	1,162	-42%	-50%	-27%
Longspine Thornyhead	1,473	3,284	2,174	1,819	1,034	1,099	1,139	-23%	-37%	4%
Shortspine Thornyhead	1,417	1,782	1,604	1,065	736	803	625	-56%	-41%	-22%
Thornyheads (Mixed)	276	484	375	327	168	89	66	-76%	-80%	-25%
Total thornyheads	3,167	5,551	4,153	3,211	1,938	1,991	1,830	-42%	-43%	-8%
Nearshore rockfish	1,473	1,619	1,529	1,346	1,476	1,316	904	-39%	-33%	-31%
Shelf rockfish	5,282	5,408	4,629	4,812	3,510	1,873	823	-84%	-83%	-56%
Slope rockfish	1,291	1,427	1,418	1,286	1,952	225	173	-87%	-87%	-23%
Unsp. rockfish	250	127	424	194	311	588	194	-23%	-0%	-67%
Total rockfish	11,464	14,131	12,154	10,850	9,188	5,994	3,924	-66%	-64%	-35%
Other groundfish	489	923	1,299	1,158	1,480	1,299	1,416	189%	22%	9%
Total groundfish	18,667	26,054	25,756	23,230	15,780	13,232	9,598	-49%	-59%	-27%
Total excluding whiting	18,663	26,050	25,751	23,229	15,778	13,231	9,597	-49%	-59%	-27%
Vancouver-Columbia-Eureka INPFC areas										
Sablefish	13,327	20,550	21,285	23,279	9,754	14,833	9,830	-26%	-58%	-34%
Pacific whiting	20,503	19,307	17,368	27,942	18,742	18,976	19,026	-7%	-32%	0%
Lingcod	1,393	1,144	1,246	1,271	394	447	260	-81%	-80%	-42%
Dover sole	4,582	4,962	5,649	4,360	4,846	5,169	5,228	14%	20%	1%
Other flatfish	4,843	5,409	4,908	5,257	4,637	5,078	6,116	26%	16%	20%
Longspine Thornyhead	6,421	9,372	6,790	4,840	2,303	2,028	2,257	-65%	-53%	11%
Shortspine Thornyhead	4,253	3,325	2,484	1,905	1,540	1,140	1,028	-76%	-46%	-10%
Thornyheads (Mixed)	479	11	3	30	1	23	67	-86%	125%	187%
Total thornyheads	11,153	12,708	9,276	6,774	3,844	3,192	3,352	-70%	-51%	5%
Nearshore rockfish	406	440	398	529	386	514	536	32%	1%	4%
Shelf rockfish	10,846	10,447	9,886	7,374	6,697	6,092	5,053	-53%	-31%	-17%
Slope rockfish	2,177	1,976	1,727	1,375	1,480	901	548	-75%	-60%	-39%
Unsp. rockfish	947	937	836	723	1,084	682	73	-92%	-90%	-89%
Total rockfish	25,530	26,508	22,124	16,775	13,491	11,382	9,563	-63%	-43%	-16%
Other groundfish	1,406	809	651	861	774	644	948	-33%	10%	47%
Total groundfish	71,583	78,689	73,231	79,745	52,638	56,528	50,970	-29%	-36%	-10%
Total excluding whiting	51,080	59,382	55,863	51,803	33,895	37,552	31,944	-37%	-38%	-15%

TABLE 3-4. Real ex-vessel revenues (millions of 1999 $s) for vessels with some groundfish, and percentage of total revenue derived from groundfish and rockfish, by year and fleet, 1994-99. (Page 1 of 2).

	Vessels with < 50% of revenue from groundfish						Vessels with > 50% of revenue from groundfish						All vessels					
		Revenue ($ mil.) from			% of rev. from			Revenue ($ mil.) from			% of rev. from			Revenue ($ mil.) from			% of rev. from	
	# of ves	All species	Grnd-fish	Rock-fish	Grnd-fish	Rock-fish	# of ves	All species	Grnd-fish	Rock-fish	Grnd-fish	Rock-fish	# of ves	All species	Grnd-fish	Rock-fish	Grnd-fish	Rock-fish
1994																		
Limited entry																		
0-$5,000	81	6.8	0.10	0.04	6%	1%	14	0.0	0.03	0.02	93%	61%	95	6.8	0.13	0.06	19%	10%
$5,000-100,000	104	15.7	3.62	0.93	27%	7%	126	6.8	5.61	1.92	87%	32%	230	22.5	9.22	2.86	60%	20%
> $100,000	17	7.0	2.68	0.74	39%	10%	178	58.8	52.52	26.26	91%	44%	195	65.8	55.20	27.00	86%	41%
Total	202	29.5	6.39	1.71	19%	5%	318	65.7	58.16	28.21	90%	40%	520	95.1	64.55	29.92	62%	26%
Open access																		
0-$5,000	967	33.3	0.57	0.36	7%	5%	556	0.7	0.64	0.51	93%	75%	1,523	34.0	1.21	0.87	39%	30%
$5,000-100,000	101	11.7	1.20	0.96	21%	18%	209	4.7	4.30	3.44	93%	74%	310	16.4	5.50	4.40	70%	56%
> $100,000	1	0.4	0.22	0.00	49%	0%	7	1.9	1.45	1.02	83%	66%	8	2.3	1.66	1.02	79%	58%
Total	1,069	45.4	1.99	1.32	9%	6%	772	7.3	6.39	4.97	93%	74%	1,841	52.7	8.37	6.29	44%	35%
1995																		
Limited entry																		
0-$5,000	28	2.2	0.03	0.01	5%	1%	10	0.0	0.03	0.02	93%	57%	38	2.2	0.06	0.03	28%	16%
$5,000-100,000	82	12.1	2.87	0.50	27%	5%	128	7.4	6.09	1.40	87%	20%	210	19.5	8.95	1.89	64%	14%
> $100,000	19	8.5	3.47	0.88	40%	10%	210	74.5	67.16	31.25	91%	40%	229	83.1	70.63	32.13	87%	37%
Total	129	22.8	6.37	1.38	24%	5%	348	81.9	73.27	32.67	89%	33%	477	104.7	79.64	34.05	72%	25%
Open access																		
0-$5,000	967	36.7	0.63	0.37	5%	4%	471	0.6	0.51	0.38	95%	72%	1,438	37.3	1.14	0.75	35%	26%
$5,000-100,000	121	15.3	1.56	0.90	19%	10%	237	6.2	5.58	3.67	92%	62%	358	21.4	7.15	4.58	67%	44%
> $100,000							4	1.5	1.41	0.69	93%	51%	4	1.5	1.41	0.69	93%	51%
Total	1,088	52.0	2.19	1.28	7%	4%	712	8.3	7.50	4.74	94%	68%	1,800	60.3	9.69	6.01	41%	30%
1996																		
Limited entry																		
0-$5,000	23	2.2	0.03	0.01	5%	1%	6	0.0	0.01	0.00	90%	45%	29	2.2	0.05	0.01	23%	10%
$5,000-100,000	104	17.4	3.88	0.83	26%	6%	146	9.0	7.40	1.58	88%	18%	250	26.4	11.28	2.41	62%	13%
> $100,000	19	10.3	3.57	0.70	36%	8%	204	67.5	59.33	25.78	89%	36%	223	77.8	62.91	26.48	85%	34%
Total	146	29.9	7.48	1.54	24%	6%	356	76.5	66.75	27.36	89%	29%	502	106.4	74.23	28.90	70%	22%
Open access																		
0-$5,000	974	39.0	0.62	0.35	6%	4%	440	0.6	0.57	0.37	95%	65%	1,414	39.6	1.19	0.71	34%	23%
$5,000-100,000	132	17.1	1.58	0.83	18%	9%	250	5.8	5.27	3.11	93%	51%	382	22.9	6.85	3.95	67%	36%
> $100,000	1	0.2	0.10	0.10	46%	45%	1	0.2	0.21	0.03	100%	14%	2	0.4	0.31	0.13	73%	30%
Total	1,107	56.2	2.30	1.28	8%	5%	691	6.6	6.05	3.51	94%	60%	1,798	62.9	8.35	4.79	41%	26%

TABLE 3-4. Real ex-vessel revenues (millions of 1999 $s) for vessels with some groundfish, and percentage of total revenue derived from groundfish and rockfish, by year and fleet, 1994-99. (Page 2 of 2).

	Vessels with < 50% of revenue from groundfish						Vessels with > 50% of revenue from groundfish						All vessels					
		Revenue ($ mil.) from			% of rev. from			Revenue ($ mil.) from			% of rev. from			Revenue ($ mil.) from			% of rev. from	
	# of ves	All species	Grnd-fish	Rock-fish	Grnd-fish	Rock-fish	# of ves	All species	Grnd-fish	Rock-fish	Grnd-fish	Rock-fish	# of ves	All species	Grnd-fish	Rock-fish	Grnd-fish	Rock-fish
1997																		
Limited entry																		
0-$5,000	18	0.8	0.03	0.01	9%	5%	12	0.0	0.02	0.01	88%	28%	30	0.8	0.05	0.02	41%	14%
$5,000-100,000	64	10.3	2.75	0.32	30%	5%	136	10.0	8.23	1.10	88%	14%	200	20.2	10.98	1.42	69%	11%
> $100,000	27	9.7	3.72	1.22	41%	11%	224	63.8	55.52	19.75	88%	29%	251	73.5	59.24	20.97	83%	27%
Total	109	20.7	6.50	1.55	29%	6%	372	73.8	63.77	20.86	88%	24%	481	94.5	70.27	22.41	75%	20%
Open access																		
0-$5,000	1,015	44.3	0.73	0.39	6%	4%	442	0.6	0.58	0.35	94%	60%	1,457	45.0	1.32	0.74	33%	21%
$5,000-100,000	125	9.4	1.43	0.72	24%	12%	245	5.3	4.69	2.84	91%	50%	370	14.6	6.12	3.56	68%	37%
> $100,000							4	1.0	0.74	0.24	84%	28%	4	1.0	0.74	0.24	84%	28%
Total	1,140	53.7	2.16	1.11	8%	5%	691	6.9	6.02	3.42	93%	56%	1,831	60.6	8.18	4.54	40%	24%
1998																		
Limited entry																		
0-$5,000	30	1.7	0.06	0.02	8%	4%	8	0.0	0.02	0.00	86%	11%	38	1.8	0.07	0.03	24%	5%
$5,000-100,000	89	12.2	3.22	0.73	29%	7%	143	7.4	6.22	2.12	89%	28%	232	19.5	9.44	2.84	66%	20%
> $100,000	10	3.3	1.24	0.56	40%	17%	162	39.7	35.36	14.71	90%	37%	172	43.0	36.60	15.27	87%	36%
Total	129	17.2	4.52	1.31	25%	7%	313	47.1	41.60	16.83	90%	32%	442	64.3	46.11	18.14	71%	25%
Open access																		
0-$5,000	868	29.6	0.58	0.33	6%	4%	378	0.6	0.51	0.32	93%	62%	1,246	30.2	1.09	0.65	32%	22%
$5,000-100,000	81	6.5	0.82	0.55	20%	13%	190	4.5	4.03	2.74	91%	57%	271	11.1	4.85	3.29	70%	44%
> $100,000							1	0.1	0.12	0.07	100%	55%	1	0.1	0.12	0.07	100%	55%
Total	949	36.1	1.40	0.88	7%	5%	569	5.2	4.67	3.13	93%	61%	1,518	41.4	6.06	4.01	39%	26%
1999																		
Limited entry																		
0-$5,000	30	2.0	0.05	0.02	7%	4%	6	0.0	0.02	0.01	89%	36%	36	2.1	0.06	0.03	21%	9%
$5,000-100,000	94	16.4	4.12	0.75	28%	5%	128	7.7	6.67	1.77	91%	24%	222	24.1	10.78	2.52	64%	16%
> $100,000	22	9.3	3.33	0.73	37%	8%	158	40.6	34.81	10.71	88%	27%	180	49.9	38.13	11.44	81%	25%
Total	146	27.8	7.49	1.50	25%	5%	292	48.3	41.49	12.49	89%	26%	438	76.1	48.98	13.98	68%	19%
Open access																		
0-$5,000	807	33.9	0.57	0.29	5%	3%	389	0.5	0.49	0.33	94%	62%	1,196	34.4	1.05	0.61	34%	22%
$5,000-100,000	90	11.3	1.00	0.41	20%	9%	196	3.7	3.30	1.90	91%	53%	286	15.0	4.30	2.32	68%	39%
> $100,000							3	0.4	0.38	0.07	90%	19%	3	0.4	0.38	0.07	90%	19%
Total	897	45.2	1.57	0.70	7%	4%	588	4.7	4.16	2.30	93%	58%	1,485	49.9	5.73	3.00	41%	26%

TABLE 3-5. Ocean non-Indian commercial salmon fishery (from Council annual salmon review).

	Nominal Exvessel Value ($ 1,000s)	Vessel Landings Salmon	Vessels With Permits	Active Portion of Permitted Vessels	Real Average Ex-Vessel Value Per Vessel
1996	9,074	1,530	3,932	0.39	6,187
1997	9,882	1,319	3,688	0.36	7,688
1998	5,480	1,066	3,405	0.31	5,214
1999	8,391	1,030	3,101	0.33	8,147

TABLE 3-6. Pink shrimp exvessel value, pounds landed and number of vessels harvesting (based on PacFIN annual vessel summary files).

	Revenue (Millions)	Pounds (Millions)	Number of Vessels
1996	18.8	31.6	237
1997	15.6	39.3	216
1998	5.6	10.7	188
1999	13.2	28.4	185

TABLE 3-7. Groundfish incidental catch in the shrimp fishery by state and by open access (OA) and limited entry (LE) trawl vessls, 1999 and 2000.

		California			Oregon			Washington			Coastwide		
		OA	LE	All	OA	LE	All	OA	LE	All	OA	LE	All
Metric tons													
1999													
	Shrimp	775.4	1,122.8	1,898.2	5,628.4	3,648.3	9,276.6	1,006.3	197.7	1,204.0	7,410.0	4,968.8	12,378.8
	Canary	**0.6**	**2.1**	**2.7**	**19.3**	**11.8**	**31.1**	**0.7**	**0.4**	**1.2**	**20.7**	**14.4**	**35.1**
	Yellowtail	0.2	1.5	1.7	29.2	15.3	44.5	14.8	3.3	18.0	44.2	20.1	64.3
	Other rock	7.1	13.6	20.7	19.2	18.1	37.2	4.6	0.2	4.7	30.9	31.8	62.7
	Sablefish	0.5	0.8	1.3	27.1	11.8	38.9	4.9	0.3	5.2	32.5	12.9	45.4
	Lingcod	1.0	1.0	2.0	14.5	13.1	27.5	1.7	0.5	2.2	17.2	14.5	31.8
	All GF	11.7	22.6	34.2	167.6	131.4	299.0	38.5	8.3	46.8	217.8	162.2	380.0
2000													
	Shrimp	503.0	477.5	980.5	4,559.3	4,063.5	8,622.8	933.7	343.6	1,277.4	5,996.1	4,884.6	10,880.7
	Canary	**0.4**	**0.0**	**0.4**	**4.8**	**3.3**	**8.1**	**0.2**	**0.3**	**0.4**	**5.3**	**3.5**	**8.9**
	Yellowtail	0.4	0.3	0.7	32.6	21.9	54.5	12.4	10.0	22.4	45.5	32.2	77.7
	Other rock	1.1	0.9	2.0	5.2	3.5	8.7	0.9	0.2	1.1	7.1	4.7	11.8
	Sablefish	0.4	0.5	0.8	13.3	13.0	26.3	2.2	0.7	2.8	15.8	14.1	29.9
	Lingcod	0.2	0.0	0.2	7.1	5.2	12.4	1.8	0.5	2.3	9.1	5.7	14.9
	All GF	2.8	2.9	5.6	82.6	72.9	155.5	22.4	14.0	36.4	107.7	89.8	197.5
Species % of shrimp mts													
1999													
	Canary	**0.08%**	**0.19%**	**0.14%**	**0.34%**	**0.32%**	**0.34%**	**0.07%**	**0.22%**	**0.10%**	**0.28%**	**0.29%**	**0.28%**
	Yellowtail	0.02%	0.14%	0.09%	0.52%	0.42%	0.48%	1.47%	1.66%	1.50%	0.60%	0.40%	0.52%
	Other rock	0.92%	1.21%	1.09%	0.34%	0.50%	0.40%	0.45%	0.08%	0.39%	0.42%	0.64%	0.51%
	Sablefish	0.06%	0.07%	0.07%	0.48%	0.32%	0.42%	0.49%	0.14%	0.43%	0.44%	0.26%	0.37%
	Lingcod	0.14%	0.09%	0.11%	0.26%	0.36%	0.30%	0.17%	0.25%	0.19%	0.23%	0.29%	0.26%
	All GF	1.50%	2.01%	1.80%	2.98%	3.60%	3.22%	3.83%	4.18%	3.89%	2.94%	3.26%	3.07%
2000													
	Canary	**0.07%**	**0.00%**	**0.04%**	**0.11%**	**0.08%**	**0.09%**	**0.02%**	**0.07%**	**0.03%**	**0.09%**	**0.07%**	**0.08%**
	Yellowtail	0.08%	0.06%	0.07%	0.72%	0.54%	0.63%	1.33%	2.91%	1.76%	0.76%	0.66%	0.71%
	Other rock	0.22%	0.19%	0.21%	0.11%	0.09%	0.10%	0.09%	0.07%	0.09%	0.12%	0.10%	0.11%
	Sablefish	0.08%	0.09%	0.09%	0.29%	0.32%	0.30%	0.24%	0.19%	0.22%	0.26%	0.29%	0.28%
	Lingcod	0.03%	0.00%	0.02%	0.16%	0.13%	0.14%	0.20%	0.13%	0.18%	0.15%	0.12%	0.14%
	All GF	0.55%	0.60%	0.57%	1.81%	1.79%	1.80%	2.40%	4.08%	2.85%	1.80%	1.84%	1.82%
Change from 1999 to 2000													
	Canary	**-0.01%**	**-0.19%**	**-0.11%**	**-0.24%**	**-0.24%**	**-0.24%**	**-0.06%**	**-0.15%**	**-0.07%**	**-0.19%**	**-0.22%**	**-0.20%**
	Yellowtail	0.06%	-0.07%	-0.02%	0.20%	0.12%	0.15%	-0.14%	1.25%	0.26%	0.16%	0.25%	0.19%
	Other rock	-0.69%	-1.02%	-0.88%	-0.23%	-0.41%	-0.30%	-0.36%	-0.01%	-0.31%	-0.30%	-0.55%	-0.40%
	Sablefish	0.01%	0.02%	0.02%	-0.19%	-0.00%	-0.11%	-0.26%	0.05%	-0.21%	-0.17%	0.03%	-0.09%
	Lingcod	-0.10%	-0.08%	-0.09%	-0.10%	-0.23%	-0.15%	0.03%	-0.12%	-0.00%	-0.08%	-0.18%	-0.12%
	All GF	-0.95%	-1.41%	-1.23%	-1.17%	-1.81%	-1.42%	-1.43%	-0.10%	-1.04%	-1.14%	-1.43%	-1.25%

TABLE 3-8. Real ex-vessel revenue ($1,000s of 1999 $s) for open-access vessels that earned more than $5,000 in coastwide fishery revenue, and average vessel percentages of total income from selected groundfish categories, by port-groups, 1994-2000. (Page 1 of 2)

	# of ves	All species total	All species avg.	Groundfish total	Groundfish avg.	Sablefish total	Sablefish avg.	Rockfish total	Rockfish avg.	Average % of revenue from: Groundfish	Sablefish	Rockfish
WA: Puget Sound												
1994	21	310	14.8	224	10.7	87	4.1	50	2.4	79%	28%	28%
1995	15	213	14.2	137	9.1	70	4.7	52	3.5	70%	28%	27%
1996	21	194	9.2	184	8.8	114	5.4	41	2.0	95%	51%	21%
1997	28	391	14.0	359	12.8	279	10.0	19	0.7	71%	40%	11%
1998	7	75	10.7	46	6.6	40	5.8	6	0.8	70%	54%	16%
1999	21	226	10.8	38	1.8	25	1.2	11	0.5	22%	15%	6%
WA: Coastal ports												
1994	75	6,233	83.1	413	5.5	51	0.7	269	3.6	22%	3%	14%
1995	72	7,778	108.0	456	6.3	150	2.1	210	2.9	20%	10%	8%
1996	58	6,419	110.7	715	12.3	243	4.2	226	3.9	34%	21%	7%
1997	66	3,899	59.1	325	4.9	191	2.9	110	1.7	30%	21%	7%
1998	43	2,889	67.2	203	4.7	70	1.6	122	2.8	21%	8%	12%
1999	46	4,075	88.6	126	2.7	91	2.0	22	0.5	13%	12%	1%
OR: North of Nehalem												
1994	51	3,216	63.1	444	8.7	53	1.0	303	5.9	15%	1%	9%
1995	59	4,816	81.6	888	15.0	404	6.9	174	2.9	9%	3%	3%
1996	62	4,037	65.1	237	3.8	66	1.1	134	2.2	8%	2%	5%
1997	50	3,635	72.7	109	2.2	39	0.8	50	1.0	8%	3%	4%
1998	48	2,286	47.6	109	2.3	25	0.5	65	1.4	9%	3%	5%
1999	43	3,782	87.9	168	3.9	48	1.1	41	0.9	11%	5%	3%
OR: Nehalem-Yachats												
1994	100	4,754	47.5	175	1.7	8	0.1	131	1.3	10%	1%	6%
1995	140	6,012	42.9	181	1.3	20	0.1	122	0.9	8%	0%	5%
1996	147	6,888	46.9	259	1.8	41	0.3	172	1.2	6%	1%	4%
1997	164	6,494	39.6	275	1.7	46	0.3	155	0.9	7%	1%	4%
1998	136	4,548	33.4	199	1.5	13	0.1	160	1.2	7%	0%	6%
1999	103	5,559	54.0	261	2.5	130	1.3	90	0.9	8%	1%	6%
OR: South of Yachats												
1994	132	7,386	56.0	1,647	12.5	377	2.9	906	6.9	24%	2%	14%
1995	138	6,222	45.1	1,330	9.6	233	1.7	819	5.9	17%	4%	10%
1996	157	6,518	41.5	566	3.6	103	0.7	380	2.4	17%	3%	11%
1997	154	5,727	37.2	1,200	7.8	257	1.7	699	4.5	25%	6%	15%
1998	131	3,372	25.7	562	4.3	35	0.3	443	3.4	23%	2%	16%
1999	164	4,870	29.7	616	3.8	63	0.4	415	2.5	18%	1%	12%
CA: North of Bodega Bay												
1994	152	7,773	51.1	621	4.1	143	0.9	422	2.8	20%	2%	15%
1995	140	6,474	46.2	1,221	8.7	766	5.5	365	2.6	34%	16%	14%
1996	187	9,383	50.2	1,165	6.2	668	3.6	376	2.0	30%	15%	10%
1997	212	9,529	44.9	1,462	6.9	637	3.0	598	2.8	38%	16%	15%
1998	140	4,537	32.4	754	5.4	115	0.8	428	3.1	35%	7%	17%
1999	138	5,992	43.4	981	7.1	204	1.5	358	2.6	40%	8%	15%
CA: Bodega Bay-Santa Cruz												
1994	321	6,958	21.7	1,846	5.8	29	0.1	1,570	4.9	28%	1%	24%
1995	335	8,745	26.1	2,238	6.7	415	1.2	1,557	4.6	30%	5%	21%
1996	290	7,812	26.9	1,960	6.8	669	2.3	1,045	3.6	33%	11%	18%
1997	288	9,343	32.4	1,933	6.7	322	1.1	1,199	4.2	30%	6%	18%
1998	242	6,385	26.4	1,769	7.3	97	0.4	1,340	5.5	36%	3%	25%
1999	244	5,304	21.7	989	4.1	180	0.7	640	2.6	29%	4%	19%
CA: Santa Cruz-Oxnard												
1994	229	8,707	38.0	2,156	9.4	11	0.0	1,799	7.9	45%	1%	37%
1995	286	12,088	42.3	2,948	10.3	56	0.2	2,124	7.4	41%	1%	29%
1996	261	10,845	41.6	2,584	9.9	22	0.1	1,732	6.6	46%	1%	29%
1997	242	10,772	44.5	1,786	7.4	2	0.0	1,117	4.6	40%	0%	24%
1998	209	9,336	44.7	1,740	8.3	4	0.0	977	4.7	36%	1%	20%
1999	194	10,395	53.6	1,765	9.1	12	0.1	899	4.6	38%	1%	22%

TABLE 3-8. Real ex-vessel revenue ($1,000s of 1999 $s) for open-access vessels that earned more than $5,000 in coastwide fishery revenue, and average vessel percentages of total income from selected groundfish categories, by port-groups, 1994-2000. (Page 2 of 2)

		Ex-vessel revenue ($1,000s) from:								Average % of revenue from:		
	# of	All species		Groundfish		Sablefish		Rockfish		Ground-	Sable-	Rock-
	ves	total	avg.	total	avg.	total	avg.	total	avg.	fish	fish	fish
CA: South of Oxnard												
1994	183	4,842	26.5	1,012	5.5	75	0.4	853	4.7	35%	2%	29%
1995	156	5,409	34.7	884	5.7	96	0.6	698	4.5	26%	3%	21%
1996	138	5,754	41.7	669	4.9	53	0.4	524	3.8	22%	2%	18%
1997	149	6,505	43.7	444	3.0	6	0.0	339	2.3	20%	1%	15%
1998	108	4,425	41.0	456	4.2	0	0.0	380	3.5	20%	0%	16%
1999	107	4,719	44.1	395	3.7	64	0.6	244	2.3	17%	3%	11%

Note: vessels may be included in more than one port group. Revenue shares are calculated for each vessel for landings made only within a port group.

TABLE 3-9. Real ex-vessel revenue ($1,000s of 1999 $s) earned by vessels with limited-entry fixed-gear permits within specified groups of ports, and average vessel percentages of total income from selected groundfish categories, 1994-2000. (Page 1 of 2).

	# of	Ex-vessel revenue ($1,000s) from								Average % of revenue from:		
		All species		Groundfish		Sablefish		Rockfish		Ground-	Sable-	Rock-
	ves	total	avg.	total	avg.	total	avg.	total	avg.	fish	fish	fish
WA: Puget Sound												
1994	40	1,293	32.3	1,138	28.4	934	23.4	144	3.6	74%	60%	10%
1995	52	1,969	37.9	1,963	37.7	1,732	33.3	227	4.4	99%	82%	17%
1996	53	1,952	36.8	1,930	36.4	1,724	32.5	199	3.7	99%	85%	13%
1997	50	2,185	43.7	2,166	43.3	2,127	42.5	38	0.8	97%	89%	8%
1998	42	1,018	24.2	1,013	24.1	966	23.0	44	1.0	95%	91%	4%
1999	44	1,688	38.4	1,672	38.0	1,554	35.3	92	2.1	95%	85%	9%
WA: Coastal ports												
1994	31	1,560	50.3	874	28.2	566	18.3	306	9.9	73%	52%	21%
1995	33	2,192	66.4	1,441	43.7	1,220	37.0	220	6.7	82%	72%	10%
1996	43	2,340	54.4	1,311	30.5	1,147	26.7	163	3.8	78%	69%	9%
1997	37	2,731	73.8	2,093	56.6	1,863	50.4	225	6.1	80%	73%	7%
1998	30	1,101	36.7	752	25.1	514	17.1	236	7.9	75%	54%	21%
1999	29	1,722	59.4	829	28.6	633	21.8	194	6.7	71%	55%	14%
OR: North of Nehalem												
1994	12	1,805	150.4	1,447	120.6	1,409	117.5	36	3.0	86%	73%	14%
1995	13	2,269	174.5	1,029	79.1	799	61.5	229	17.6	69%	53%	17%
1996	17	4,648	273.4	1,083	63.7	952	56.0	129	7.6	43%	36%	7%
1997	21	2,817	134.2	1,092	52.0	1,027	48.9	64	3.1	51%	48%	3%
1998	19	1,549	81.5	674	35.5	560	29.5	113	5.9	61%	51%	10%
1999	20	4,171	208.6	1,248	62.4	1,181	59.1	65	3.3	49%	43%	5%
OR: Nehalem-Yachats												
1994	21	2,223	105.9	926	44.1	865	41.2	54	2.6	44%	36%	7%
1995	23	3,480	151.3	1,383	60.1	1,335	58.0	41	1.8	43%	37%	6%
1996	24	3,907	162.8	1,880	78.3	1,801	75.0	70	2.9	52%	48%	4%
1997	23	3,186	138.5	1,818	79.1	1,715	74.6	98	4.3	62%	59%	3%
1998	22	2,057	93.5	866	39.4	804	36.5	61	2.8	55%	52%	3%
1999	22	3,439	156.3	1,408	64.0	1,336	60.7	67	3.1	46%	44%	2%
OR: South of Yachats												
1994	37	3,603	97.4	2,206	59.6	2,068	55.9	125	3.4	69%	49%	20%
1995	33	3,327	100.8	1,977	59.9	1,842	55.8	124	3.8	66%	54%	12%
1996	37	4,089	110.5	2,051	55.4	1,881	50.8	157	4.2	61%	55%	6%
1997	34	3,760	110.6	2,496	73.4	2,260	66.5	190	5.6	73%	63%	7%
1998	30	2,298	76.6	886	29.5	534	17.8	298	9.9	44%	25%	14%
1999	37	4,621	124.9	1,744	47.1	1,367	36.9	316	8.5	45%	32%	11%
CA: North of Bodega Bay												
1994	19	2,086	109.8	969	51.0	772	40.6	175	9.2	46%	30%	13%
1995	33	2,636	79.9	1,367	41.4	1,027	31.1	296	9.0	63%	49%	13%
1996	35	2,978	85.1	1,303	37.2	887	25.3	363	10.4	54%	37%	16%
1997	36	4,133	114.8	2,128	59.1	1,767	49.1	317	8.8	59%	51%	7%
1998	29	1,566	54.0	523	18.0	360	12.4	141	4.9	46%	30%	13%
1999	25	2,022	80.9	644	25.8	532	21.3	79	3.2	42%	31%	8%
CA: Bodega Bay-Santa Cruz												
1994	30	1,287	42.9	696	23.2	326	10.9	347	11.6	52%	22%	27%
1995	37	2,657	71.8	1,427	38.6	1,079	29.2	311	8.4	57%	40%	15%
1996	46	3,622	78.7	2,809	61.1	2,063	44.9	531	11.6	73%	57%	14%
1997	44	3,252	73.9	2,469	56.1	1,879	42.7	471	10.7	73%	52%	18%
1998	37	1,444	39.0	956	25.8	418	11.3	401	10.8	77%	38%	31%
1999	31	1,748	56.4	1,274	41.1	604	19.5	565	18.2	73%	40%	29%

TABLE 3-9. Real ex-vessel revenue ($1,000s of 1999 $s) earned by vessels with limited-entry fixed-gear permits within specified groups of ports, and average vessel percentages of total income from selected groundfish categories, 1994-2000. (Page 2 of 2).

		Ex-vessel revenue ($1,000s) from								Average % of revenue from:		
	# of	All species		Groundfish		Sablefish		Rockfish		Ground-	Sable-	Rock-
	ves	total	avg.	total	avg.	total	avg.	total	avg.	fish	fish	fish
CA: Santa Cruz-Oxnard												
1994	13	486	37.4	182	14.0	2	0.1	136	10.5	78%	1%	75%
1995	20	583	29.1	119	5.9	26	1.3	80	4.0	55%	4%	48%
1996	14	787	56.2	390	27.9	55	4.0	323	23.1	63%	7%	54%
1997	19	1,073	56.5	646	34.0	186	9.8	443	23.3	80%	20%	56%
1998	14	709	50.6	326	23.3	55	3.9	264	18.8	63%	12%	51%
1999	18	466	25.9	121	6.7	27	1.5	90	5.0	64%	15%	47%
CA: South of Oxnard												
1994	12	507	42.3	384	32.0	184	15.3	193	16.1	74%	29%	42%
1995	11	445	40.5	358	32.5	143	13.0	210	19.1	91%	27%	62%
1996	17	619	36.4	520	30.6	220	12.9	298	17.5	81%	31%	49%
1997	17	517	30.4	465	27.4	217	12.8	245	14.4	85%	36%	49%
1998	19	868	45.7	682	35.9	267	14.0	412	21.7	63%	21%	41%
1999	14	625	44.7	548	39.1	264	18.8	277	19.8	73%	29%	43%

Note: vessels may be included in more than one port group. Revenue shares are calculated for each vessel for landings made only within a port group.

TABLE 3-10. Real ex-vessel revenue ($1,000s of 1999 $s) earned by vessels with limited-entry trawl permits within specified groups of ports, and average vessel percentages of total income from selected groundfish categories, 1994-2000. (Page 1 of 2)

	# of ves	Ex-vessel revenue ($1,000s)From								Average % of revenue from:		
		All species		Groundfish		DTS species*		Rockfish*		Ground-fish	Sable-species *	Rock-fish*
		total	avg.	total	avg.	total	avg.	total	avg.			
WA: Puget Sound												
1994	28	3,228	115.3	3,185	113.7	641	22.9	1,275	45.5	95%	12%	37%
1995	23	2,728	118.6	2,612	113.6	865	37.6	979	42.6	95%	29%	30%
1996	22	2,860	130.0	2,763	125.6	947	43.1	1,041	47.3	95%	21%	39%
1997	20	3,093	154.7	3,026	151.3	950	47.5	795	39.7	95%	22%	28%
1998	17	2,715	159.7	2,624	154.3	639	37.6	698	41.0	92%	20%	25%
1999	17	3,112	183.1	2,955	173.8	808	47.5	715	42.1	97%	28%	24%
WA: Coastal ports												
1994	48	4,567	95.1	3,848	80.2	1,525	31.8	1,223	25.5	74%	23%	27%
1995	35	6,214	177.5	5,841	166.9	2,355	67.3	1,891	54.0	84%	32%	29%
1996	34	5,103	150.1	4,449	130.9	1,889	55.6	1,199	35.3	84%	35%	24%
1997	25	3,795	151.8	3,481	139.2	1,285	51.4	776	31.0	88%	38%	17%
1998	21	2,566	122.2	2,278	108.5	573	27.3	671	32.0	81%	23%	23%
1999	20	2,716	135.8	2,175	108.8	594	29.7	472	23.6	83%	29%	19%
OR: North of Nehalem												
1994	56	12,480	222.9	11,531	205.9	5,188	92.6	3,449	61.6	89%	34%	26%
1995	56	15,016	268.1	13,363	238.6	5,828	104.1	3,280	58.6	83%	33%	20%
1996	52	14,970	287.9	12,404	238.5	5,794	111.4	3,161	60.8	84%	38%	20%
1997	59	12,859	218.0	11,571	196.1	4,579	77.6	2,243	38.0	88%	35%	14%
1998	54	9,034	167.3	8,372	155.0	2,870	53.1	2,637	48.8	83%	26%	25%
1999	59	11,935	202.3	10,094	171.1	3,539	60.0	2,201	37.3	78%	28%	17%
OR: Nehalem-Yachats												
1994	50	10,838	216.8	9,637	192.7	2,559	51.2	3,254	65.1	85%	23%	31%
1995	48	11,471	239.0	10,140	211.3	2,409	50.2	2,393	49.8	82%	29%	25%
1996	48	9,835	204.9	8,500	177.1	2,931	61.1	2,690	56.0	83%	30%	24%
1997	40	9,140	228.5	8,547	213.7	2,518	62.9	1,778	44.4	92%	32%	22%
1998	46	6,154	133.8	5,466	118.8	1,441	31.3	1,391	30.2	78%	26%	25%
1999	48	7,868	163.9	6,427	133.9	1,887	39.3	1,568	32.7	71%	24%	23%
OR: South of Yachats												
1994	61	10,786	176.8	7,232	118.6	4,619	75.7	1,249	20.5	58%	33%	8%
1995	56	13,107	234.1	10,066	179.8	7,072	126.3	1,503	26.8	66%	44%	11%
1996	57	12,815	224.8	8,674	152.2	6,058	106.3	1,276	22.4	57%	41%	6%
1997	52	11,345	218.2	7,834	150.6	4,888	94.0	1,433	27.5	61%	39%	9%
1998	51	7,865	154.2	6,079	119.2	3,564	69.9	1,274	25.0	64%	40%	12%
1999	56	10,298	183.9	5,978	106.8	3,618	64.6	943	16.8	56%	32%	8%
CA: North of Bodega Bay												
1994	75	16,401	218.7	10,549	140.7	7,060	94.1	1,682	22.4	58%	39%	8%
1995	75	17,370	231.6	14,561	194.2	10,356	138.1	2,188	29.2	74%	52%	9%
1996	80	17,902	223.8	12,765	159.6	9,179	114.7	1,696	21.2	65%	46%	7%
1997	84	18,074	215.2	11,976	142.6	7,712	91.8	1,828	21.8	60%	38%	7%
1998	77	12,355	160.5	8,594	111.6	5,187	67.4	1,840	23.9	69%	41%	12%
1999	78	11,714	150.2	7,800	100.0	5,320	68.2	1,027	13.2	65%	43%	8%
CA: Bodega Bay-Santa Cruz												
1994	43	5,172	120.3	4,285	99.7	1,773	41.2	1,186	27.6	78%	36%	20%
1995	52	8,603	165.4	7,698	148.0	3,963	76.2	2,111	40.6	84%	49%	20%
1996	55	8,859	161.1	7,845	142.6	3,568	64.9	2,436	44.3	83%	47%	19%
1997	53	7,677	144.9	5,971	112.7	2,550	48.1	1,953	36.8	69%	33%	20%
1998	44	5,507	125.2	4,051	92.1	1,356	30.8	1,603	36.4	66%	25%	27%
1999	50	4,663	93.3	3,507	70.1	1,558	31.2	776	15.5	70%	37%	14%
CA: Santa Cruz-Oxnard												
1994	29	3,421	118.0	2,686	92.6	1,642	56.6	678	23.4	65%	46%	10%

TABLE 3-10. Real ex-vessel revenue ($1,000s of 1999 $s) earned by vessels with limited-entry trawl permits within specified groups of ports, and average vessel percentages of total income from selected groundfish categories, 1994-2000. (Page 2 of 2)

	# of	Ex-vessel revenue ($1,000s)From								Average % of revenue from:		
		All species		Groundfish		DTS species*		Rockfish*		Ground-	Sable- species	Rock-
	ves	total	avg.	total	avg.	total	avg.	total	avg.	fish	*	fish*
1995	22	4,078	185.4	3,230	146.8	2,525	114.8	478	21.7	66%	53%	8%
1996	22	3,722	169.2	2,916	132.6	2,336	106.2	352	16.0	70%	58%	8%
1997	18	3,259	181.1	2,523	140.1	1,918	106.6	396	22.0	64%	49%	9%
1998	21	2,842	135.3	1,869	89.0	1,140	54.3	604	28.8	61%	38%	18%
1999	17	1,669	98.2	918	54.0	750	44.1	104	6.1	58%	49%	6%
CA: South of Oxnard												
1994	4											
1996	1											
1998	2											

Note: vessels may be included in more than one port group. Revenue shares are calculated for each vessel for landings made only within a port group.
* DTS species are sablefish, Dover sole, and lonspine and shortspine thornyhead rockfish.
The "rockfish" category includes all rockfish except thornyheads.

TABLE 3-11. Canary rockfish landings (in mt) by fleet by area, 1990-2000.

	Fleet					Area							
	Limited Entry			Open Access		INPFC Area							
	Groundfish Trawl	Non-Trawl	Shrimp Trawl	Non-Shrimp	Shrimp Trawl	Vancouver	Columbia	Eureka	Monterey	Conception	Total Commercial	Total Recreational	Grand Total
1990				2,627.5	52.9	1,141.8	931.4	239.2	357.5	10.4	2,680.4	2,680.4+	
1991				2,976.3	37.1	916.0	1,772.3	139.9	1,78.2	6.9	3,013.4	*	3,013.4+
1992				2,691.2	21.9	838.0	1,449.8	311.5	97.4	16.4	2,713.1	*	2,713.1+
1993	0.4	0.0		2,017.5	46.6	340.1	1,428.8	175.4	107.5	12.7	2,064.5	120.1	2,184.6
1994	870.6	48.6	3.2	190.8	6.8	172.5	656.1	157.3	110.4	23.4	1,119.8	87.5	1,207.3
1995	677.0	70.1	2.1	147.5	9.4	159.4	456.2	177.3	86.0	27.2	906.0	125.3	1,031.3
1996	957.7	76.4	11.5	168.5	13.9	194.0	673.5	174.9	169.9	15.7	1,228.0	92.8	1,320.8
1997	784.2	81.7	8.6	224.5	7.5	279.6	518.8	169.2	135.4	3.7	1,106.6	141.1	1,247.7
1998	894.1	111.2	3.9	164.4	8.7	208.6	601.8	261.5	105.4	4.9	1,182.3	89.7	1,272.0
1999	494.6	55.4	14.2	56.6	21.3	119.0	366.1	123.2	33.8	0.1	642.2	118.1	760.3
2000	30.7	5.3	4.3	4.7	7.2	8.7	28.6	12.6	2.3	0.1	52.2	107.4	159.6

Notes: Prior to 1994, all commercial groundfish fisheries were open access.
Recreational data unavailable for 1990-1992.
All 2000 data are preliminary.

TABLE 3-12. Distribution of canary rockfish among commercial sectors, 1993-2000.

	Limited Entry Groundfish Trawl	Limited Entry Non-Trawl	Limited Entry Shrimp-Trawl	Open Access non Shrimp	Total Shrimp Trawl
1994	78%	4%	0%	17%	1%
1995	75%	8%	0%	16%	1%
1996	78%	6%	1%	14%	2%
1997	71%	7%	1%	20%	1%
1998	76%	9%	0%	14%	1%
1999	77%	9%	2%	9%	6%
2000	59%	10%	8%	9%	22%

TABLE 3-13. Recreational ocean salmon angler trips (thousands, from Council annual salmon review).

	California	Oregon	Washington	West Coast
1996	225.4	44.0	38.8	308.3
1997	234.3	30.4	27.6	292.3
1998	151.9	26.1	12.3	190.3
1999	147.9	49.5	47.4	244.8

TABLE 3-14 . Number of ocean area recreational trips by region and for rockfish and lingcod trips.[a/b/]

Region/Year		Total Recreational Trips	Rockfish Trips			Lingcod Trips		
			All	No Catch	Percent No Catch	All	No Catch	Percent No Catch
Washington								
	1994	60	NA	NA		NA	NA	
	1995	100	NA	NA		NA	NA	
	1996	154	12	6	0.52	4	0	0.13
	1997	107	NA	NA		NA	NA	
	1998	246	86	36	0.42	17	9	0.53
	1999	186	51	9	0.18	21	5	0.26
Oregon[c/]								
	1994	179	231	38	0.16	76	19	0.25
	1995	196	216	41	0.19	52	24	0.45
	1996	146	206	44	0.21	57	24	0.42
	1997	206	288	61	0.21	68	29	0.43
	1998	307	409	92	0.22	87	48	0.56
	1999	279	337	60	0.18	65	35	0.54
California - northern[d/]								
	1994	1,538	1,055	358	0.34	167	98	0.59
	1995	1,413	959	315	0.33	186	112	0.60
	1996	992	852	256	0.30	145	74	0.51
	1997	1,226	1,374	448	0.33	185	115	0.63
	1998	1,187	881	243	0.28	142	82	0.58
	1999	959	1,012	256	0.25	139	67	0.48
California - southern								
	1994	4,076	918	341	0.37	26	17	0.66
	1995	3,550	599	204	0.34	20	12	0.61
	1996	2,819	949	260	0.27	33	25	0.76
	1997	2,680	308	84	0.27	10	6	0.64
	1998	2,531	495	146	0.29	15	10	0.70
	1999	1,989	853	238	0.28	40	32	0.80
Total[e/]								
	1994	5,853	2,204	736	0.33	269	134	0.50
	1995	5,260	1,774	559	0.32	475	189	0.40
	1996	4,111	2,018	566	0.28	239	123	0.51
	1997	4,219	1,970	592	0.30	263	151	0.57
	1998	4,271	1,871	517	0.28	261	150	0.57
	1999	3,413	2,253	563	0.25	266	140	0.53

TABLE 3-15. Purchase information for processing plants (coastwide) stratified by groundfish purchases and implied groundfish and rockfish dependence, 1994 - 1999.

	Plants with < 50% purchases of groundfish						Plants with > 50% purchases groundfish						All plants					
		Purchases ($ mil.) from			% Purchases of			Purchases ($ mil.) of			% Purchases of			Purchases ($ mil.) from			% of rev. from	
Groundfish Purchases for Plant	# of plants	All species	Grnd-fish	Rock-fish	Grnd-fish	Rock-fish	# of plants	All species	Grnd-fish	Rock-fish	Grnd-fish	Rock-fish	# of plants	All species	Grnd-fish	Rock-fish	Grnd-fish	Rock-fish
1994																		
0-$10,000	667	1.6	0.04	0.02	3%	2%	198	0.4	0.36	0.29	94%	73%	865	2.0	0.40	0.31	24%	18%
$10,000-100,000	319	11.5	0.50	0.37	4%	3%	79	2.8	2.48	1.66	88%	63%	398	14.4	2.98	2.02	21%	15%
$100,000-500,000	122	28.7	1.89	1.26	6%	4%	22	5.0	4.17	1.86	84%	41%	144	33.6	6.06	3.12	18%	10%
> $500,000	99	167.6	23.62	11.58	11%	6%	26	57.6	39.86	19.17	72%	35%	125	225.2	63.49	30.75	23%	12%
Total	1,207	209.3	26.05	13.23	4%	3%	325	65.8	46.88	22.98	90%	65%	1,532	275.1	72.93	36.21	22%	16%
1995																		
0-$10,000	543	1.4	0.04	0.02	2%	1%	128	0.3	0.24	0.18	93%	66%	671	1.7	0.28	0.20	20%	14%
$10,000-100,000	290	11.2	0.51	0.38	4%	3%	65	2.1	1.91	1.33	89%	65%	355	13.4	2.42	1.70	20%	14%
$100,000-500,000	108	24.7	1.59	1.03	6%	4%	19	5.5	4.52	1.77	82%	35%	127	30.2	6.11	2.79	18%	9%
> $500,000	103	183.7	26.98	11.47	10%	4%	31	77.1	53.54	23.89	73%	31%	134	260.8	80.52	35.36	25%	11%
Total	1,044	221.1	29.12	12.89	4%	2%	243	85.0	60.22	27.17	88%	59%	1,287	306.1	89.33	40.06	20%	13%
1996																		
0-$10,000	534	1.5	0.03	0.02	2%	1%	110	0.3	0.24	0.16	91%	60%	644	1.7	0.27	0.18	17%	11%
$10,000-100,000	265	9.5	0.55	0.36	5%	3%	63	2.1	1.90	1.22	89%	58%	328	11.7	2.45	1.58	21%	14%
$100,000-500,000	121	30.5	1.38	0.83	5%	3%	25	6.0	4.75	1.84	82%	32%	146	36.5	6.13	2.67	18%	8%
> $500,000	97	203.6	26.58	10.22	10%	4%	32	72.9	47.15	19.02	71%	28%	129	276.4	73.73	29.24	25%	10%
Total	1,017	245.0	28.53	11.43	4%	2%	230	81.3	54.04	22.25	87%	52%	1,247	326.3	82.58	33.68	19%	11%
1997																		
0-$10,000	538	1.5	0.06	0.04	3%	2%	135	0.3	0.23	0.18	91%	65%	673	1.8	0.29	0.22	21%	15%
$10,000-100,000	270	9.2	0.57	0.38	5%	3%	61	2.2	1.89	1.19	89%	60%	331	11.4	2.46	1.56	20%	14%
$100,000-500,000	104	25.7	1.40	0.81	6%	3%	29	6.6	5.21	1.95	82%	31%	133	32.3	6.61	2.76	22%	9%
> $500,000	103	180.0	26.69	9.17	11%	4%	30	58.1	42.40	13.24	75%	22%	133	238.1	69.09	22.41	25%	8%
Total	1,015	216.4	28.72	10.39	5%	3%	255	67.2	49.73	16.56	87%	55%	1,270	283.7	78.45	26.95	21%	13%
1998																		
0-$10,000	665	1.9	0.05	0.03	2%	1%	125	0.3	0.30	0.23	94%	73%	790	2.3	0.35	0.26	16%	13%
$10,000-100,000	311	11.1	0.53	0.35	4%	3%	70	2.2	1.80	1.20	85%	60%	381	13.3	2.33	1.55	19%	13%
$100,000-500,000	119	28.9	1.33	0.82	5%	3%	31	8.0	6.56	2.83	81%	36%	150	36.9	7.89	3.65	21%	10%
> $500,000	58	94.7	13.05	5.64	13%	6%	22	41.9	28.56	11.05	72%	28%	80	136.6	41.61	16.69	29%	12%
Total	1,153	136.6	14.96	6.84	3%	2%	248	52.4	37.22	15.31	88%	61%	1,401	189.0	52.18	22.15	18%	13%
1999																		
0-$10,000	682	1.8	0.05	0.04	3%	2%	129	0.3	0.29	0.21	91%	65%	811	2.1	0.34	0.25	17%	12%
$10,000-100,000	282	10.0	0.50	0.27	4%	2%	41	1.5	1.27	0.77	85%	61%	323	11.5	1.77	1.03	14%	10%
$100,000-500,000	126	29.1	1.34	0.77	5%	3%	23	5.5	4.47	1.48	83%	29%	149	34.6	5.81	2.24	17%	7%
> $500,000	87	159.4	19.71	6.25	8%	3%	20	41.6	27.07	7.21	74%	18%	107	201.0	46.78	13.46	21%	6%
Total	1,177	200.3	21.60	7.32	4%	2%	213	48.9	33.11	9.66	88%	56%	1,390	249.2	54.71	16.98	17%	10%

TABLE 3-16. Purchase information for processing plants (by port group) stratified by groundfish purchases and implied groundfish and rockfish dependence, 1994 - 1999. (Page 1 of 5)

Groundfish Purchases for Plant		# of Plants	Purchases ($ million) of			% Purchases of	
			All species	Groundfish	Rockfish	Groundfish	Rockfish
Puget Sound							
1994	0-$10,000	24	0.0	0.01	0.01	50%	28%
	$10,000-100,000	16	0.6	0.30	0.05	30%	5%
	$100,000-500,000	5	1.4	1.11	0.18	76%	20%
	> $500,000	3	4.7	3.33	1.46	57%	26%
	Total	48	6.7	4.75	1.70	46%	19%
1995	0-$10,000	27	0.1	0.01	0.00	26%	11%
	$10,000-100,000	8	0.4	0.03	0.01	6%	2%
	$100,000-500,000	8	2.2	1.37	0.28	50%	16%
	> $500,000	5	5.4	3.33	1.28	51%	15%
	Total	48	8.1	4.74	1.57	29%	11%
1996	0-$10,000	24	0.1	0.00	0.00	25%	15%
	$10,000-100,000	8	0.3	0.12	0.09	31%	18%
	$100,000-500,000	8	2.1	0.82	0.03	42%	1%
	> $500,000	4	4.3	3.96	1.39	95%	27%
	Total	44	6.7	4.90	1.51	35%	14%
1997	0-$10,000	21	0.1	0.01	0.00	29%	13%
	$10,000-100,000	12	0.5	0.22	0.02	36%	9%
	$100,000-500,000	8	1.6	0.72	0.04	45%	3%
	> $500,000	4	4.8	4.63	1.00	98%	16%
	Total	45	6.9	5.58	1.06	40%	10%
1998	0-$10,000	18	0.1	0.01	0.00	15%	1%
	$10,000-100,000	21	0.7	0.10	0.00	10%	0%
	$100,000-500,000	12	2.4	1.31	0.15	45%	5%
	> $500,000	2	2.4	2.28	0.69	94%	28%
	Total	53	5.5	3.70	0.84	23%	3%
1999	0-$10,000	13	0.0	0.00	0.00	8%	0%
	$10,000-100,000	18	0.8	0.21	0.00	17%	0%
	$100,000-500,000	9	2.6	0.69	0.10	20%	3%
	> $500,000	5	4.6	3.78	0.77	74%	12%
	Total	45	8.0	4.68	0.87	21%	2%
WA Coast							
1994	0-$10,000	32	0.1	0.00	0.00	5%	3%
	$10,000-100,000	23	0.9	0.12	0.03	11%	3%
	$100,000-500,000	9	2.1	0.01	0.01	1%	1%
	> $500,000	12	35.0	5.73	2.75	10%	6%
	Total	76	38.1	5.86	2.80	7%	3%
1995	0-$10,000	34	0.1	0.00	0.00	4%	2%
	$10,000-100,000	20	0.7	0.01	0.00	4%	1%
	$100,000-500,000	7	1.7	0.29	0.00	15%	0%
	> $500,000	16	44.3	7.48	3.38	7%	3%
	Total	77	46.8	7.77	3.39	6%	2%
1996	0-$10,000	29	0.1	0.00	0.00	14%	4%
	$10,000-100,000	16	0.5	0.03	0.00	10%	1%
	$100,000-500,000	10	2.4	0.25	0.00	19%	0%
	> $500,000	14	45.9	6.48	2.26	10%	3%
	Total	69	48.9	6.75	2.27	13%	3%
1997	0-$10,000	21	0.1	0.01	0.01	19%	12%
	$10,000-100,000	14	0.5	0.02	0.01	3%	1%
	$100,000-500,000	8	2.3	0.25	0.02	16%	1%
	> $500,000	11	28.0	5.64	1.44	14%	3%
	Total	54	30.8	5.91	1.48	13%	6%
1998	0-$10,000	37	0.1	0.00	0.00	0%	0%
	$10,000-100,000	15	0.7	0.01	0.00	2%	1%
	$100,000-500,000	8	2.2	0.21	0.07	7%	3%
	> $500,000	8	21.8	3.01	1.09	8%	3%
	Total	68	24.8	3.23	1.17	2%	1%
1999	0-$10,000	27	0.1	0.00	0.00	0%	0%
	$10,000-100,000	13	0.3	0.01	0.00	4%	0%
	$100,000-500,000	9	2.3	0.00	0.00	0%	0%
	> $500,000	11	28.0	3.14	0.76	7%	2%
	Total	60	30.7	3.15	0.77	2%	0%
OR: N. of Nehalem							
1994	0-$10,000	18	0.0	0.01	0.00	6%	1%

TABLE 3-16. Purchase information for processing plants (by port group) stratified by groundfish purchases and implied groundfish and rockfish dependence, 1994 - 1999. (Page 2 of 5)

	Groundfish Purchases for Plant	# of Plants	Purchases ($ million) of			% Purchases of	
			All species	Groundfish	Rockfish	Groundfish	Rockfish
	$10,000-100,000	12	0.5	0.08	0.03	18%	4%
	$100,000-500,000	2	0.3	0.01	0.00	3%	1%
	> $500,000	9	20.6	13.42	6.49	58%	28%
	Total	41	21.4	13.52	6.51	20%	8%
1995	0-$10,000	14	0.0	0.00	0.00	0%	0%
	$10,000-100,000	11	0.4	0.03	0.00	9%	0%
	$100,000-500,000	2	0.3	0.01	0.00	3%	1%
	> $500,000	10	28.7	15.25	6.42	42%	16%
	Total	37	29.5	15.28	6.43	14%	4%
1996	0-$10,000	11	0.0	0.00	0.00	8%	3%
	$10,000-100,000	9	0.3	0.03	0.00	12%	1%
	$100,000-500,000	2	0.5	0.01	0.01	4%	2%
	> $500,000	10	29.8	13.96	5.54	40%	15%
	Total	32	30.7	14.00	5.55	19%	6%
1997	0-$10,000	18	0.0	0.00	0.00	12%	7%
	$10,000-100,000	7	0.2	0.03	0.00	12%	1%
	$100,000-500,000	3	0.5	0.06	0.02	19%	6%
	> $500,000	8	23.6	12.52	3.73	50%	10%
	Total	36	24.3	12.61	3.76	21%	7%
1998	0-$10,000	27	0.1	0.01	0.01	3%	3%
	$10,000-100,000	12	0.3	0.02	0.00	6%	1%
	$100,000-500,000	5	0.9	0.18	0.03	15%	3%
	> $500,000	6	17.8	8.86	3.53	44%	15%
	Total	50	19.1	9.07	3.57	10%	4%
1999	0-$10,000	28	0.1	0.01	0.00	4%	3%
	$10,000-100,000	8	0.2	0.00	0.00	0%	0%
[redacted]							
	> $500,000	8	24.2	11.12	2.90	40%	7%
	Total	44	24.4	11.13	2.90	10%	3%
OR: Nehalem-Yachats							
1994	0-$10,000	50	0.1	0.01	0.00	10%	4%
	$10,000-100,000	21	0.6	0.06	0.03	12%	6%
	$100,000-500,000	2	0.4	0.34	0.02	55%	6%
	> $500,000	6	19.8	10.30	4.71	52%	22%
	Total	79	20.9	10.71	4.76	15%	6%
1995	0-$10,000	44	0.1	0.00	0.00	7%	3%
	$10,000-100,000	21	0.7	0.08	0.06	11%	7%
	$100,000-500,000	4	1.1	0.41	0.27	26%	17%
	> $500,000	7	22.9	11.14	3.16	62%	18%
	Total	76	24.9	11.63	3.49	14%	6%
1996	0-$10,000	53	0.2	0.00	0.00	7%	3%
	$10,000-100,000	18	0.5	0.06	0.04	14%	8%
	$100,000-500,000	5	1.4	0.54	0.19	35%	12%
	> $500,000	6	23.8	9.76	3.62	50%	16%
	Total	82	25.8	10.37	3.85	14%	5%
1997	0-$10,000	41	0.1	0.01	0.01	6%	5%
	$10,000-100,000	29	0.7	0.11	0.08	12%	6%
	$100,000-500,000	3	0.6	0.39	0.01	42%	2%
	> $500,000	5	20.4	10.00	2.61	53%	12%
	Total	78	21.8	10.51	2.71	13%	6%
1998	0-$10,000	63	0.2	0.01	0.00	7%	4%
	$10,000-100,000	26	0.7	0.06	0.05	5%	4%
	$100,000-500,000	3	0.6	0.28	0.03	37%	4%
	> $500,000	5	13.2	6.16	1.87	46%	12%
	Total	97	14.7	6.50	1.95	9%	4%
1999	0-$10,000	47	0.2	0.01	0.00	7%	4%
	$10,000-100,000	22	0.7	0.07	0.05	7%	5%
	$100,000-500,000	3	0.8	0.45	0.02	35%	2%
	> $500,000	5	18.3	7.49	2.02	41%	8%
	Total	77	19.9	8.01	2.09	10%	4%
OR: S. of Yachats							
1994	0-$10,000	56	0.1	0.02	0.01	6%	6%
	$10,000-100,000	16	0.6	0.03	0.01	5%	3%
	$100,000-500,000	6	1.9	0.54	0.17	34%	11%

TABLE 3-16. Purchase information for processing plants (by port group) stratified by groundfish purchases and implied groundfish and rockfish dependence, 1994 - 1999. (Page 3 of 5)

	Groundfish Purchases for Plant	# of Plants	Purchases ($ million) of			% Purchases of	
			All species	Groundfish	Rockfish	Groundfish	Rockfish
	> $500,000	10	23.8	10.77	4.73	47%	21%
	Total	88	26.5	11.35	4.93	13%	7%
1995	0-$10,000	52	0.1	0.01	0.01	11%	9%
	$10,000-100,000	12	0.4	0.06	0.05	14%	10%
	$100,000-500,000	6	1.2	0.39	0.18	24%	12%
	> $500,000	11	24.7	12.96	6.01	44%	18%
	Total	81	26.4	13.42	6.25	17%	11%
1996	0-$10,000	54	0.2	0.01	0.01	10%	6%
	$10,000-100,000	16	0.5	0.08	0.05	12%	9%
	$100,000-500,000	4	1.3	0.36	0.18	20%	10%
	> $500,000	10	26.6	10.87	4.20	40%	14%
	Total	84	28.5	11.32	4.43	14%	8%
1997	0-$10,000	51	0.1	0.01	0.01	11%	9%
	$10,000-100,000	14	0.4	0.09	0.06	11%	7%
	$100,000-500,000	3	1.0	0.22	0.14	22%	14%
	> $500,000	10	21.9	11.27	3.96	53%	17%
	Total	78	23.4	11.58	4.17	17%	10%
1998	0-$10,000	67	0.2	0.01	0.01	4%	3%
	$10,000-100,000	17	0.5	0.11	0.06	19%	10%
	$100,000-500,000	5	1.5	0.57	0.30	37%	25%
	> $500,000	7	13.8	6.89	2.74	47%	21%
	Total	96	16.0	7.58	3.10	12%	7%
1999	0-$10,000	61	0.2	0.01	0.01	3%	2%
	$10,000-100,000	18	0.6	0.12	0.06	12%	6%
	$100,000-500,000	7	1.7	0.69	0.38	38%	22%
	> $500,000	9	20.0	7.57	2.11	40%	10%
	Total	95	22.4	8.39	2.56	11%	5%
CA: N. of Bodega Bay							
1994	0-$10,000	109	0.2	0.06	0.05	32%	27%
	$10,000-100,000	24	0.8	0.07	0.05	11%	9%
	$100,000-500,000	14	3.9	0.53	0.38	12%	8%
	> $500,000	20	38.7	11.99	6.20	27%	13%
	Total	167	43.6	12.65	6.67	26%	21%
1995	0-$10,000	50	0.1	0.04	0.02	41%	21%
	$10,000-100,000	19	0.7	0.19	0.09	36%	19%
	$100,000-500,000	16	4.4	0.98	0.46	21%	10%
	> $500,000	15	31.3	16.02	7.46	37%	17%
	Total	100	36.5	17.23	8.03	36%	18%
1996	0-$10,000	73	0.2	0.04	0.02	26%	12%
	$10,000-100,000	35	1.4	0.40	0.17	26%	12%
	$100,000-500,000	15	3.7	0.42	0.22	9%	4%
	> $500,000	19	36.0	14.41	5.91	33%	13%
	Total	142	41.3	15.26	6.32	25%	11%
1997	0-$10,000	81	0.2	0.06	0.05	38%	25%
	$10,000-100,000	27	0.9	0.28	0.14	34%	20%
	$100,000-500,000	14	2.9	0.96	0.40	39%	17%
	> $500,000	20	36.8	14.38	5.18	39%	15%
	Total	142	40.7	15.68	5.77	37%	22%
1998	0-$10,000	68	0.2	0.05	0.03	24%	17%
	$10,000-100,000	28	1.0	0.24	0.15	28%	18%
	$100,000-500,000	15	4.5	1.15	0.58	25%	13%
	> $500,000	17	21.9	8.53	3.60	35%	15%
	Total	128	27.7	9.97	4.35	27%	17%
1999	0-$10,000	99	0.2	0.06	0.03	23%	8%
	$10,000-100,000	24	0.7	0.14	0.10	15%	10%
	$100,000-500,000	19	4.5	0.71	0.26	18%	6%
	> $500,000	15	23.9	8.61	2.80	30%	10%
	Total	157	29.4	9.52	3.19	22%	8%
CA: Bodega Bay - Santa Cruz							
1994	0-$10,000	245	0.5	0.13	0.10	24%	18%
	$10,000-100,000	102	3.8	1.15	0.90	32%	26%
	$100,000-500,000	36	7.8	1.52	0.89	21%	12%
	> $500,000	19	22.6	4.38	2.19	23%	12%
	Total	402	34.7	7.18	4.08	26%	19%

TABLE 3-16. Purchase information for processing plants (by port group) stratified by groundfish purchases and implied groundfish and rockfish dependence, 1994 - 1999. (Page 4 of 5)

Groundfish Purchases for Plant		# of Plants	Purchases ($ million) of			% Purchases of	
			All species	Groundfish	Rockfish	Groundfish	Rockfish
1995	0-$10,000	195	0.5	0.12	0.09	26%	18%
	$10,000-100,000	99	3.5	0.90	0.69	27%	21%
	$100,000-500,000	31	7.1	1.27	0.59	19%	10%
	> $500,000	25	34.7	9.21	4.48	26%	13%
	Total	350	45.7	11.50	5.84	26%	18%
1996	0-$10,000	178	0.4	0.11	0.07	22%	15%
	$10,000-100,000	93	3.0	0.63	0.44	24%	17%
	$100,000-500,000	38	9.4	1.94	0.77	24%	11%
	> $500,000	25	34.7	9.94	4.11	29%	12%
	Total	334	47.5	12.62	5.39	23%	15%
1997	0-$10,000	199	0.5	0.10	0.08	23%	17%
	$10,000-100,000	87	3.0	0.72	0.55	26%	19%
	$100,000-500,000	37	9.6	2.43	1.06	24%	11%
	> $500,000	32	42.1	7.26	2.99	18%	7%
	Total	355	55.2	10.50	4.68	23%	16%
1998	0-$10,000	259	0.7	0.13	0.10	22%	18%
	$10,000-100,000	100	3.3	0.87	0.64	26%	20%
	$100,000-500,000	36	9.3	2.08	1.20	21%	12%
	> $500,000	15	11.8	3.82	2.05	31%	16%
	Total	410	25.0	6.90	3.99	23%	18%
1999	0-$10,000	241	0.6	0.13	0.09	21%	16%
	$10,000-100,000	93	3.5	0.72	0.48	21%	15%
	$100,000-500,000	33	7.8	1.55	0.52	20%	6%
	> $500,000	15	13.5	3.50	1.48	24%	12%
	Total	382	25.4	5.89	2.57	21%	15%
CA: Santa Cruz-Oxnard							
1994	0-$10,000	160	0.4	0.09	0.07	33%	26%
	$10,000-100,000	87	3.3	0.68	0.57	21%	18%
	$100,000-500,000	43	9.9	1.52	1.15	14%	11%
	> $500,000	28	33.5	3.12	1.85	10%	6%
	Total	318	47.1	5.41	3.63	25%	20%
1995	0-$10,000	138	0.3	0.04	0.03	19%	16%
	$10,000-100,000	74	2.9	0.48	0.40	19%	15%
	$100,000-500,000	29	6.4	1.19	0.86	15%	10%
	> $500,000	28	40.0	4.75	2.81	12%	7%
	Total	269	49.7	6.46	4.11	18%	14%
1996	0-$10,000	118	0.4	0.05	0.05	19%	16%
	$10,000-100,000	53	2.0	0.53	0.44	26%	20%
	$100,000-500,000	40	9.8	1.50	1.12	16%	12%
	> $500,000	23	36.8	4.05	1.91	13%	6%
	Total	234	49.0	6.13	3.51	19%	15%
1997	0-$10,000	122	0.3	0.05	0.04	23%	17%
	$10,000-100,000	60	2.2	0.52	0.44	22%	19%
	$100,000-500,000	35	8.9	1.38	0.92	18%	12%
	> $500,000	25	26.6	3.19	1.32	10%	4%
	Total	242	38.0	5.13	2.71	20%	15%
1998	0-$10,000	135	0.4	0.08	0.07	19%	16%
	$10,000-100,000	81	3.2	0.56	0.39	22%	17%
	$100,000-500,000	36	8.5	1.44	0.86	17%	11%
	> $500,000	10	9.0	1.97	1.04	17%	9%
	Total	262	21.1	4.06	2.36	20%	15%
1999	0-$10,000	154	0.4	0.10	0.09	25%	21%
	$10,000-100,000	60	2.3	0.30	0.21	16%	13%
	$100,000-500,000	39	8.7	1.03	0.60	12%	7%
	> $500,000	20	33.4	1.53	0.58	3%	1%
	Total	273	44.8	2.95	1.48	19%	16%
CA: S. of Oxnard							
1994	0-$10,000	171	0.4	0.08	0.07	21%	17%
	$10,000-100,000	97	3.5	0.50	0.35	16%	12%
	$100,000-500,000	27	5.9	0.49	0.33	12%	8%
	> $500,000	18	26.4	0.44	0.39	4%	3%
	Total	313	36.1	1.51	1.14	18%	14%
1995	0-$10,000	117	0.3	0.05	0.05	15%	12%
	$10,000-100,000	91	3.6	0.64	0.41	18%	12%

TABLE 3-16. Purchase information for processing plants (by port group) stratified by groundfish purchases and implied groundfish and rockfish dependence, 1994 - 1999. (Page 5 of 5)

Groundfish Purchases for Plant		# of Plants	Purchases ($ million) of			% Purchases of	
			All species	Groundfish	Rockfish	Groundfish	Rockfish
	$100,000-500,000	24	5.7	0.21	0.15	5%	4%
	> $500,000	17	28.9	0.39	0.36	3%	3%
	Total	249	38.6	1.31	0.97	14%	11%
1996	0-$10,000	104	0.3	0.04	0.04	11%	8%
	$10,000-100,000	80	3.2	0.58	0.36	17%	12%
	$100,000-500,000	24	5.9	0.29	0.17	8%	4%
	> $500,000	18	38.5	0.31	0.29	2%	2%
	Total	226	47.9	1.23	0.85	12%	9%
1997	0-$10,000	119	0.3	0.03	0.02	13%	10%
	$10,000-100,000	81	2.9	0.49	0.27	16%	10%
	$100,000-500,000	22	5.0	0.22	0.15	7%	5%
	> $500,000	18	34.2	0.21	0.18	2%	1%
	Total	240	42.4	0.95	0.62	13%	9%
1998	0-$10,000	116	0.3	0.05	0.04	17%	14%
	$10,000-100,000	81	3.0	0.38	0.27	16%	12%
	$100,000-500,000	30	7.0	0.67	0.44	12%	9%
	> $500,000	10	24.8	0.09	0.08	1%	1%
	Total	237	35.2	1.19	0.84	15%	12%
1999	0-$10,000	141	0.3	0.04	0.03	12%	9%
	$10,000-100,000	67	2.4	0.21	0.13	10%	7%
	$100,000-500,000	30	6.3	0.69	0.36	16%	8%
	> $500,000	19	35.2	0.05	0.05	0%	0%
	Total	257	44.2	0.99	0.56	11%	7%

TABLE 3-17. Management measures set in the fishery management plan (FMP) or frameworked and set by regulation or notice.

Set in the FMP	Frameworked in the FMP and Set by Regulation or Notice
Permit requirements Limited access Limited entry and open access allocation shares	Annual harvest levels Mesh size Allocations and quotas Landing and frequency limits (trip limits) Inseason adjustments to trip limits Time/area closures Recreational bag limits, hook limits

TABLE 3-18. Specified harvest levels and observed commercial landings, 1983-1999.

	1983-84	1985-90	1991-94	1995-96	1997	1998	1999	2000
Total Acceptable Biological Catch/Harvest Guideline or Optimum Yield	2,700 (V+C+E)	3,500 (V+C+E)	2,900 (V+C+E)	1,250/ 850 (V+C)	1,220/ 1,000(V+C)	1,045/ 878 (V+C)	1,045/ 689 (V+C)	287/ 200 (coast-wide)
Commercial Landings (average, if multiple years)	3,433	2,644	2,228	741	797	565	406	

TABLE 4-1 estimated time range for canary rockfish stock to recover to maximum sustainable yield stock size, in the absence of all fishing-related mortality.

Years to Rebuild to Maximum Sustainable Yield	Recruitment Assumption
23	Immediate increase to the mean recruitment level observed 1987-1991.
74	Immediate increase to the recruits/spawner level observed 1978-1986.
119	Recruitment sampled from recruitments observed in 1978-1995, assuming a reduced number of 1996-1998 recruits in the 2001 population.
41	Recruitment sampled from recruitments observed in 1978-1997, with 1996-1997 reduced 25% from initial estimates ("medium recruitment" scenario).
64	Recruitment sampled from mean recruitment observed 1978-1997, with 1996-1997 reduced 50% from initial estimates ("low recruitment" scenario).

TABLE 4-2. Summary impacts of alternative management approaches considered.

FISHERY	FISHERY DESCRIPTION	CATCHES/IMPACTS (mt) Lowest option	Highest option
Recreational			
WA sport		2	2
OR sport		16	21
CA sport		26	45
Commercial			
Limited Entry Trawl			
Shrimp (includes open access)		5.5	11
Whiting		3	3
Slope longspine thornyhead	>150 fm only	0	0
Slope sablefish	>150 fm only	0	0
Slope Dover sole	>150 fm only	0	0
Slope petrale sole	>150 fm only	0	0
Midwater widow		1	1.5
Nearshore flatfish	<50 fm	1	1
South of Mendocino	all depths trawl	1	1
Midwater yellowtail		0	0
Summer arrowtooth	>150 fm only	0	0
Limited Entry Fixed Gear			
all except 3-tier sablefish	close 50 - 150 fm? reduced widow and yellowtail rockfish targets	1	1
3-tier sablefish		1	1
South of Mendocino	reduced widow and yellowtail rockfish targets	1	1
Open access			
line gear, including salmon troll	close 50 - 150 fm?	2	2
South of Mendocino		0	0
Totals		60.5	90.5

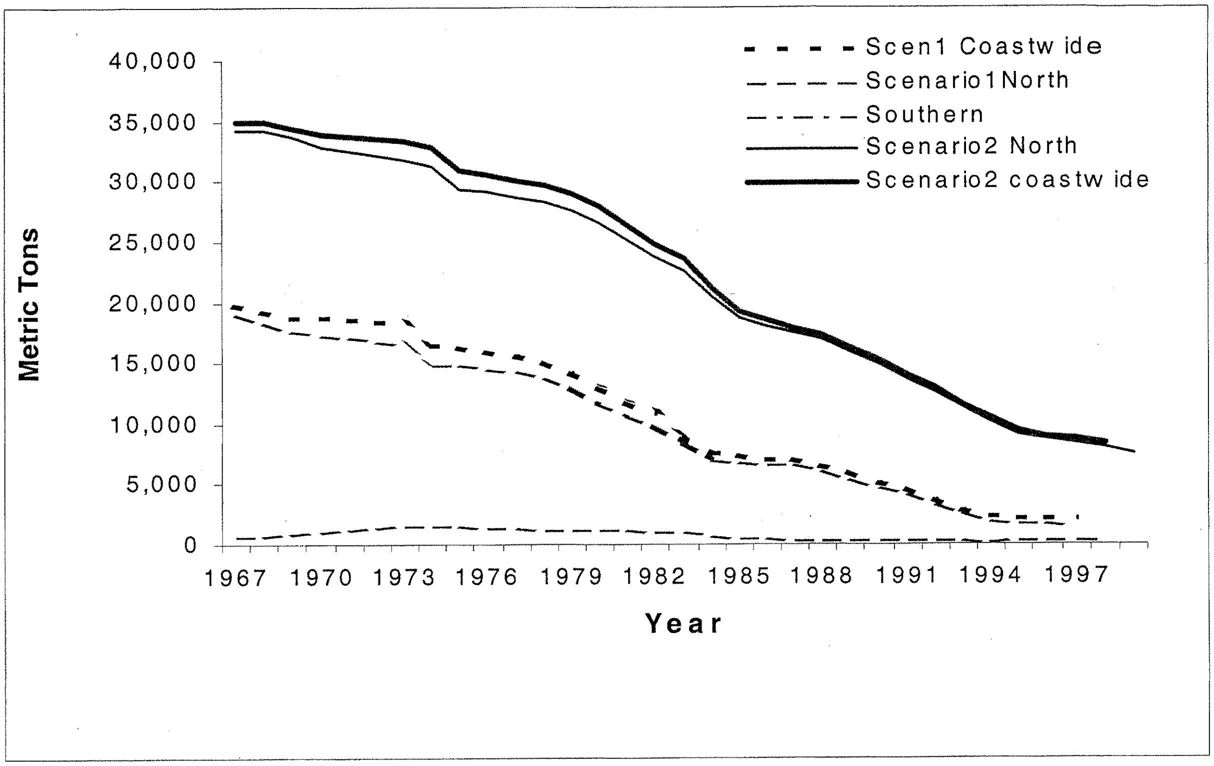


Figure 3-1. Canary spawning biomass trend 1967-1997.

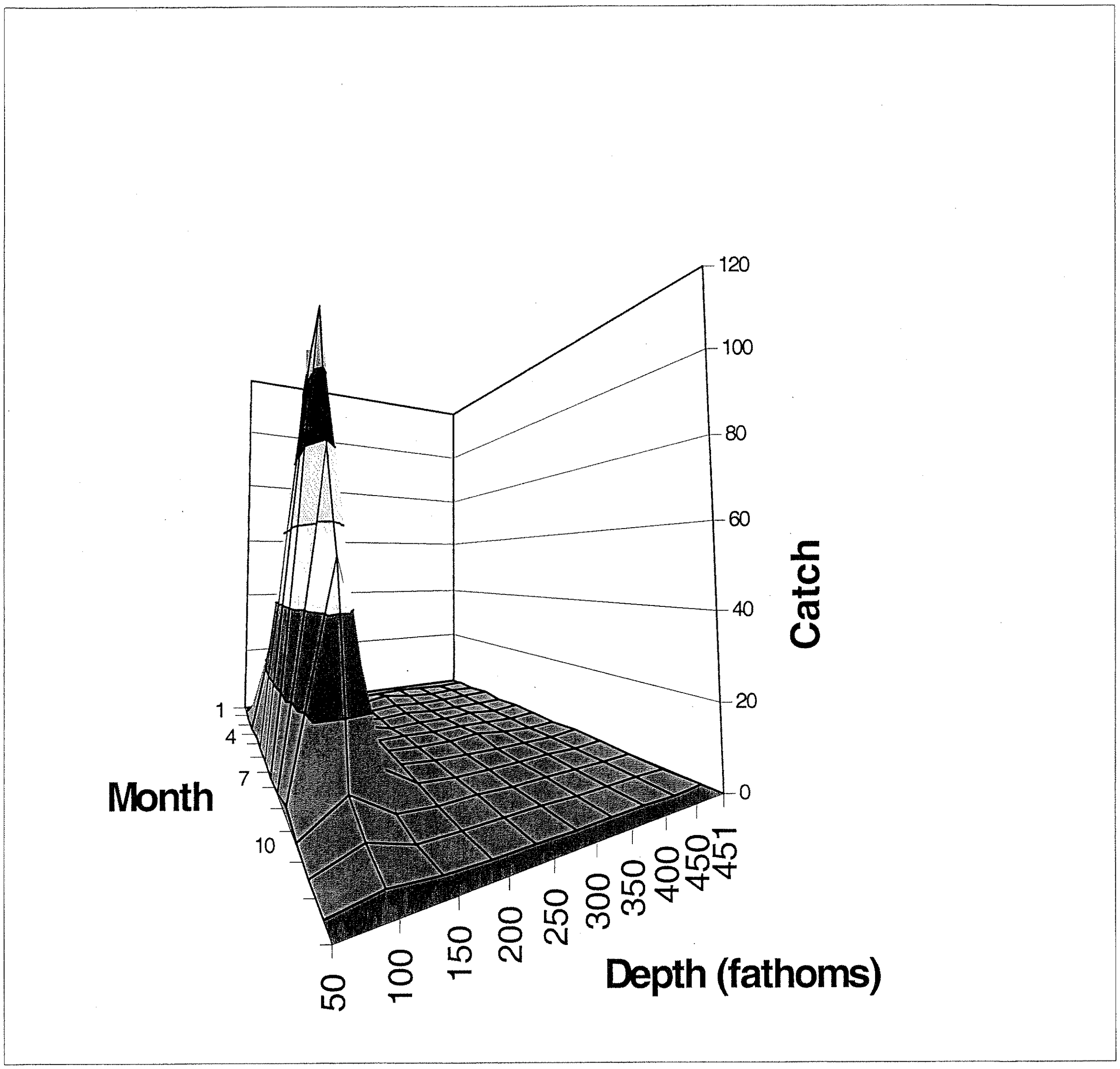
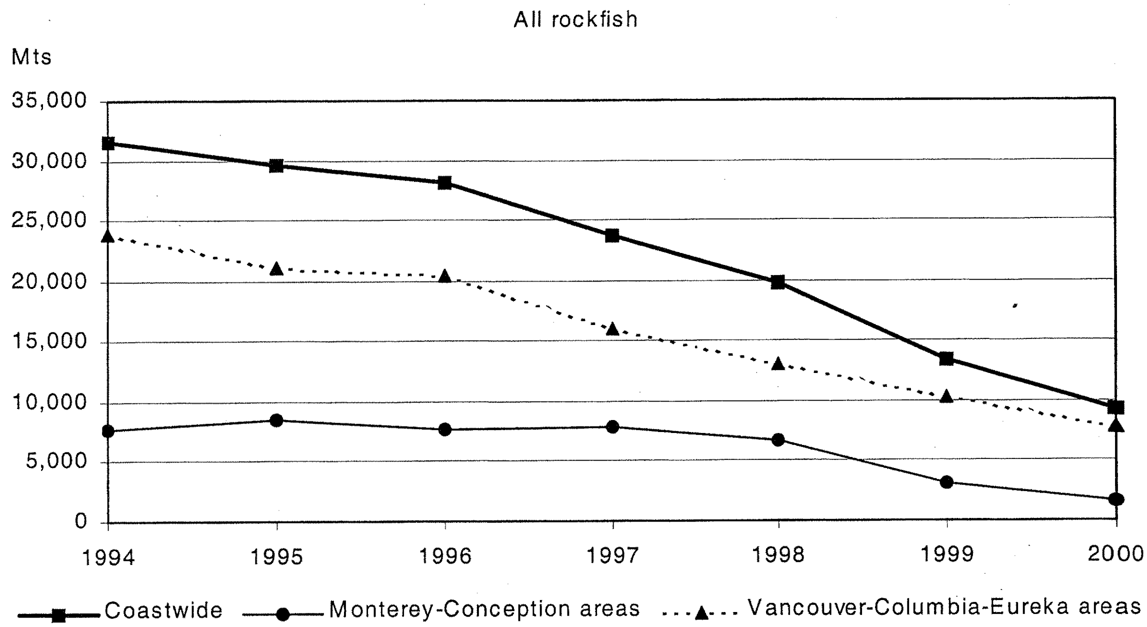
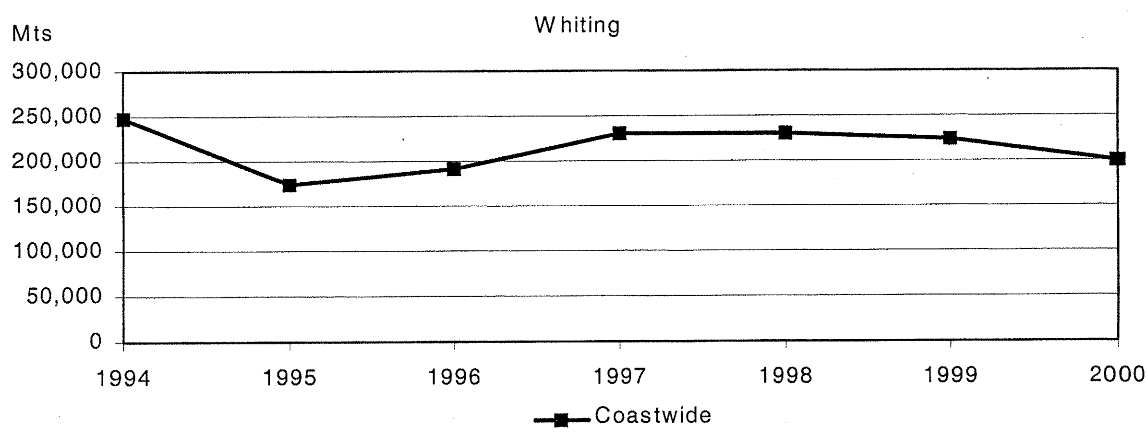


Figure 3-2. Canary logbook tows (Washington).

FIGURE 3-3. Small footrope trawl start locations in 2000 compared to high density rockfish habitat (grey polygons) determined from 1993-1995 tows that hailed more than 800 lb/h of rockfish.

Figure 3-4. Landings trends in West Coast groundfish, 1994-2000.





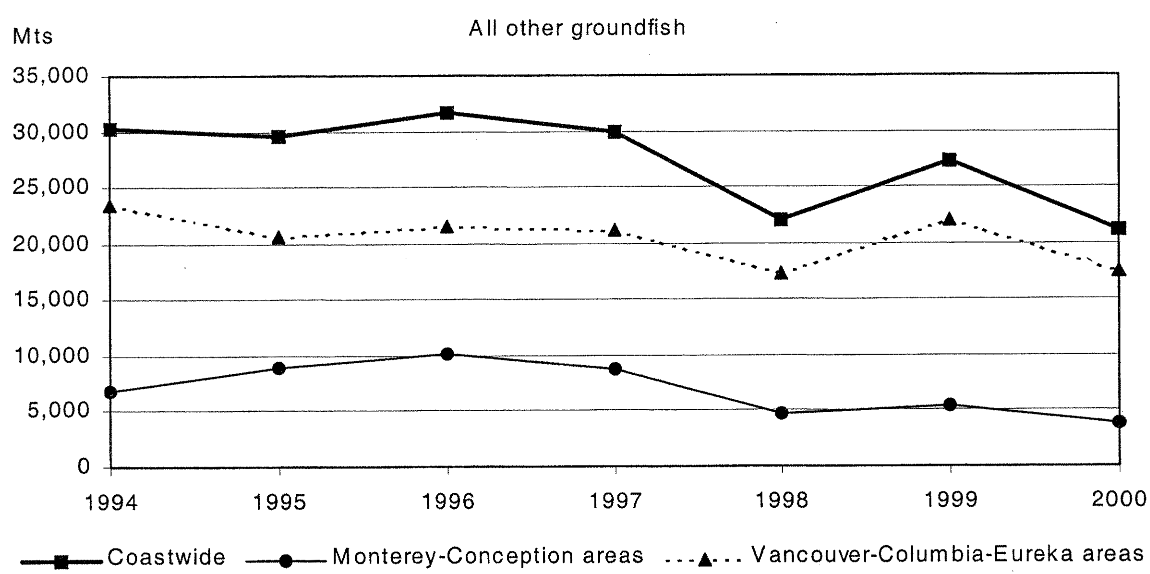


Figure 3-5. Real ex-vessel revenue trends in west coast groundfish, 1994-2000

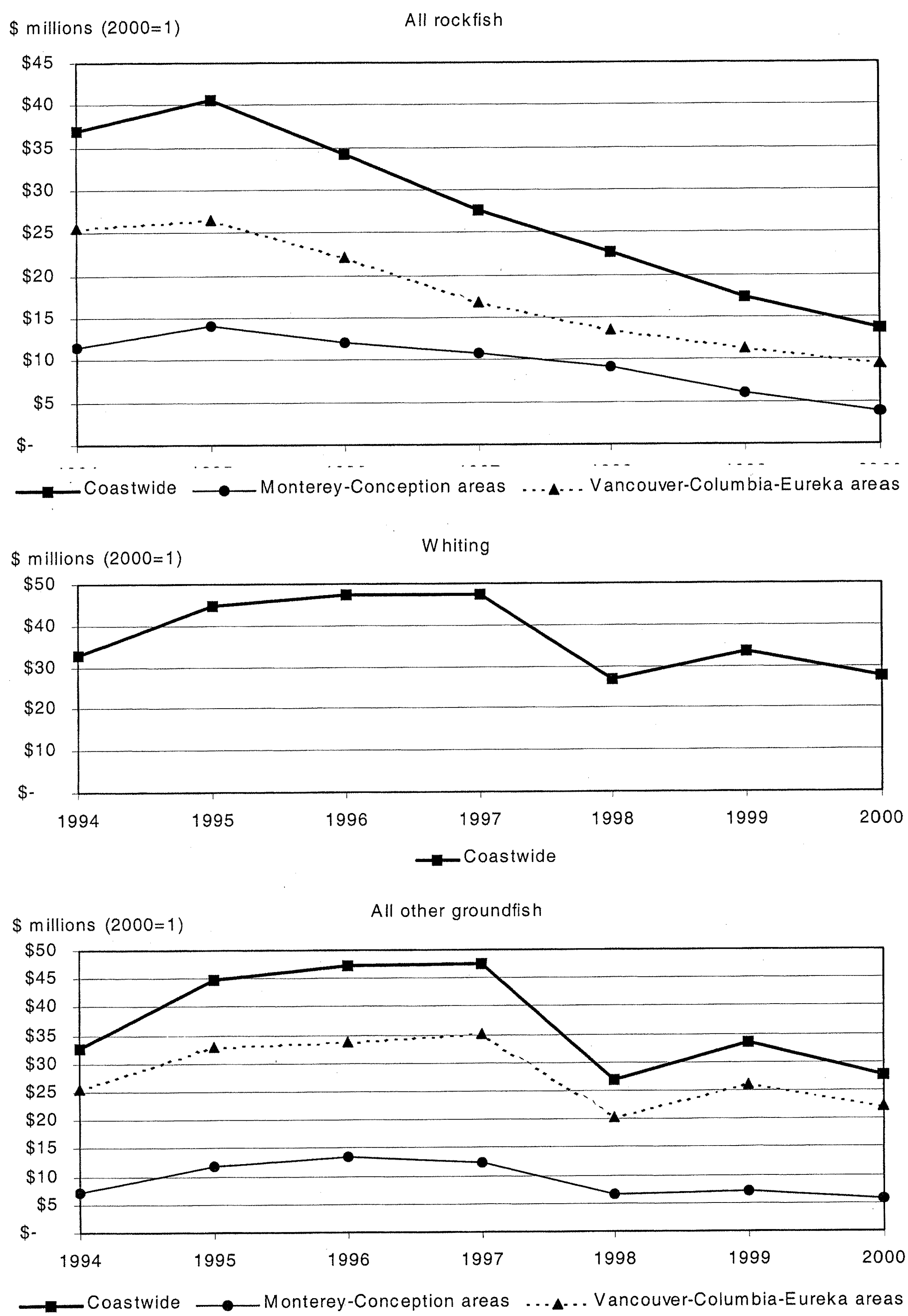


Figure 3-6a. Number of groundfish **open access** vessels by level of dependence on groundfish.

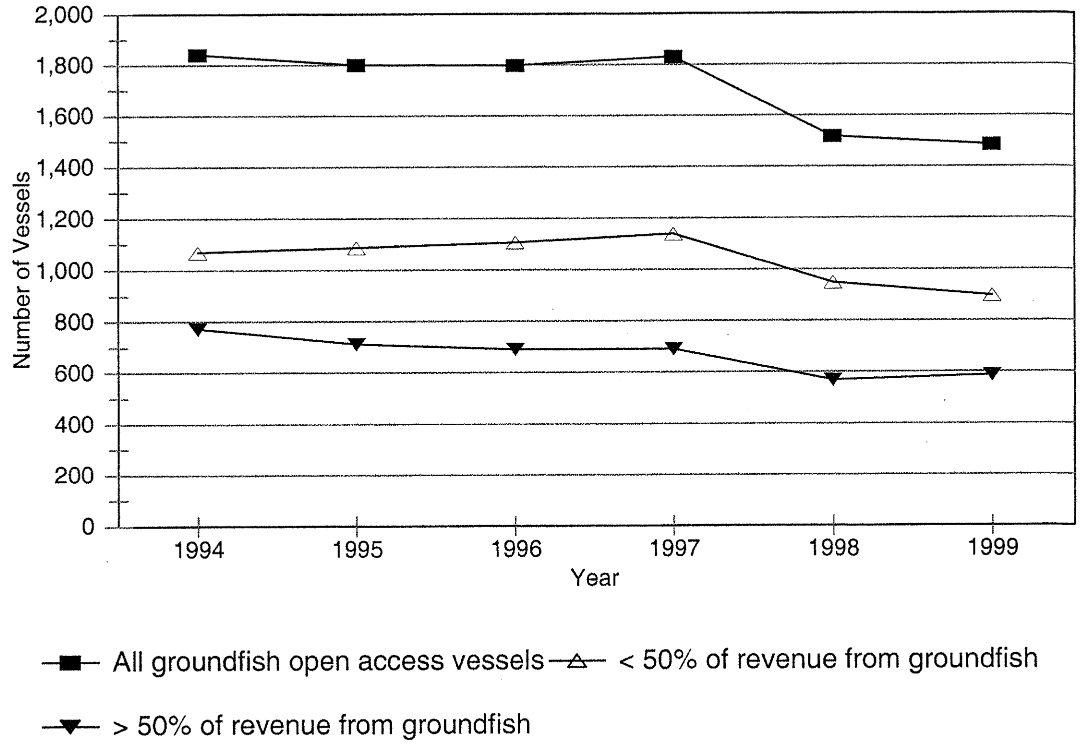


Figure 3-6b. Number of groundfish **limited entry** vessels by level of dependence on groundfish.

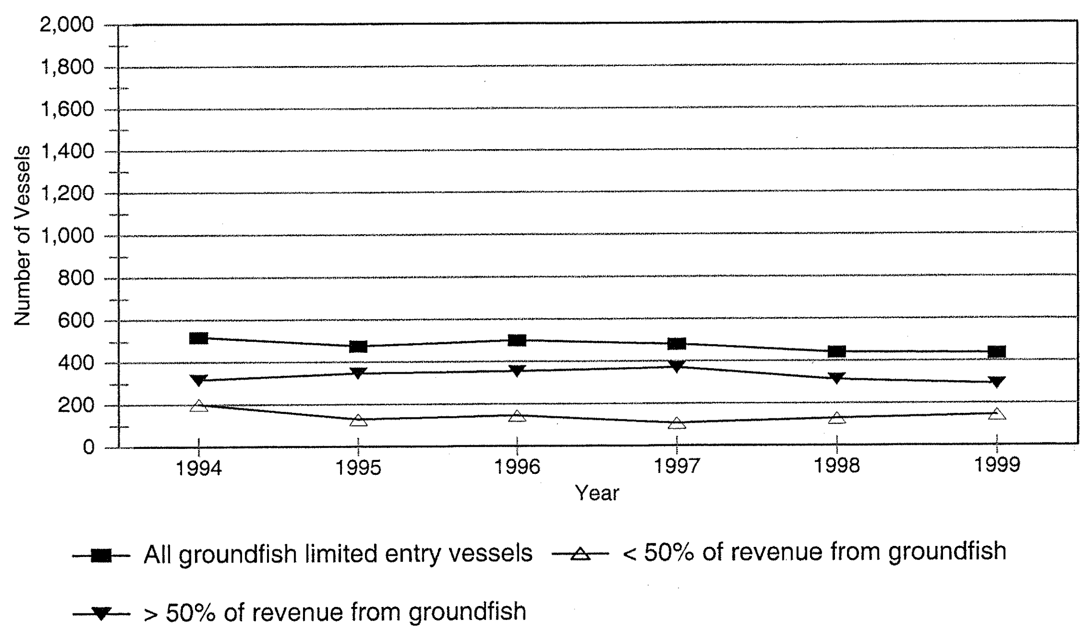


Figure 3-7a . Number of **open access** vessels by level of groundfish revenue.

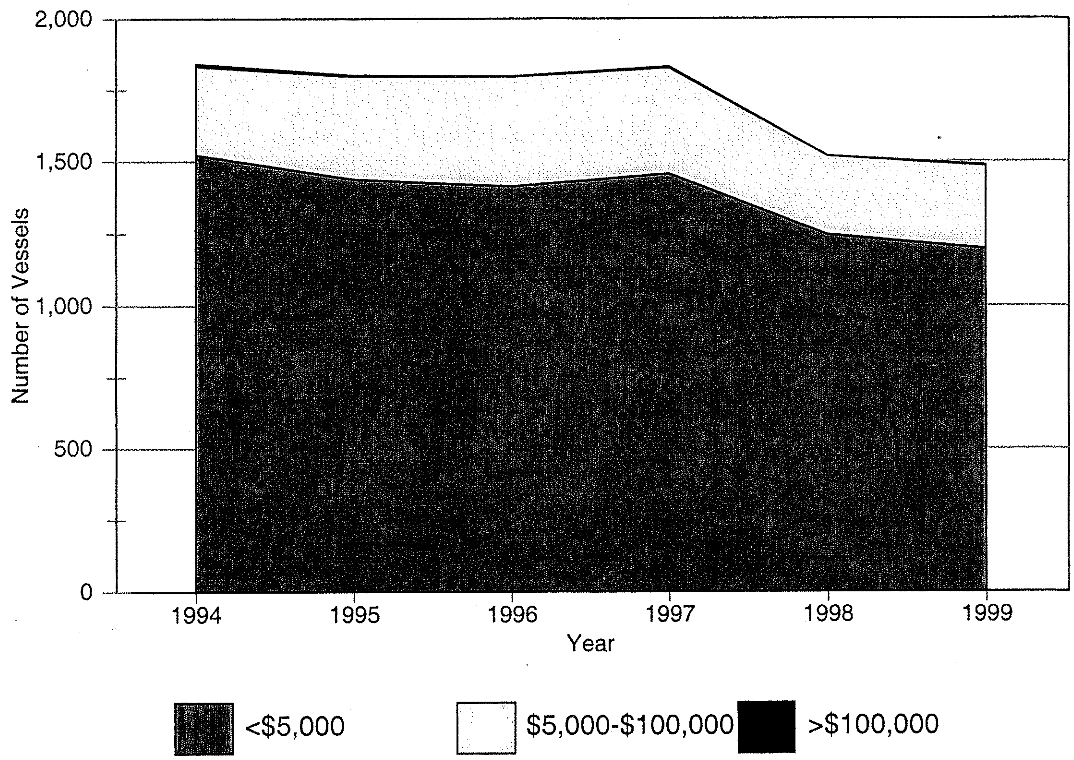
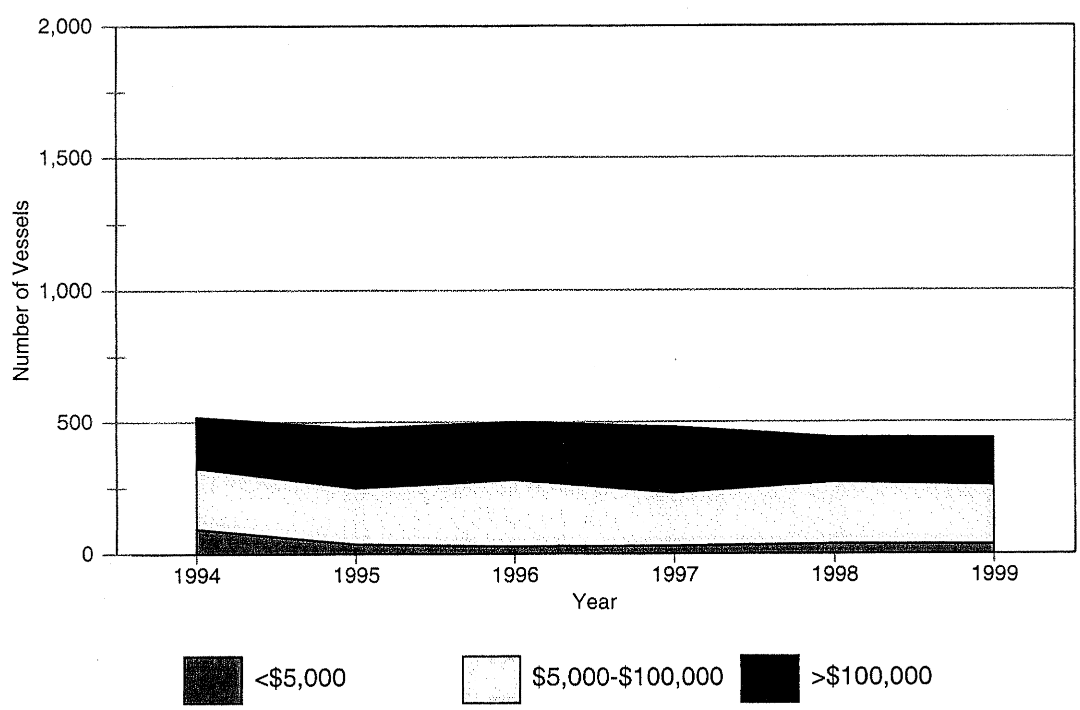


Figure 3-7b. Number of **limited entry** vessels by level of groundfish revenue.



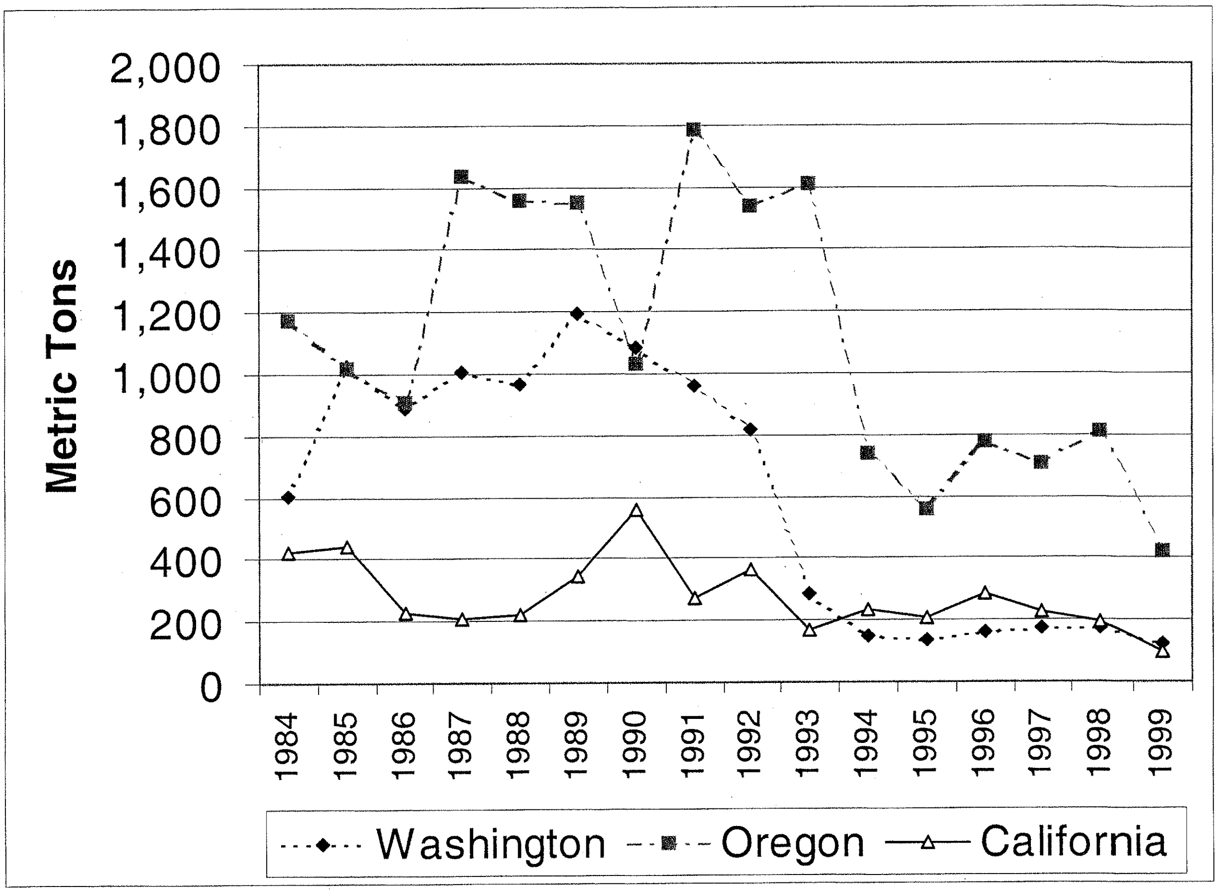


Figure 3-8. Canary rockfish landings trend, 1984-2000.

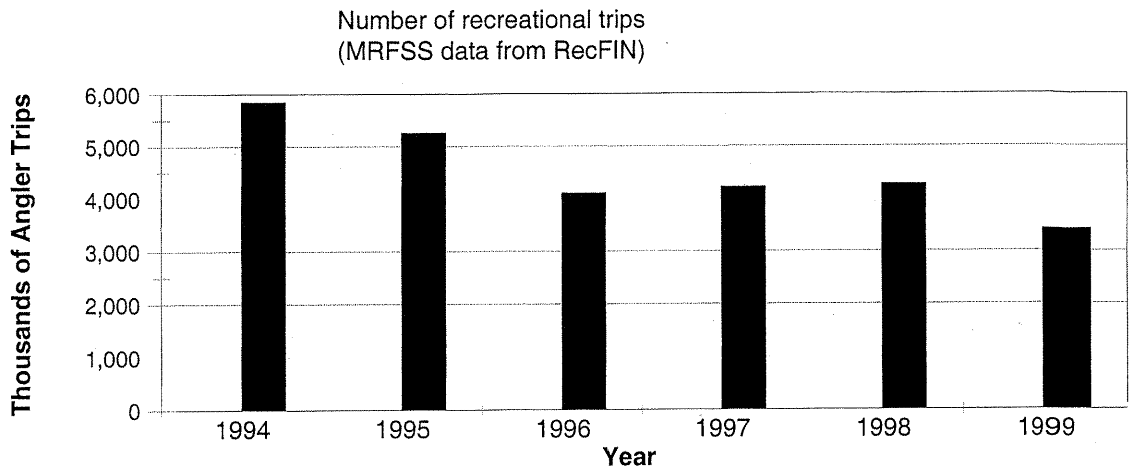
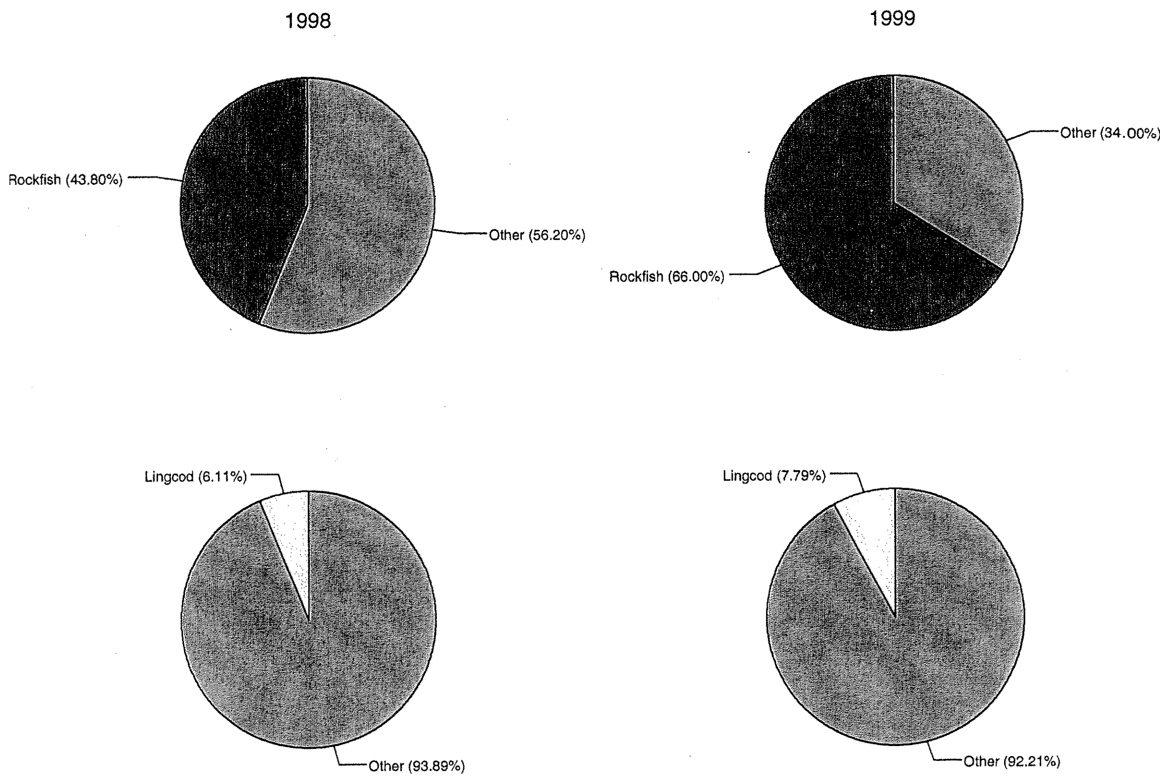


Figure 3-9. Number of recreational trips (MRFSS data from RecFIN).

Figure 3-10. Proportion of total trips that were targeted on rockfish or included rockfish in the catch and proportion of total recreational angler trips that were targeted on lingcod or included lingcod in the catch.



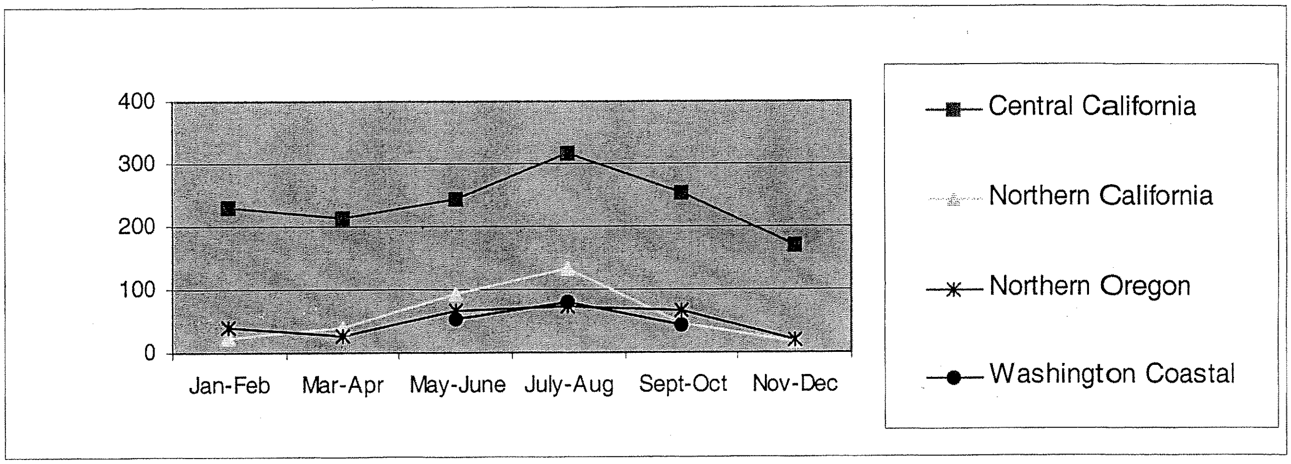


Figure 3-11. Angler trips (in 1000s) by region.

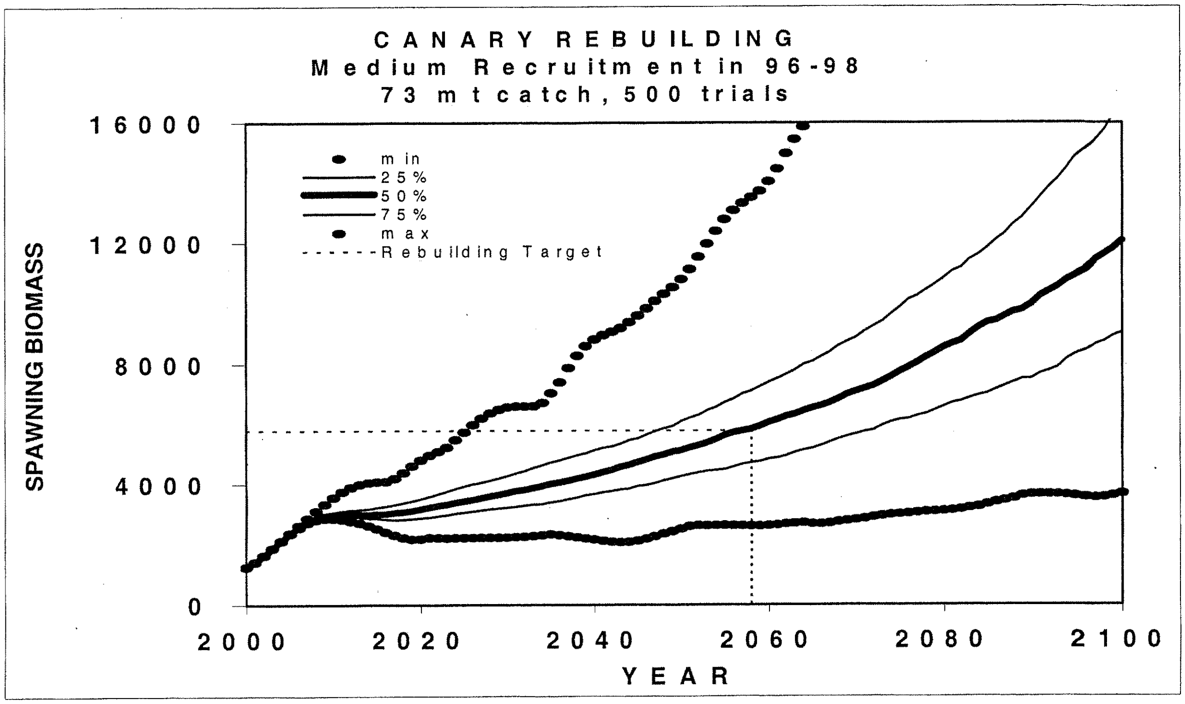


Figure 3-12. Trajectory of spawning biomass expected.

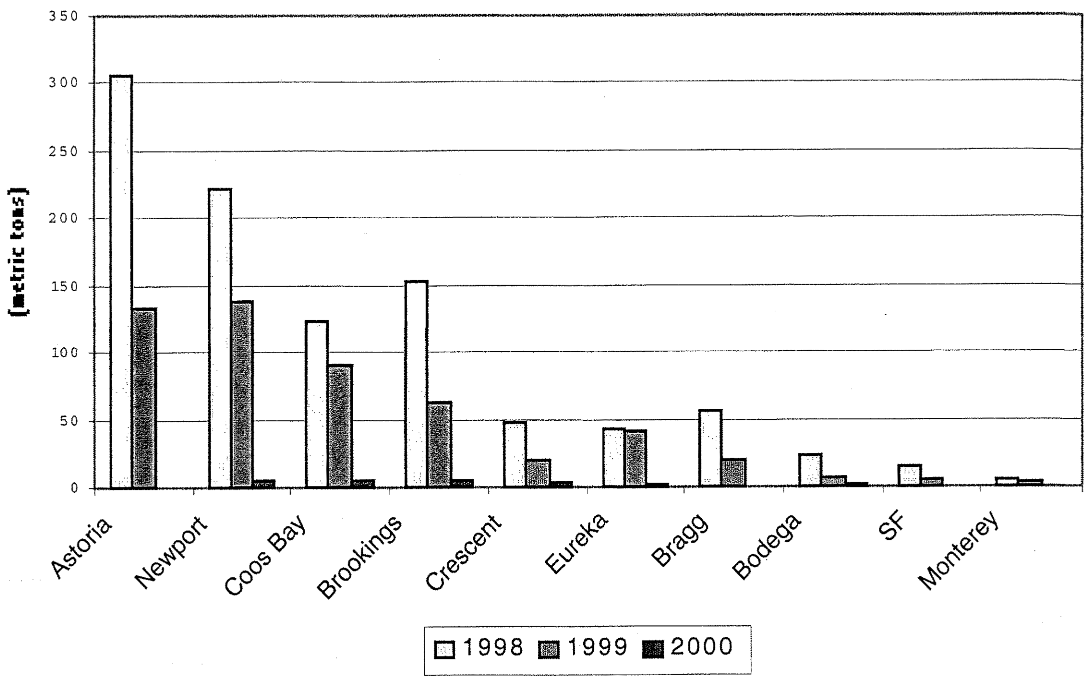


Figure 5-1. Commercial rockfish landings, 1998-2000.

APPENDIX A: Preliminary Rebuilding Analysis for Canary Rockfish

August 24, 2000
Richard Methot
National Marine Fisheries Service

Summary

Canary rockfish exhibit extremely low productivity (level of recruits per spawner) which has contributed to their decline in the northern area and impedes their recovery. There is tremendous uncertainty in these rebuilding projections due to extremely low levels of R/S during 1987-1995 and high, but very uncertain, levels in 1996-1998. On the low side, rebuilding time frames stretch out to 136 to 217 years. During these delayed rebuilding scenarios, catch would need to be only about 15 mt per year in order for the stock to begin to grow out of its current low state. Increased catch later in the rebuilding period is likely to be possible, but not quantitatively examined here. On the high side, the median rebuilding time frame could be as short as 41-45 years and annual catches of 150-185 mt in the north would allow rebuilding. Such an optimistic scenario is risky because it is based upon three large, but poorly estimated, recruitments in 1996-1998. Intermediate scenarios use the 1996-1998 recruitments, but on a reduced level. Such intermediate results allow catches of 25-40 mt while rebuilding in 80-100 years.

A further uncertainty is due to the observation that the southern area of the stock appears to have greater productivity (higher R/S at low spawning biomass). Rough calculations based upon combining northern and southern information are more consistent with the optimistic rebuilding scenario. A new assessment and updated rebuilding analysis that examines the northern and southern data in a holistic manner should be conducted as soon as possible after the trawl survey in summer 2001 provides a new data point.

Introduction

The most recent stock assessment for canary rockfish in the northern area (Columbia and U.S. Vancouver INPFC areas) indicated that a long-term decline had continued and that the abundance of the female spawning biomass had fallen below the depleted threshold (Crone et al., 1999). The assessment in the southern area indicates a somewhat different timeframe for the downtrend, but a similar conclusion regarding the depleted status of this stock is obtained (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 purpose of this document is to estimate the potential rate of rebuilding of canary rockfish. The analysis will focus on the northern area which has had a larger population and fishery historically; then results will be extrapolated to the entire coast. The analysis will involve six steps:

(1) examining the recruitment-spawner information to determine probable levels of recruitment in the near future and as the stock rebuilds;
(2) determine unfished level of spawning biomass in order to calculate target levels for rebuilding;
(3) determining the generation time, which affects the potential duration or rebuilding;
(4) determining expected levels of recruitment during the rebuilding period;
(5) calculating in rebuilding can occur within 10 years, and if not then calculating the time to rebuild with no fishing mortality;
(6) finally, calculate the degree of reduction in fishing mortality needed to rebuild within a time period equal to one mean generation time plus the time to rebuild with no fishing mortality.

The canary rock fish assessment explored two scenarios regarding natural mortality and fishery selectivity for females. These two scenarios provide alternative explanations for the relative low occurrence of old females compared to the occurrence of old males. Scenario #1 has increasing natural mortality for older females and asymptotic fishery selectivity for both sexes. Scenario #2 has constant natural mortality for both sexes and dome-shaped fishery selectivity to explain the low incidence of old females in the fishery samples.

Neither the STAT or STAR in 1999 was able to develop a preference between these two hypotheses, so both are carried forward in this rebuilding analysis. The model developed for the southern area was based on constant female natural mortality and a new approach to modeling fishery selectivity (Williams et al., 1999).

Assessment Summary

Before beginning this analysis of rebuilding, it is helpful to review the basic conclusions of the northern and southern assessments which provide the basic information for any rebuilding analysis.

Northern Area, scenario #1 -

A. In the era prior to 1967, a mean level of recruitment of 2,872 thousand age 1 fish occurred. This level of recruitment would produce a female spawning biomass of 22,376 mt if unfished, but a historical average catch of 1,000 mt reduced this to 16,811 mt at the beginning of the modeled period in 1967.

B. Recruitment over the 1967-1977 period averaged 1,859 thousand fish, which will be taken as the relevant estimate of "virgin" recruitment level. This lower recruitment level and an average catch of 1,845 mt reduced spawning biomass to 13,757 mt in 1978.

C. Over the period 1978-1986, recruitment averaged 1,621 thousand fish; catch averaged 2,860 mt; and spawning biomass declined to 6,613 mt in 1987. This level is barely above the overfished threshold.

D. Over the period 1987-1995, recruitment declined precipitously to an average of only 622 thousand fish. Assessments conducted during this era resulted in quotas that reduced annual catch to approximately 1,000 mt per year. But with the low recruitment (which could not be well estimated by these early assessments), female spawning biomass continued to decline to only 949 mt in 1999.

Northern Area, scenario #2 -

A. In the era prior to 1967, a mean level of recruitment of 2,744 thousand age 1 fish occurred. This level of recruitment would produce a female spawning biomass of 44,991 mt if unfished, but a historical average catch of 1,000 mt reduced this to 34,210 mt at the beginning of the modeled period in 1967. Female biomass per recruit is lower in scenario #1 because of higher female natural mortality compared to that in scenario #2.

B. Recruitment over the 1967-1977 period averaged 1,763 thousand fish, which will be taken as the relevant estimate of "virgin" recruitment level. This lower recruitment level and an average catch of 1,845 mt reduced spawning biomass to 27,683 mt in 1978.

C. Over the period 1978-1986, recruitment averaged 1,634 thousand fish; catch averaged 2,860 mt; and spawning biomass declined to 16,859 mt in 1987.

D. Over the period 1987-1995, recruitment declined precipitously to an average of only 802 thousand fish. Assessments conducted during this era resulted in quotas that reduced annual catch to approximately 1,000 mt per year. But with the low recruitment (which could not be well estimated by these early assessments), female spawning biomass continued to decline to 7,157 mt in 1999, which is at the overfished level.

Southern Area -

A. In the era prior to 1965, a mean level of recruitment of 1,060 thousand age 1 fish occurred. This level of recruitment would produce a female spawning biomass of 11,657 mt if unfished, but average catch of 1,495 mt during 1950-1965 reduced this to 697 mt at the beginning of the modeled period in 1965, which is only 10% of the "virgin" spawning biomass level (6,850 mt) calculated from a long-term average recruitment of 617 thousand recruits.

B. Recruitment over the 1965-1977 period averaged only 473 thousand fish. This lower recruitment level and a much lower average catch of 620 mt allowed spawning biomass to recover to 1,280 mt in 1978, which is still below 25% of the "virgin" level.

C. Over the period 1978-1986, recruitment increased to 620 thousand fish; catch increased to 773 mt; and spawning biomass declined to 381 mt in 1987.

D. Over the period 1987-1995, recruitment continued to average 620 thousand fish and average catch was 486 mt. Female spawning biomass continued to decline to 261 mt in 1993 and has increased to 400 mt recently, but is still below the overfished threshold.

Overview -

A. Both areas have high historical catches which mined an accumulated biomass that is estimated to have been based upon a pre-historical recruitment level that substantially exceeds the recruitment levels occurring during the period of the assessments.

B. Even though pre-historical recruitment was high, the southern area's stock was already below the overfished threshold by 1965. In the northern area, the decline was slower.

C. In the southern area, the stock continued to produce moderate levels of recruitment in spite of low spawning biomass and high fishing mortality rates. In the northern area, recruitment continued to decline through 1995. By the 1990s, both areas were producing 600-800 thousand recruits per year, but the southern area does it from a spawning biomass that is much smaller than the biomass in the north.

D. The high current "recruits per spawner" in the southern area indicates a resilient stock that would be expected to increase rapidly if fishing pressure was much reduced. In contrast, the current "recruits per spawner" in the northern area is extremely low and barely above the level that would allow the stock to recover even without fishing.

E. The increase in northern area recruitment in 1996-1998 is promising and consistent with the level of recruits per spawner found in the south, but these recent recruitment estimates are highly uncertain until these young fish have been seen in more than one survey and several years of fishery age composition data.

F. These north-south comparisons must be accompanied with a large caveat of uncertainty regarding stock structure. The division of the stock into north-south zones at Cape Blanco (Eureka-Columbia dividing line) does not represent knowledge of biological stock boundaries. Canary rockfish distribution in trawl surveys shows no break at this point of the coast and there is no other information with which to establish a biological stock boundary at that point. Although the northern and portions of the southern canary rockfish population are not likely to be completely separate, nor are they likely to be well-mixed annually, as evidenced by the different trends in stock abundance estimated in the two areas. There certainly is potential for oceanographic conditions to favor recruitment in the north versus recruitment in the south on a year-to-year and on a longer term basis. The degree of intermingling of these northern and southern recruits during their lifetime is unknown, and probably influenced by oceanographic conditions.

Projection model configuration

Projects were made using the synthesis assessment model in forecast mode. Most projections were done by resampling from the observed time series of recruits per spawner (R/S) and calculating the median time to rebuild among 500 trials.

Conditions for these projections were the same as those as estimated in Crone et al (1999) with the following exceptions:

1. Recent recruitments - Small fish occurring in the 1998 survey resulted in large estimates for recruitment of age 1 fish in 1996-1998. The assessment review in 1999 recommended an alternative scenario with these 3 recruitments set at half of their estimated value. Examination of the detailed model results support this alternative, and it is taken as the baseline conditions for this rebuilding analysis. Tables 1 and 2, and Figures 1,2,4 and 5 present the original "high" recruitment values. Recruitment in 1999 and 2000 is set equal to the average recruitment during 1987-1995.

2. Recent catch - The assessment was conducted with the assumption that 1999 catch would be the same as 1998 (996 mt). Available data indicate that total catch in 1999 was only 528 mt and this lower value is used in calculation the population numbers at age in 2001. Catch in 2000 is assumed to be 150 mt.
3. Maturity at age - These values were not correctly set in the 1999 analysis. Correcting these values changes the spawning biomass calculations presented in the 1999 assessment, but does not affect the fitting of the model because spawner-recruitment relationships were not included in the 1999 assessment. The corrected maturity schedule and spawning biomass calculations are used throughout this rebuilding analysis.

Scenario #1

Spawner-Recruit Relationship
The level of recruitment estimated in the most recent canary rockfish assessment exhibits a substantial decline. During 1987-1995, average recruitment was only 33% of the average that occurred during 1967-1977 (Table 1, Figure 1). As long as this low level of recruitment persists, the stock cannot rebuild to the 40% biomass level, even without fishing. The level of recruits per spawner for canary rockfish is barely above the replacement level throughout the time series (Figure 2). As long as similar levels of recruits/spawner occur, any rebuilding will be extremely slow. However, adding recruitment levels from the northern and southern regions moderates this decline, so that the 1987-1995 mean recruitment is 54% of the mean during 1967-1977.

Spawner-recruitment results of the canary rockfish assessment were used in the meta-analysis of general patterns of spawner-recruitment curvature for rockfish (Dorn 2000) based upon adding the northern and southern assessment results together. Dorn (2000) estimated a moderate level of steepness (0.55) in his examination of the combined northern and southern assessment results. The Beverton-Holt spawner-recruitment relationship was parameterized so that the steepness was defined as the level of recruitment when spawning biomass was at 20% of its unfished level.

Here we explore the parameters of the canary rockfish spawner-recruitment relationship for the northern area alone. The synthesis assessment model was rerun with the same data set as used in the1999 assessment. The parameters for year-specific recruitment were kept at the same values as estimated in the 1999 assessment, so only the parameters of the spawner-recruitment relationship were estimated.

The estimated S/R steepness was only 0.381 (Figure 1). Hence, canary rockfish in the northern area are estimated to have a high level of decline in recruitment as spawning biomass is reduced to a low level. The low recruitments during 1987-1995 and the high recruitments during 1996-1998 create a poor fit to these spawner-recruitment information. If the 1996-1998 recruitments are replaced by half their value, then the estimated steepness is reduced and the overall fit is improved. If these 3 ending recruitments are deleted from the spawner-recruitment curve fitting, then the estimated steepness declines to 0.23 and the 1987-1995 recruitments are well fit by the estimated curve. When synthesis is allowed to re-estimate the year-specific recruitment parameters while estimating the spawner-recruitment relationship, the estimated S-R curvature is 0.389 and the poorly estimated early and late recruitment values are moved towards the curve.

Unfished Abundance Level
Three possibilities are the level from the assessment model, the level from the fitted spawner-recruitment curve, and the level calculated from the mean recruitment level in the early years of the time series.

The highest value comes from the initial assessment where a recruitment level of 2,872 million age 1 recruits would produce an unfished female spawning biomass of 22,376 mt. In the initial assessment modeling, this initial recruitment level is acted on by a fishing mortality sufficient to produce a catch of 1,000 mt which reduces the initial spawning biomass down to 18,971 mt (Table 1, Figure 1).

The lowest level comes from the intercept between the estimated spawner-recruitment curve and the recruits/spawner replacement line. This level has 1,301milllion recruits producing a spawning biomass of 10,136 mt. However, because this relationship is fitted to the logarithm of recruitment, a correction when backtransforming to mean recruitment is necessary. These transformed values are 1,598 million recruits producing an unfished spawning biomass of 12,450 mt (Table 1, Figure 1).

An intermediate level comes from taking the early mean recruitment level (1,859 million recruits in 1967 through 1977) which would produce a spawning biomass of 14,483 mt if unfished.

The intermediate level is taken as the best estimate of unfished spawning biomass (Figure 1). Note, however, that high historical catches were obtained while fishing down from an even higher level of biomass. The rebuilding target is set at 40% of the unfished spawning biomass level, which is 5,793 mt of female spawners.

This rebuilding target is essentially identical to the biomass level associated with MSY on the basis of the estimated spawner-recruitment curve. MSY is estimated to be approximately 725 mt which occurs at a spawning biomass of about 5,700 mt and a fishing mortality rate corresponding to a SPR of 63%. Note that because of the low S/R steepness for canary, fishing at an SPR of 65% is expected to produce a spawning biomass level equal to about 40% of the unfished level. The equilibrium catch at $F_{50\%}$ to $F_{70\%}$ ranges from 689 to 724 mt, but at F levels of $F_{50\%}$ - $F_{60\%}$ the equilibrium stock level would be less than the rebuilding target of 40%. Thus, upon completion of the rebuilding, the long-term harvest policy for canary rockfish should be no more aggressive than $F_{65\%}$ if the goal is to keep the stock size above the 40% level.

Note that the canary rockfish stock is estimated to have declined rapidly through the 40% biomass level, so few recruitments were observed while the biomass was in its target range (Figure 1). The estimated spawner-recruitment curvature and projected rebuilding rates could easily change if the next several years of canary rockfish recruitment indicate that the stock has greater capacity to produce strong recruitment from intermediate stock levels.

Generation Time

This is calculated as the mean age of female spawners in an unfished population. It is calculated to be 16.8 years in scenario #1 in which female natural mortality increases at older ages.

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 resampling of deviations from the estimated spawner-recruitment relationship. The first method is not used here 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 will be the baseline approach here, but we note here that such a method incorporates no population compensation, so often leads to exponential model 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 results from this method will be presented in comparison to the R/S method.

The main approach to estimating future recruitment levels is through randomly resampling the historical values of R/S (Figure 2) and multiplying the selected value by the previous year's spawning biomass to estimate the current year's recruitment of age 1 fish. These R/S values indicate very little ability of the population to compensate for fishing mortality. The 1996-1998 R/S values are higher, but these values are driven nearly solely by the highly variable occurrence of young canary rockfish in the 1998 triennial trawl survey. Most projections will be based upon resampling the R/S from 1978-1995. Sensitivity analyses will utilize different ranges of years for the resampling.

Rebuilding in the Absence of Fishing

The rate of rebuilding with no fishing mortality depends only upon the level of recruitment that occurs during the rebuilding period, which begins in 2001. It is informative to consider first how rebuilding would proceed if various constant levels of future recruitment occurred. As noted above, mean recruitment during 1987-1995 was less than 40% of the 1,859 thousand recruits in the "virgin" level, so if this low recruitment level persists the stock cannot rebuild to the 40% target. If the average recruitment immediately increased to 782 thousand (which is the mean recruitment during 1987-1991 as the spawning stock was declining through the 40% biomass level), then rebuilding to that 40% biomass level would occur in 23 years. This scenario with relatively constant recruitment (and increasing R/S) at lower spawning stock size is consistent with combining the northern and southern results. However, in the northern area alone, lower recruitment levels have occurred as the stock continued to decline and the relative constancy of R/S (Figure 2) indicates that resampling from recent R/S values is a more realistic characterization of the likely rate of rebuilding.

With resampling R/S, the time to rebuild is sensitive to the range of years from which this resampling occurs (Table 3) and to the level of the 1996-1998 recruitments. Using the reduced 1996-1998 recruitments in the calculation of the starting population in 2001, then resampling from 1978-1995 produces a median time to rebuild of 119 years (Table 3).

Preliminary calculations used the higher estimates of recruitment in 1996-1998. These higher recruitments start the rebuilding early and provided high R/S values in the future resampling. If the resampling includes 1987-1997, then 2 of the 10 possible values are from the uncertain high estimates. This provides an optimistic result with median rebuilding in 24 years. Even when the higher recruitments are not used in the resampling, their contribution to the starting population in 2001 reduces median rebuilding from 119 years to 82 years.

The range of years used to resample also has a great impact on the results. Higher R/S during 1978-1986 produces rebuilding in 74 years, but lower R/S in 1987-1995 delays rebuilding substantially. Adding the higher R/S values from 1996 and 1997 reduces the time to rebuild.

Similar calculations of time to rebuild occur if the calculations are based upon deviations from the estimated spawner-recruitment curve.

The time to rebuild ranges from an optimistic level of 23 or 24 years if either there is an immediate increase in recruitment to an intermediate level (782 thousand fish), or if the high estimated R/S values during 1996-1998 represent a substantial probability for future recruitment, respectively. More realistic scenarios are based upon lower recruitment levels in 1996-1998 and R/S levels observed over a longer period. These scenarios produce rebuilding time frames of at least 74 years, and the recommended result (resampling from 1978-1995) shows a median time to rebuild of 119 years.

The assessment of canary rockfish in the southern area (Eureka-Monterey) found continued moderate recruitment and high R/S values at low levels of spawner abundance (Figure 3). The combined average historical recruitment from north plus south would produce a spawning biomass of 18,477 mt if unfished (using unfished S/R from the northern analysis). The 1987-1995 average recruitment from the combined areas has no obvious trend and averaged 1,291 thousand fish. At this level of recruitment, the combined area population would rebuild in 16 years. This calculation should not be considered definitive. At this time we have not quantitatively combined the northern and southern results in a way that would allow rebuilding calculations based upon R/S deviations.

The target rebuilding time is equal to one generation time plus the time to rebuild with zero fishing.

Rebuilding

Rebuilding scenarios were conducted at various levels of constant catch. The level of catch that can be sustained during rebuilding is strongly related to the degree that R/S during rebuilding are above the F=0 replacement level. Under the scenario with lower 1996-1998 recruitment and resampling from 1978-1995, the stock can only sustain 13 mt of catch per year without delaying rebuilding beyond 136 years (Table 3). This extremely low level of potential catch is extraordinary in comparison to the >1000 mt catches that occurred for many years. The difference is due to the fact that the high catches were not sustainable and were reducing the stock size, and that R/S has been extremely low for canary rockfish. It is unknown what sort of prolonged climate conditions would have allowed historical R/S to be sufficiently high to build up the biomass that supported the historical fishery.

Under the higher recruitment scenario with resampling from 1987-1997, the stock can rebuild in 42 years 67% of the time while catch is 150 mt per year. Preliminary calculations were also made with the higher recruitment scenario and constant exploitation rate rather than a constant catch level. In this case, fishing at $F_{80\%}$ (without 40-10 adjustment) would allow rebuilding in 42 years. During early years (while biomass is low) the annual catch would be about 50 mt. As the stock approached the rebuilt level, the annual catch would be near 300 mt. Over the course of the rebuilding, the median total catch from this $F_{80\%}$ policy would be 37% greater than that obtained from a constant catch of 150 mt per year.

Scenario #2

Spawner-Recruit Relationship

The level of decline estimated in scenario #2 is not as extreme as that estimated in scenario #1. In addition, the absolute level of recruitment has not declined as much (Table 3, Figure 4). During 1987-1995, average recruitment was 46% of the average that occurred during 1967-1977 (Table 3). However, the level of recruits per spawner in the late 1980s to mid 1990s is very low (Figure 5) and even closer to the replacement line than in scenario #1. As long as this low level of recruitment per spawner persists, any rebuilding will be very slow. As in scenario #1, the 1996-1998 recruitment estimates are higher, but based on limited data.

A spawner-recruitment curve fitted as in scenario #1 produces an estimate of curvature equal to 0.403 (Figure 4), which is similar to the 0.38 level estimated in scenario #1.

Unfished Abundance Level

Three possibilities are the level from the assessment model, the level from the fitted spawner-recruitment curve, and the level calculated from the mean recruitment level in the early years of the time series.

The highest value comes from the initial assessment where a recruitment level of 2,744 million age 1 recruits would produce an unfished female spawning biomass of 44,991 mt. Note that the level of female spawning biomass per recruit is much higher in scenario #2 than in scenario #1 because of the lower female natural mortality in the second scenario. In the initial assessment modeling, this initial recruitment level is acted on by a fishing mortality sufficient to produce a catch of 1,000 mt which reduces the initial spawning biomass down to 34,210 mt (Table 2, Figure 4).

The lowest level comes from the intercept between the estimated spawner-recruitment curve and the recruits/spawner replacement line. This level has 1,250 million recruits producing a spawning biomass of 20,495 mt. However, because this relationship is fitted to the logarithm of recruitment, a correction when back transforming to mean recruitment is necessary. These transformed values are 1,567 million recruits producing an unfished spawning biomass of 25,693 mt (Table 2, Figure 4).

An intermediate level comes from taking the early mean recruitment level (1,763 million recruits in 1967 through 1977) which would produce a spawning biomass of 28,909 mt if unfished.

The intermediate level is taken as the best estimate of unfished spawning biomass Figure 4. We note, however, that high historical catches were obtained while fishing down from an even higher level of biomass. The rebuilding target is set at 40% of the unfished spawning biomass level, which is 10,277 mt of female spawners. The spawning biomass in 1999 is at 25% of the unfished level according to scenario #2.

Generation Time

This is calculated as the mean age of female spawners in an unfished population. It is calculated to be 24.7 years in scenario #2.

Expected Recruitment Level

The main approach to estimating future recruitment levels is through randomly resampling the historical values of recruits per spawner (Figure 5) and multiplying the selected value by the previous year's spawning biomass to estimate the current year's recruitment of age 1 fish. These R/S values indicate very little ability of the northern portion of the stock to compensate for fishing mortality.

Rebuilding in the Absence of Fishing

The rate of rebuilding with no fishing mortality depends only upon the level of recruitment that occurs during the rebuilding period, which begins in 2001. With resampling R/S, the time to rebuild is sensitive to the range of years from which this resampling occurs (Table 3) and to the level of the 1996-1998 recruitments. Using the reduced 1996-1998 recruitments in the calculation of the starting population in 2001, then resampling from 1978-1995 produces a median time to rebuild of 192 years (Table 3).

Preliminary calculations used the higher estimates of recruitment in 1996-1998. These higher recruitments start the rebuilding early and provided high R/S values in the future resampling. If the resampling includes 1987-1997, then 2 of the 10 possible values are from the uncertain high estimates. This provides an optimistic result with median rebuilding in 20 years. Even when the higher recruitments are not used in the resampling, their contribution to the starting population in 2001 reduces median rebuilding from 192 years to 85 years.

The range of years used to resample also has a great impact on the results. Higher R/S during 1978-1986 produces rebuilding in 75 years, but lower R/S in 1987-1995 delays rebuilding beyond the timeframe of the simulations. Adding the higher R/S values from 1996 and 1997 reduces the time to rebuild to 98 and 84 years.

The time to rebuild ranges from an optimistic level of 20 years if the high estimated R/S values during 1996-1998 represent a substantial probability for future recruitment. More realistic scenarios are based upon lower recruitment levels in 1996-1998 and R/S levels observed over a longer period. These scenarios produce rebuilding time frames of at least 75 years.

Adding southern area results to this scenario #2 northern result probably will not have as great an impact as adding the south to the scenario #1 north. This is because the northern abundance in scenario #2 is larger, so adding the southern recruitments will have a diminished proportional contribution.

Rebuilding

Rebuilding scenarios were conducted at various levels of constant catch. The level of catch that can be sustained during rebuilding is strongly related to the degree that R/S levels during rebuilding are above the F=0 replacement level. Under the scenario with lower 1996-1998 recruitment and resampling from 1978-1995, the stock can sustain less than 15 mt of catch per year without delaying rebuilding beyond 217 years (Table 3). Even adding the R/S from 1996 and 1997 would only allow 25 mt of catch per year during rebuilding. Under the higher recruitment scenario with resampling from 1987-1997, the stock can rebuild in 45 years 51% of the time while catch is 185 mt per year.

Expansion for Southern Area

The estimate of female spawning biomass in the southern area in 1998 was 376 mt, which is 20.2% of the combined north-south female spawning biomass according to scenario #1, but only 4.7% according to scenario #2. A simple estimate of allowable catch in the combined north-south areas could be based upon these percentages. However, the level of recruitment in the southern area is nearly on par with that in the northern area, so this simple expansion based upon current distribution of biomass may underestimate the combined potential. The current $F_{50\%}$ yield (with no adjustment for the 40-10 OY policy) in the southern area is approximately 55 mt, which would represent an upper bound on possible short-term contribution from that area.

Table 1. Time series of canary rockfish abundance in the northern area according to scenario #1 in which fishery selectivity is asymptotic at older ages, and females are estimated to have increasing natural mortality (Crone et al 1999). The high recruitment values in 1996-1998 reported here are adjusted downwards by 50% for the baseline rebuilding analysis.

YR	Total Biomass	Female Spawning Biomass	Age 1 Recruits	Catch
Initial Equilibrium	53109	18971	2872	1000
67	53016	18971	526	2504
68	51145	18384	526	2802
69	48833	17639	3692	1731
70	47612	17366	1606	1607
71	46499	17110	3278	1427
72	45529	16856	847	1382
73	44538	16522	1312	4181
74	40492	14912	2333	860
75	40117	14773	1842	1351
76	39166	14421	1652	785
77	38831	14294	2834	1672
78	37528	13757	1309	2326
79	35583	12912	2423	3192
80	32857	11712	3170	3215
81	30269	10600	570	2608
82	28481	9801	1845	4352
83	24871	8298	1254	4277
84	21482	6995	1429	1839
85	20784	6873	1173	2084
86	19804	6696	1417	1848
87	19001	6613	652	2698
88	17161	6065	670	2578
89	15359	5497	946	2820
90	13185	4734	681	2174
91	11643	4205	960	2802
92	9381	3302	704	2433
93	7488	2556	540	1982
94	6034	1962	346	960
95	5631	1826	101	770
96	5420	1789	1351	974
97	4977	1644	936	920
98	4612	1480	1083	996
99	4197	1265	473	996
Alternative Calculations of unfished level:				
S/R equil	30912	10136	1301	0
S/R, with bias adjust	37969	12450	1598	0
67-77 recr mean	44168	14483	1859	0
init. Equilibrium	68240	22376	2872	0

Table 2. Revised time series of canary rockfish abundance in the northern area according to scenario #2 in which fishery selectivity is dome-shaped and natural mortality is constant for all ages and both sexes (Crone et al 1999).

YR	Total Biomass	Female Spawning Biomass	Age 1 Recruits	Catch
Initial Equilibrium	67277	34210	2744	1000
67	67186	34210	433	2504
68	65297	33639	433	2802
69	62933	32822	3542	1731
70	61626	32467	1425	1607
71	60413	32112	3162	1427
72	59332	31752	723	1382
73	58226	31305	1277	4181
74	54024	29468	2226	860
75	53460	29147	1751	1351
76	52337	28626	1618	785
77	51857	28361	2805	1672
78	50423	27683	1270	2326
79	48326	26646	2395	3192
80	45405	25164	3140	3215
81	42563	23691	581	2608
82	40482	22509	1858	4352
83	36530	20500	1269	4277
84	32731	18657	1465	1839
85	31604	18050	1217	2084
86	30208	17402	1519	1848
87	29013	16859	749	2698
88	26805	15841	792	2578
89	24658	14815	1178	2820
90	22166	13593	898	2174
91	20337	12628	1286	2802
92	17819	11288	928	2433
93	15706	10132	764	1982
94	14049	9147	500	960
95	13468	8677	129	770
96	13127	8356	2240	974
97	12620	7961	1580	920
98	12270	7574	1840	996
99	11945	7157	960	996
Alternative Calculations of unfished level:				
S/R equil	40545	20495	1250	0
S/R, with bias adjust	50827	25693	1567	0
67-77 recr mean	57190	28909	1763	0
init. Equilibrium	89004	44991	2744	0

Table 3. Summary results of rebuilding calculations. All scenarios present results from 500 trials. R/S refers to scenarios based upon resampling recruits per spawner. HR represents scenarios with the 1996-1998 recruitments at their original (high) level. Other scenarios have these 3 recruitments at half of their original level.

Scenario #1

		Years to Rebuild			
Conditions	% Rebuilt	Min	Max	Median	Annual Catch
Resamp R/S 78-95	-	55	249	119	0
Resamp R/S 87-97, HR	-	13	57	24	0
Resamp R/S 78-95, HR	-	39	231	82	0
Resamp R/S 78-86	-	47	165	74	0
Resamp R/S 87-95	-	114	999	369	0
Resamp R/S 78-96	-	38	176	74	0
Resamp R/S 78-97	-	37	129	64	0
Resamp R/S 78-95	53%	63	275	132	13
Resamp R/S 78-95	42%	75	344	144	20
Resamp R/S 87-97, HR	67%	17	97	35	150
Resamp R/S 78-97	47%	42	203	81	40

Scenario #2

		Years to Rebuild			
Conditions	% Rebuilt	Min	Max	Median	Annual Catch
Resamp R/S 78-95		58	797	192	0
Resamp R/S 87-97, HR		10	66	20	0
Resamp R/S 78-95, HR		23	675	85	0
Resamp R/S 78-86	-	35	180	75	0
Resamp R/S 87-95		999	999	999	0
Resamp R/S 78-96		37	312	98	0
Resamp R/S 78-97		33	228	84	0
Resamp R/S 78-95	34%	66	999	273	15
Resamp R/S 87-97, HR	51%	14	999	45	185
Resamp R/S 87-97, HR	68%	12	183	36	150
Resamp R/S 78-97	51%	51	338	108	25

Figure 1. Estimated recruitment and spawner levels for scenario #1

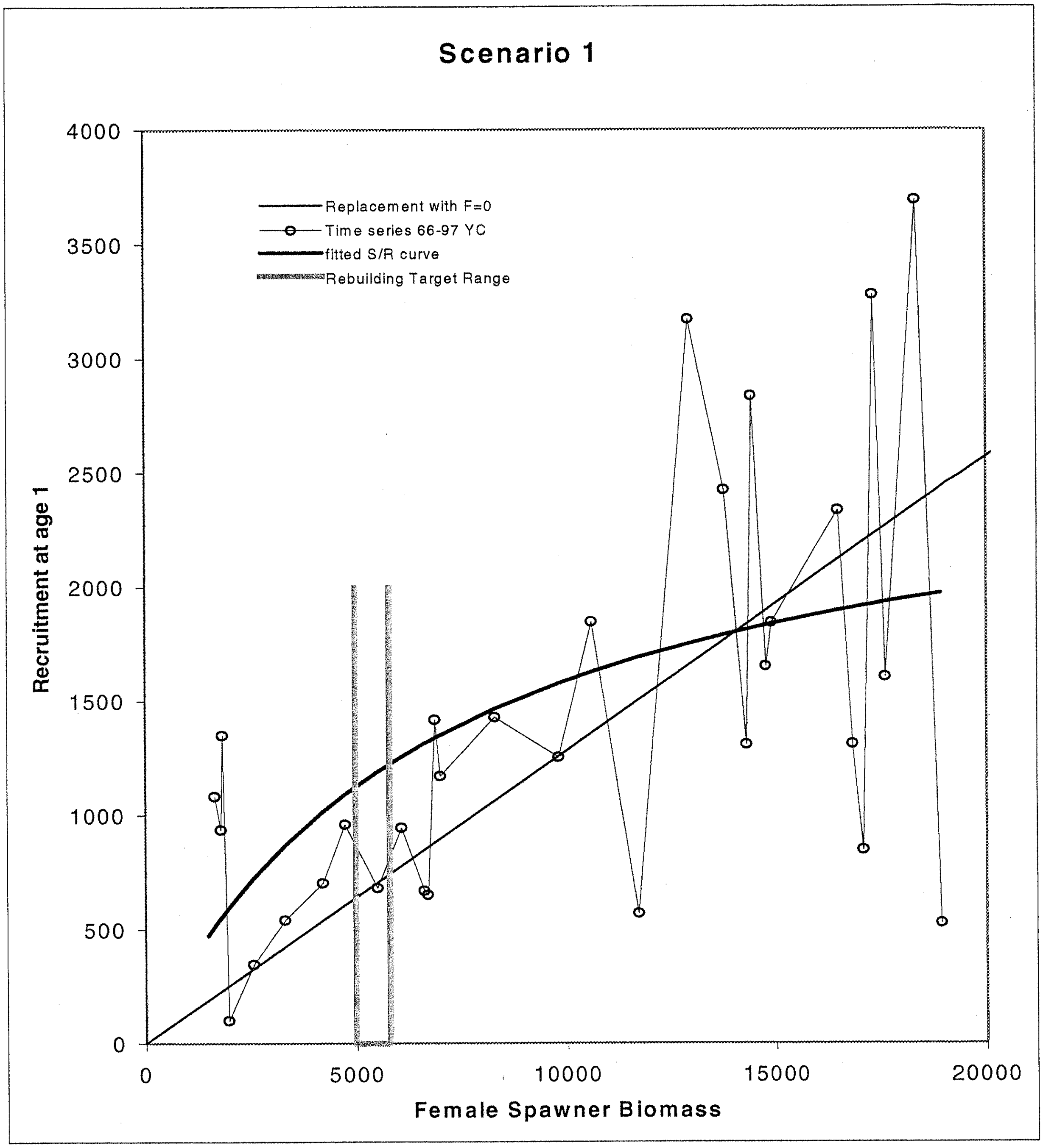


Figure 2. Recruits per Spawner time series for scenario #1. The bold horizontal line represents the replacement level with no fishing. The curved line is from the estimated recruitment-spawner relationship.

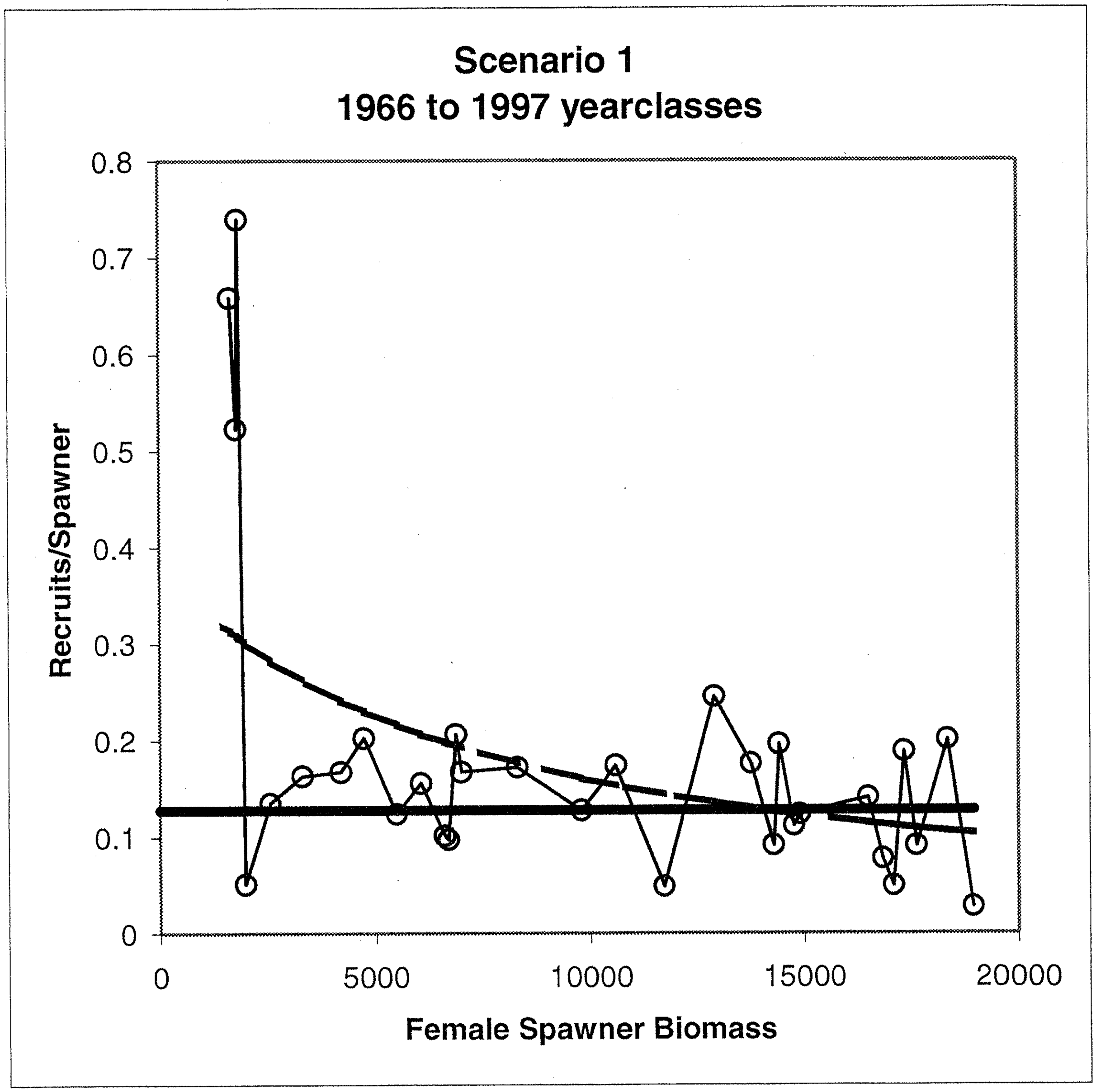


Figure 3. Comparison of recruits per spawner between the northern and southern assessment areas (based upon scenario #1 in the north). Unlike Figures 1 and 2, the recruitment values for 1996-1998 in the north are adjusted down to 50% of their original estimated value.

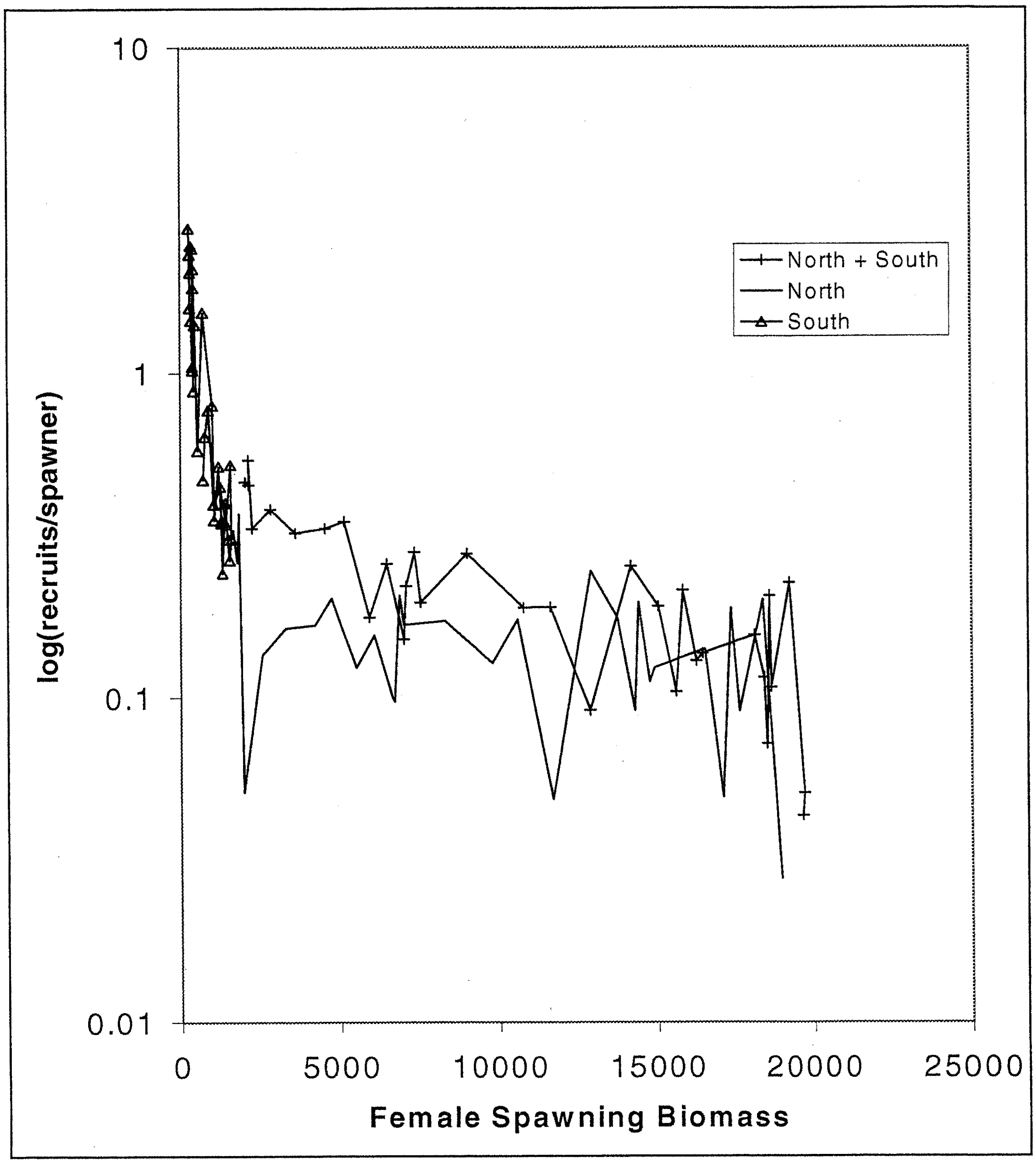


Figure 4. Estimated recruitment and spawner levels for scenario #2. Values for 1996-1998 are at their original estimated value (high recruitment).

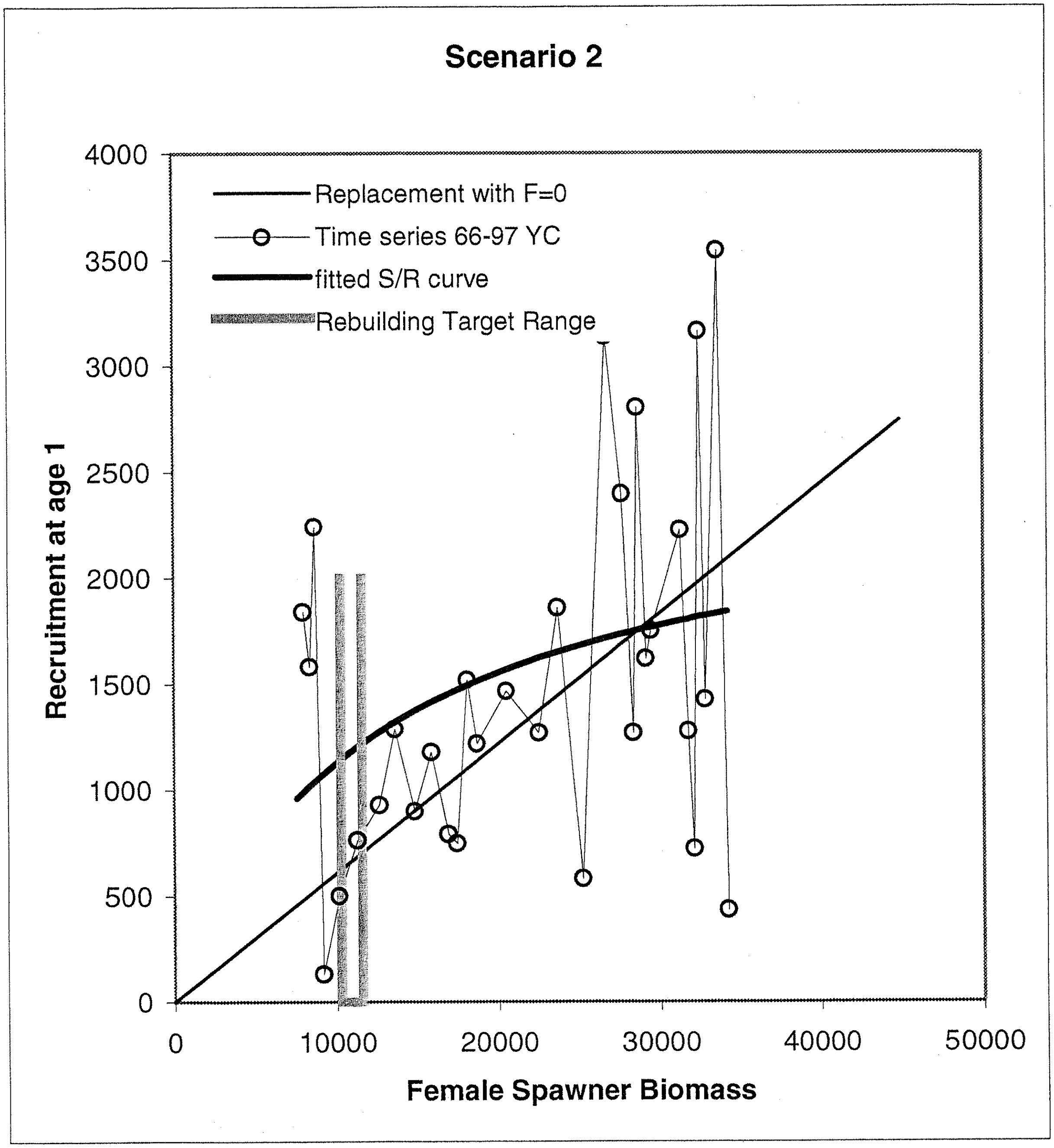
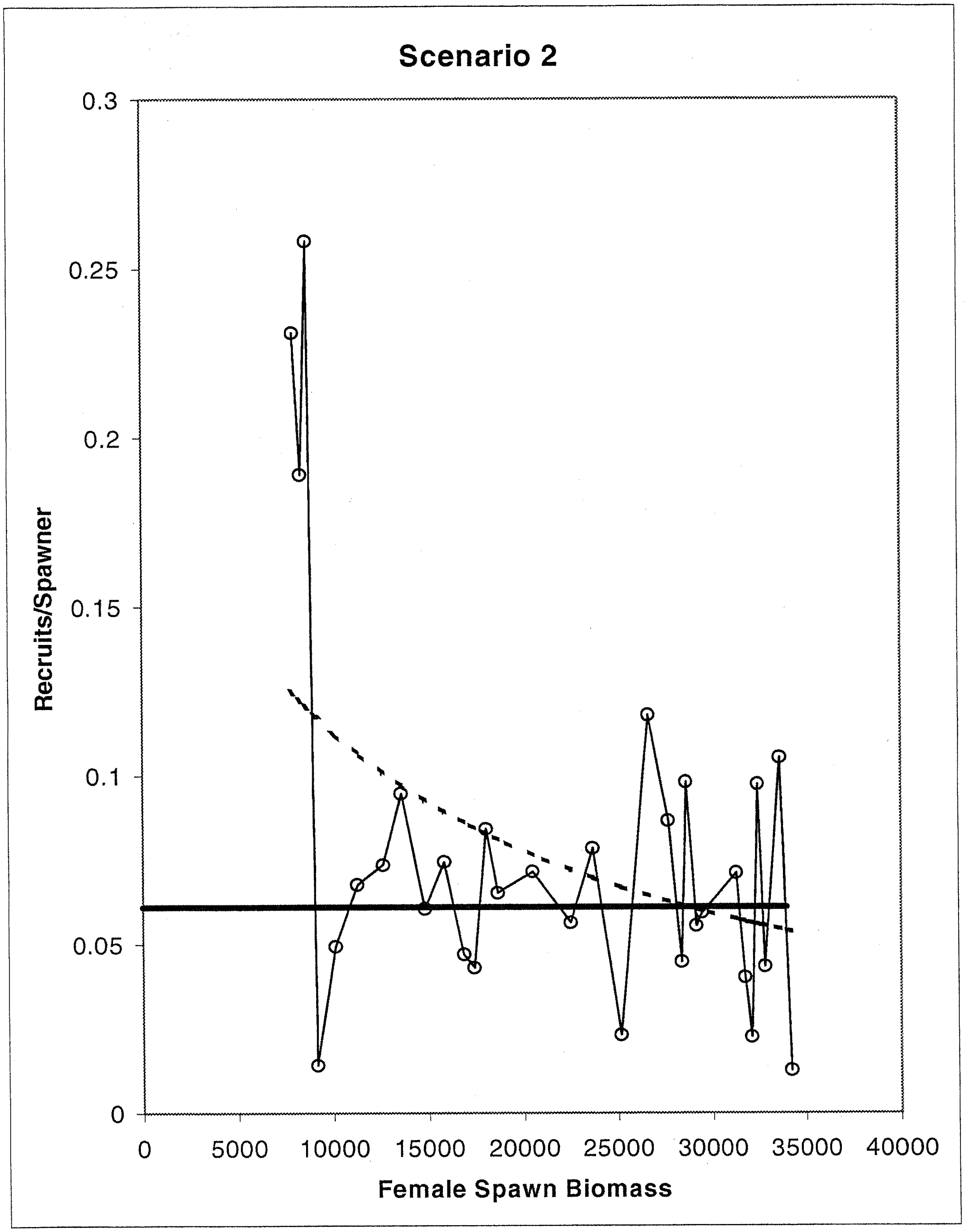


Figure 5. Estimated time series of recruits per spawner for scenario #2.



APPENDIX B: Canary Rockfish Rebuilding Analysis
Addendum for November 2000 PFMC meeting
(Revised December 7, 2000)

This addendum to the canary rockfish rebuilding analysis documents the expected impact of the scenario selected by the PFMC at its November 2000 meeting. The revised addendum maintains the extensive calculations based upon "low recruitment" as presented at the September 2000 PFMC meeting and adds the final set of calculations based upon "medium recruitment" (MR) as defined here. In addition, the results of other assessment and rebuilding scenarios are tabulated in Tables 1 and 2.

Based upon the MR scenario, the northern stock would be expected to rebuild from its current level (8.7% of unfished level) to the target level (40% of unfished level) in 41 years with no fishing. With a mean generation time of 17 years, the allowable time to rebuild is calculated to be 58 years. A constant catch of 73 mt per year would allow the stock to rebuild in 57 years in 52% of the simulations, so meets the rebuilding requirements.

Features of Selected Assessment and Rebuilding Scenario:
Age-specific female natural mortality (scenario #1 from northern area assessment).

Expected unfished female spawning biomass is calculated from the average age 1 recruitment level in 1967-1977 (Figure 1).

Current female spawning stock size is at 8.7% of the unfished level in scenario #1[1/].

Rebuilding target is 40% of unfished biomass level.

Rebuilding rates are based upon random resampling of recruits per spawner (R/S) observed in 1978-1997 (Figure 2)

Rebuilding forecasts were conducted using a range of constant catch levels, rather than constant fishing mortality level. This allows a higher catch in the early years, but no increased catch in later years if the stock rebuilds along the currently forecasted trajectory.

The rate of rebuilding is extremely sensitive to the level of recruitment in 1996-1998. These recruitments are at the end of the time series so have little supporting data and are estimated with low precision. The final set of rebuilding forecasts are based upon recruitment in 1996-1998 set at 75% of the level initially estimated in the stock assessment (labeled MR for medium recruitment). This 75% level is intermediate between the 100% level (HR) and the 50% level (LR) presented as alternatives in the stock assessment. In terms of absolute recruitment, the 75% level is intermediate between the moderate recruitment level observed during the early 1980s and the low level observed during 1987-1995.

Results with Low Recruitment
Rebuilding with no fishing occurs in 64 years in 50% of the simulations (Table 1, Figure 3).

Generation time is 17 years, so allowed rebuilding time frame is 64+17 = 81 years.

Catch in the northern area of 39 mtons per year would allow rebuilding in 81 years in 50% of the simulations (Figure 3 and Figure 4).
The range of possible rates of rebuilding is wide (Figure 3) due to the high variability in recruitment.

1/ Similar overall rebuilding results are obtained from scenario #2 which has a lesser decline in biomass, but a greater decline in recruitment compared to scenario #1.

A constant catch of 39 mtons per year represents an exploitation rate of less than 1% per year during the early years of rebuilding. A constant exploitation rate of only 0.37% would also achieve rebuilding in 81 years, but would have short-term catch levels of only 16 mtons then higher catch levels as the stock rebuilds.

Over the next five years, abundance is expected to increase even if the catch is as high as the current ABC of approximately 200 mtons, but lower catches are necessary to achieve the rebuilding target.

Results with Medium Recruitment
Rebuilding with no fishing occurs in 41 years in 50% of the simulations (Table 1)

Generation time is 17 years, so allowed rebuilding time frame is 41+17 = 58 years

Catch in the northern area of 73 mtons per year would allow rebuilding in 57 years in 52% of the simulations. This scenario is selected as the basis for the rebuilding plan.

The expected trajectory of female spawning biomass is presented in Figure 5 and Table 3.

Discussion Points:
The extremely low rate of rebuilding, and the low level of allowable catch while rebuilding, is due to the low level of R/S (Figure 2) that has been observed for canary rockfish. There are two reasonable explanations for this low recruitment:

A. STOCK - If the low level of R/S observed during the 1990s is due to an inherent inability of the canary rockfish stock to produce good recruitment at low spawner levels, then rebuilding is unlikely to be faster than calculated here, and future fishery productivity of canary rockfish could be lower than for other rockfish species.

B. CLIMATE - If the low level of R/S observed during the 1990s is due to long term, climate-related fluctuations in fish productivity, then a change to more productive ocean conditions could restore higher recruitment levels sooner and produce more rapid rebuilding. The timing and magnitude of such a current or future climate shift and its effect on recruitment of canary rockfish cannot be predicted with available information. As more information on climate effects on recruitment is obtained, better forecasts of rebuilding times should be possible.

A coastwide annual catch of 93 mtons is based upon the calculated 73 mtons for the northern area and an expansion to the southern area. Because of uncertainty in the north-south boundary in the assessment, there is not sufficient evidence to require a strict north-south allocation of the 93 mton coastwide catch. An updated stock assessment that carefully examines the north-south characteristics of the stock should be conducted after results of the summer 2001 survey are available.

Future rebuilding analyses will present the progress towards rebuilding and will update information on expected future rates of rebuilding. These analyses will incorporate updated stock assessments and should have more information on effects of climate on recruitment, so it is highly likely that some adjustment to the rebuilding plan will be necessary.

Table 1. Summary results of rebuilding calculations for assessment scenario #1. Each row of table summarizes results from 500 trials. **Allowable Years** is the median number of years to rebuild without fishing plus the mean generation time. The **%Rebuilt** is the percentage of trials that achieve rebuilding within the allowable number of years. HR represents scenarios with the 1996-1998 recruitments at their original (high) level. The outlined, selected scenario has these recruitments at 75% of their original level (MR) and other scenarios have these 3 recruitments at 50% of their original level.

Scenario #1

Years for Resampling	% Rebuilt	Years to Rebuild Min	Max	Median	Annual Catch	Allow-able Years
78-95	-	55	249	119	0	136
78-95	53%	63	275	132	13	
78-86	-	47	165	74	0	
87-95	-	114	999	369	0	
78-96	-	38	176	74	0	
78-97	-	37	129	64	0	81
78-97	50%	43	167	80	39	
78-95, HR	-	39	231	82	0	
87-97, HR	-	13	57	24	0	41
87-97, HR	67%	17	97	35	150	
78-97 HR	--	14	105	31	0	48
78-97 HR	51%	18	136	47	125	
78-97, MR	-	21	101	41	0	58
78-97, MR	52%	0.52	22	155	57	73

Table 2. Summary results of rebuilding calculations for assessment scenario #2.

Scenario #2

Years for Resampling	% Rebuilt	Years to Rebuild Min	Years to Rebuild Max	Years to Rebuild Median	Annual Catch	Allow-able Years
78-95	-	58	797	192	0	218
78-95	34%	66	999	273	15	
78-86	-	35	180	75	0	
87-95	-	999	999	999	0	
78-96	-	37	312	98	0	
78-97	-	33	228	84	0	110
78-97	51%	51	338	108	25	
78-95, HR	-	23	675	85	0	
87-97, HR	-	10	66	20	0	46
87-97, HR	68%	12	183	36	150	
87-97, HR	51%	14	999	45	185	
78-97, HR	-	11	77	24	0	50
78-97, HR	59%	14	262	45	100	
78-97, HR	52%	14	313	48	125	

Table 3. Expected trajectory of female spawning biomass under northern assessment scenario #1, with medium level of recent recruitment and constant catch of 73 mt per year. Statistics are based upon 500 simulations.

Year	min	max	mean	25%	50%	75%
2000	1248	1248	1248	1248	1248	1248
2001	1412	1412	1412	1412	1412	1412
2002	1629	1629	1629	1629	1629	1629
2003	1863	1864	1864	1864	1864	1864
2004	2107	2113	2109	2108	2108	2109
2005	2343	2365	2350	2347	2349	2351
2006	2551	2615	2569	2562	2566	2572
2007	2709	2860	2749	2733	2743	2757
2008	2809	3102	2882	2854	2871	2898
2009	2855	3339	2968	2924	2952	2996
2010	2857	3560	3017	2955	2995	3067
2011	2819	3748	3037	2950	3008	3109
2012	2761	3893	3040	2931	3005	3138
2013	2707	3991	3038	2903	2997	3154
2014	2615	4048	3037	2863	2989	3176
2015	2515	4076	3046	2848	3004	3218
2016	2408	4088	3063	2830	3013	3264
2017	2304	4196	3090	2815	3051	3317
2018	2217	4389	3125	2825	3077	3376
2019	2164	4611	3167	2847	3117	3440
2020	2171	4812	3224	2873	3173	3506
2021	2220	4971	3279	2900	3237	3596
2022	2213	5093	3338	2941	3292	3681
2023	2210	5234	3395	2978	3334	3766
2024	2214	5486	3453	3026	3389	3853
2025	2218	5737	3508	3063	3445	3937
2026	2220	5984	3566	3099	3489	4011
2027	2223	6202	3625	3134	3544	4063
2028	2222	6371	3685	3171	3606	4127
2029	2224	6493	3745	3192	3653	4197
2030	2231	6569	3806	3227	3715	4279
2031	2244	6603	3867	3256	3782	4372
2032	2258	6604	3928	3295	3824	4451
2033	2275	6611	3991	3325	3883	4557
2034	2303	6719	4056	3340	3955	4644
2035	2333	7041	4122	3409	4018	4739
2036	2301	7402	4190	3445	4072	4805
2037	2270	7871	4260	3508	4127	4892
2038	2234	8283	4330	3565	4197	4971
2039	2196	8595	4401	3637	4258	5041
2040	2155	8813	4473	3673	4325	5136
2041	2117	8961	4546	3738	4412	5227
2042	2087	9072	4620	3774	4486	5264
2043	2070	9199	4696	3827	4586	5361
2044	2080	9391	4773	3855	4651	5471
2045	2119	9608	4853	3950	4750	5543
2046	2185	9846	4935	3979	4831	5661
2047	2265	10085	5019	4045	4928	5775
2048	2350	10315	5103	4127	4994	5869
2049	2433	10544	5189	4204	5088	5943
2050	2515	10801	5276	4274	5138	6110
2051	2601	11138	5365	4334	5228	6221
2052	2627	11542	5456	4399	5304	6313
2053	2624	11975	5549	4442	5397	6467
2054	2625	12390	5645	4472	5510	6577
2055	2626	12781	5744	4498	5640	6732
2056	2623	13077	5846	4587	5735	6853
2057	2618	13322	5949	4674	5788	7025
2058	2610	13514	6053	4726	5850	7113

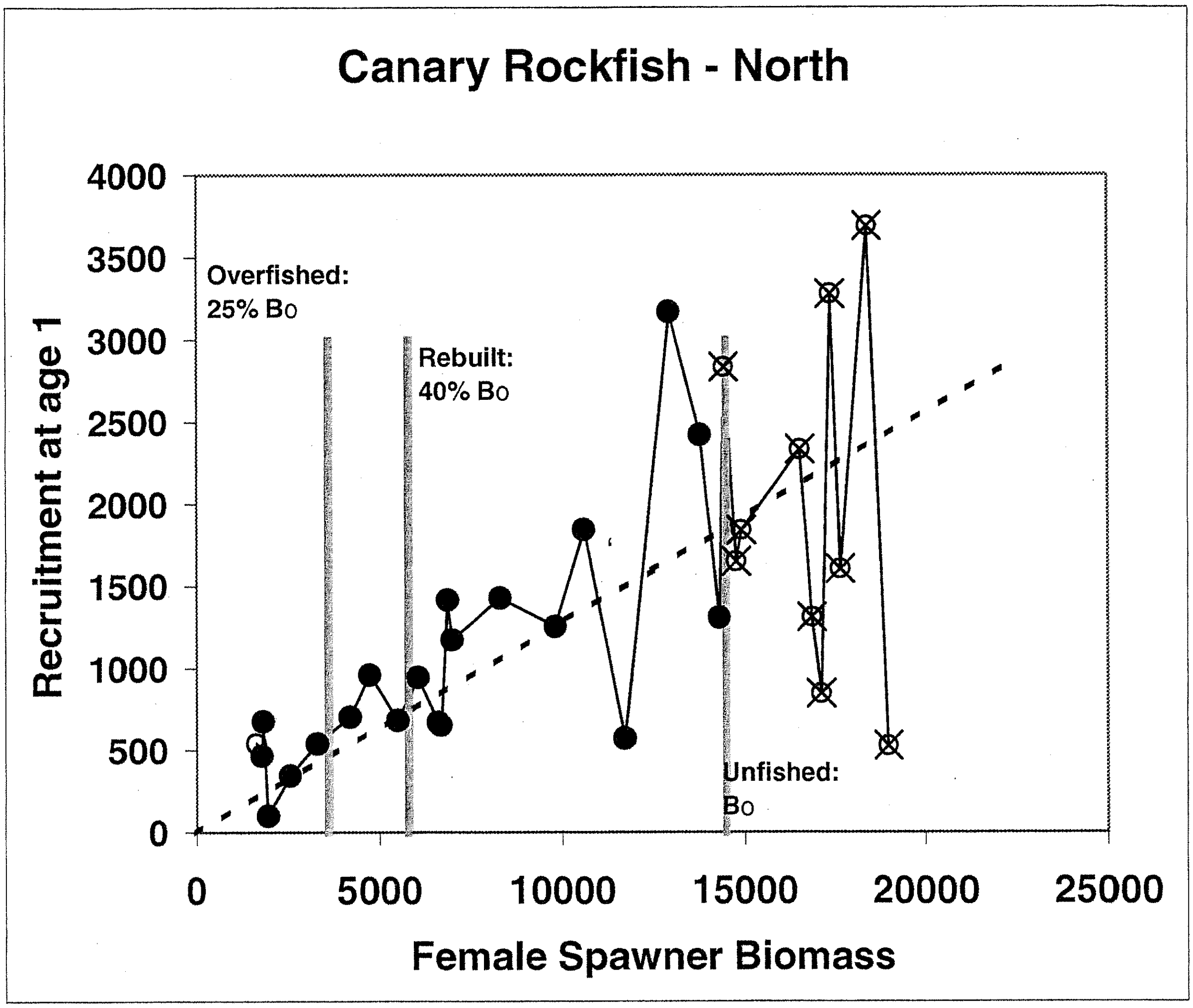


Figure 1. Time series of recruitment versus spawning biomass for canary rockfish in the northern area according to scenario #1 and with recruitments in 1996-1998 (leftmost points on figure) reduced to 50% of value in stock assessment according to recommendations of STAR panel. The recruitment points with an X were used to calculate the unfished biomass level, B_0. The dashed line shows the level of recruitment that would maintain that level of female spawning biomass with no fishing. The recruits/spawner values for the solid points (see Figure 2) were resampled to calculate rebuilding rates.

Figure 2. Level of recruitment per spawner that was used to calculate rebuilding rate in the LR scenario.

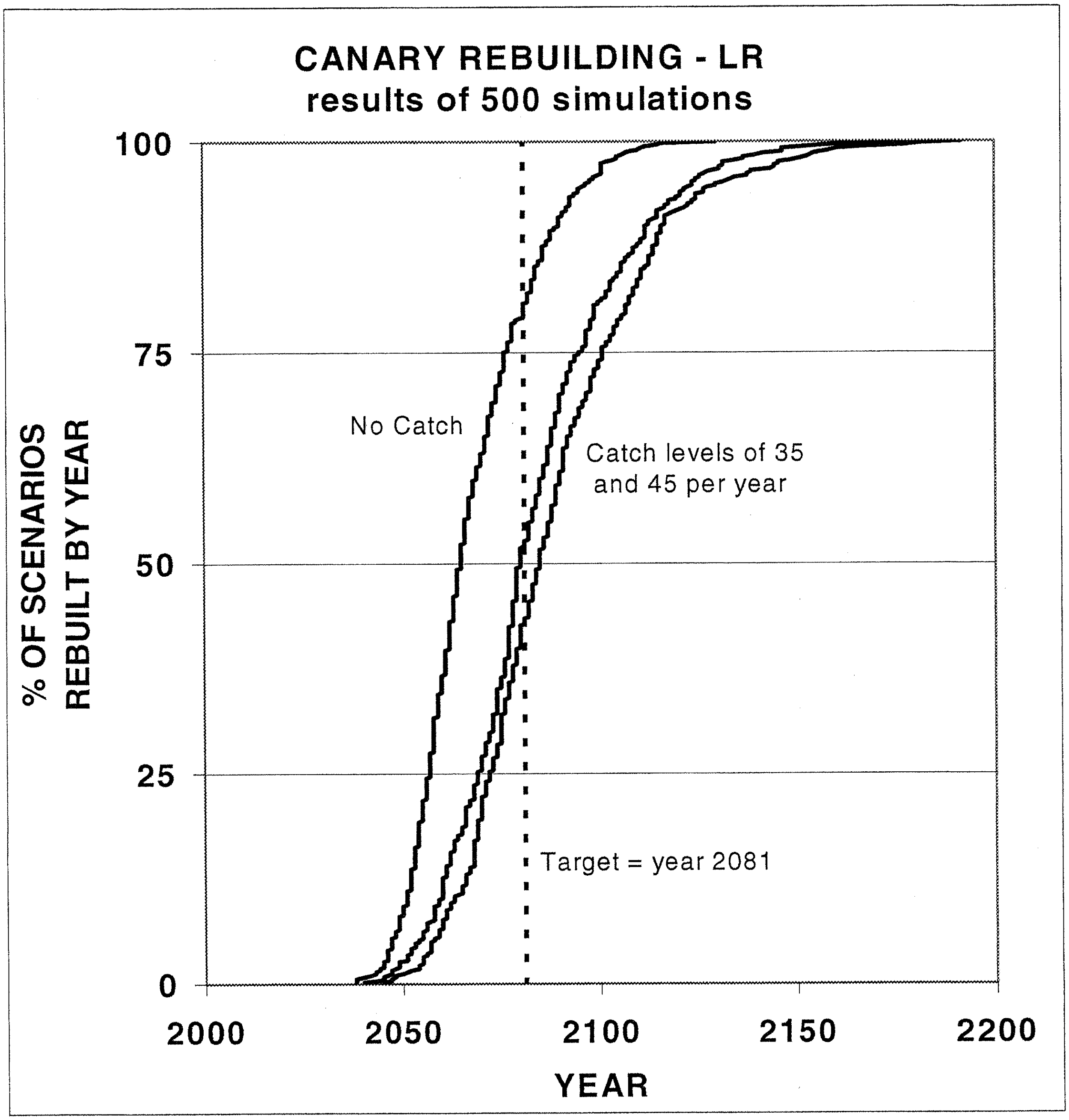


Figure 3. Percentage of 500 simulations that achieve the rebuilt biomass level in the indicated year according to the LR scenario. The "no catch" line shows that 50% of the simulations achieve the rebuilt level in 64 years. At a catch of 39 mtons per year (intermediate between displayed levels of 35 and 45 mtons) the stock is expected to rebuild in 50% of the simulations by the year 2081. Similar calculations with the MR scenario would shift the curves to the left (earlier) and be based upon higher catch levels.

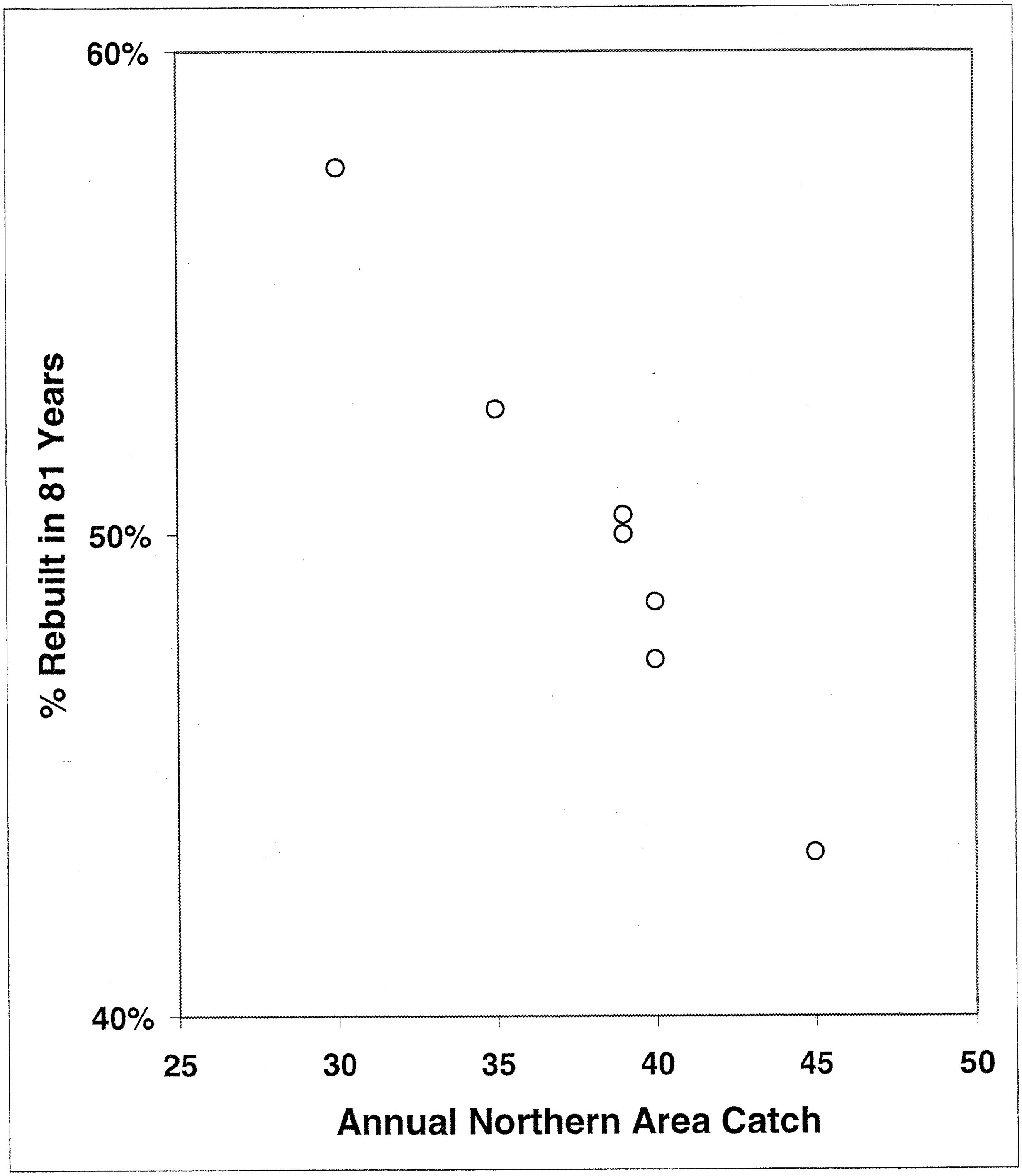


Figure 4. Relationship between annual catch level in the northern area (scenario #1, LR) and the probability of being rebuilt in 81 years. The multiple points shown at catch levels of 39 and 40 mtons demonstrate the level of variability in this calculation due to the use of only 500 simulations.

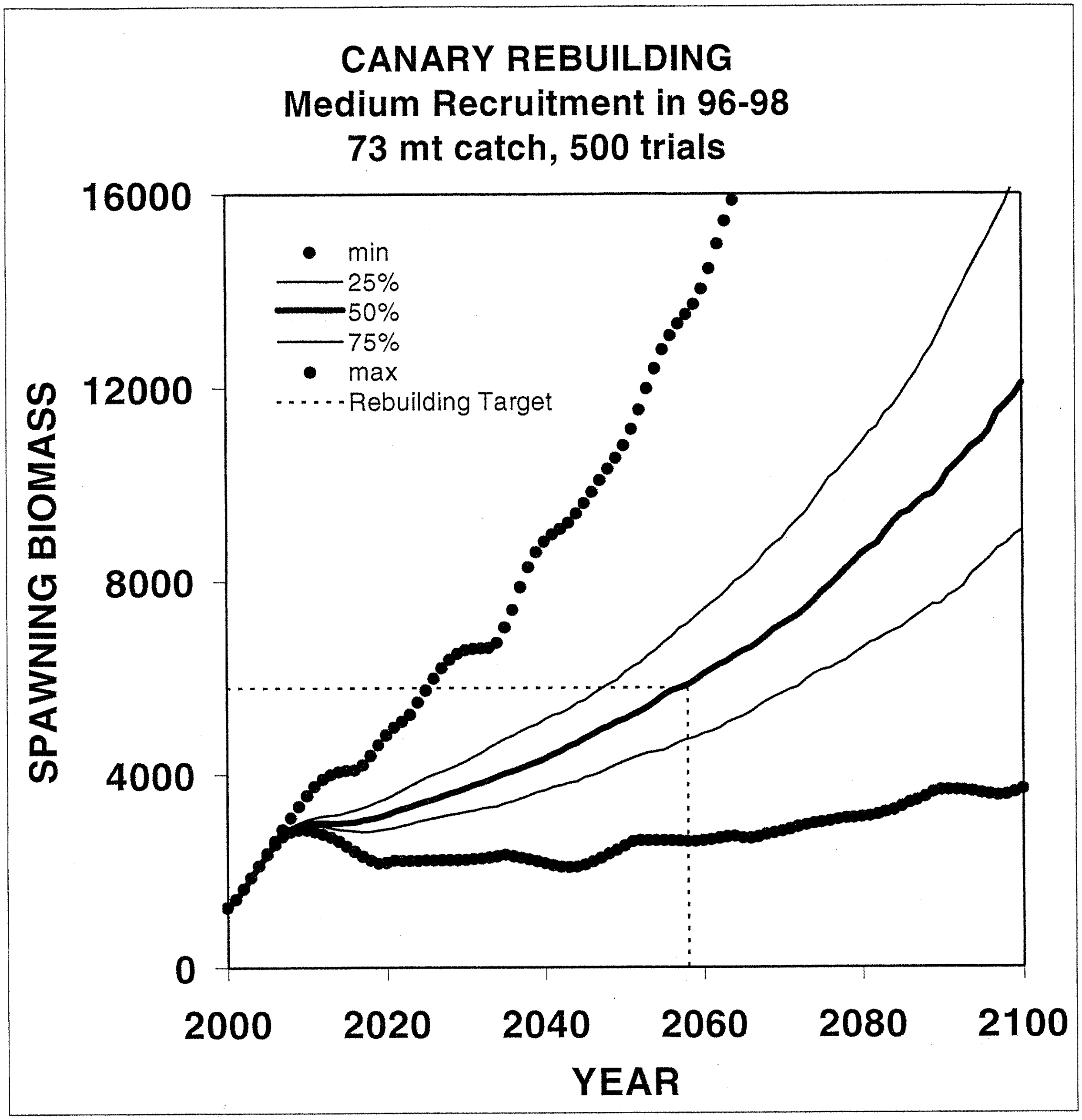


Figure 5. Trajectory of spawning biomass expected in the MR scenario with an annual catch of 73 mtons and recruitment levels selected by randomly resampling recruits per spawner from 1978-1997. The initial steeper recovery is due to the sequence of stronger recruitment during 1996-1998. The maximum (MAX) rate of rebuilding occurs when similarly large recruitments occur frequently in the future. The MIN rate shows that if larger recruitments occur infrequently, then the stock will maintain itself, but little rebuilding will occur. The 50% line (median) is the target with 50% of the simulations reaching the rebuilt level in 57 years.

APPENDIX C: Magnuson-Stevens Fishery Conservation and Management Act and Groundfish Fishery Management Plan Regulatory Language Pertinent to the Canary Rockfish Rebuilding Plan

Stock rebuilding is required by the Magnuson Stevens Act, Section 304. The applicable section of the Act is provided below.

(e) REBUILDING OVERFISHED FISHERIES.--

(1) The Secretary shall report annually to the Congress and the Councils on the status of fisheries within each Council's geographical area of authority and identify those fisheries that are overfished or are approaching a condition of being overfished. For those fisheries managed under a fishery management plan or international agreement, the status shall be determined using the criteria for overfishing specified in such plan or agreement. A fishery shall be classified as approaching a condition of being overfished if, based on trends in fishing effort, fishery resource size, and other appropriate factors, the Secretary estimates that the fishery will become overfished within two years.

(2) If the Secretary determines at any time that a fishery is overfished, the Secretary shall immediately notify the appropriate Council and request that action be taken to end overfishing in the fishery and to implement conservation and management measures to rebuild affected stocks of fish. The Secretary shall publish each notice under this paragraph in the Federal Register.

(3) Within one year of an identification under paragraph (1) or notification under paragraphs (2) or (7), the appropriate Council (or the Secretary, for fisheries under section 302(a)(3)) shall prepare a fishery management plan, plan amendment, or proposed regulations for the fishery to which the identification or notice applies--

(A) to end overfishing in the fishery and to rebuild affected stocks of fish; or

(B) to prevent overfishing from occurring in the fishery whenever such fishery is identified as approaching an overfished condition.

(4) For a fishery that is overfished, any fishery management plan, amendment, or proposed regulations prepared pursuant to paragraph (3) or paragraph (5) for such fishery shall--

(A) specify a time period for ending overfishing and rebuilding the fishery that shall--

(i) be as short as possible, taking into account the status and biology of any overfished stocks of fish, the needs of fishing communities, recommendations by international organizations in which the United States participates, and the interaction of the overfished stock of fish within the marine ecosystem; and

(ii) 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;

(B) allocate both overfishing restrictions and recovery benefits fairly and equitably among sectors of the fishery; and

(C) for fisheries managed under an international agreement, reflect traditional participation in the fishery, relative to other nations, by fishermen of the United States.

(5) If, within the one-year period beginning on the date of identification or notification that a fishery is overfished, the Council does not submit to the Secretary a fishery management plan, plan amendment, or proposed regulations required by paragraph (3)(A), the Secretary shall prepare a fishery management plan or plan amendment and any accompanying regulations to stop overfishing and rebuild affected stocks of fish within 9 months under subsection (c).

(6) During the development of a fishery management plan, a plan amendment, or proposed regulations required by this subsection, the Council may request the Secretary to implement interim measures to reduce overfishing under section 305(c) until such measures can be replaced by such plan, amendment, or regulations. Such measures, if otherwise in compliance with the provisions of this Act, may be implemented even though they are not sufficient by themselves to stop overfishing of a fishery.

(7) The Secretary shall review any fishery management plan, plan amendment, or regulations required by this subsection at routine intervals that may not exceed two years. If the Secretary finds as a result of the review that such plan, amendment, or regulations have not resulted in adequate progress toward ending overfishing and rebuilding affected fish stocks, the Secretary shall--

(A) in the case of a fishery to which section 302(a)(3) applies, immediately make revisions necessary to achieve adequate progress; or

(B) for all other fisheries, immediately notify the appropriate Council. Such notification shall recommend further conservation and management measures which the Council should consider under paragraph (3) to achieve adequate progress.

Rebuilding plans and regulations to implement them must be consistent with the National Standards of the Magnuson-Stevens Act. Below in this section is an excerpt from the Final Rule on National Standard Guidelines, published in the Federal Register on May 1, 1998 (63 FR 24212).

Sec. 600.310 National Standard 1--Optimum Yield.

(e) Ending overfishing and rebuilding overfished stocks– (1) Definition. A threshold, either maximum fishing mortality or minimum stock size, is being "approached" whenever it is projected that the threshold will be breached within 2 years, based on trends in fishing effort, fishery resource size, and other appropriate factors.

(2) Notification. The Secretary will immediately notify a Council and request that remedial action be taken whenever the Secretary determines that:

(i) Overfishing is occurring;

(ii) A stock or stock complex is overfished;

(iii) The rate or level of fishing mortality for a stock or stock complex is approaching the maximum fishing mortality threshold;

(iv) A stock or stock complex is approaching its minimum stock size threshold; or

(v) Existing remedial action taken for the purpose of ending previously identified overfishing or rebuilding a previously identified overfished stock or stock complex has not resulted in adequate progress.

(3) Council action. Within 1 year of such time as the Secretary may identify that overfishing is occurring, that a stock or stock complex is overfished, or that a threshold is being approached, or such time as a Council may be notified of the same under paragraph (e)(2) of this section, the Council must take remedial action by preparing an FMP, FMP amendment, or proposed regulations. This remedial action must be designed to accomplish all of the following purposes that apply:

(i) If overfishing is occurring, the purpose of the action is to end overfishing.

(ii) If the stock or stock complex is overfished, the purpose of the action is to rebuild the stock or stock complex to the MSY level within an appropriate time frame.

(iii) If the rate or level of fishing mortality is approaching the maximum fishing mortality threshold (from below), the purpose of the action is to prevent this threshold from being reached.

(iv) If the stock or stock complex is approaching the minimum stock size threshold (from above), the purpose of the action is to prevent this threshold from being reached.

(4) Constraints on Council action.

(i) In cases where overfishing is occurring, Council action must be sufficient to end overfishing.
(ii) In cases where a stock or stock complex is overfished, Council action must specify 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.

(A) A number of factors enter into the specification of 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; and
(5) Management measures under an international agreement in which the United States participates.

(B) 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 10 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 10 years, unless management measures under an international agreement in which the United States participates dictate otherwise.

(3) If the lower limit is 10 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 12 years in the absence of any fishing mortality, and has a mean generation time of 8 years. The rebuilding period, in this case, could be as long as 20 years.

(C) A rebuilding program undertaken after May 1, 1998 commences as soon as the first measures to rebuild the stock or stock complex are implemented.

(D) In the case of rebuilding plans that were already in place as of May 1, 1998, such rebuilding plans must be reviewed to determine whether they are in compliance with all requirements of the Magnuson- Stevens Act, as amended by the Sustainable Fisheries Act.

(5) Interim measures. The Secretary, on his/her own initiative or in response to a Council request, may implement interim measures to reduce overfishing under section 305(c) of the Magnuson-Stevens Act, until such measures can be replaced by an FMP, FMP amendment, or regulations taking remedial action.

(i) These measures may remain in effect for no more than 180 days, but may be extended for an additional 180 days if the public has had an opportunity to comment on the measures and, in the case of Council-recommended measures, the Council is actively preparing an FMP, FMP amendment, or proposed regulations to address overfishing on a permanent basis. Such measures, if otherwise in compliance with the provisions of the Magnuson-Stevens Act, may be implemented even though they are not sufficient by themselves to stop overfishing of a fishery.

(ii) If interim measures are made effective without prior notice and opportunity for comment, they should be reserved for exceptional situations, because they affect fishermen without providing the usual procedural safeguards. A Council recommendation for interim measures without notice-and-comment rulemaking will be considered favorably if the short-term benefits of the measures in reducing overfishing outweigh the value of advance notice, public comment, and deliberative consideration of the impacts on participants in the fishery.

Section 5.0 of the FMP describes the annual specification process 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.

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 harvest guidelines (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 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 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.

An excerpt from Section 5.3.2 of the FMP describes the process for determining OY each year and references rebuilding in several provisions:

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 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 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 the current biomass estimate is less than the precautionary threshold, the harvest rate will be reduced according to the harvest control rule specified in Section 5.3.5 in order to accelerate a return of abundance to optimal levels. If the abundance falls below the overfished/rebuilding threshold, 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: Other social, economic, or ecological considerations, including reduction for anticipated bycatch, 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 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.
      (iii) Any new rebuilding program will commence as soon as the first measures to rebuild the stock or stock complex are implemented.
      (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, harvest guidelines, and/or OYs, as appropriate.

Section 5.3.6 of the FMP provides the following procedures, guidance and requirements relating to stock rebuilding.

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. 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.

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. As with all Council activities, public participation is critical to the development, implementation and success of management programs.

5.3.6.1 Goals and Objectives of Rebuilding Plans

The 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.

5.6.3.2 Contents of Rebuilding Plans

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) 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; (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.

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.

In general, the Council will also consider the following questions 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?

5.6.3.3 Process for Development and Approval of Rebuilding Plans

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 it 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 the 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.

Revised Rebuilding Analysis for Pacific Ocean Perch

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(July 2001)

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Introduction

The Pacific Fishery Management Council (PFMC) adopted Amendment 11 to its Groundfish Management Plan in 1998. This amendment established an overfishing definition of 25% of the unfished biomass ($0.25B_0$). NMFS determined that a rebuilding plan was required for Pacific Ocean perch (*Sebastes alutus*) in March 1999 based on the most recent stock assessment at that time (Ianelli and Zimmerman, 1997). The PFMC began developing a rebuilding plan for Pacific Ocean perch (based upon a rebuilding analysis; August 1999; A. MacCall, pers. comm.) and submitted this plan to NMFS in February 2000. However, NMFS deferred adoption of the plan until the assessment was updated and reviewed, which was later that year (Ianelli *et al.*, 2000). This rebuilding analysis is based upon the updated assessment and is consistent with the Terms of Reference for rebuilding analyses developed by the SSC.

Ianelli *et al.*'s (2000) assessment involved fitting an age-structured population dynamics model to catch, catch-rate, length-frequency, age-composition, and survey data. Results were presented based on maximum likelihood and Bayesian estimation frameworks. The STAR panel that reviewed this assessment selected the posterior modal estimate from Model 1d as the "best assessment" (PFMC, 2000), and this result is carried forward into this rebuilding analysis. Appendix 1 lists the values for the biological and technological parameters used for the rebuilding analyses and the age-structure at the start of 2000 while Appendix 2 lists the time-series of recruitment and spawning output. The catches for 2000 and 2001 are assumed to be 270 and 303*t* respectively (J. Hastie, NWFSC, pers. commn).

The calculations of this document were performed using the rebuilding software developed by Punt (2001) and the results are based on 1000 Monte Carlo replicates. The definition of "recovery by year *y*" in this analysis is that the spawning output reaches $0.4B_0$ by year *y* (even if it subsequently drops below this level due to recruitment variability). The input to the rebuilding program for the base-case rebuilding analysis is given as Appendix 3.

Selection of the rebuilding period

The maximum allowable rebuild period is defined as ten years if the resource can be rebuilt to $0.4B_0$ in fewer than ten years or the minimum possible rebuild period plus one generation if the resource cannot be rebuilt to $0.4B_0$ in ten years. In order to determine the maximum allowable rebuild period, it is therefore necessary to define B_0, how future recruitments are to be generated, and the generation time.

Selection of B_0

It is common (and indeed recommended by the SSC) to define B_0 in terms of the recruitment in the first years of the assessment period. This approach is not considered appropriate in this case because these recruitments were substantially larger than earlier or later recruitments (Figure 1)[1]. Instead, virgin recruitment (7.8 million age 3 fish - see the horizontal line in the left panel of Figure 1) is based on the estimate of B_0 obtained from the assessment (60,212 units of spawning output). The spawning output at the start of 1998 (the year on which the designation of overfished status was based) is 21.7% of B_0, i.e. below the overfished threshold of $0.25B_0$.

Generation of future recruitment

The assessments on which Appendices 1 and 2 are based included a Beverton-Holt stock-recruitment relationship. However, consistent with SSC guidelines, the base-case projections on which the rebuilding analyses are based ignore this relationship. Figure 1 indicates that both recruitment and recruits per spawner exhibit increasing trends over recent years. However, the trend in recruitment is less marked than that in recruits per spawner so the analyses in this document are based on generating future recruitment by selecting randomly from the historical estimates of recruitment. The years used when generating future (age 3) recruitment are restricted to 1965-98 (see the horizontal line in the left panel of Figure 1). This period encompasses a time of relative stability in recruitment. The mean recruitment during this period is 3839, which is 49% of the virgin level. Furthermore, only three recruitments during 1965-98 exceed the virgin recruitment; rebuilding depends on achieving more of these larger recruitments in the future. Recruitments for 1999 and 2000 are produced by the assessment but are ignored when generating future recruitment because there are few data on which to base recruitment estimates for these years.

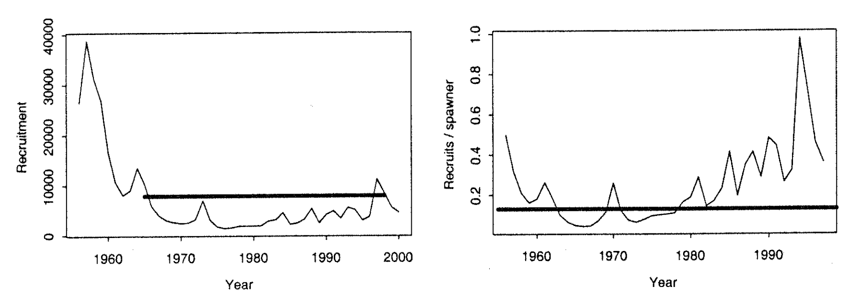

Figure 1 : Recruitment and recruits per spawner. The horizontal line in the left panel indicates the recruitment corresponding to B_0 (the range of this line indicates the years used when generating future recruitment) and that in the right panel indicates the virgin recruits per spawner ratio.

Generation time

The generation time (30 years) is defined as the mean age weighted by net spawning output (Figure 2).

[1] The earlier recruitments are calculated as part of the assessment but are not reported in Figure 1.

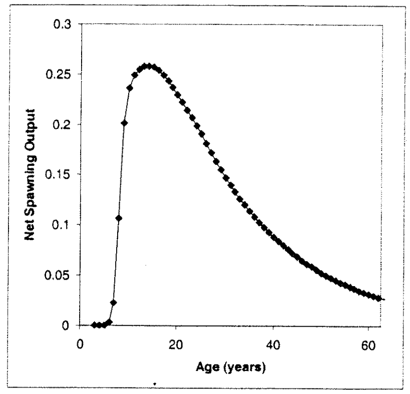

Figure 2 : Net spawning output versus age for Pacific Ocean perch.

The maximum allowable rebuild period
The minimum possible rebuild period (the median time to rebuild to $0.4B_0$ with 0.5 probability in the absence of catches from 2002) based on the above specifications is 10 years (i.e. 2012) (Figure 3). This year is later than 2010 (ten years beyond the year in which Pacific Ocean perch was declared overfished). Therefore the maximum allowable rebuild period is defined as the minimum possible rebuild period plus 30 years (i.e. 2042).

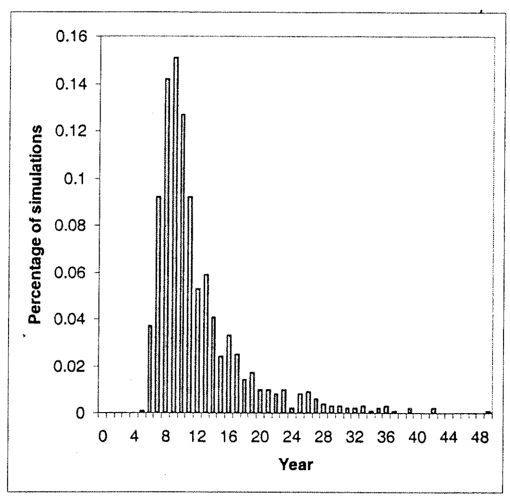

Figure 3 : Time to recover to $0.4B_0$.

Alternative rebuilding strategies
Figure 4 illustrates the trade-off between the time to rebuild with 0.5 probability, the probability of recovery within the maximum allowable rebuild period, and the OY for 2002. The points in Figure 4 are based on a range of equally spaced constant fishing mortalities between 0 and that which achieves a 0.5 probability of recovery within the maximum allowable rebuild period. The relationship between the probability of recovery within the maximum allowable rebuild period and the number of years to achieve a 0.5 probability of recovery is close to linear. However, the other two relationships are not.

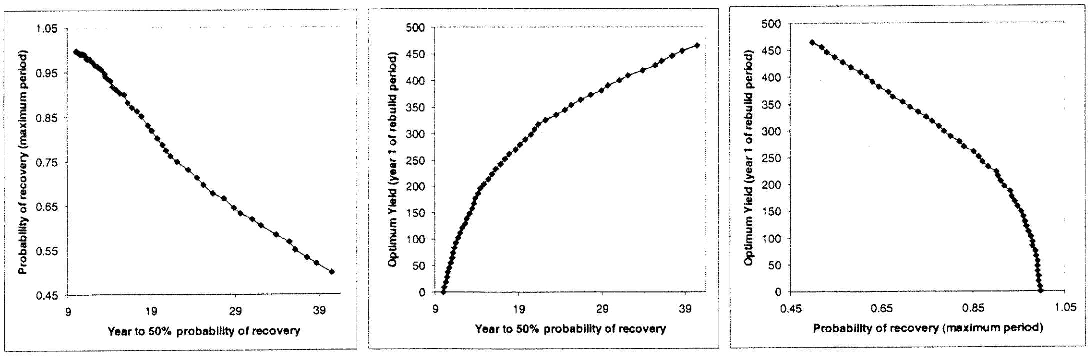

Figure 4: Plots illustrating the trade-off between the probability of rebuilding within the maximum allowable rebuild period, the time to rebuild with 0.5 probability, and the 2002 OY (in mt).

Table 1 lists some key output statistics for five rebuild strategies (probabilities of recovery in the maximum allowable rebuild period of 0.5, 0.6, 0.7 and 0.8 and the strategy of setting future fishing mortality to zero). The probabilities of recovery are not exactly 0.5, 0.6, etc. because of the limited number of recruitments on which the projections are based and the accuracy of the numerical search procedure employed. Figure 5 contrasts the time-trajectory of the probability of recovery for each of the five rebuild strategies in Table 1 along with the envelopes (5%, 25%, 50%, 75% and 95%) of the time-trajectories for catch and the ratio of spawning output to $0.4B_0$ for a 0.6 rebuild probability. Appendix 4 lists the envelopes for the annual catch and the ratio of the spawning output to the target level for a 0.6 probability of rebuild. Note that this ratio is calculated each point in time – the probability of having reached $0.4B_0$ sometime before a given year is at least as great as that listed in Appendix 4 and shown in the right panel of Figure 5 for that year. The choice of 0.6 is based on a suggestion by the SSC (Punt, 2001).

Table 1: Four management-related quantities for five rebuild strategies.

Fishing mortality rate	0.0109	0.0096	0.0082	0.0068	0
OY_{2002} (mt)	464.5	409.7	352.5	290.5	0
Probability of recovery in 40 years	49.9	60.1	69.9	80.1	99.7
Median years to rebuild from year 2000	42.1	33.8	26.8	21.5	11.6

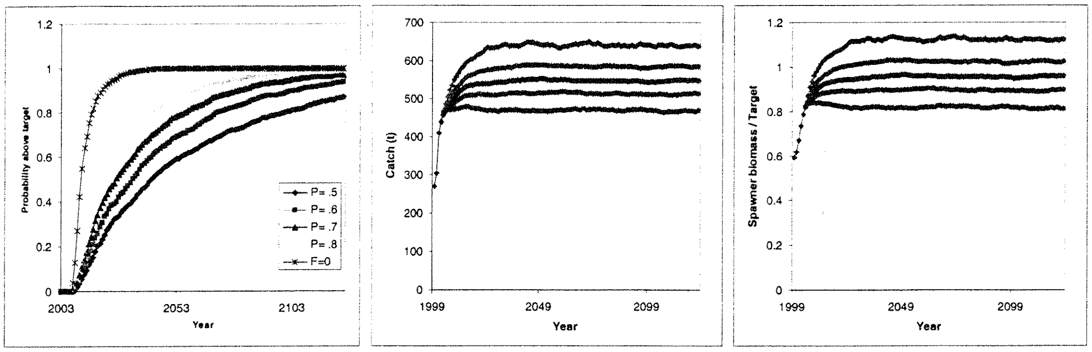

Figure 5 : Time trajectories of the probability of recovery for five rebuild strategies, of the catch for a 0.6 probability of recovery, and of the spawning output expressed relative to $0.4B_0$ for a 0.6 probability of recovery.

Sensitivity tests

Stock-recruitment relationship

The assessments on which the results in the Appendices are based placed constraints on the recruitments in the form of a stock-recruitment relationship. This relationship was ignored for the calculations reported above for consistency with past SSC practice. Table 2, however, reports the values of the four key output statistics when the rebuilding analysis includes the estimated stock-recruitment relationship rather than when future recruitment is generated by sampling from past recruitments (note that including the stock-recruitment relationship changes the maximum allowable rebuild period). The inclusion of a stock-recruitment relationship makes the results more optimistic. These results should, however, be interpreted with some caution because the fits of the stock-recruitment relationship (Figure 6) are relatively poor.

Table 2: Four management-related quantities for five rebuild strategies. Results are shown for the rebuilding analyses that include a Beverton-Holt stock-recruitment relationship and that ignore the three highest recruitments when generating future recruitment.

With stock-recruitment relationship					
Fishing mortality rate	0.0311	0.0287	0.0266	0.0233	0
OY_{2002} (mt)	1313.2	1214.6	1125.6	990.9	0
Probability of recovery in 38 years	50.1	60.1	70	80.1	100
Median years to rebuild from year 2000	39.9	32.8	28.1	23.4	9.9
Ignoring 1965, 1997 and 1998 recruitments when generating future recruitment					
Fishing mortality rate	0.0038	0.0031	0.0023	0.0014	0
OY_{2002} (mt)	162.4	133.3	100.8	58.6	0
Probability of recovery in 44 years	49.9	60.1	70	80.1	90.2
Median years to rebuild from year 2000	46.1	36.8	28.0	20.5	15.8

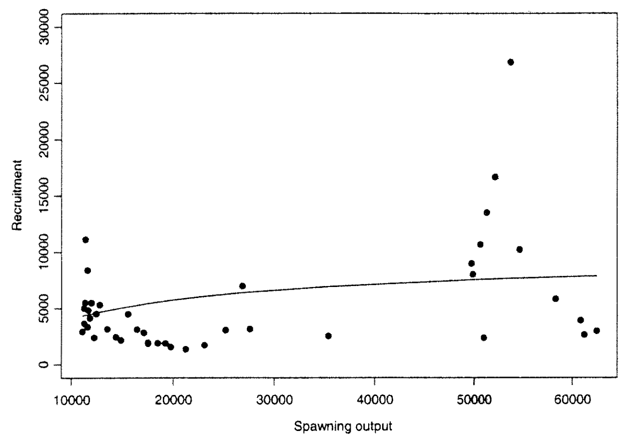

Figure 6: Fit of the Beverton-Holt stock recruitment relationship to the data for Pacific Ocean perch.

Removal of selected recruitment estimates

Table 3 also reports results when the three largest recruitments (1965, 1997 and 1998) are ignored when generating future recruitment. The rationale for omitting these years for sensitivity analyses is to provide a scenario where the future recruitments are much lower and less variable. Also, there is a large degree of uncertainty in the recruitments for 1997 and 1998. The approximate 95% confidence bounds for these years range from nearly one third to three times the point estimate. As expected, removal of these estimates from the projection calculations led to a major reduction in rebuild potential. Consequences of this include a longer time to rebuild in the absence of exploitation (14 compared to 10 years) and lower 2002 OYs.

Revisions to the catch series

Several refinements to the assessment of Pacific Ocean perch and other species are being considered at present. The development since the 2000 assessment that will probably have the greatest impact on the rebuilding analysis is the re-analysis of the foreign catches by Rogers (In prep). Although the revisions to the catch series for Pacific Ocean perch are yet to be finalized, preliminary results indicate that the OYs for 2002 based on assessments using the revised catches will be lower than those reported in Table 1.

References

Ianelli, J.N., Wilkins, M. and S. Harley. 2000. Status and future prospects for the Pacific Ocean Perch resource in waters off Washington and Oregon as assessed in 2000. In: Appendix to "Status of the Pacific coast groundfish fishery through 2000 and recommended Acceptable Biological Catches for 2001". Stock Assessment and Fishery Evaluation. Pacific Fishery Management Council. 2130 SW Fifth Avenue, Suite 224, Portland OR, 97201.

Ianelli, J.N. and M. Zimmerman. 1997. Status and future prospects for the Pacific Ocean perch resource in waters off Washington and Oregon as assessed in 1998. In: "Status of the Pacific coast groundfish fishery through 1998 and recommended Acceptable Biological Catches for 1999". Stock Assessment and Fishery Evaluation. Pacific Fishery Management Council. 2130 SW Fifth Avenue, Suite 224, Portland OR, 97201.

Pacific Fishery Management Council. 2000. Pacific Ocean Perch STAR Panel Report. In "Status of the Pacific Coast Groundfish Fishery Through 2000 and Recommended Biological Catches for 2001: Stock Assessment and Fishery Evaluation". (Document prepared for the Council and its advisory entities) Pacific Fishery Management Council. 7700 NE Ambassador Place, Suite 200. Portland, OR 97220.

Punt, A.E. SSC default rebuilding analysis. Technical specifications and user manual. Ver. 1.00003. (Draft document, available from author).

Rogers, J.B. In prep. Species allocation of 1965-1977 United States west coast foreign rockfish (*Sebastes* and *Sebastolobus* sp.) catch

Appendix 1 : Biological and technological parameters used for the rebuilding analyses

Age	Fecundity	Weight (kg)	Selectivity	*N*
3	0.000	0.169	0.015	4519
4	0.000	0.241	0.046	5228
5	0.000	0.317	0.138	7574
6	0.004	0.396	0.349	9525
7	0.028	0.474	0.697	2945
8	0.137	0.550	1.047	2229
9	0.274	0.622	1.239	3554
10	0.339	0.690	1.251	3638
11	0.375	0.752	1.223	2053
12	0.404	0.809	1.197	2748
13	0.431	0.861	1.178	2169
14	0.454	0.908	1.170	1151
15	0.475	0.950	1.168	2331
16	0.494	0.987	1.166	1260
17	0.510	1.021	1.174	887
18	0.525	1.050	1.201	719
19	0.538	1.076	1.239	1364
20	0.550	1.099	1.265	860
21	0.560	1.119	1.262	706
22	0.569	1.137	1.244	440
23	0.576	1.153	1.244	381
24	0.583	1.166	1.244	350
25+	0.589	1.178	1.244	5847

Appendix 2 : Historical series of spawning output and recruitment.

Year	Recruitment (age 3)	Spawning output
1956	26452	53787
1957	38763	52201
1958	31233	50654
1959	26822	49841
1960	16651	49702
1961	10648	51349
1962	8005	54705
1963	8979	58321
1964	13485	60822
1965	10198	62421
1966	5828	61190
1967	3904	51035
1968	2965	35385
1969	2629	27577
1970	2357	26841
1971	2522	25157
1972	3141	23073
1973	6969	21230
1974	3047	19746
1975	1703	19236
1976	1345	18493
1977	1537	17546
1978	1860	17533
1979	1867	17131
1980	1847	16464
1981	1931	15572
1982	2812	14873
1983	3111	14388
1984	4499	13528
1985	2166	12801
1986	2440	12243
1987	3157	11814
1988	5317	11669
1989	2395	11598
1990	4139	11371
1991	4841	11250
1992	3351	11095
1993	5512	11273
1994	5011	11395
1995	2936	11594
1996	3646	11998
1997	11142	12457
1998	8399	13039
1999	5504	13725
2000	4519	14250

Appendix 3 : The input file for the base-case rebuilding analysis

#Title,
POP - STAR panel model (Original foreign catches),
Number of sexes,
1,
Age range to consider (minimum age; maximum age),
3,25,
First year of projection,
2000,
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
3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25
3.84E-06,4.03E-
05,0.000392248,0.003560962,0.028260766,0.1374925,0.273954602,0.338584679,0.375081501,0.404469053,0.430553194,0.453991276,0.47499
65,0.493739,0.510395,0.52515,0.53818,0.549655,0.559745,0.568595,0.576345,0.58313,0.589055
Age specific information (Females then males) M; body wt; selex; Numbers
Females
0.051268,0.051268,0.051268,0.051268,0.051268,0.051268,0.051268,0.051268,0.051268,0.051268,0.051268,0.051268,0.051268,0.051268,0.051
268,0.051268,0.051268,0.051268,0.051268,0.051268,0.051268,0.051268,0.051268
0.169105,0.240603,0.317273,0.395966,0.474162,0.54997,0.62206,0.689572,0.752022,0.80921,0.861146,0.907988,0.949993,0.987478,1.02079,1
.0503,1.07636,1.09931,1.11949,1.13719,1.15269,1.16626,1.17811
0.0150383,0.0460987,0.137995,0.349401,0.696964,1.04722,1.23902,1.25075,1.22328,1.1965,1.17838,1.17032,1.16768,1.16629,1.17384,1.2012
4,1.23873,1.26485,1.26166,1.24369,1.24369,1.24369,1.24369
4518.68,5228.16,7573.91,9524.67,2945.37,2228.92,3554.34,3637.52,2052.94,2748.15,2168.62,1151.47,2330.93,1259.57,886.926,718.926,1364.
47,860.091,706.002,439.578,381.17,349.572,5847.27
Number of simulations
1000
recruitment and biomass
Number of historical assessment years
46
Historical data
year,recruitment,spawner,in B0,in R project,in R/S project
1955,7822.9,60212,1,0,0
1956,26451.8,53787.1,0,0,0
1957,38762.7,52200.5,0,0,0
1958,31232.9,50653.7,0,0,0
1959,26821.6,49841.3,0,0,1
1960,16650.9,49701.9,0,0,1
1961,10648.3,51349.2,0,0,1
1962,8005.34,54704.5,0,0,1
1963,8978.75,58320.8,0,0,1
1964,13485,60821.6,0,0,1
1965,10198.2,62420.6,0,1,1
1966,5828.14,61190.2,0,1,1
1967,3904.45,51034.5,0,1,1
1968,2965.33,35385.3,0,1,1
1969,2629.07,27577.3,0,1,1
1970,2356.87,26840.8,0,1,1
1971,2521.91,25157.4,0,1,1
1972,3141.36,23073.4,0,1,1
1973,6969.44,21229.5,0,1,1
1974,3046.8,19745.7,0,1,1
1975,1703.11,19235.9,0,1,1
1976,1344.54,18493.2,0,1,1
1977,1536.94,17545.6,0,1,1
1978,1859.93,17533.3,0,1,1
1979,1866.67,17131.1,0,1,1
1980,1846.92,16464,0,1,1
1981,1931.13,15572.2,0,1,1
1982,2812.19,14873.4,0,1,1
1983,3110.87,14387.5,0,1,1
1984,4498.81,13528,0,1,1

```
1985,2165.78,12801.2,0,1,1
1986,2440.4,12242.8,0,1,1
1987,3157.47,11814.4,0,1,1
1988,5316.72,11668.7,0,1,1
1989,2394.87,11597.9,0,1,1
1990,4138.59,11371.2,0,1,1
1991,4841.48,11250.2,0,1,1
1992,3350.57,11095.4,0,1,1
1993,5512.09,11272.9,0,1,1
1994,5011.27,11394.6,0,1,1
1995,2936.13,11594.2,0,1,1
1996,3646.31,11997.5,0,1,1
1997,11141.9,12457.3,0,1,1
1998,8399.49,13039.4,0,1,1
1999,5504.47,13725.2,0,0,0
2000,4518.68,14249.6,0,0,0
# Number of years with pre-specified catches
2
# catches for years with pre-specified catches,
2000,270,
2001,303,
# 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.)
2
# Steepness,sigma-R,
0.5,0.5,
# Target SPR information: Use (1=Yes), target SPR rate,power
0,0.7,20
# 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
# Defintion of recovery (1=now only;2=now or before)
2
# Produce the risk-reward plots (1=Yes)
1
```

Appendix 4 : The envelopes (5%, 25%, 50%, 75% and 95% distribution points) for the annual catch and the annual ratio of the spawner output to $0.4B_0$.

Year	Spawner output / $0.4B_0$					Annual catch (t)				
	5%	25%	50%	75%	95%	5%	25%	50%	75%	95%
2000	0.592	0.592	0.592	0.592	0.592	270	270	270	270	270
2001	0.619	0.619	0.619	0.619	0.619	303	303	303	303	303
2002	0.669	0.669	0.669	0.669	0.669	410	410	410	410	410
2003	0.733	0.733	0.733	0.733	0.733	437	438	438	438	440
2004	0.785	0.785	0.785	0.785	0.786	456	457	458	460	465
2005	0.818	0.819	0.820	0.821	0.826	466	469	472	476	487
2006	0.834	0.838	0.842	0.849	0.870	470	475	481	488	506
2007	0.839	0.848	0.858	0.872	0.910	471	480	489	500	522
2008	0.840	0.856	0.873	0.893	0.936	471	485	496	511	536
2009	0.840	0.863	0.884	0.913	0.960	472	489	503	520	548
2010	0.839	0.870	0.896	0.928	0.979	473	493	509	528	559
2011	0.840	0.877	0.905	0.940	0.997	474	497	515	534	569
2012	0.839	0.880	0.913	0.949	1.014	475	500	520	539	577
2013	0.836	0.882	0.922	0.956	1.026	477	503	525	547	584
2014	0.835	0.884	0.926	0.966	1.036	479	507	530	553	591
2015	0.836	0.887	0.929	0.971	1.045	479	508	532	557	596
2016	0.834	0.887	0.932	0.977	1.051	479	509	534	559	600
2017	0.833	0.889	0.936	0.982	1.055	476	510	535	563	604
2018	0.829	0.890	0.936	0.988	1.065	475	510	536	565	606
2019	0.827	0.891	0.939	0.992	1.069	474	510	537	567	610
2020	0.825	0.892	0.940	0.996	1.073	473	512	539	570	614
2021	0.825	0.894	0.942	0.999	1.078	473	512	538	572	617
2022	0.823	0.895	0.942	1.003	1.085	472	511	539	573	621
2023	0.821	0.893	0.944	1.004	1.089	471	510	539	575	625
2024	0.821	0.893	0.944	1.006	1.099	470	510	539	576	632
2025	0.820	0.891	0.945	1.010	1.108	469	511	539	577	636
2026	0.813	0.892	0.945	1.009	1.116	469	510	540	575	635
2027	0.818	0.891	0.944	1.008	1.116	469	509	541	578	634
2028	0.817	0.891	0.946	1.013	1.115	469	510	543	578	635
2029	0.817	0.891	0.949	1.014	1.117	467	510	543	578	636
2030	0.815	0.892	0.950	1.015	1.115	467	511	543	580	636
2031	0.814	0.894	0.950	1.016	1.121	469	512	544	581	639
2032	0.817	0.894	0.950	1.017	1.119	469	512	543	580	641
2033	0.818	0.894	0.950	1.019	1.129	469	511	543	581	643
2034	0.818	0.893	0.951	1.019	1.127	470	513	545	582	641
2035	0.821	0.895	0.955	1.021	1.125	471	515	547	582	638
2036	0.821	0.897	0.956	1.021	1.120	470	515	547	581	639
2037	0.820	0.900	0.957	1.021	1.121	471	515	547	584	641
2038	0.821	0.900	0.957	1.023	1.126	471	514	548	586	639
2039	0.821	0.898	0.958	1.025	1.123	470	515	548	587	639
2040	0.818	0.899	0.959	1.025	1.120	470	514	548	587	639
2041	0.818	0.897	0.958	1.029	1.125	468	514	551	588	643
2042	0.817	0.898	0.960	1.032	1.129	469	514	550	589	645

Year	Spawner output / $0.4B_0$					Annual catch (t)				
	5%	25%	50%	75%	95%	5%	25%	50%	75%	95%
2043	0.817	0.897	0.961	1.031	1.136	468	514	551	588	648
2044	0.815	0.897	0.964	1.031	1.137	468	514	552	589	648
2045	0.819	0.897	0.963	1.031	1.139	468	513	552	588	648
2046	0.816	0.897	0.965	1.028	1.136	469	514	550	589	649
2047	0.819	0.899	0.964	1.032	1.132	469	514	552	589	646
2048	0.817	0.897	0.964	1.031	1.134	469	515	552	589	645
2049	0.817	0.898	0.966	1.029	1.129	468	514	553	589	642
2050	0.814	0.898	0.966	1.034	1.126	468	515	553	589	642
2051	0.817	0.899	0.968	1.033	1.125	468	515	552	589	641
2052	0.814	0.899	0.965	1.033	1.127	469	515	550	590	642
2053	0.816	0.900	0.963	1.032	1.126	466	517	550	587	643
2054	0.814	0.902	0.960	1.029	1.126	467	517	549	587	640
2055	0.813	0.903	0.959	1.029	1.122	468	517	550	586	641
2056	0.815	0.904	0.960	1.025	1.120	469	517	550	586	639
2057	0.819	0.902	0.962	1.025	1.121	470	517	550	587	637
2058	0.820	0.903	0.962	1.026	1.115	470	517	549	586	634
2059	0.817	0.903	0.960	1.028	1.113	471	519	550	587	634
2060	0.822	0.905	0.962	1.029	1.117	470	519	550	586	637
2061	0.820	0.906	0.963	1.024	1.119	470	518	550	585	638
2062	0.821	0.905	0.962	1.026	1.120	472	518	550	586	638
2063	0.823	0.905	0.962	1.025	1.119	471	516	549	585	640
2064	0.822	0.902	0.960	1.025	1.123	473	516	548	586	642
2065	0.827	0.901	0.958	1.026	1.129	474	517	547	586	644
2066	0.827	0.902	0.958	1.026	1.135	473	517	547	586	646
2067	0.825	0.903	0.958	1.027	1.130	472	517	547	585	642
2068	0.825	0.903	0.956	1.025	1.129	471	516	548	585	644
2069	0.823	0.900	0.957	1.025	1.132	473	514	548	585	645
2070	0.825	0.899	0.959	1.025	1.135	473	513	548	586	647
2071	0.824	0.896	0.958	1.026	1.136	471	514	548	584	646
2072	0.824	0.896	0.959	1.023	1.139	471	514	548	585	650
2073	0.821	0.899	0.958	1.023	1.137	472	514	547	583	645
2074	0.822	0.898	0.956	1.022	1.133	473	513	547	584	644
2075	0.825	0.896	0.955	1.021	1.130	472	513	546	584	643
2076	0.823	0.895	0.957	1.023	1.130	474	513	547	585	646
2077	0.824	0.897	0.955	1.026	1.135	474	513	547	585	643
2078	0.824	0.894	0.957	1.024	1.129	472	512	547	586	641
2079	0.825	0.893	0.958	1.023	1.126	472	511	547	587	638
2080	0.822	0.892	0.956	1.024	1.120	471	514	547	587	638

Exhibit C.5
Attachment 6
September 2001

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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Jagielo, T.H., D. Wilson-Vandenberg, J. Sneva, S. Rosenfield, and F. Wallace. 2000. Assessment of Lingcod (*Ophiodon elongatus*) for the Pacific Fishery Management Council in 2000. In Appendix to Status of the Pacific Coast Groundfish Fishery Through 2000 and Recommended Acceptable Biological Catches for 2001, Stock Assessment and Fishery Evaluation. 142 p. Pacific Fishery Management Council, 2130 SW Fifth Avenue, Suite 224, Portland, Oregon 97201, October 2000.

Punt, A.E. 2001. SSC Default Rebuilding Analysis. Technical specifications and user manual. Ver. 1.000003 (July 2001).

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.

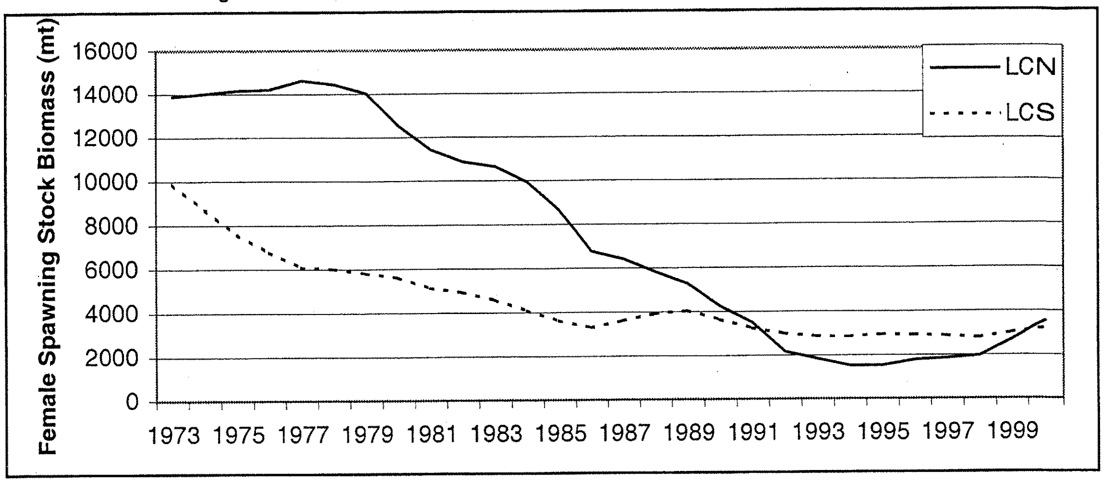


Figure 1a. Full recruitment time series by brood year (1971-1993) for LCN and LCS.

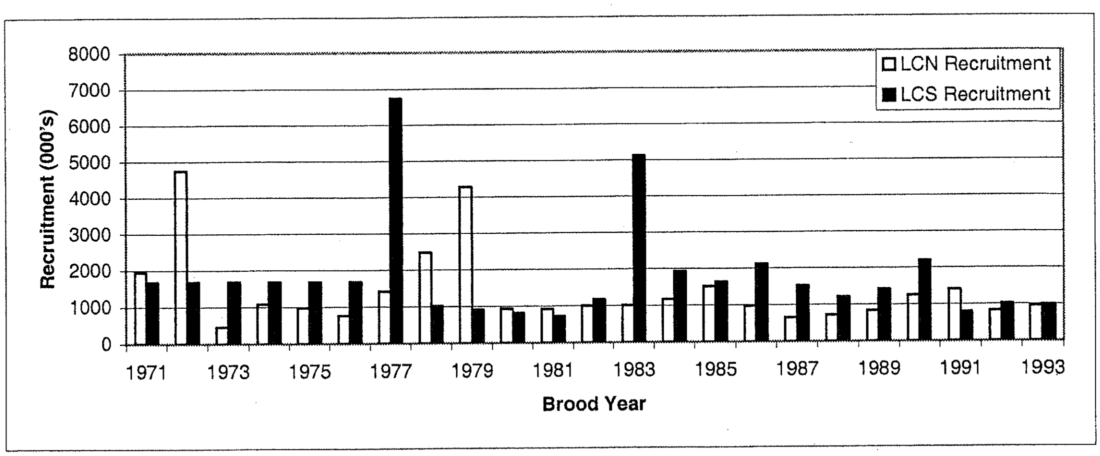
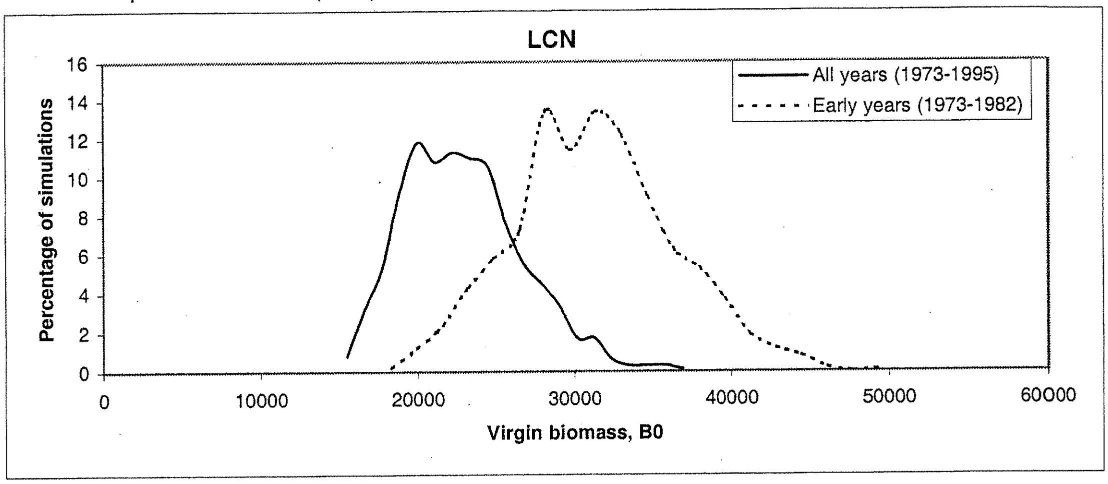


Figure 2. Distribution of Virgin Spawning Biomass (B_0) estimates for 1000 simulation runs.
Top: Northern area (LCN), Bottom: Southern area (LCS).



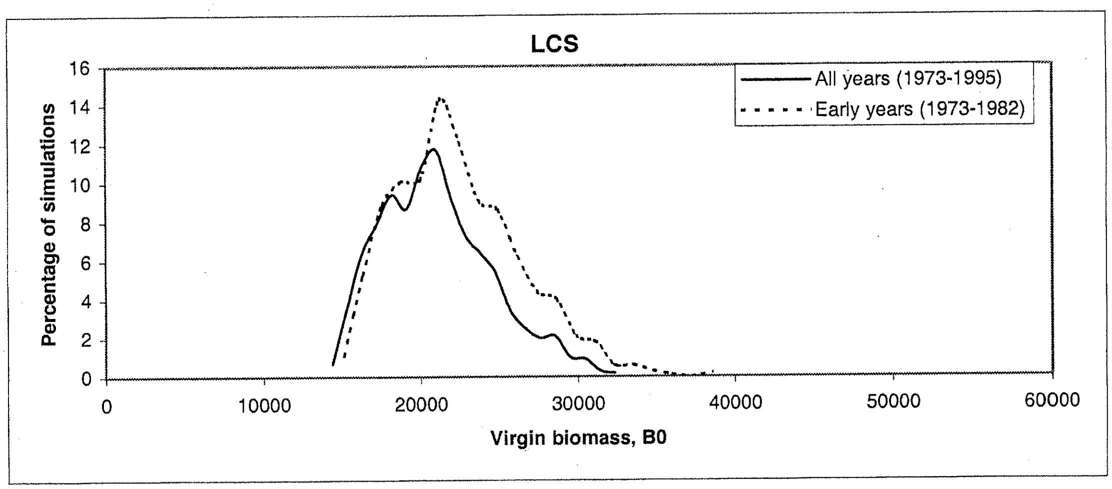


Figure 3. Recent northern area (LCN) recruitment and recruits/spawning output (R/S).

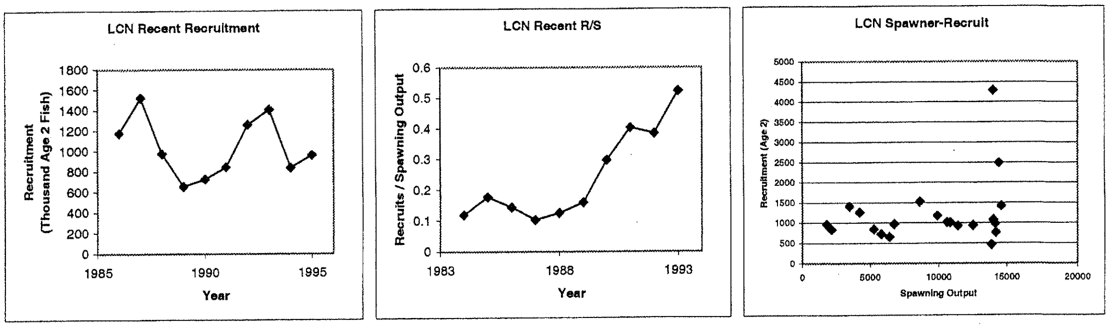


Figure 4. Recent southern area (LCS) recruitment and recruits/spawning output (R/S).

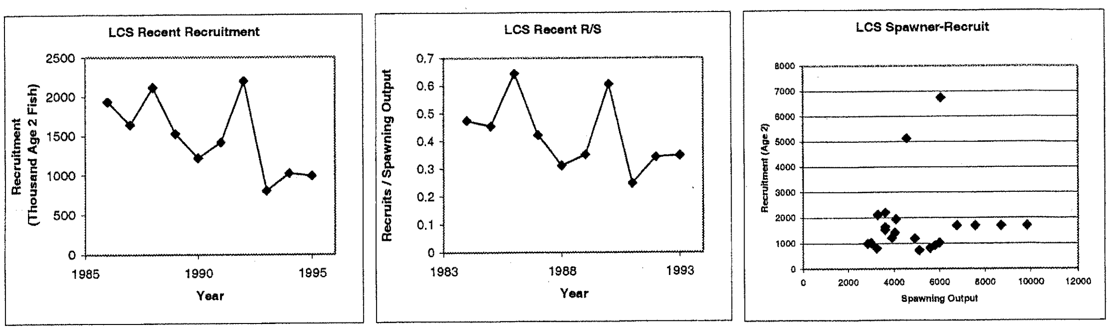


Figure 5.--Probability of limit attainment, median OY trajectories, and ratios of spawner biomass to target biomass, under six alternative harvest policies in the northern area (LCN).

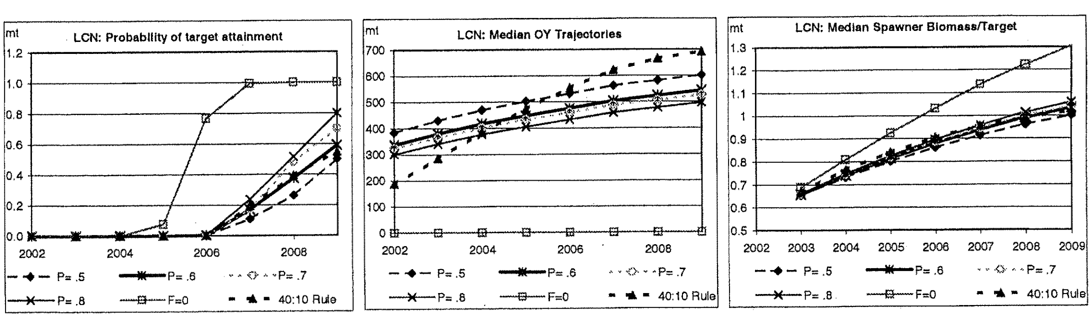


Figure 6.--Probability of limit attainment, median OY trajectories, and ratios of spawner biomass to target biomass, under six alternative harvest policies in the southern area (LCS).

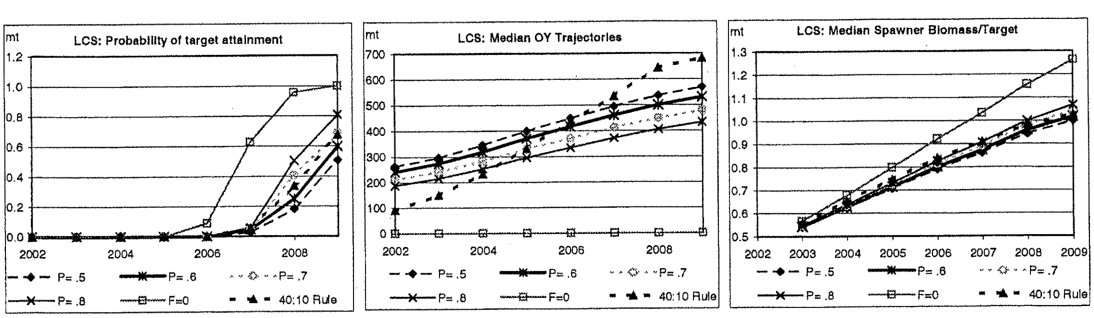


Figure 7.--Coastwide rebuilding OYs for lingcod, 2002-2008, based on the median projections, for six alternative harvest policies, and the 2000 harvest and 2001 OY.

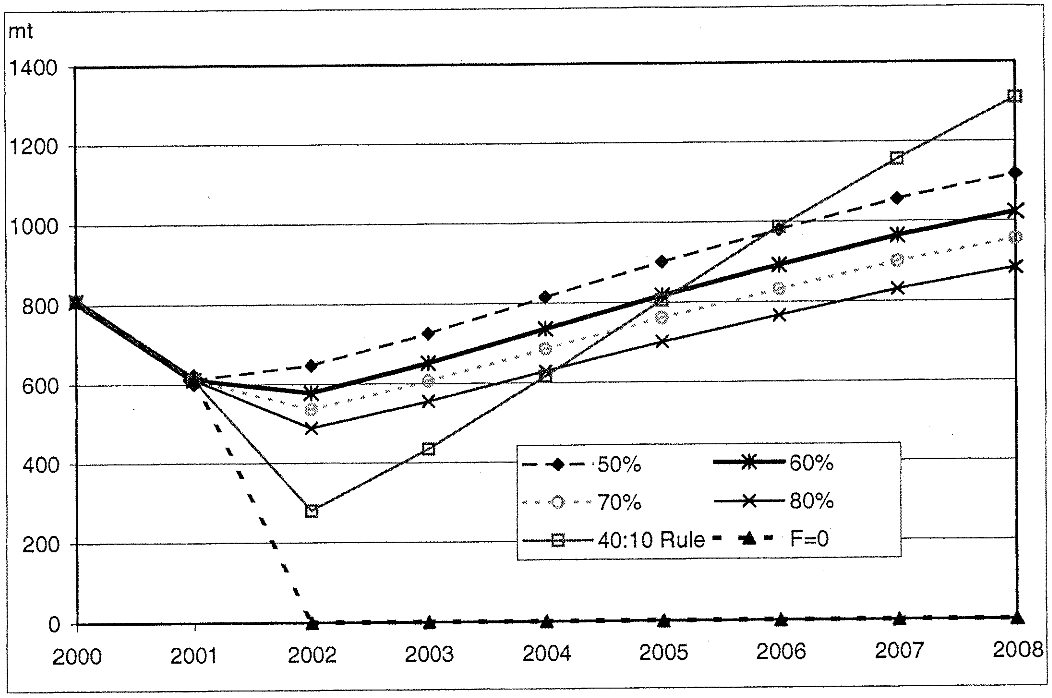
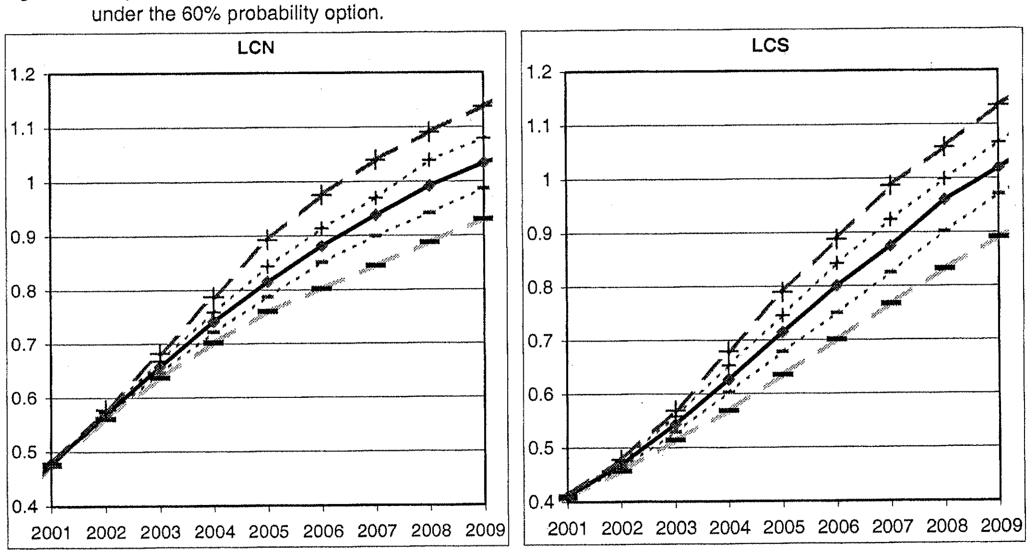


Figure 8.--Projected ratios of spawner biomasses to the targets, for the northern (LCN) and southern (LCS) areas under the 60% probability option.



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.

DRAFT WIDOW ROCKFISH REBUILDING PLAN ALTERNATIVES

2.1 Rebuilding Plan Goals and Objectives

In January 2001, the National Marine Fisheries Service (NMFS) informed the Council that the widow rockfish stock in the U.S. territorial waters off Washington, Oregon and California (WOC) is "overfished" according to the definitions in the FMP and the National Standard Guidelines for the Magnuson-Stevens Act. When a stock is declared to be overfished, a rebuilding plan must be developed within one year.

Alternative 1. Status quo. No rebuilding plan would be adopted for widow rockfish.

Alternative 2 (**adopted** by the Council). Establish a rebuilding plan for widow rockfish. The rebuilding plan will provide goals and objectives for strategies, targets, checkpoints and guidance to rebuild the widow rockfish stock to a healthy and productive level.

The goals of rebuilding plan are to: (1) achieve the widow rockfish population size and structure that will support the maximum sustainable yield within the target rebuilding period; (2) establish a long-term management program that has a high probability that total annual fishing mortality of widow rockfish will not exceed the specified amounts; (3) minimize, to the extent practicable, the social and economic impacts associated with rebuilding this stock; and (4) protect the quantity and quality of habitat necessary to support the widow rockfish stock at healthy levels in the future.

To achieve these rebuilding goals, the Council will: *(1) set harvest levels that will achieve the established rebuilding schedule; (2) establish measures such as area closures, bag limits, and commercial landing limits to reduce widow rockfish mortalities to very low levels, especially during the initial phase of the rebuilding period; (3) monitor the condition of the stock at least every two years to ensure the goals and objectives are being achieved; (4) identify any important habitat areas and implement measures to ensure their protection; and (5) promote public education regarding these goals, objectives and the measures intended to achieve them.*

2.2 Target Biomass

The rebuilding target is the spawning biomass level (in spawning units; millions of fertilized eggs) that produces maximum sustainable yield (B_{msy}). B_{msy} is often near 40% of initial biomass (B_0), and is also the biomass target for rebuilding the widow rockfish stock. Projections based on historical recruitments estimate mean B_0 ranging from 33,369 to 41,872 spawning units in the WOC area, depending on the recruitment years. The B_0 estimate based on all recruitment years in the data base (1965-1997) was lower than the estimate using pre-exploitation recruitment years (1965-1979), presumably due to a decline in spawning abundance. The rebuilding targets (B_{msy}) associated with these B_0 estimates were 13,348 and 16,749 spawning units, respectively.

Alternative 1. Status quo. No target biomass would be set.

Alternative 2 (**adopted** by the Council). Observations of declining recruitment in recent years indicated that the B_0 estimate should reflect the higher recruitment levels of the pre-exploitation years, or 41,872 spawning units. Target biomass would be set at a B_{msy} of 16,749 spawning units ($B_{40\%}$).

Alternative 3. Target biomass would be set at a B_{msy} of 13,348 spawning units based on the average recruitment for all years (1965-1997).

2.3 Maximum Rebuilding Period

The National Standards Guidelines and the FMP require the Council to specify a maximum rebuilding period of 10 years unless the status and biology of the stock and its interactions with other components of the marine ecosystem require a longer period in the absence of fishing related mortality (F_0). If the required time is greater than 10 years, the maximum rebuilding period shall be no more than the time estimated to rebuild the stock at $F_{100\%}$ plus one mean generation time. The estimated generation time for widow rockfish is 16 years.

Two approaches to projecting recruitment during the rebuilding period can be used to estimate the time required to reach the target biomass (B_{MSY}). The first approach employs recruit per spawner (R/S) observed for recent recruitment estimates, multiplied by the current stock size. The second approach uses only the recent recruitment (R) estimates without relating future estimates to spawning stock size. The first approach assumes that there is no compensation in the recruitment function, the second approach assumes that there is complete compensation The R/S scenarios generally have longer rebuilding times than the R scenarios. This is due to the effect of the currently low biomass, which results in much smaller recruitments in the initial years of rebuilding. These two approaches likely encompass the range of actual recruitment. Based on the two approaches and the two alternatives for $B_{40\%}$, the following matrix was developed for rebuilding times with no fishing mortality:

	$B_{40\%}$ =16,749 (1965-1979)	$B_{40\%}$ =13,348 (all years)
Recent R/S	median T = 22 years	median T = 14 years
Recent R	median T = 12 years	median T = 7 years

Alternative 1. Status quo. No maximum time to rebuild would be set.

Alternative 2 (**adopted** by the Council). The recent history of recruits per spawner (R/S) has been stable, whereas recruitments themselves have been declining. The tendency for recruitments to decline in more recent years (and at lower spawning abundances) is reason to reject the right-hand and lower cases in the matrix. Based on a recruit per spawner (R/S) function and a $B_{40\%}$ based on pre-exploitation years, the median time to rebuild in the absence of fishing mortality is 22 years and the maximum allowable median time to rebuild (T_{max}) is 38 years.

Alternative 3. Based on a recruit per spawner (R/S) function and a $B_{40\%}$ based on all years, the median time to rebuild in the absence of fishing mortality is 14 years and the maximum allowable median time to rebuild (T_{max}) is 30 years.

Alternative 4. Based on recent year average recruitment independent of stock size (R) and a $B_{40\%}$ based on pre-exploitation years, the median time to rebuild in the absence of fishing mortality is 12 years and the maximum allowable median time to rebuild (T_{max}) is 28 years.

Alternative 5. Based on recent year average recruitment independent of stock size (R) and a $B_{40\%}$ based on all years, the median time to rebuild in the absence of fishing mortality is 7 years and the maximum allowable median time to rebuild (T_{max}) is 10 years.

2.4 Target Rebuilding Period Alternatives

The target rebuilding period may be set for periods less than the maximum rebuilding period to increase the probability of achieving B_{msy} in the required time. The selection of an alternative rebuilding period will also affect the harvest rate necessary to achieve the desired level of probability. The maximum rebuilding period calculation is based on a constant harvest rate that achieves a 50% probability ($F_{0.5}$) of reaching B_{msy} within the maximum rebuilding period. In order to increase the probability, the harvest rate must be reduced, which in turn reduces the target rebuilding period.

The target rebuilding period will be based on the selection of a maximum rebuilding period. Using the recommendations in the rebuilding analysis, which were adopted by the Council, the maximum rebuilding period is 38 years. At $F_{1.0}$ (no fishing related mortality) there is a 100% probability of achieving the target biomass within 38 years and 50% probability of achieving the target biomass within a target period of 22 years.

Alternative 1. Status quo. No target rebuilding period would be set.

Alternative 2. A target rebuilding period of 38 years results in a 50% probability of achieving the target biomass objective within 38 years based on a constant fishing mortality rate of 0.0288.

Alternative 3 (**Lower end of range adopted** by the Council). A target rebuilding period of 37 years results in a 60% probability of achieving the target biomass objective within 38 years based on a constant fishing mortality rate of 0.0268.

Alternative 4 (**Mid-point of range adopted** by the Council). A target rebuilding period of 35 years results in a 70% probability of achieving the target biomass objective within 38 years based on a constant fishing mortality rate of 0.0243.

Alternative 5 (**Upper end of range adopted** by the Council). A target rebuilding period of 34 years results in an 80% probability of achieving the target biomass objective within 38 years based on a constant fishing mortality rate of 0.0227.

Alternative 6. A target rebuilding period of 22 years results in a 100% probability of achieving the target biomass objective within 38 years based on no fishing related mortality.

2.5 Harvest Rate Policy Alternatives

In previous years, when directed fisheries for widow rockfish were allowed, specified harvest levels (OYs) were set each year. Typically, harvest levels are set in accordance with the standard ABC/OY method in the FMP. That method applies the MSY harvest rate (or a proxy value, currently $F_{50\%}$) to the estimated biomass, and then making an adjustment based on the ratio of current to historic abundance.

For the rebuilding analysis, fixed harvest rates were modeled to determine the target rebuilding periods and associated probabilities for achieving rebuilding within the allotted time. Fixed harvest rate strategies allow increases in the annual OY specifications as the stock rebuilds; however, the harvest rate increases abruptly to F_{MSY} when rebuilding is achieved.

Transition harvest rate strategies allow increasing harvest rates as rebuilding objectives are approached so that the change from the rebuilding harvest rate to F_{MSY} (6.0%) is less abrupt. However, to allow increased harvest rates late in the rebuilding process, harvest rates early in the process must be reduced to balance the effect. This is typically achieved by keeping the initial harvest rate at a constant low level for a certain period, then allowing periodic increases in the harvest rate until rebuilding is achieved. The more conservative the initial harvest rate, the sooner transition harvest rates can be implemented.

Alternative 1. Default method. Harvest levels would be based on the $F_{50\%}$ harvest rate (the current MSY proxy), as adjusted by the default OY control rule in the FMP. The default OY rule is commonly referred to as the "40-10" adjustment. Under this policy, the 2002 OY would be 2,300 mt.

Alternative 2 (**Upper end of range adopted** by the Council). Set the annual harvest as a fixed fraction of the population for the duration of the rebuilding period. Based on current estimates of stock abundance, a target biomass of 16,749 spawning units, and a target rebuilding period of 37 years, the annual fishing rate would be 2.68%. This policy would be consistent with and a 60% probability of achieving the target biomass within 38 years. For 2002, the associated OY would be 856 mt.

Alternative 3 (**Mid-point of range adopted** by the Council). Set the annual harvest as a fixed fraction of the population for the duration of the rebuilding period. Based on current estimates of stock abundance, a target biomass of 16,749 spawning units, and a target rebuilding period of 35 years, the annual fishing rate would be 2.43%. This policy would be consistent with and a 70% probability of achieving the target biomass within 38 years. For 2002, the associated OY would be 777 mt.

Alternative 4 (**Lower end of range adopted** by the Council). Set the annual harvest as a fixed fraction of the population for the duration of the rebuilding period. Based on current estimates of stock abundance, a target biomass of 16,749 spawning units, and a target rebuilding period of 34 years, the fishing rate would be 2.27%. This policy would be consistent with and an 80% probability of achieving the target biomass within 38 years. For 2002, the associated OY would be 726 mt.

Alternative 5. Set a more conservative harvest rate policy in the early years to allow a gradually increasing (transition) harvest rate as the stock nears the target biomass. Reduce the harvest rate in the early years to 70% of that based on a policy of a constant annual harvest rate for the duration of the rebuilding period. This would allow the harvest rate to start increasing after 28 years. This policy would be consistent with a target biomass of 16,749 spawning units, a target rebuilding period of 35 years, and a 70% probability of achieving the target biomass within 38 years. This would allow a low level of harvest in the initial years and increased harvest as the population rebuilds. For 2002, the associated OY would be 546 mt.

Alternative 6. Prevent all harvest of widow rockfish for the duration of the rebuilding period, leaving only natural mortality to determine stock size. This would require elimination of all fishing in widow rockfish habitat in the WOC area. This policy would be consistent with a target biomass of 16,749 spawning units and a target rebuilding period of 22 years, and a 100% probability of achieving the target biomass within 38 years.

Alternative 7. Prohibit all fishing for widow rockfish and all retention of any widow rockfish caught incidentally to other fishing strategies. This would allow fishing in widow rockfish habitat, but not intentional fishing for widow rockfish. All retention of widow rockfish would be prohibited. This policy would be consistent with a target biomass of 16,749 spawning units, a target rebuilding period of >22 years, and a <100% probability of achieving the target biomass within 38 years. The actual target rebuilding period and probability of achieving the biomass objective would depend on the level of bycatch discard.

2.6 Alternatives Rejected as Not Compliant with the Magnuson-Stevens Act

The Magnuson-Stevens Act requires that overfished stocks be rebuilt within ten years, except in limited cases such as where the biology of the stock or other environmental conditions prevent it. The widow rockfish stock assessment and rebuilding analysis indicate this stock cannot be rebuilt within 10 years due to its low abundance and low stock productivity. The maximum rebuilding time authorized by the National Standard Guidelines would be 38 years. Any alternatives that would not allow the stock to rebuild within that time would be inconsistent with the Magnuson-Stevens Act.

The Magnuson-Stevens Act also requires that conservation burdens and benefits be fairly distributed among participants. Alternatives that would have given exclusive harvest opportunity to either the recreational or commercial sector would be inconsistent with this requirement.

Exhibit C.7.c
Supplemental CDFG Report 1
September 2001

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State of California - The Resources Agency
DEPARTMENT OF FISH AND GAME
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GRAY DAVIS, *Governor*

September 7, 2001

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

Dear Fellow Members:

Management Measures for 2001 and 2002 California Groundfish Fisheries

At the recent Allocation Committee (AC) meeting I committed to provide recommendations to you and our advisory bodies regarding management measures for California groundfish fisheries aimed at meeting year 2001 and 2002 optimum yields and fishery set asides. At our upcoming meeting, the Council will develop recommendations addressing 2001 catch levels and preliminary groundfish fishery specifications, optimum yields, and management measure for 2002 fisheries. Our final recommendations for 2002 fisheries will be developed at our October/November meeting.

In California, in order to bring certain state regulations into conformance with federal regulations, concurrent regulatory action by our Fish and Game Commission is required. Commission authority, in the case of federal groundfish, extends to the recreational groundfish fishery in state waters, the commercial fishery for cabezon and kelp greenling, and the pink shrimp and prawn trawl fisheries. For the other commercial fisheries we have adopted regulations that automatically conform to the federal regulations (see Section 189, Title 14, California Code of Regulations).

Challenges for 2001

We will look to the GAP for commercial fishery recommendations to stay within 2001 OYs.

For the recreational fishery, in spite of additional restrictions implemented this year, the bocaccio catch for California is on track to exceed the set-aside for that fishery. The in-season data from the Marine Recreational Fishery Statistics Survey (MRFSS) indicates the California sport fishery through wave 3 (January-June) has already landed 50 mt of bocaccio, including 17 mt and 33 mt north and south of Point Conception, respectively. The entire season set-aside for this fishery is 52 mt. The canary rockfish estimate through wave 3 is 16 mt, all north of Pt. Conception, and 15 mt was landed in wave 1 (January-February). The canary catch for the area south of Cape Mendocino, for the entire year was assumed to be 22 mt.

The recreational lingcod catch appears to be safely below the set-aside for the coast wide recreational fishery (see AC report).

Last year, and again this year, we have reason to question the northern California total effort estimates for charterboats (for all fisheries not just groundfish) in wave 1. We have compared the MRFSS and DFG logbook data for the past five years and find that the MRFSS estimates of effort are 4 to over 20 times (average=9.6) the logbook estimates, uncorrected for non-compliance (see attached report). We have studied non-compliance in the northern California fishery and find an average annual return rate for rockfish boats is about 65%. If we assume a 35% non-compliance rate the average effort overage is 6.2.

We do not have non-compliance data for southern California logbooks. However, comparison of the raw logbook data and the MRFSS effort estimates are, in some ways even more disparate for the south than they are in the north (see attached). The MRFSS estimates show steeply declining fishing effort between 1996 and 2000 while the logbook returns indicate the fishery has been stable or slightly increasing. The MRFSS estimates are much higher than the logbook estimates in 1996 and 1997, of the same magnitude in 1999 and 2000.

In part because of the concerns raised last year over the MRFSS estimates of charterboat effort, the Pacific States Marine Fisheries Commission (PSMFC) initiated a new effort survey in the California charterboat fishery beginning at the start of wave 2 this year. The new survey is patterned after an East Coast effort and focuses on surveying the industry participants themselves rather than random households. We have discussed the availability of those data with NMFS and PSMFC staff. Unfortunately, the new effort data have yet to be processed and are not expected to be available until late September or early October of this year. These new estimates will be important for verifying the traditional effort estimates. In the meantime, we are faced with using the traditional MRFSS estimates for considering in-season adjustments in the California recreational fishery. Our assessment is that we need the revised effort data and an additional wave of data to properly assess the situation for both species. These data should be available by early to mid-October, according to National Marine Fisheries Service (NMFS) staff. We have asked the NMFS and the PSFMC to expedite the estimation process, if at all possible.

It should be noted that California has adopted a regulation that allows the Department to close the shelf (and slope) rockfish fishery south of Point Conception during the months of November and December, if needed to meet the Council's harvest goals. This provision can be implemented at any time during the year to be effective during November and December. No such provision exists for the area north of Point Conception where both bocaccio and canary rockfish are present. An emergency action by the Commission to implement a broader or earlier closure would be required at a regularly scheduled meeting (October 4-5, November 1-2, and December 6-7, 2001) or at an emergency meeting called by the Commission President.

The Department will ask the Commission to place consideration of emergency action to close fisheries for bocaccio and canary rockfish statewide on their October meeting agenda. At that meeting we can present the most current recreational fishery catch estimates, discuss the MRFSS estimation program, and determine the appropriate course of action. NMFS presence and input at that meeting (in San Diego) will be very important.

Challenges for 2002

The Fish and Game Commission has filed regulatory notice to consider two changes in current rockfish and lingcod regulations in the recreational fishery beginning next year: 1) allow for the retention of lingcod when rockfish and lingcod fishing is restricted to waters under 20 fathoms in depth and 2) allow for the retention of up to two shelf or slope rockfish, excluding bocaccio, canary and cowcod rockfish, during these same fisheries. Final action will be taken at their December meeting, along with action to conform to any additional recreational regulations that the Council may adopt for 2002. Public notice of any additional regulations options will be filed following our September meeting.

Bocaccio. It is apparent from the recent AC meeting that we may need to consider additional regulatory constraints to keep recreational fisheries for bocaccio within its pre-season set aside of 52 mt. The 2000 final MRFSS estimates for this species is 107 mt, 60 and 47 mt, respectively, north and south of Point Conception. Moreover, the situation for bocaccio is dynamic because of growth in average weight of the strong 1998 year class. This will make limiting the catch to 52 mt extremely difficult without further fishery restrictions.

Canary Rockfish. We estimated last year that the regulations implemented in 2001 to protect canary rockfish (additional 2-month shelf closure north of Point Conception and 1-fish bag limit) would be effective in keeping the California catch south of Cape Mendocino to 22 mt or less for the year. It is too early in our view, to assess the effectiveness of those regulations.

Yelloweye Rockfish. Yelloweye rockfish is an additional shelf rockfish species that must be considered in our regulations for implementation in 2002. Our preliminary discussions with the AC indicated the recreational catch south of Cape Mendocino may need to be reduced to 2 mt or less. This compares to recent annual catches (largely north of Point Conception) of 6.4 to 16.3 mt (11.1 mt average) during 1996-99 and 2.3 mt in 2000.

Recreational Options. Department staff has been analyzing MRFSS catch data and some additional recreational fishery closures for shelf rockfish (from two to six months in addition to our current closures) under various projected catch levels of key species. These analysis will be useful in determining whether additional restrictions are necessary to meet our recreational fishery set-asides for bocaccio and yelloweye rockfish. They will be shared with the GMT and the GAP at our September meeting with the objective of agreeing upon a set of recreational fishery options for public input and additional analysis prior to our October/November decision meeting.

Under the proposed recreational fishery options, we recommend no bag limit or minimum size limit changes except the yelloweye bag limit would drop from 10 to 1 fish per angler, no more than 2 fish per boat. During the closures, fishing would be allowed inside 20 fathoms for lingcod and nearshore rockfish (including sculpin), and ocean whitefish (a state-managed species), with a provision for retention of 2 shelf or slope rockfish per angler not including bocaccio, canary, cowcod or yelloweye rockfish. The regulations south of Point Conception would also apply to the Cowcod Conservation Area.

We have not addressed recreational fishing options for California north of Cape Mendocino. We propose, as we have done in the past, that those regulations be the same as Oregon.

Commercial Fishery Options. The commercial fishing regulations for non-trawl vessels south of Cape Mendocino would have the same closures as the recreational fishery with a provision for fishing inside 20 fathoms for nearshore rockfish (including sculpin), lingcod, cabezon, greenlings; all slope rockfish; and an incidental landing of shelf rockfish not including bocaccio, canary, cowcod or yelloweye rockfish. Commercial regulations for California north of Cape Mendocino would be the same as Oregon for non-trawl vessels.

Trawl fishing options are not addressed in our recommendations. Please refer to the AC recommendations for strategies to consider for 2002.

Other Considerations. We have not projected the impact of shifting potential rockfish and lingcod fishing effort, both sport and commercial, to nearshore waters. We also have not analyzed the effect of reducing the yelloweye bag limit to 1 fish, with not more than 2 fish per boat. The likely effort shift associated with additional shelf rockfish closures may result in increased recreational harvest of nearshore rockfish and sculpin. The yelloweye bag limit reduction will discourage targeting on these fish. The affect on lingcod catch under the closure options has not been quantified, but our expectation is that the recreational catch would slightly decline because of usually lower abundance of legal-sized lingcod when fishing in shallow water during the proposed summer shelf fishing area closures.

We have provided the GAP and the GMT with an advanced copy of this letter. Mr. Dave Thomas has copies of the MRFSS data that we have been analyzing. Those tables will be available to the GMT and GAP at our September meeting to evaluate additional closure options for the California recreational fishery to protect overfished groundfish species.

In closing we would like to announce that a state-sponsored public meeting has been scheduled for October 10, 2001 in Santa Rosa, California at the Flamingo Hotel. At that meeting we will discuss and receive public input on all of the Council's groundfish options and proposed groundfish specifications for 2002.

Sincerely,

LB Boydstun

LB Boydstun
Representative
Intergovernmental Affairs Office

Attachments

cc: Mr. Robert C. Hight
Department of Fish and Game

Mr. Robert Treanor
Fish and Game Commission

Mr. Rod Moore
Mr. Darby Neal
Groundfish Advisory Committee

Mr. Dave Thomas
Groundfish Management Team

Lt. George Gross
Enforcement Consultants

ATTACHMENT

Summary of Angler Estimates Comparison between MRFSS and CA Logbook data for CPFV Angler Trip Estimates

Data from 1996 through 2001 were compared by region and wave for angler effort between California's CPFV logbook data (number of anglers) and the MRFSS Angler trip estimates. Total estimates of angler effort are fundamental to the MRFSS total catch expansions. Because these MRFSS estimates are being used for inseason monitoring, allocations between commercial and recreational anglers, and future sport regulations it is essential to have a better understanding of their accuracy. Logbook data and MRFSS data were compared to see how close the estimates were for the past 6 years. In a comparison by wave, the Jan – Feb MRFSS estimates account for much of the higher annual estimates in northern and southern California, more so in No. Cal. Data from 2001 are incomplete, and considered preliminary for 2001.

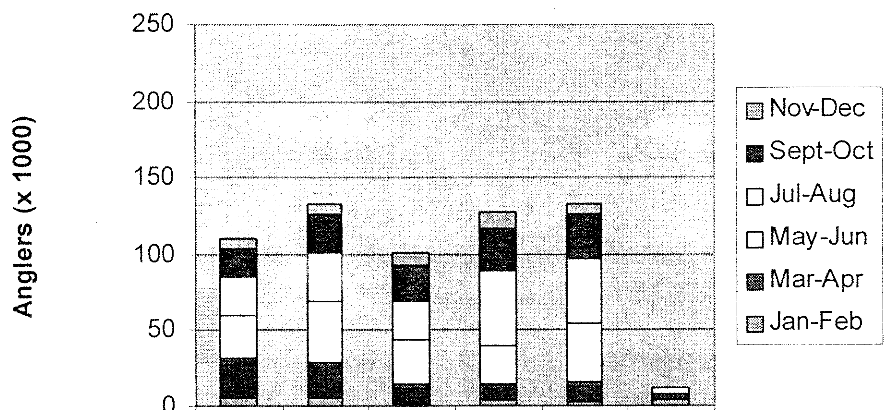
The highlights include:

- Trends were different between northern and southern California.
- MRFSS estimates were higher in both regions in all years except 1996 in northern California and 2000 in southern California when both values were very close to each other (logbook 111 vs. MRFSS 98; logbook 530 vs. MRFSS 501, no. and so. respectively).
- Northern California, Wave 1 MRFSS estimates are from 4 to 20 times higher than comparable logbook values.
- Southern California MRFSS estimates in wave one were proportionally higher from 1996 to 2000 (4 to 0.5 times higher).
- Annual Logbook values were fairly consistent from year to year in both southern and northern California. By contrast, MRFSS estimates increased each year in northern CA from 1996 to 2000, and decreased yearly from 1996 to 2000 in southern CA.

Bottom line: In northern California, with closures for shelf rockfish from March to June, we are relying on the worst possible effort estimates (expansions based on Wave 1) to make decisions on future management direction for shelf species.

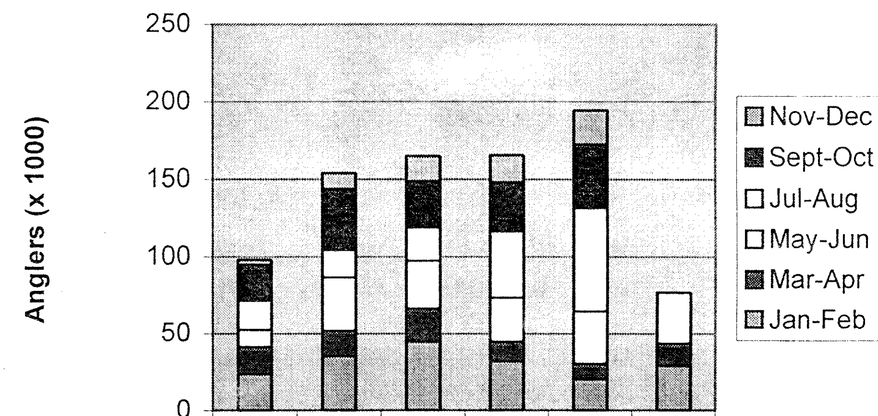
Per Wade Van Buskirk, how the angler effort data are generated:
The pooling is only done for the estimates of effort for the passenger fishing boats. The man-made fishing, beaches and banks, and private & rental boats data are not pooled. The data is gathered by making phone calls to random phone numbers within coastal counties and asking a series of questions from the person that answers the phone. From these questions they determine how many fishing trips (on passenger fishing boats) there are per "household" (called the prevalence rate) and multiply that number by the total number of households. This gives the total number of fishing trips. This number is pooled with the fishing trips from the last two years and an average is taken. They do not use the pooled data from last year in this calculation.

No. Cal Logbook CPFV Angler Estimates



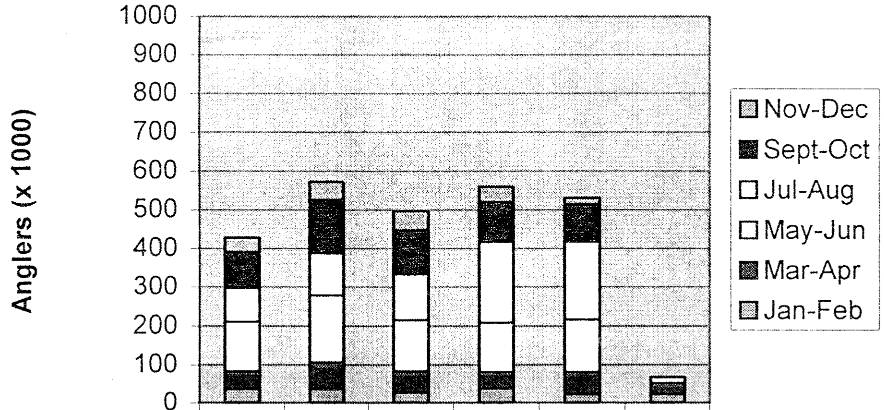
	1996	1997	1998	1999	2000	2001
Nov-Dec	8	8	8	11	6	0
Sept-Oct	18	25	23	28	29	0
Jul-Aug	25	31	25	50	42	0
May-Jun	28	40	29	24	38	4
Mar-Apr	28	24	13	11	14	5
Jan-Feb	5	5	2	5	2	4

No. Cal MRFSS CPFV Angler Estimates



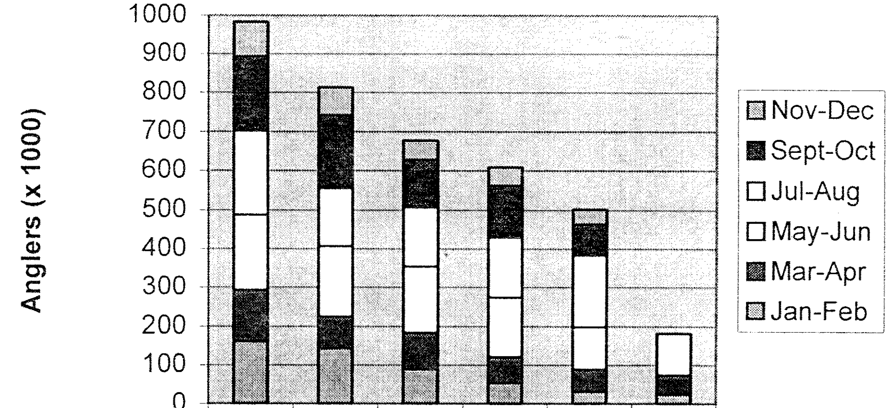
	1996	1997	1998	1999	2000	2001
Nov-Dec	3	10	16	18	22	
Sept-Oct	24	39	29	31	41	
Jul-Aug	19	18	22	43	67	
May-Jun	11	35	31	28	34	33
Mar-Apr	18	16	21	13	10	15
Jan-Feb	23	35	45	32	20	29

So. Cal Logbook CPFV Angler Estimates



	1996	1997	1998	1999	2000	2001
Nov-Dec	37	48	50	41	16	0
Sept-Oct	92	137	114	102	96	0
Jul-Aug	87	109	119	208	202	0
May-Jun	127	171	131	128	137	15
Mar-Apr.	47	71	56	44	58	29
Jan-Feb	36	36	27	37	22	22

So. Cal MRFSS CPFV Angler Estimates



	1996	1997	1998	1999	2000	2001
Nov-Dec	89	71	49	48	38	
Sept-Oct	191	186	121	131	80	
Jul-Aug	214	149	153	156	185	
May-Jun	194	181	169	153	109	107
Mar-Apr	132	81	95	68	57	50
Jan-Feb	161	144	89	53	32	25

California Recreational Rockfish and Lingcod Options for 2002

All 2001 regulations remain in effect for 2002 unless modified by proposed changes

I. Northern California (Oregon border to Cape Mendocino)

Same as Oregon

II. Central California (Cape Mendocino to Point Conception)

Rockfish and Lingcod Season Options

2a. Open: July - August, November - December

2b. Open: September - October

2c. Open: January - February, November - December

Bag limit: 10 rockfish with a 2 bocaccio, 1 canary, 1 yelloweye (2 fish per vessel), sub-limit.
2 lingcod with a 26 inch minimum length

III. Southern California (Point Conception to Mexican border)

Rockfish and Lingcod Season Options

3a. Open: July - October

3b. Open: May - August

Bag limit: 10 rockfish with a 2 bocaccio, 1 canary, 1 yelloweye (2 fish per vessel), sub-limit.
2 lingcod with a 26 inch minimum length

Nearshore Rockfish and Lingcod Inside 20 fathoms

Outside the rockfish and lingcod seasons (above), fishing may be considered inside 20 fathoms for lingcod and nearshore rockfish (including sculpin), and ocean whitefish, with a 5 -10 fish bag limit for nearshore rockfish, cabezon, greenlings and lingcod, not exceeding regular species bag limits. Also a provision for retention of 2 shelf rockfish per angler not including bocaccio, canary, cowcod, or yelloweye rockfish may be considered.

South of Pt. Conception per LB Boydstun 9-14-01 1:40pm

Cowcod Conservation Areas (CCA's): Same as 2001 except that nearshore rockfish and lingcod closed when nearshore rockfish and lingcod is closed outside CCA's. Special nearshore rockfish and lingcod regulations are in effect when nearshore rockfish and lingcod is open in adjacent waters.

GMT STATEMENT ON PROPOSED GROUNDFISH MANAGEMENT REGIME FOR 2002

The GMT developed a year-round landings limit option for the three sectors of the groundfish fishery (limited entry trawl, limited entry fixed gear, and open access). This option provides higher trawl limits for some flatfish in the winter months, when bycatch of overfished species is expected to be lower. Lingcod retention would again be prohibited during the winter spawning season. Throughout the year, limits are crafted to set retention of overfished species at incidental catch levels only. For the limited entry fixed gear and open access fisheries, shelf fishing opportunities were limited to reduce interception opportunities for yelloweye rockfish, canary rockfish, and bocaccio. Yelloweye rockfish is primarily caught with hook and line gear. The majority of the GMT encourages the states to mandate the use of groundfish excluder devices in trawl fisheries for prawn and shrimp.

On Thursday, September 13, the Council asked that the GMT and the GAP consider management alternatives to a year-round fishery. The GMT notes that it has developed such options on numerous past occasions, yet these options have not reflected industry interest. One particular difficulty with management schemes of this nature is that different fishing schemes are appropriate for different geographic areas. Where the GMT received industry input on a shortened season, in the open access fishery for nearshore rockfish, the team included that industry suggestion in the trip limit tables. Where availability of mid-water trawl species was not sufficient to sustain a year-round fishery, the team has developed mid-water options for shortened seasons.

The GMT welcomes suggestions from the Council and the fishing industry on how to structure management options for shortened fishing seasons. Although such seasons would necessarily be more complex in order to meet the needs of the different fisheries in the different sections of the coast, the major benefit of shortened seasons would be the larger trip limits that would accompany those seasons. As a start, the GMT suggests that analysis of when and where groundfish vessels are participating in fisheries for non-groundfish fisheries could show windows of time when groundfish landings are most needed to fill out the fishing and processing year.

The GMT is relying on the States to provide sufficiently conservative recreational fishery management recommendations in consultation with the Council. The GMT notes that in 2001, as in the past, the commercial fisheries bore the brunt of inseason adjustments to meet conservation needs for overfished species since the Council does not have similar inseason control over recreational fisheries.

Proposed trip limits for **Limited-Entry Trawl** for 2002

ies/groups	Landed catch	JAN-FEB	MAR-APR	MAY-JUN	JLY-AUG	SEP-OCT	NOV-DEC
Minor slope rockfish							
North of Cape Mend.		1,500 lb / 2 months					
South of Cape Mend.		25,000 lb / 2 months					
Splitnose-South		25,000 lb / 2 months					
POP	244	1,500 / month		3,500 lb / month			1,500 lb / month
	294	2,000 / month		4,000 lb / month			2,000 / month
	344	2,500 / month		4,000 lb / month			2,500 / month
DTS							
Dover sole	5,244	14,000 / 2 months					
	6,090	16,000 / 2 months					
	7,068	18,000 / 2 months					
Sablefish	1,180	3,000 lb / 2 months					
	1,476	4,000 lb / 2 months					
	1,660	5,000 lb / 2 months					
Shortspine	614	1,400 lb / 2 months					
	759	1,700 lb / 2 months					
Longspine		6,000-7,000 lb / 2 months					
Arrowtooth		20,000 lb / trip		Sm. Footrope: 7,500 lb/trip, up to 30,000 lb/mo			20,000 lb / trip
Petrale sole		No restriction		Small footrope range: 30,000-60,000 lb / mo for all non-Dover flatfish species combined using small footrope, no more than 10,000-20,000 lb of which may be petrale			No restriction
Rex sole		No limit					No limit
All other flatfish		Small Footrope range: 30,000 lb/mo -to- no limit | Large footrope: 1,000 lb/trip					Small Footrope range: 30,000 lb/mo -to- no limit | Large footrope: 1,000 lb/trip
side whiting *		20,000 lb / trip		Open			20,000 lb / trip
Use of small footrope required for landing all shelf and near-shore rockfish							
Minor Shelf rockfish							
North of Cape Mend.		300 lb / month		1,000 lb / month			300 lb / month
South of Cape Mend.		500 lb / month		1,000 lb / month			500 lb / month
Canary-Coastwide		100 lb / month		300 lb / month			100 lb / month
Widow-Coastwide (mid-water only)		10,000 lb / 2 months		with >=10,000 lb whiting, 2,000 lb/mo; combined widow+yellowtail of 500 lb/trip			Evaluate remaining widow OY
Small footrope		1,000 lb / month					
Yellowtail-North (mid-water only)		20,000 lb / 2 months		with >=10,000 lb whiting, 2,000 lb/mo; combined widow+yellowtail of 500 lb/trip			Evaluate remaining widow OY
Small footrope		1,500 lb / month					
as flatfish bycatch		Up to 33% of all flatfish (excluding arrowtooth) plus 10% of weight of Arrowtooth not to exceed:					
		2,500 lbs/trip		7,500 lbs/trip			2,500 lbs/trip
				<---------- and 20,000 lb/ 2 months ---------->			
Bocaccio-South		300 lb / month		500 lb / month			300 lb / month
Chilipepper-South (mid-water only)		25,000 lb / 2 months					
Small footrope		7,500 lb / 2 months					
Cowcod		No retention					
Minor Nearshore rockfish							
North of Cape Mend.		200 lb / month					
South of Cape Mend.		200 lb / month					
Lingcod		No retention		400 lb / month			No retention

* ng limit in the Eureka area for catch inside 100 fathoms is 10,000 lb / trip throughout the year.

Proposed trip limits for **Limited-Entry Fixed-gear** for 2002

Species/groups	landed catch	JAN-FEB	MAR	APR	MAY-JUN	JLY-AUG	SEP	OCT	NOV	DEC
Minor slope rockfish North of Cape Mend.		same as trawl, but potentially higher limits during the sablefish fishery								
South of Cape Mend.		same as trawl								
Splitnose-South		same as trawl								
POP		same as trawl								
Sablefish: Daily-	196	300 lb / day, or 1 landing per week up to 1,100 lb, not to exceed 2,200 lb / 2 months								
Trip-Limit fishery *	174	300 lb / day, or 1 landing per week up to 1,000 lb, not to exceed 2,000 lb / 2 months								
options	139	300 lb / day, or 1 landing per week up to 900 lb, not to exceed 1,800 lb / 2 months								
Longspine		same as trawl								
Shortspine		same as trawl								
Dover sole		same as trawl								
Arrowtooth		same as trawl								
Petrale sole		same as trawl								
Rex sole		same as trawl								
All other flatfish		same as trawl								
Shoreside whiting		same as trawl								
Canary		No retention								
Lingcod		No retention			400 lb / month				No retention	
North of Cape Mend. Minor Shelf rockfish + widow + yellowtail		200 lb/month (No yelloweye retention)								
Minor Nearshore rockfish options		1,000 lb/month		2,000 lb/month				1,000 lb/month		
					5,500 lb/month					
		with a sublimit on species other than black or blue rockfish <= 40% of monthly total								
South of Cape Mend. Minor Shelf rockfish + widow		200 lb/month (No yelloweye retention)								
Minor Nearshore rockfish		1,600 lb/2 months								
Bocaccio-South		No retention								
Chilipepper-South		No retention								
Cowcod-South		No retention								

LBS

Option for South of Pt. Conception, during periods when the recreational fishery is open

Minor Shelf rockfish		1,000 lb/month
Bocaccio		500 lb/month
Chilipepper		2,500 lb/month

* South of Pt. Conception, sablefish DTL limit is 350 lb / day, or 1 landing per week of up to 1,050 lb.

Notes:
Nearshore and shelf fishing opportunities will be closed in the Monterey and Conception areas when the recreational fisheries are closed in those areas.

Proposed trip limits for **Open-access** (other than exempted trawl) for 2002

Species/groups	landed catch	JAN-FEB	MAR-APR	MAY-JUN	JLY-AUG	SEP-OCT	NOV	DEC
Minor slope rockfish								
North of Cape Mend.		500 lb / 2 months						
South of Cape Mend.		10,000 lb / 2 months						
Splitnose-South		200 lb / month						
POP		100 / month						
Sablefish: Daily-	322	300 lb / day, or 1 landing per week up to 1,100 lb, not to exceed 2,200 lb / 2 months						
Trip-Limit fishery *	286	300 lb / day, or 1 landing per week up to 1,000 lb, not to exceed 2,000 lb / 2 months						
options	229	300 lb / day, or 1 landing per week up to 900 lb, not to exceed 1,800 lb / 2 months						
Longspine		No retention (North of Pt. Conception) \			S. of Pt. Conception, 50 lb / day for both			
Shortspine		No retention (North of Pt. Conception) /			species combined, up to 2,000 lb / 2-months			
Arrowtooth		200 lb / month						
Dover sole		(included in "other" flatfish limit)						
Petrale sole		(included in "other" flatfish limit)						
Near-shore flatfish		(included in "other" flatfish limit)						
"Other" flatfish		300 lb / month						
Shoreside whiting		300 lb / month						
Canary		No retention						
Lingcod		No retention		300 lb / month			No retention	
North of Cape Mend. Minor Shelf rockfish + widow + yellowtail		200 lb/month (No yelloweye retention)						
Minor Nearshore rockfish options		1,000 lb/month		2,000 lb/month			1,000 lb/month	
				5,500 lb/month				
		with a sublimit on species other than black or blue rockfish <= 40% of monthly total						
LBS South of Cape Mend. Minor Shelf rockfish + widow		200 lb/month (No yelloweye retention)						
Minor Nearshore rockfish		1,600 lb/2 months						
Bocaccio-South		No retention						
Chilipepper-South		No retention						
Cowcod		No retention						

Option for South of Pt. Conception, during periods when the recreational fishery is open

Minor Shelf rockfish		1,000 lb/month
Bocaccio		500 lb/month
Chilipepper		2,500 lb/month

GMT recommended:

Exempted trawl

Spot/ridgeback prawn, California halibut, sea cucumber fisheries:

300 lb. of groundfish per trip, not to exceed the poundage of target species, or any other open-access species limit.
Spiny dogfish poundage can exceed target poundage but not the 300 lb per trip limit.

Note: Nearshore and shelf fishing opportunities will be closed in the Monterey and Conception areas when the recreational fisheries are closed in those areas.

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Temperature magnified postcapture mortality in adult sablefish after simulated trawling

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For sablefish *Anoplopoma fimbria* that had been transferred abruptly from ambient (5·7° C) to temperatures ranging from 15 to 20° C for 30 min followed by 15 min in air (19·5° C), mortality increased with temperature. Mortality occurred at lower temperatures for sablefish that were net-towed for 4 h at ambient temperature before exposure to a rapid increase in temperature. A clear relationship was apparent between serum lactate and temperature with lactate increasing as temperature increased. For treatments in which mortality did not occur, lactate decreased sharply within 24 h, suggesting recovery. It would appear that the critical postcapture temperature for sablefish that reside and are captured at 4–6° C, would be between 12 and 15° C. The results of this study suggest that fishery management strategies designed to increase postcapture survival of sablefish bycatch should include a consideration of the impact of exposure to seasonal thermoclines and seasonally elevated air temperatures.

Key words: by-catch; physiology; survival; stress.

INTRODUCTION

The ultimate fate of fish that survive capture and are returned to the sea as by-catch is largely unknown. Depending on the gear type and fishing method, the more obvious inducers of capture stress include net entrainment, mesh passage, crushing and wounding, sustained swimming until exhaustion, changes in pressure, hooking and exposure to air (Fernö, 1993; Chopin & Arimoto, 1995; Olla *et al.*, 1997). One major impediment to being able to predict accurately whether fish will survive after capture is the dearth of knowledge of how certain key environmental factors might interact to magnify the stress that is induced by the capture process. Temperature is one of several key environmental factors that could interact with fishing-induced stressors to affect survival. Temperature controls virtually all physiological functions and plays a major role in the life history of all species by exerting a critical influence on growth, metabolism, reproduction, distribution, behaviour and, ultimately, survival (Brett, 1970; Fry, 1971).

Based on the habitat in which a fish species resides, the temperatures at which it is caught and acclimated may be quite different from those that it would be subsequently subjected to during gear retrieval. A rapid increase in temperature

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can induce mortality directly or reduce indirectly the potential for survival by diminishing the capability to deal with basic ecological challenges such as food acquisition and predator avoidance (for reviews of how stress may effect behaviour, see Olla *et al.*, 1980; Schreck *et al.*, 1997). When added to the stress induced by capture, temperature could exert a potent influence on survival.

Off the north-west coast of the U.S.A., demersal fish species caught below 100 m during summer and early autumn often are exposed to rapid changes in temperature as they are brought towards the surface through the sharp thermocline that typifies the thermal regime of the fishing grounds. During this time of year in the waters off of Oregon and California, the temperature change from bottom to surface can range from 6 to 17° C (Tully, 1964; Huyer, 1977; Hunter *et al.*, 1989); during years when an El Niño is present, e.g. 1982–1983, 1997; temperature differences could be even greater (Huyer & Smith, 1985; Smith, pers. comm.). Captured fish also face the additional stress imposed by elevated deck temperatures.

While there is a plethora of information on the effects of temperature on a number of fish species (e.g. Fry, 1967; Brett, 1970; Olla *et al.*, 1985) little is known about how this factor may interact with capture stressors. Sablefish *Anoplopoma fimbria* Pallas is a highly valued species that is the subject of an intense commercial fishery off the Pacific Coast of North America. Fish may be caught by trawl, longline or trap typically at depths ranging from 155 to 1350 m (Hunter *et al.*, 1989; Macewicz & Hunter, 1994). When not targetted for capture, they are often caught as bycatch in other directed groundfish fisheries At least during summer and early autumn, there is a high probability that sablefish during capture would be subjected to sharp differences in temperature that could induce acute levels of stress.

Sablefish have a high propensity for recovery from stress induced by simulated trawling and air exposure in the absence of any thermal challenges (Olla *et al.*, 1997). Our aim in this study was to use these previous findings as a basis for examining under controlled laboratory conditions, how rapid exposure to elevated temperatures would influence recovery from the effects of simulated trawling and air exposure. The temperature changes that were imposed matched those which adult sablefish might face under natural harvest conditions. Additionally, we employed a suite of biochemical measures that could act as surrogates to estimate recovery and mortality. The measurement of stressor-induced departures from established biochemical norms in fish has been shown to be a sensitive and pertinent tool for assessing the effects of stress and predicting mortality (Schreck, 1990; Schreck *et al.*, 1997).

MATERIALS AND METHODS

Adult sablefish (40–50 cm L_F) were collected in traps offshore from Newport, Oregon and held in the laboratory for 6–12 months prior to testing. Fish were reared in circular tanks (4·5 m diameter, 1·0 m depth; 15 904 l volume) supplied with flow-through sea water (20 l min^{-1}; 4–6° C, 30–32‰ salinity, O_2 >90% saturation) and fed to satiation on whole dead squid twice a week. Fish used in experiments ranged from 52 to 70 cm L_F.

The time course of elevation of body core temperature was determined by transferring sablefish from rearing temperature (5·8 ± 0·1° C; mean ± 1 S.E.) to a tank (3·0 m diameter, 1·0 m depth; 7068 l volume) containing heated sea water (16·0 ± 0·0° C). Replicate fish ($n=8$) were immobilized in a nylon mesh (1·0 cm) bag (1·0 m long × 0·7 m wide) and temperature was sampled electronically every 5 min for 30 min by insertion of a muscle probe. The muscle probe was a stainless steel penetration thermocouple probe (1·6 mm diameter), inserted 30 mm into the central dorsal area of the fish and sampled using a standard thermocouple thermometer. The probe and thermometer were calibrated using an NIST standard thermometer.

The effects of elevated temperature and exposure to air on mortality were determined by transferring fish from rearing tanks (5·7 ± 0·2° C) to a tank with elevated sea water temperature and subjected to 15·0 ± 0·0, 17·0 ± 0·0, 18·0 ± 0·0 or 20·0 ± 0·0° C for 30 min while in a nylon mesh bag, followed by 15 min in the air (19·5 ± 0·5° C). After treatment, replicate ($n=6$) fish were placed in recovery tanks (4·5 m diameter, 1 m depth) supplied with flow-through sea water (10 l min^{-1}; 4–6° C, 30–32‰ salinity, O_2 >90% saturation) and divided in quarters by clear acrylic partitions to form four sections. One fish was placed in each section; either transferred from a rearing tank (untreated baseline) or after having been exposed to warm water and air. Mortality was noted as it occurred.

Towing stress was imposed by using a modification of a towing apparatus previously described in Olla *et al.* (1997). In brief, the apparatus had two nets suspended at the ends of two rotating arms in a tank (4·5 m diameter, 1 m depth) to simulate cod-ends of fishing trawls. The nets were cylindrical (1·2 m length, 0·7 m diameter) and constructed with 2·5 cm nylon diamond mesh. Nets were towed in lighted conditions (1·0 µmol photons m^{-2} s^{-1}) at 1·1 m s^{-1}, a speed at which sablefish could not swim. While the dimensions of the towing arm and apparatus were similar to the first version, the apparatus was strengthened and the size of the motor increased from 0·5 to 5 hp.

The combined effect of towing and temperature on mortality was determined using fish that had been towed for 4 h (4·8 ± 0·2° C), and then subjected to either 4·3 ± 0·2, 12·0 ± 0·0, 15·0 ± 0·0 or 16·0 ± 0·0° C sea water for 30 min while placed in a nylon mesh bag, followed by 15 min in the air (18·3 ± 0·3° C). Towing simulated capture at depth, while exposure to elevated sea water temperature simulated net passage through a thermocline and exposure to the air simulated time on the deck of a fishing vessel. Treated replicate ($n=8$) fish were placed in recovery tanks (4·5 m diameter, 1 m depth) supplied with flow-through sea water (10 l min^{-1}; 4–6° C, 30–32‰ salinity, O_2 >90% saturation) and divided in quarters by clear acrylic partitions to form four sections. One fish was placed in each section; either that had been towed, held at 4·3° C and in the air (towed cold control), or that had been towed, held at 12·0, 15·0 or 16·0° C and in the air (towed heated treatment). Mortality was noted as it occurred.

Treatments of sablefish for determining the effects of towing and temperature together were repeated and fish were killed with 400 ppm MS-222 immediately after air treatment. Blood was sampled from the caudal vein of fish into heparinized capillary tubes; the plasma was separated from other constituents by centrifugation for 3 min at 2500 *g*. Plasma was collected and frozen at − 80° C until analysis for cortisol, glucose and lactate. Cortisol concentrations were determined in 10 µl of plasma by radioimmunoassay techniques as described and originally validated by Redding *et al.* (1984) and validated for sablefish by Olla *et al.* (1997). Glucose was determined using standard colorimetric methods (Wedemeyer & Yasutake, 1977). Lactate was determined using standard colorimetric methods (Passonneau, 1974).

Confidence intervals (95% CI) for per cent mortality were estimated using the method of Conover (1980). Standard one-way analysis of variance (ANOVA) procedures using Statistix analytical software (Version 1.0 for Windows) were used for analysis of physiological data.

RESULTS

When sablefish that were acclimated to 5·8° C were transferred abruptly to 16·0° C, body core temperature rose to 12·8 ± 0·3° C ($n=8$; mean ± 1 S.E.) after 15 min, an increase of 121% (Fig. 1). By 30 min body core temperature had reached 15·6 ± 0·1° C.

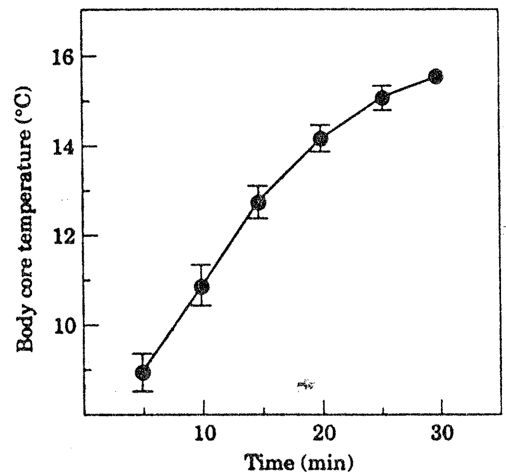

FIG. 1. Time course of body core temperature in sablefish acclimated initially to 5·8° C and transferred abruptly to 16° C. Values are mean ± 1 S.E. (n=8) and confidence intervals are included in points when not indicated.

When sablefish that were acclimated to 5·7° C were transferred abruptly to a water temperature of 15·0° C for 30 min and then held in air for 15 min (19·5° C), all fish survived (n=6) for at least 60 days [Fig. 2(a)]. However, abrupt transfers of fish to temperatures that exceeded 15·0° C caused a concomitant rise in mortality within 48 h. A transfer from 5·7° to 17·0° C caused mortality to increase to 33% (n=6; 95% CI=3–77%); at 18° C, mortality more than doubled to 83% (n=6; 95% CI=35–100%); at 20° C mortality reached 100% (n=6). All fish that had survived after 48 h were still alive after 60 days.

Sablefish that were net towed for 4 h at 4·8° C, held for 30 min at either 4·3° or 12·0° C and then exposed to air for 15 min (18·3° C), suffered no mortality after 48 h (n=8) [Fig. 2(b)] and in fact were still alive after 60 days. But when the water temperature the fish were exposed to for 30 min between net towing and air exposure was raised to 15° C, mortality after 48 h was 38% (n=8, 95% CI=12–75%). Raising temperature to 16·0° C caused mortality to double to 75% (n=8; 95% CI=35–98%) in 48 h. All fish that survived after 48 h were alive after 60 days.

Indicative of a stress response, serum cortisol was elevated across all temperature treatments with no difference in concentrations between temperature treatments observed immediately after treatment completion [ANOVA P>0·05; Fig. 3(a)]. After 24 h, cortisol for treatments in which no mortality was observed, i.e. 4·3 and 12° C, increased by 44% [ANOVA P<0·05; Fig. 3(a)]. Cortisol for untreated fish decreased by 79% [ANOVA P<0·05; Fig. 3(a)].

Serum glucose was also elevated across treatments with concentrations significantly higher for the treatment with the highest temperature (16° C) and greatest mortality (75%) [ANOVA P<0·05; Fig. 3(b)]. After 24 h, glucose concentrations for the two treatments in which all fish survived, did not change significantly from what they had been immediately after treatment completion [ANOVA P>0·05; Fig. 3(b)].

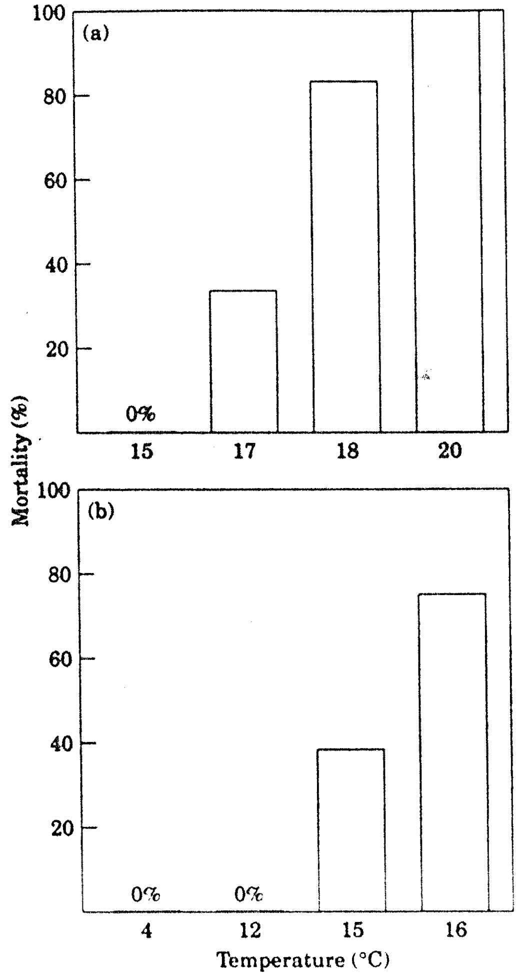

FIG. 2. Mortality (%) in sablefish 48 h after treatment with: (a) acclimation at 5·7° C then abrupt transfer to 15°, 17°, 18°, 20° C for 30 min, followed by 15 min in air (n=6) or, (b) acclimation at 4·8° C, towed 4 h, abrupt transfer to 4°, 12°, 15°, 16° C, followed by 15 min in air (n=8).

A clear relationship was apparent between serum lactate and temperature treatment with lactate increasing as temperature increased [ANOVA P<0·05; Fig. 3(c)]. After 24 h, lactate in the two treatments in which no mortality was observed decreased sharply [ANOVA P<0·05; Fig. 3(c)], and did not differ from untreated values [ANOVA P>0·05; Fig. 3(c)].

DISCUSSION

Exposing sablefish to an abrupt change in temperature exacerbated the effects of net towing and air exposure as manifested in increased mortality. The extent of the influence that temperature had on mortality depended on the magnitude of the change. An abrupt rise of 8° C or less resulted in no mortalities, while a

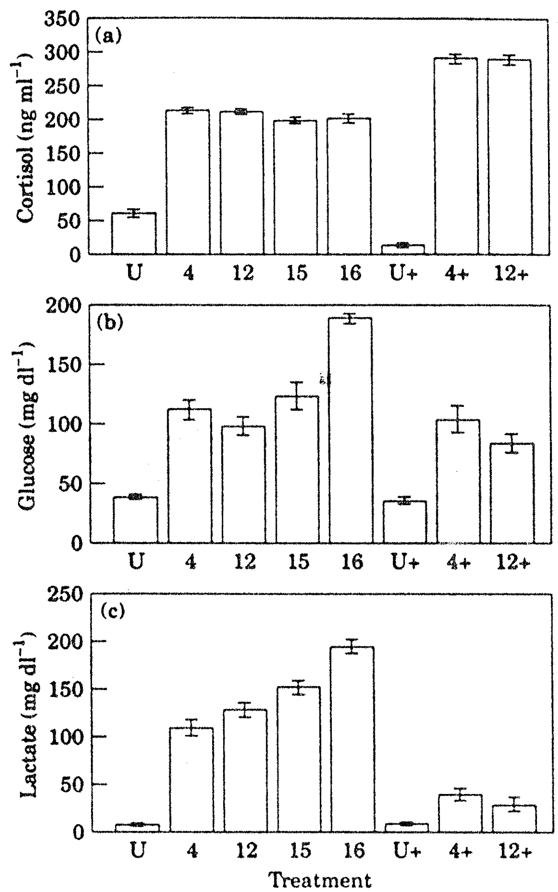

FIG. 3. Plasma concentrations in sablefish for: (a) cortisol (ng ml^{-1}); (b) glucose (mg dl^{-1}) and; (c) lactate (mg dl^{-1}). Fish treatments were: (U) untreated fish acclimated at 4·8° C ($n=6$); (4°, 12°, 15°, 16° C) fish treated as described in Fig. 2(b) ($n=9, 9, 6, 6$); (U+) untreated fish at 24 h (4·8° C; $n=6$); (4+, 12+) fish 24 h after treatment ($n=6, 9$). Values are mean ± 1 S.E.

change of 10–11° C caused mortalities of 38–75%. Even in the absence of any other stressors, an abrupt rise in temperature could induce mortality but the magnitude of change required to do so was several degrees higher.

It would appear from our results that the critical postcapture temperature for sablefish that reside and are trawl-caught at temperatures of 4–6° C, would be between 12 and 15° C. At 12° C no mortality occurred with all fish still surviving after 60 days; at 15° C, mortality was 38% after 48 h. With or without multiple stressors, the specific temperature or magnitude of change that a fish can tolerate depends in part on the acclimation temperature (Fry, 1971). In the present study, our aim was not to determine the upper incipient lethal temperature for the species but rather to apply acclimation and towing temperatures that were ecologically relevant for adult sablefish that reside off the north-west coast of the U.S.A. Further, the abrupt rise in temperature that fish were subjected to in this study was intended to simulate the postcapture temperature changes that

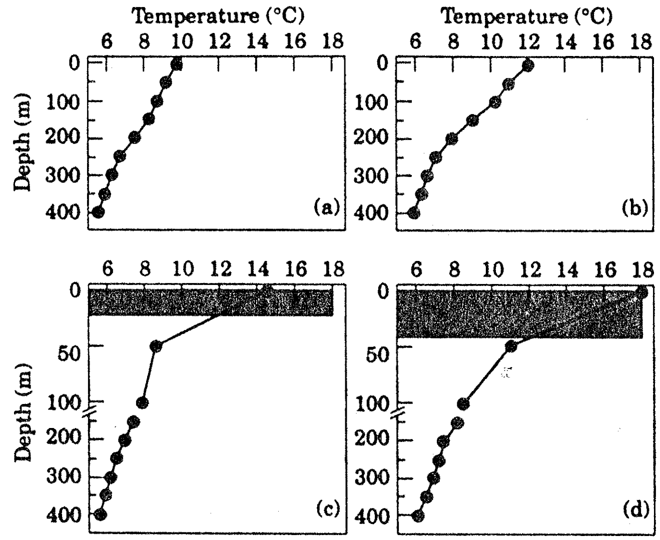

FIG. 4. Temperature increases with decreasing depth 70 km off the coast of Oregon, U.S.A. (adapted from Huyer & Smith, 1985). Profiles are for (a) average values for April, (b) values for April during El Niño year 1983, (c) values for July, (d) values for July during El Niño year 1983. Shaded regions in (c) and (d) indicate depths at which temperature was 12° C or greater, temperature at which sablefish that had been towed were thermally stressed.

sablefish might encounter as they are brought to the surface through the sharp thermocline that typifies the thermal regime in this region during summer and early autumn.

The seasonal variation in thermocline structure off the north-west coast of the U.S.A. is characterized by greater mixing during the winter and spring and the development of warmer temperatures and greater thermal stratification during the summer and autumn months (Huyer, 1977). This pattern holds true for average years and for years when the coastal ocean exhibits anomalous warming associated with El Niño ocean circulation patterns (Huyer & Smith, 1985; Rienecker & Mooers, 1986). For example, 70 km off the coast of Oregon, the warming of surface waters during the summer and fall results in a range of depths in which sablefish will be exposed to temperatures >12° C (Fig. 4), a temperature above which this study has determined that thermal stress effects are manifested. During average years, the critical depth is at ~25 m, while during El Niño years the depth may be ~45 m (Fig. 4).

It is obvious that the multiple stressors that are imposed on fish during actual fishing operations cannot be duplicated in the laboratory. Nonetheless, our results on the effects of temperature indicate clearly that temperature plays a major role in postcapture survival. In the absence of any other stressors, precise thermal limits were established for adult sablefish at the acclimation temperatures that were employed in the study. It was also clear that thermal limits would decrease as other stressors are added.

A clear pattern of increasing serum lactate was obtained when temperature stress was added to towing and air exposure. Held at 4 and 12° C for 30 min, lactate concentrations rose to 100–150 mg dl^{-1}, but then returned to prestress

(<50 mg dl^{-1}) concentrations within 24 h with all fish surviving for more than 60 days. At 15 and 16° C, lactate increased to 150–200 mg dl^{-1} with mortalities ranging from 38 to 75%. No relationship was apparent between elevations in serum cortisol or glucose and mortality. These results suggest that serum lactate may serve as a surrogate for mortality. If further work confirms this, then the potential exists for being able to predict mortality from fish sampled at sea during actual fishing operations by relating circulating lactate from these fish to laboratory-derived standard curves regressing this variable against mortality.

When sablefish were transferred abruptly from 5·8 to 16° C it took ~30 min for body core temperature to reach levels near ambient. At 15 min after transfer, body core temperature was still ~3° C below ambient. This observation points up the importance of establishing the time course of temperature effects based on body core temperature (Spigarelli *et al.*, 1977), especially when attempting to develop strategies mitigating postcapture survival of non-targeted bycatch species. Presuming that adult sablefish in this study were returned to the sea in 15 min, body core temperature and hence the physiological effects of elevated temperature would have been at temperatures that were 3° C lower than they would have been at 30 min. Such a small temperature differential would be much less likely to induce mortality. Body core temperature would vary according to actual temperature, exposure time and size of the fish (Spigarelli *et al.*, 1977). Such determinations would be required for each species of interest and would be critical in defining the effect of at least one major stressor associated with fishing.

Fish towed for 4 h at 4 or 12° C and then held in air for 15 min experienced no mortality. This agreed with what we had observed in an earlier study with the towing and acclimation temperatures being 10–13° C (Olla *et al.*, 1997). These temperatures are within the range of non-lethal temperatures that were established in the present work.

In summary, elevated temperatures produced marked increases in serum lactate and mortality in adult sablefish, with or without the additional stress of towing. These effects indicate that temperature stress can be a significant factor in determining the effects of fishing practices on bycatch survival. Effects of elevated temperature in combination with stress associated with capture have not been considered directly before. Seasonal factors such as temperature should be included in calculations of mortality associated with fishing practices. Fishing effort could be adjusted to minimize the impact of exposure to seasonal thermoclines and high air temperatures that are neglected at present in management plans for bycatch survival. By making possible the direct measurement of effects of specific fishing practices *in situ*, the development of behavioural and biochemical assays for the effects of temperature and capture on stress in bycatch will be an important part of the effort to increase survival of bycatch.

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REGULAR PAPERS

Stress induced by hooking, net towing, elevated sea water temperature and air in sablefish: lack of concordance between mortality and physiological measures of stress

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In a series of laboratory studies designed to simulate bycatch processes, sablefish *Anoplopoma fimbria* were either hooked for up to 24 h or towed in a net for 4 h and then subjected to an abrupt transfer to elevated sea water temperature and air. Mortality did not result from hooking or net towing followed by exposure to air, but increased for both capture methods as fish were exposed to elevated temperatures, reflecting the magnifying effect of elevated temperature on mortality. Hooking and exposure to air resulted in increased plasma cortisol and lactate concentrations, while the combination of hooking and exposure to elevated temperature and air resulted in increased lactate and potassium concentrations. In fish that were towed in a net and exposed to air, cortisol, lactate, potassium and sodium concentrations increased, but when subjected to elevated temperature and air, no further increases occurred above the concentrations induced by net towing and air, suggesting a possible maximum of the physiological stress response. The results suggest that caution should be exercised when using physiological measures to quantify stress induced by capture and exposure to elevated temperature and air, that ultimately result in mortality, since the connections between physiological stress and mortality in bycatch processes remain to be fully understood.

Key words: bycatch; capture; physiology; temperature.

INTRODUCTION

The capture and return of non-targeted fish to the sea as bycatch produces a largely unknown source of mortality to the world fisheries. Determination of this mortality continues to be a difficult problem for the management of fisheries, with few direct methods available. Studies of marine fish have demonstrated the role of gear type, fishing method and species type in the induction of stress and mortality (Muoneke & Childress, 1994; Chopin & Arimoto, 1995; Murphy *et al.*, 1995; Olla *et al.*, 1997). The role of key environmental factors, e.g. elevated temperature, in magnifying stress resulting from capture has also been suggested for freshwater fish (Plumb *et al.*, 1988; Barton & Iwama, 1991; Muoneke &

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Childress, 1994; Schisler & Bergersen, 1996) and marine fish (Barton & Iwama, 1991; Muoneke & Childress, 1994; Ross & Hokenson, 1997; Olla *et al.*, 1998). Temperature can be one of the major controlling factors in the life history of fishes, exerting a critical influence on all aspects including survival (Brett, 1970; Fry, 1971). While the effects of temperature on fish behaviour, growth and survival have been investigated widely, the interaction of elevated temperature and capture processes in the induction of stress and mortality in marine fishes has not been investigated in detail and has been ignored generally in the management of economically important species of fish.

Sablefish *Anoplopoma fimbria* Pallas is a highly valued species that is subjected to an intense commercial fishery off the Pacific Coast of North America. When not targeted for capture, non-reproductive and reproductive sablefish are often part of the bycatch of other directed groundfish fisheries, using trawl or longlining methods (Rickey & Lai, 1990; Sampson *et al.*, 1997). In warmer months of the year, there is a high probability that during gear retrieval, sablefish would be subjected to abrupt elevation in temperature that may induce acute levels of stress and ultimately, mortality beyond that associated with capture processes alone (Olla *et al.*, 1998).

Prediction of fitness and survival in fish subject to bycatch processes is dependent on measures of mortality that results from induced stress. Mortality can be the direct result of physiological stress (Olla *et al.*, 1995, 1997, 1998) or can occur indirectly as a result of inhibition of critical behaviours, e.g. feeding and predator evasion (Olla *et al.*, 1995, 1997; Schreck *et al.*, 1997). While behavioural and survival measures have been used at sea, their application is problematic and subject to great variation and lack of control, not the least of which is the imposition of stress in excess of that associated with the capture process (Van Beek *et al.*, 1990; Berghahn *et al.*, 1992; Soldal *et al.*, 1993; Wassenberg & Hill, 1993).

Physiological measures are a promising technique for measuring stress at sea (Morgan & Iwama, 1997), and may be a useful proxy for potential mortality (Schreck *et al.*, 1997). The ability for physiological measures of stress to be predictive of fitness and survival beyond direct mortality depends upon how closely they are linked with more ecologically meaningful measures, e.g. orientation, feeding, predator avoidance and mortality. In many cases, there is clear linkage between physiological and behavioural or mortality measures of stress in fish (Schreck *et al.*, 1997; Olla *et al.*, 1998), while in others there is not a clear linkage (Olla *et al.*, 1992).

The aim in this study was to examine in the laboratory, the relative degree to which stress and eventual mortality was induced in non-reproductive sablefish by capture with hooking or net towing followed by exposure to air, and to document the importance of exposure to elevated temperature following capture in magnifying physiological changes and mortality resulting from capture stressors. An important aspect of this research was to characterize the possible correspondence between mortality and physiological measures of bycatch-induced stress. Changes in concentration of plasma chemicals were used to measure departures from normality and may also act as surrogates to estimate recovery and potential mortality in both laboratory and field settings.

MATERIALS AND METHODS

Juvenile sablefish (20–40 mm L_F) were captured in the spring from the neuston offshore from Newport, Oregon and reared in the laboratory for up to 3 years prior to experimentation. For the first year of rearing, fish were held in circular tanks (2·0 m diameter, 0·8 m depth; 3140 l volume) supplied with sea water (10 l min^{-1}, 10–13° C, 30–32‰ salinity, O_2>90% saturation) and fed to satiation with chopped dead squid three times per week. For the remaining time, fish were reared in circular tanks (4·5 m diameter, 1·0 m depth; 15 904 l volume) supplied with flow-through sea water (20 l min^{-1}, 4·0–5·5° C, 30–32‰ salinity, O_2>90% saturation) and fed to satiation on whole dead squid twice per week.

The effects of exposure to elevated sea water temperature and air on mortality were determined in non-reproductive 2+ year old sablefish (46–54 cm L_F). Fish were transferred by dip net from rearing tanks (4·7 ± 0·2° C, mean ± S.D.) to a tank (3·0 m diameter, 1·0 m depth) with elevated sea water temperature and subjected to 4·0, 12·0, 14·0 or 16·0° C for 30 min while in a nylon mesh (1·0 cm) bag (1·0 m long × 0·7 m wide), followed by 15 min in the air (15·3 ± 0·6° C). After treatment, fish were placed in recovery tanks (2·0 m diameter, 0·8 m depth; 3140 l volume) supplied with flow-through sea water (10 l min^{-1}, 4·0–5·5° C, 30–32‰ salinity, O_2>90% saturation) and divided in half by opaque white PVC partitions to form two sections. One fish was placed in each section and mortality was noted as it occurred.

The combined effect of hooking for 4 h followed by exposure to elevated sea water temperature and air on mortality was determined in non-reproductive 2+ year old sablefish (32–48 cm L_F). Fish were transferred by dip net from a rearing tank to a circular tank (2·0 m diameter, 0·8 m depth). Fish were restrained by hand in the dip net in the water and hooked in <30 s through the upper jaw on to commercial longline gear consisting of 10 mm rope, 3 mm nylon ganglions, swivel snaps and Mustad circle hooks (13/0). Fish were held on the lines for 4 h in darkness, then they were unhooked by hand into a dip net in the water within 10 s and treated as described above for exposure to elevated temperature and air. Fish were exposed to 4·0, 12·0, 14·0, or 16·0° C for 30 min while in a nylon mesh bag, followed by 15 min in air (17·0 ± 0·3° C). Recovery was assessed as described for temperature and air treatment fish.

The combined effect of net towing for 4 h followed by exposure to elevated sea water temperature and air on mortality was determined in non-reproductive 2+ year old sablefish (45–58 cm L_F). Fish were transferred by dip net from a rearing tank into towing nets, located in a tank, previously described in Olla *et al.* (1997, 1998). In brief, the apparatus had two nets suspended at the ends of two rotating arms in a tank (4·5 m diameter, 1 m depth) to simulate cod-ends of fishing trawls. The nets were cylindrical (1·2 m length, 0·7 m diameter) and constructed with 2·5 cm nylon diamond mesh. Nets were towed for 4 h at 5·0 ± 0·2° C in lighted conditions (1·0 μmol photons m^{-2} s^{-1}) at 1·1 m s^{-1}, a speed at which sablefish could not swim. Following towing, fish were exposed to 4·0, 12·0, 14·0, or 16·0° C for 30 min while in a nylon mesh bag, followed by 15 min in air (16·3 ± 0·4° C). Recovery was assessed as described for temperature and air treatment fish.

Treatments described above were repeated and fish were killed with 400 ppm MS-222 immediately after exposure to air for 15 min. Blood was sampled from the caudal vein of fish into heparinized capillary tubes; the plasma was separated from other constituents by centrifugation for 3 min at 2500 *g*. Plasma was collected and frozen at −80° C until analysis for cortisol, lactate, glucose, potassium and sodium concentrations. Cortisol was determined in 10 μl of plasma by radioimmunoassay techniques as described and originally validated by Redding *et al.* (1984) and validated for sablefish by Olla *et al.* (1997). Lactate was determined using standard colorimetric methods (Passonneau, 1974). Glucose was determined using standard colorimetric methods (Wedemeyer & Yasutake, 1977). Potassium and sodium were measured using ion selective electrodes and a Hitachi 719 meter. Plasma was diluted 1 : 1 (v : v) with nanopure water before electrolyte measurement.

The time course (2–24 h) of elevation of cortisol, lactate, glucose, potassium and sodium concentrations caused by hooking followed by exposure to elevated sea water

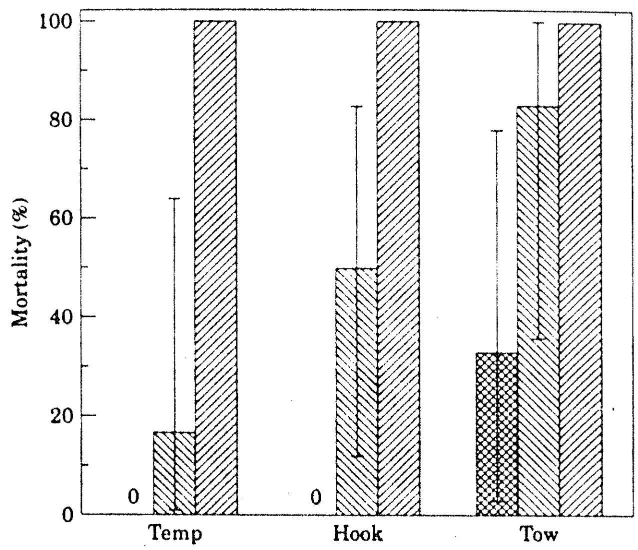

FIG. 1. *Anoplopoma fimbria*. Effect of sea water temperature (12, 14 and 16° C) on mortality (%) in fish: exposed to elevated temperature and air exposure (Temp); exposed to hooking for 4 h followed by elevated temperature and air exposure (Hook); exposed to towing for 4 h followed by elevated temperature and air exposure (Tow). Mortality at 12° C for Temp and Hook treatments was 0%. Bars show confidence intervals (95% CI) for per cent mortality (Conover, 1980). ▩, 12° C; ▧, 14° C; ▨, 16° C.

temperature and air was determined in non-reproductive 2+ year old sablefish (32–48 cm L_F). Experimental treatments were administered as described above for hooked fish, with fish remaining on hooks for 2, 4, 6, 8, 12 and 24 h before exposure to sea water temperature (4·0, 12·0, 14·0 and 16·0° C) and air (17·1 ± 0·3° C); followed by killing for plasma sampling.

The time course of elevation of body core temperature was determined by transferring sablefish from rearing temperature (4·0–5·5° C) to a circular tank (3·0 m diameter, 1·0 m depth; 7068 l volume) containing heated sea water (16·0° C). Three ages of non-reproductive fish were used: 1+ years (41–48 cm L_F); 2+ years (46–53 cm L_F); 3+ years (57–63 cm L_F). An ultrasonic temperature transmitter (30 × 16 mm; Sonotronics) was inserted into the stomach of a fish 5 min prior to transfer to the heated sea water to insure that the transmitter reached initial body core temperature. Changes in body core temperature were monitored every 5 min for 30 min using an ultrasonic receiver (Sonotronics). At the end of a trial, the transmitter was removed from the fish and inserted into another fish.

Confidence intervals (95% CI) for percent mortality were estimated and differences in mortality associated with elevated temperature and capture method were tested using a Friedman's two-way analysis of variance (Conover, 1980). One-way and two-way analysis of variance tests using Statistix analytical software (Version 2.0 for Windows) were used for analysis of physiological data.

RESULTS

Sablefish that were transferred abruptly from 4·7 to 12° C for 30 min and then exposed to air for 15 min (15·3° C) all survived (n=6) for at least 60 days (Fig. 1). However, abrupt transfer to higher temperatures caused a concomitant rise in mortality within 48 h. At 14° C mortality was 16·7% (n=6; 95% CI=1–64%), with survivors still alive after 60 days. At 16° C, mortality was 100% ($n=6$). Increased temperature induced physiological change with peaks in cortisol, lactate, glucose and sodium concentrations occurring at 12° C, when no mortality had occurred (Figs 2 and 3; Table I). Potassium concentration continued to increase to a maximum between 14 and 16° C.

Sablefish that were hooked for 4 h at 4·7° C and then transferred abruptly to 12° C for 30 min followed by exposure to air for 15 min (17·0° C) all survived ($n=6$) for at least 60 days (Fig. 1). However, hooking and abrupt transfer of fish to 14° C resulted in 50% mortality ($n=6$; 95% CI=12–83%) with survivors still alive after 60 days. At 16° C, mortality increased to 100% ($n=6$). Hooking alone induced changes in cortisol and lactate that were higher than any concentrations observed for temperature alone (Fig. 2; Table II). Increase in temperature magnified physiological stress resulting from hooking such that at 12° C, lactate concentration was higher than for temperature alone and continued to increase to a maximum at 14° C (Figs 2 and 3; Table I). Potassium concentration continued to increase between 14 and 16° C. Cortisol, glucose and sodium concentrations reached peaks at 4° C and were not changed by elevated temperature.

Sablefish that were towed in a simulated cod end for 4 h at 5·0° C and then transferred abruptly to 4° C for 30 min followed by exposure to air for 15 min (16·3° C) all survived ($n=6$) for at least 60 days (Fig. 1). Net towing and abrupt transfers of fish to 12° C caused 33% mortality ($n=6$; 95% CI=3–78%), while exposure to 14° C caused mortality of 83% ($n=6$; 95% CI=36–100%) with survivors from both temperatures still alive after 60 days. At 16° C, mortality increased to 100% ($n=6$). All plasma chemicals measured, except for glucose, were elevated at 4° C to concentrations higher than that for hooking or temperature (Figs 2 and 3; Table II) and did not increase further when temperature was added as a factor.

Elevated temperature caused an increase in mortality as temperature was increased from 12 to 16° C for sablefish that were exposed to elevated temperature and air and to capture by hooking or towing followed by elevated temperature and air (Friedman test; $F_2=6{\cdot}00$, $P<0{\cdot}05$). Differences in mortality associated with capture method were not detected in sablefish that had been exposed to elevated temperature (12, 14 and 16° C) and air and exposed to hooking or towing, followed by elevated temperature (12, 14 and 16° C) and air (Friedman test; $F_2=3{\cdot}71$, $P>0{\cdot}15$).

The time course for the development of physiological stress in sablefish that were hooked for 2–24 h and then subjected to a range of temperatures from 4 to 16° C showed that cortisol concentrations increased with hook time up to 24 h (Figs 4 and 5; Table III). Lactate and sodium concentrations reached peaks after 2 h of hooking, then decreased through 24 h. Potassium concentrations reached a peak after 12 h, then decreased after 24 h, while glucose concentration did not vary with hook time. Regarding the effect of temperature, exposure to a range between 4 and 16° C after hook times ranging from 2 to 24 h did not cause cortisol concentration to vary with temperature (Figs 4 and 5; Table III). Lactate and potassium concentrations increased with temperature, while glucose increased up to 14° C. Sodium concentration did not vary with temperature.

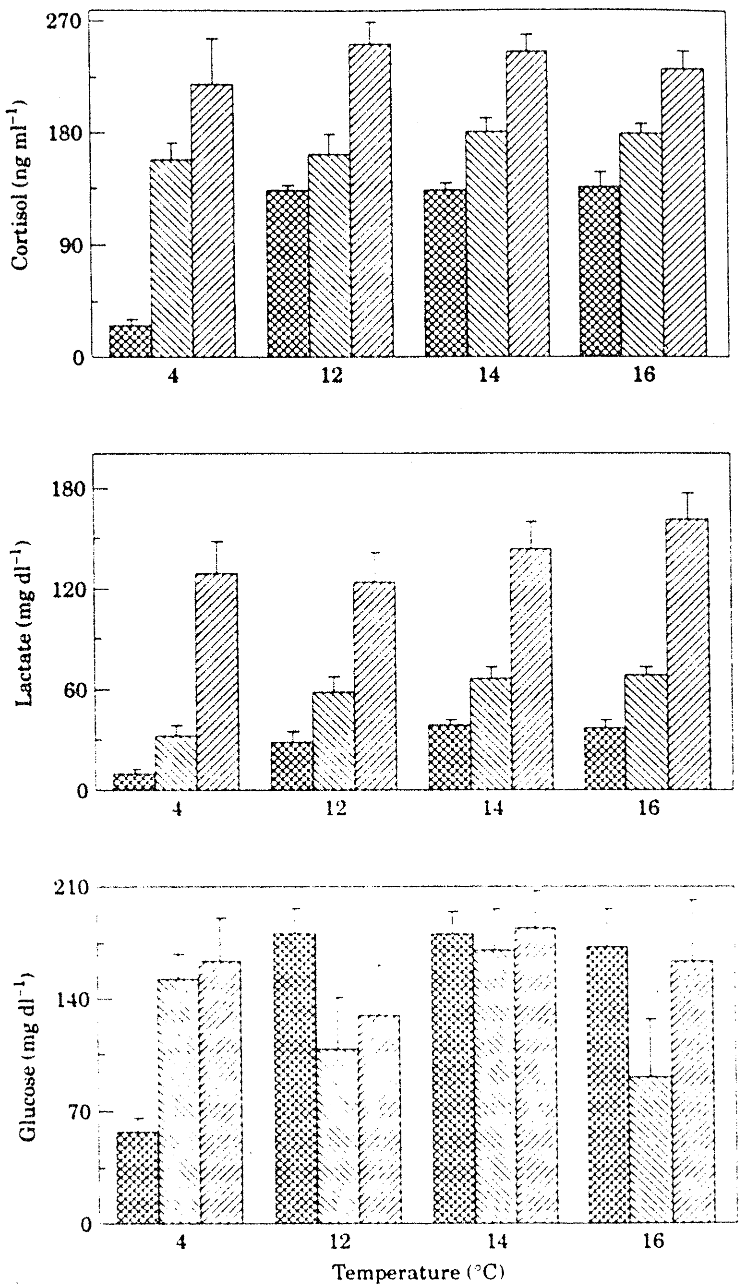

FIG. 2. *Anoplopoma fimbria.* Effect of sea water temperature (°C) and capture stressors on plasma concentrations for cortisol, lactate and potassium. Stressor treatment included: (Temp) elevated temperature and air exposure; (Hook) hooking followed by elevated temperature and air exposure; (Tow) towing followed by elevated temperature and air exposure. Bars are means + 1 S.E. ▩, Temp; ▧, Hook; ▨, Tow.

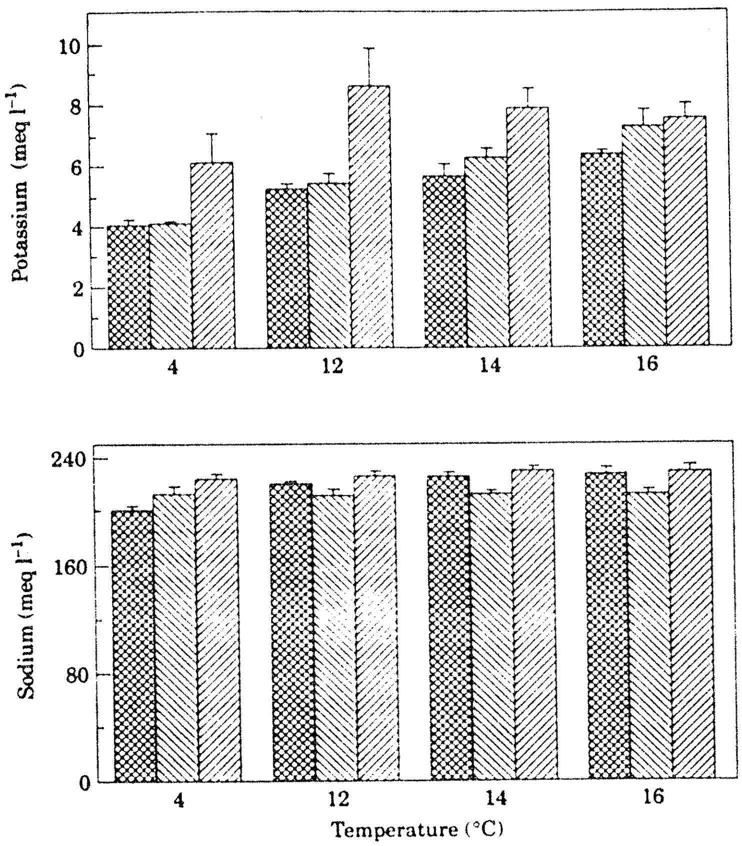

FIG. 3. *Anoplopoma fimbria*. Effect of sea water temperature (° C) and capture stressors on concentrations for glucose and sodium. Stressor treatments included: (Temp) elevated temperature and air exposure; (Hook) hooking followed by elevated temperature and air exposure; (Tow) towing followed by elevated temperature and air exposure. Bars are means + 1 S.E. ▩, Temp; ▧, Hook; ▨, Tow.

There was a clear relationship between the size of fish and the rate of change of the body core temperature when fish were transferred abruptly to elevated ambient temperature. Body core temperature change for fish that matched the size of ones used in the stress experiments (intermediate sized fish; 45 to 58 cm L_F) increased at a rate that fell between that for smaller and larger fish (Fig. 6). When intermediate sized fish that had been acclimated to 4·0° C were transferred abruptly to 16·0° C, body core temperature rose to 10·2 ± 0·9° C (n=4; mean ± S.E.) after 15 min and by 30 min had reached 14·1 ± 0·6° C. When smaller fish (41–48 cm L_F) that had been acclimated to 5·1° C were transferred abruptly to 16·0° C, body core temperature rose to 12·9 ± 0·3° C (n=5) after 15 min and by 30 min had reached 15·5 ± 0·1° C. For larger fish (57–63 cm L_F) that had been acclimated to 4·4° C and transferred abruptly to 16·0° C, body core temperature rose to 8·0 ± 0·6° C (n=6) after 15 min and by 30 min had reached 12·6 ± 0·6° C.

DISCUSSION

In sablefish, levels of physiological stress induced by capture, elevated temperature and air were not useful predictors of potential mortality, but did

TABLE I. *Anoplopoma fimbria.* Effect of increasing sea water temperature on mean concentrations of cortisol, lactate, glucose, potassium and sodium in sablefish exposed to stressor treatments (see Figs 2 and 3). Stressor treatments included: temperature and air exposure (Temp), hooking for 4 h followed by temperature and air exposure (Hook), net towing for 4 h followed by temperature and air exposure

Stressor	*F* value	*P* level	Comparison of means for temperatures			
Temp						
Cortisol (ng ml^{-1})	$F_{3,23}=56\cdot84$	0·000	4	12	14	16
Lactate (mg dl^{-1})	$=10\cdot69$	0·000	4	12	14	16
Glucose (mg dl^{-1})	$=13\cdot40$	0·000	4	12	14	16
Potassium (meq l^{-1})	$=16\cdot81$	0·000	4	12	14	16
Sodium (meq l^{-1})	$=21\cdot97$	0·000	4	12	14	16
Hook						
Lactate (mg dl^{-1})	$F_{3,23}=5\cdot15$	0·008	4	12	14	16
Potassium (meq l^{-1})	$=14\cdot61$	0·000	4	12	14	16

F values are from one-way analysis of variance (ANOVA) among temperatures. Comparison of means was made at $P<0\cdot05$ using Tukey test and similar values are underlined together. No significant ANOVAs were found for net towing stressor treatments.

TABLE II. *Anoplopoma fimbria.* Effect of stressor treatments: sea water temperature and aire exposure (Temp); hooking for 4 h followed by sea water temperature and air exposure (Hook); net towing for 4 h followed by sea water temperature and air exposure (Tow) on mean concentrations of cortisol, lactate, glucose, potassium and sodium in sablefish tested at 4, 12, 14 and 16° C (see Figs 2 and 3)

	F value	*P* level	Comparison of means for stressor treatments		
Cortisol (ng ml^{-1})	$F_{2,71}=48\cdot13$	0·000	Temp	Hook	Tow
Lactate (mg dl^{-1})	$=96\cdot90$	0·000	Temp	Hook	Tow
Glucose (mg dl^{-1})	$=1\cdot12$	N.S.	Temp	Hook	Tow
Potassium (meq dl^{-1})	$=12\cdot31$	0·000	Temp	Hook	Tow
Sodium (meq dl^{-1})	$=13\cdot68$	0·001	Temp	Hook	Tow

F values are from one-way analysis of variance (ANOVA) among stressors. Comparison of means was made at $P<0\cdot05$ using Tukey test and similar values are underlined together.

correspond to the types of stressor. Sablefish that were hooked and exposed to air did not experience mortality, although fish were stressed, as was shown by increased cortisol and lactate concentrations for hooked fish. Fish that were hooked and then exposed to 14° C and air experienced both increased physiological stress and mortality, with concentrations of lactate and potassium above that resulting from elevated temperature and air alone, reflecting the magnifying effects of elevated temperature on stress induced by hooking. However, with exposure to 16° C and air there was no apparent relationship between mortality and physiological stress, when mortality was 100% for fish that had been hooked,

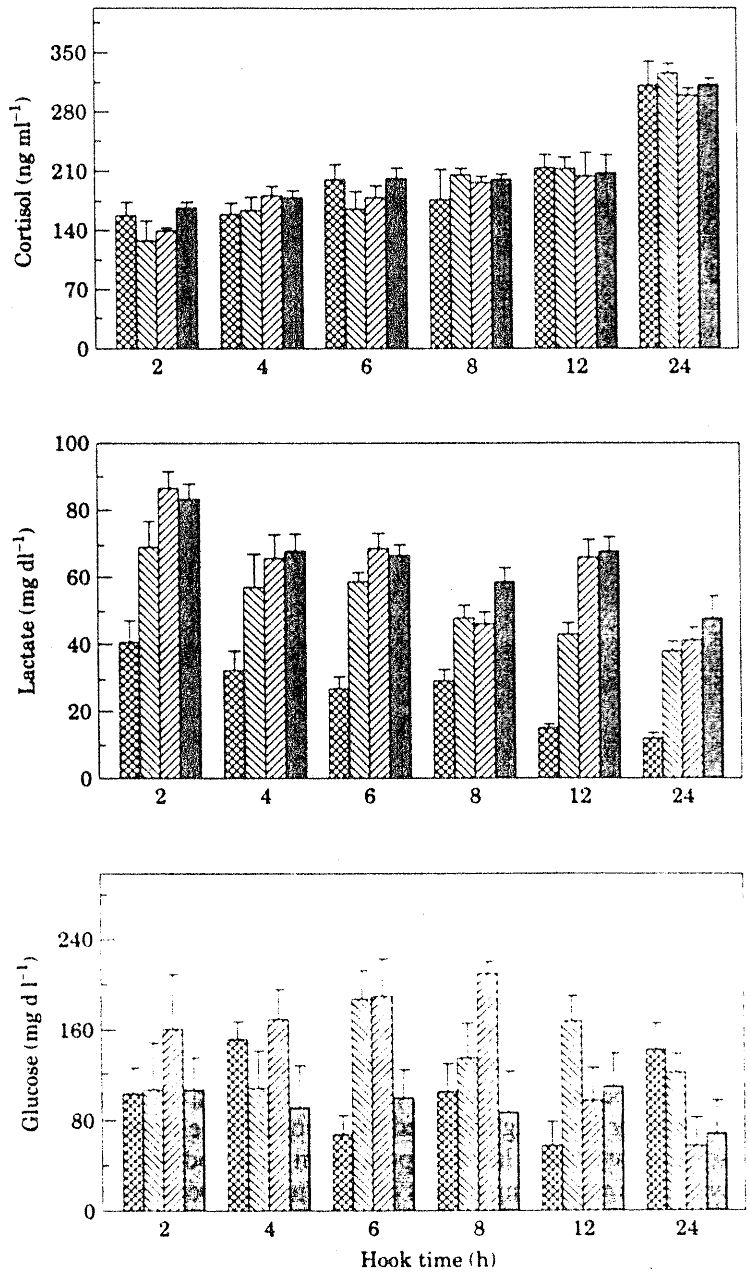

FIG. 4. *Anoplopoma fimbria*. Effect of hook times and sea water temperature on concentrations for cortisol, lactate and potassium. Hooking times were 2, 4, 6, 8, 12 and 24 h followed by exposure for 30 min to 4, 12, 14 and 16° C and 15 min air. Bars are means + 1 S.E. ▩, 4° C; ▨, 12° C; ▧, 14° C; □, 16° C.

towed, or exposed only to elevated temperature and air. It is clear that cortisol and lactate reflected the stress of capture by hooking, while lactate and potassium reflected the magnifying effects of elevated temperature. Fish exposed

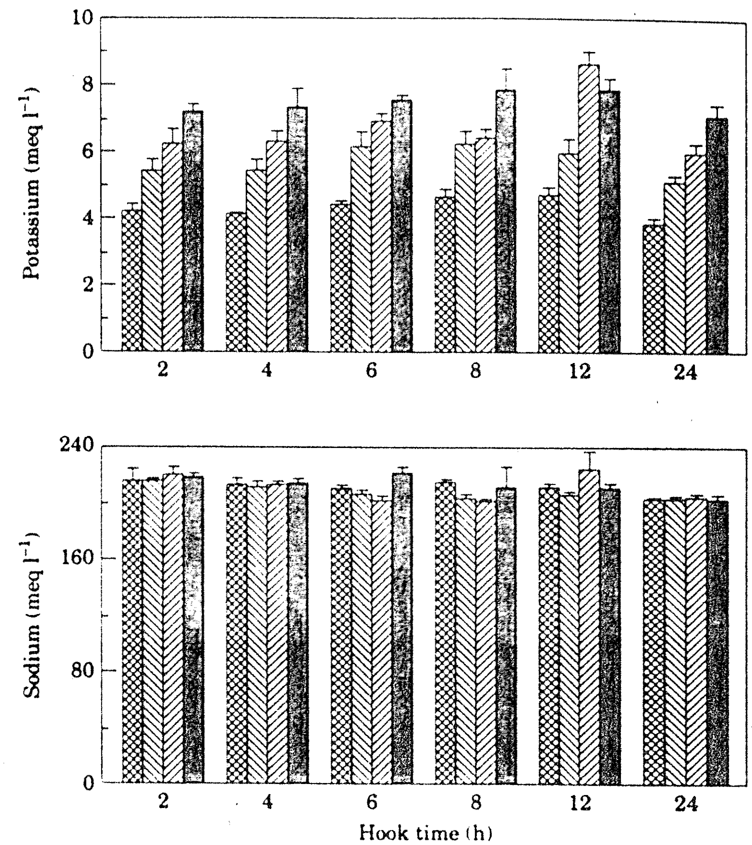

FIG. 5. *Anoplopoma fimbria*. Effect of hook times and sea water temperature on concentrations for glucose and sodium. Hooking times were 2, 4, 6, 8, 12 and 24 h followed by exposure for 30 min to 4, 12, 14 and 16° C and 15 min air. Bars are means + 1 S.E. ▩, 4° C; ▧, 12° C; ▨, 14° C; □, 16° C.

to elevated temperature and air alone showed only an increase in potassium, suggesting that the increase in lactate was associated with the effects of the combination of hooking and elevated temperature.

Physiological responses to towing, followed by elevated temperature and air were greater than for hooking followed by exposure to elevated temperature and air, with increased cortisol, lactate, potassium and sodium observed in towed fish. However, the magnifying effects of elevated temperature on stress induced by net towing were not evident in physiological measures. Apparently, plasma chemicals were increased to maximum concentrations by net towing and air, allowing no further capacity for increases that might be induced by elevated temperature. This was in contrast to what was observed in a previous study, when lactate and glucose concentrations were increased by elevated temperature after net towing (Olla *et al.*, 1998).

While the results from the present study and a previous one (Olla *et al.*, 1998) demonstrated clearly the major role that elevated temperature can play in post-capture survival in sablefish, differences were observed in the levels of mortality and physiological responses between the two studies. In the

TABLE III. *Anoplopoma fimbria*. Effect of hooking time (2, 4, 6, 8, 12 and 24 h) followed by sea water temperature exposure (4, 12, 14 and 16° C) and air exposure on mean concentrations of cortisol, lactate, glucose, potassium and sodium in sablefish (see Figs 4 and 5)

Effect	F value	P level	Comparison of means					
Time								
Cortisol (ng ml^{-1})	$F_{5,143}$=46·80	0·000	2	4	6	8	12	24
Lactate (mg dl^{-1})	=22·43	0·000	24	8	12	6	4	2
Glucose (mg dl^{-1})	=1·10	N.S.	2	4	6	8	12	24
Potassium (meq l^{-1})	=8·11	0·000	24	2	4	6	8	12
Sodium (meq l^{-1})	=3·06	0·013	24	8	6	4	12	2
Temp								
Cortisol (ng ml^{-1})	$F_{3,143}$=0·59	N.S.	4	12	14	16		
Lactate (mg dl^{-1})	=78·35	0·000	4	12	14	16		
Glucose (mg dl^{-1})	=5·04	0·003	16	4	12	14		
Potassium (meq l^{-1})	=102·32	0·000	4	12	14	16		
Sodium (meq l^{-1})	=1·27	N.S.	4	12	14	16		

F values are from two-way analysis of variance (ANOVA) among hooking time (Time) and sea water temperature (Temp). Comparison of means was made at $P<0·05$ using Tukey test and similar values are underlined together. There were no significant interactions between time and temperature.

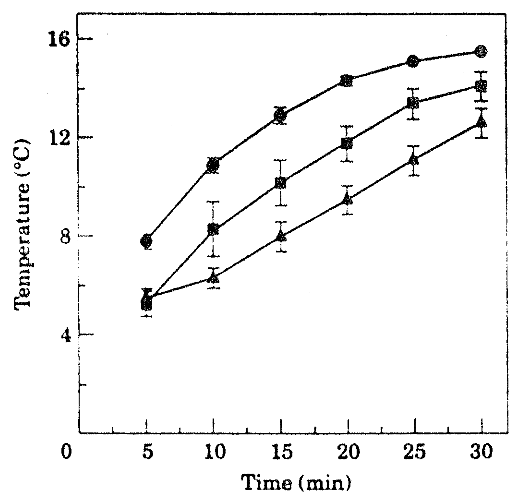

FIG. 6. *Anoplopoma fimbria*. Time course (min) for increase of body core temperature (° C) in (1 year old) 1+ years (41–48 cm L_F); (2 years old) 2+ years (46–53 cm L_F); (3 years old) 3+ years (57–63 cm L_F) fish. Values are means ± 1 S.E.; points include error bar in some cases. ●, 1 year old; ■, 2 years old; ▲, 3 years old.

earlier study, sablefish that were exposed to net towing followed by elevated temperature and air experienced mortality at higher temperatures and had peak concentrations of lactate that corresponded to increased temperature and mortality (Olla *et al.*, 1998). However, in the present study sablefish showed peak concentrations of lactate and no accompanying mortality resulting from net towing only, with no further capacity for physiological response upon exposure to elevated temperature. These differences may have been attributable to a variety of factors including previous growth conditions, thermal acclimation and stock type. While the cause for such differences could not be ascribed readily to one or more of these factors, nevertheless the principle of the magnifying effect of elevated temperature in capture-induced stress and mortality remains valid. This would be especially relevant during summer when thermal regimens off the north-west coast of the U.S.A. include thermoclines and elevated deck temperatures which fall well within the ranges applied in this study (Olla *et al.*, 1998). These results suggest that when ocean water temperature is above 12° C, fisheries which involve sablefish bycatch should be restricted in order to minimize bycatch mortality.

The use of chemical measures of physiological stress in the field to predict potential mortality in bycatch will, in part, depend on knowledge of the varieties of stressors involved and what type of stress response they may induce, as well as the effect of the duration of exposure to these stressors. For example, the time to reach peak concentrations for chemical measures of physiological stress induced in sablefish differed as a result of hooking for times ranging from 2 to 24 h, followed by exposure to elevated temperature and air. This result indicated that in addition to the effects of additive stressors, e.g. capture, elevated temperature and air, the duration of exposure to a stressor may alter the dynamics of different chemical indicators of physiological stress. Lactate and sodium reached peak concentrations after 2 h of hooking, while potassium reached peak concentration after 12 h. The response of cortisol did not appear to reach a maximum, with concentrations that increased through 24 h. Glucose concentration showed considerable variation, with no significant pattern through time. Through 24 h of hooking, the relationship between increased temperature and increased lactate and potassium concentrations was maintained, while cortisol and sodium concentrations showed no relationship with temperature and appeared to be at a maximum prior to exposure to elevated temperature.

Stress induced in fish as a result of bycatch processes can often result from the combination of several stressors, including capture, environmental factors and handling. The magnification of stress in fish caused by interactions of stressors is probably a common occurrence (Wedemeyer *et al.*, 1990; Barton & Iwama, 1991). Capture under conditions of elevated temperature has been observed to cause the magnification of physiological stress and mortality in fresh water fishes (Plumb *et al.*, 1988; Barton & Iwama, 1991; Muoneke & Childress, 1994; Schisler & Bergersen, 1996) and marine fish (Barton & Iwama, 1991; Muoneke & Childress, 1994; Ross & Hokenson, 1997; Olla *et al.*, 1998). Since commercial and sport fishing activities that produce bycatch often involve stressor interactions, priority should be given to conducting studies which contribute to more complete understanding of the interaction of capture processes and environmental factors, e.g. elevated temperature, in the induction of physiological stress and mortality of commercially important species. Because of the potential for reducing bycatch significantly during warmer seasons, the results of these studies should be applied in the management of affected fisheries.

Physiological responses to handling and capture stressors for many species of marine fish including salmonids, round fish and flat fish have included increased concentrations of plasma cortisol, glucose, lactate, potassium and sodium, with salmonids showing the greatest sensitivity to stressors (Waring *et al.*, 1996). However, in some fish species that are generally sedentary, plasma glucose and lactate concentrations have not been observed to increase in response to stressors, suggesting that there is a class of fish which do not release glucose or lactate into the blood in response to stressors (Vijayan & Moon, 1994; Waring *et al.*, 1996). Sablefish responded to capture and elevated temperature with a series of graded stress responses correlated with the intensity of stressor and, when compared to physiological stress induced in other fish species, showed similar levels of increase in plasma chemicals. Stressor conditions in this study apparently ranged from mild to extreme and induced a range of plasma chemical concentrations, including peak values beyond which increase was apparently not possible. Concentrations of cortisol and lactate increased in response to capture, while lactate and potassium increased in response to elevated temperature. Glucose generally was not altered by capture and increased slightly with elevated temperature. It would appear that sablefish may share characteristics of physiological stress with both classes of fish proposed by Vijayan & Moon (1994) and Waring *et al.* (1996). However, further research on the kinetics of glucose in blood and tissue is necessary to elucidate this point. The results of this study point to the necessity for designing and conducting multifactor experiments that would lead to a more comprehensive understanding of the conditions which induce stress and mortality in fish (Wedemeyer *et al.*, 1990; Barton & Iwama, 1991).

As would be predicted, the time course of increase in body core temperature for three size classes of sablefish showed that smaller fish reached higher core temperatures more quickly than did larger fish. Therefore, it would be expected that under equal conditions of initial body core temperature, exposure time and ambient temperature difference, smaller fish would be more vulnerable to the stress resulting from exposure to elevated temperature than larger fish which would correspond to the cumulative thermal history of the fish (Spigarelli *et al.*, 1977).

Since fish used in this study were non-reproductive, it is not known what levels of stress may be induced in reproductive sablefish that have been exposed to capture, elevated temperature and air. Reproductive sablefish can also be a component of sablefish bycatch in Pacific coast fisheries (Rickey & Lai, 1990; Sampson *et al.*, 1997). It is expected that reproductive sablefish would show similar or higher levels of stress in response to capture and exposure to elevated temperature. There are many opportunities for stressors to interrupt endocrine systems, behavioural responses and growth associated with reproductive condition (Barton & Iwama, 1991). Stress in reproductive fish could result in increased mortality, as well as impacts on reproductive fitness that would be greater than the direct mortality resulting from bycatch processes (Pankhurst & Dedual, 1994; Pankhurst & Van Der Kraak, 1997).

Chemical measures would seem to be one of the more promising ways to measure stress at sea (Morgan & Iwama, 1997). However, it is clear from the results in this study that caution should be exercised when using physiological measures to evaluate stress induced by capture and elevated temperature that ultimately results in mortality. Different plasma chemicals measured different qualities of stress which were induced by various types of bycatch processes and these measures were not correlated directly with mortality. Other mechanisms have been postulated for the cause of mortality in fish, including intracellular acidosis, which is not reflected directly in plasma physiology (Wood *et al.*, 1983). While future research investigating induction of physiological stress associated with different methods of capture and handling of bycatch may be productive, the connections between physiological stress and mortality in bycatch processes remain to be fully understood.

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Oregon Recreational Bottomfish Fishery Options for 2002

Option 1 Time and offshore closures *

Open April 1 through October 31. Rockfish will be open only within the 20 fathom curve during May and June. The period of time that June is restricted to nearshore waters depends on the necessary reduction to achieve yelloweye constraints.

Bag limit: 10 rockfish with a 1 canary and 1 yelloweye sub-limit
1 lingcod with a 24 inch minimum length

* Time closures include all bottomfish species for ocean boat anglers (i.e., rockfish, greenling, cabezon, flat fish). Angling from shore remains open. Angling from boats in inside waters remains open.

Option 2 Offshore closure

Open January 1 through December 31. Rockfish will be open only within the 20 fathom curve during May and part of August. The period of time that August is restricted to nearshore waters depends on the necessary reduction to achieve yelloweye constraints.

Bag limit: 10 rockfish with a 1 canary and 1 yelloweye sub-limit
1 lingcod with a 24 inch minimum length

JUN 2 1 2001

Exhibit C.7.d
Public Comment 1
September 2001

SUBJECT: RED ROCKCOD CLOSURE TO SPORTFISHING BOATS OUT OF MORRO BAY

Please consider lifting the ban on Red Rockcod for Sport Fishermen for the following reasons.

First, some basic facts about Rockcod. The depth at which these fish are found ranges from approximately one hundred feet to over fourteen hundred feet. Because of the physiology of the Rockcod, their bodies are unable to compensate for the rapid ascent to the surface when they are caught. This causes the internal gasses to expand, forcing the extrusion of their bladder from the mouth cavity.

Frequently on Sportfishing boats when a Rockcod is landed, before throwing it back, a crew member will cut it. The practice of cutting the bladder to ease the internal pressure, unfortunately, does not help the fish. If the bloating has not killed the fish when it reaches the surface, the cutting will most likely guarantee it its death when it is thrown back. (Predators love blood!)

The practical approach to a balanced level of Rockfish distribution (Red Rockcod, Red Snapper, Rockcod, Rockfish, Etc.) would be to allow all the Rockcod to count in the total legal limit of the Anglers' catch. This takes the pressure off those fish not included in the closure, who are currently having to make up the total limit. Catching and throwing back Red Rockcod, which will most likely not survive, makes no sense.

The closure of Red Rockcod fishing out of Morro Bay needs to be lifted. It makes good sense for both the fish and the Fishermen.

Respectfully;

Bill Perkinson
Los Osos, California

... Perkinson
2728 Nokomis CT.
Los Osos, Calif, 93402

PM
18 JUN
2001

Donald McIsaac
Pacific Fishery Management Council
2130 S.W. Fifth Avenue, Suite 224
Portland, Oregon, 97201

97201+4934

Subject:	closures of sport fishing landings
Date:	Tue, 14 Aug 2001 23:43:48 EDT
From:	<Sedwa4@aol.com>
To:	kerry.aden@noaa.gov

For the information of The Council - your efforts are paying off - in my area (Ventura County) there soon will be no landings devoted to sport fishing and servicing recreational fishermen - Ventura Harbor currently has no landings and I am told Cisco's is scheduled to close at the end of the summer while Captain Hooks plans to close permanently at the end of the year. It makes me wonder if this is your intended result and whether you feel you are doing a good job?
Steve Edwards

Exhibit C.7.d
Public Comment 2
September 2001

West Coast Seafood Processors Association

P.O. Box 1477, Portland, OR 97207
503-227-5076 / 503-227-0237 (fax)
email: seafood@attglobal.net

Serving the shore based seafood processing industry in California, Oregon and Washington

August 18, 2001

RECEIVED

AUG 21 2001

PFMC

Mr. Jim Lone
Chairman
Pacific Fishery Management Council
7700 NE Ambassador Place
Portland, Oregon 97220-1384

Dear Jim:

Several times, our Council and others have been criticized for not doing enough to address harvest levels of species that have been designated as "overfished" and for not being precautionary. Conversely, the Groundfish Advisory Subpanel (GAP) has pointed out on more than one occasion that existing management measures adopted by the Council have effectively reduced catches and that we should analyze what we have done so far before changing the management system.

At the request of one of our members, we looked at allowable harvest levels and landed catches for major species of groundfish from 1996 to 2000. The attached table and accompanying graphs show the results. Over all, for the major species of concern, the Council has reduced allowable catch by 37% and landed catch by 50%. For individual species, the Council has reduced landed catch by as much as 95.8%. For most species in most years, landed catch has been well below the allowable catch level. Since allowable catch levels are established using conservative principles (such as the Council's "40-10" policy), we believe this helps demonstrate that the Council is already taking a cautious approach and that it is succeeding.

As the Council prepares to discuss 2002 management measures, we hope that this information is both illuminating and helpful.

Sincerely,

Rod Moore
Executive Director

West Coast Seafood Processors Association
P.O. Box 1477
Portland, OR 97207

The attached report tracks the allowable harvest and actual commercial landings of major species of Pacific groundfish between 1996 and 2000.

1996 was chosen as a starting point for several reasons:

- it was the first year that two-month cumulative limits were established for most species;
- it was the last year before significant fisheries policy changes were made by Congress;
- it was the first year of large tribal groundfish allocations.

Data used were obtained from the Stock Assessment and Fishery Evaluation reports produced annually by the Pacific Fishery Management Council and the Pacific States Marine Fisheries Commission PacFIN database. While we have tried to be consistent in use of data, the frequent changes in management direction made it difficult. For example, in 1996 and 1997, Allowable Biological Catch (ABC) figures were generally used; from 1998 to 2000, total catch harvest guidelines (later optimum yields or "OY") were used. For simplicity, all of these figures are noted as "OY" in the report.

In general, the OY figure shows total allowable catch (recreational and commercial combined) prior to subtracting assumed discard amounts. Tribal allocations have been removed.

The final page lists major management milestones that occurred in the years covered. We have included only those that have a significant influence (in our judgement) on how allowable catch has been determined and on how the fishery operates.

The report does not track calculated stock abundance, nor should OY figures be assumed to track trends in abundance. In two cases (sablefish and yellowtail), back-to-back stock assessments resulted in significant decreases in OY followed by increases the next year. Since this is a near impossibility given the life histories of the species involved, the OY figures obviously do not give a snapshot of actual stock abundance, nor even necessarily trends. The OY figures merely demonstrate the amount of fish which - for a variety of reasons - was available for harvest. Similarly, care should be taken in comparing the commercial landed catch with the OY in a given year, since the OY reflects amounts available to both commercial and recreational fishermen and does not deduct for assumed discards.

SIGNIFICANT MANAGEMENT ACTIONS

1996

- Two month cumulative trip limit periods for limited entry groundfish were established, with no more than 60% of the limit available for harvest in the first month.
- Dover sole, shortspines, and sablefish were managed as a complex, with separate sub-limits for the various species. Differential limits were established north and south of Cape Mendocino.

1997

- A new (and highly controversial) stock assessment for yellowtail rockfish substantially reduced the ABC.

1998

- New stock assessments were completed for Dover sole, sablefish, the thornyhead species, and widow rockfish, resulting in decreased ABCs for these species.
- A revised stock assessment for yellowtail rockfish raised the ABC.
- The lingcod ABC was revised downward and harvest restrictions were placed on both commercial and recreational harvests.
- Cumulative limits for deep water species (Dover sole, thornyheads and sablefish) were established coast-wide rather than being separated at Cape Mendocino.

A "platoon" system was established so that some vessels began fishing later during cumulative periods, in order to spread out landings.

1999

- The Council adopted a precautionary "40-10" policy which automatically reduced OY for species below 40% of unfished biomass.
- The Council adopted an MSY proxy of F40% for rockfish species.
- Chilipepper rockfish and splitnose rockfish had separate OYs calculated; chilipepper harvest was managed so as not to exceed 2000 mt in landings in order to avoid interaction with bocaccio rockfish.
- Cumulative limits were adjusted to allow harvest at higher levels during times that bycatch could be avoided, including a three-month cumulative period at the beginning of the year.

2000

- Rebuilding plans were put in effect for lingcod and bocaccio rockfish.
- Major rockfish species were separated from the Sebastes assemblage and the remaining species were aggregated in groups based on occurrence at depth: slope, shelf, and near-shore. Resulting cumulative limits allocated a major portion of the near-shore assemblage to the recreational fishery. New sorting requirements accompanied this change.

Fixed gear harvest of lingcod was prohibited for 6 months.

Differential fishing opportunities based on trawl footrope size were established to avoid targeting of sensitive species. This in turn led to establishment of bycatch allowances for some species that are inevitably taken along with other target species.

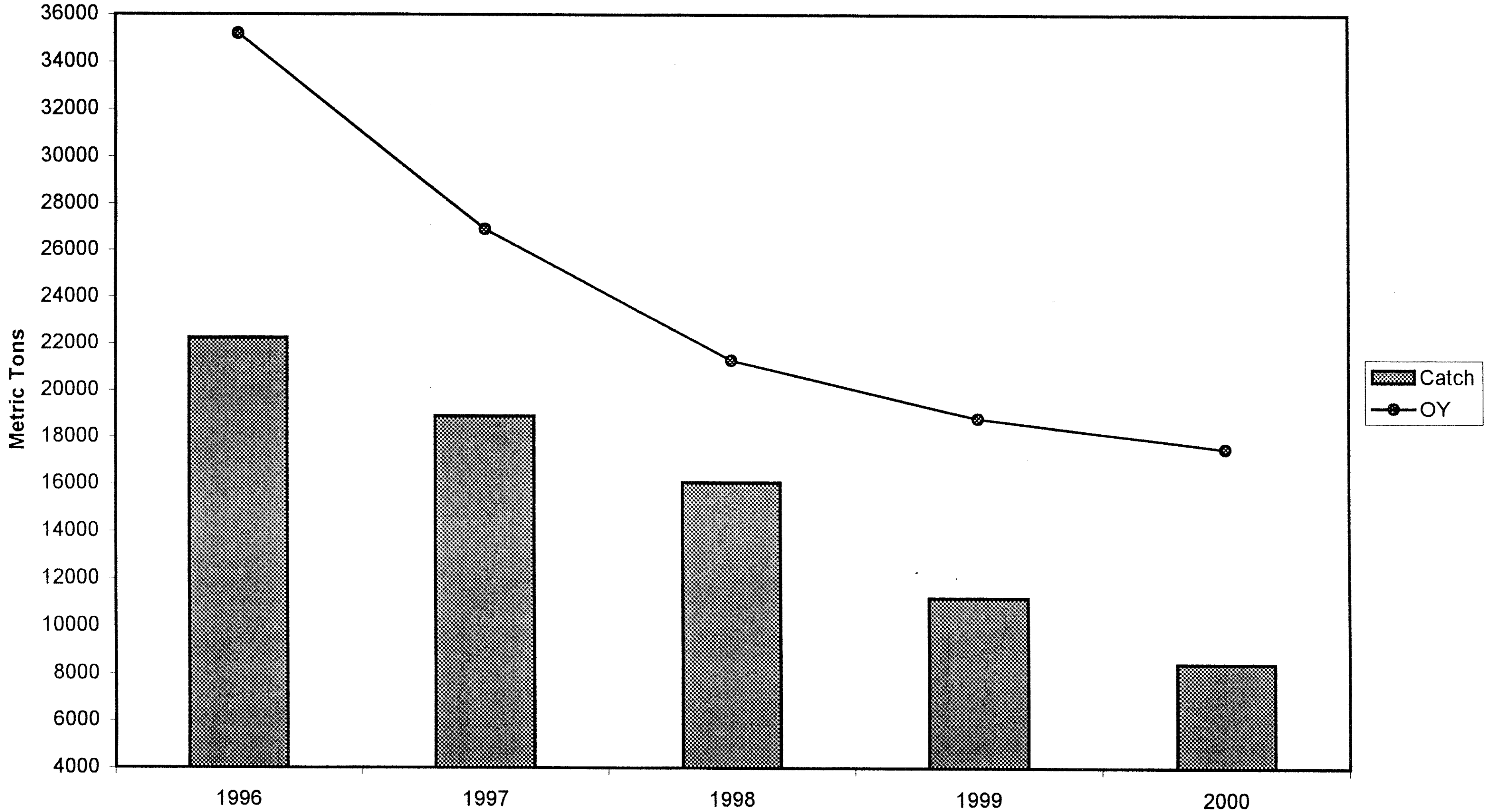
	1996		**1997**		**1998**		**1999**		**2000**		**% Reduction**
	OY	Catch	OY	Catch	OY	Catch	OY	Catch	OY	Catch	96-00 Catch
Lingcod	2400	1554	2400	1562	838	349	730	357	378	144	-90.7%
Pacific Ocean Perch	750	798	750	646	650	621	595	491	270	121	-84.8%
Widow	7700	6072	7700	6454	4960	3881	5023	3937	4333	3789	-37.6%
Misc. Rockfish [1]	11397	5942	8755	5378	6952	6165	4473	2496	6315	1204	-79.7%
Canary	1250	1140	1305	1104	1130	1182	942	646	200	56	-95.1%
Yellowtail	6740	5216	2032	2082	3347	2854	3664	2742	3694	2788	-46.5%
Bocaccio	1700	598	689	457	654	199	230	99	524	25	-95.8%
Chilipepper	4000	1737	4000	1850	3400	1436	3724	919	2043	403	-76.8%
Sablefish [2]	8345	8294	8345	7844	5105	4388	7678	6646	7678	5383	-35.1%
Dover Sole	11603	12128	11603	10094	9426	8004	9426	9136	9426	8739	-27.9%
Shortspine Thornyhead	1500	1523	1500	1427	1300	1219	1325	808	1145	682	-55.2%
Longspine Thornyhead	7000	4855	7000	3920	4102	2274	4531	1791	4531	1608	-66.9%

[1] OY 96-98 = sebastes north (+) sebastes south (-) canary, yellowtail, bocaccio & chilipepper (-) 13 tons for tribal
OY 99 = sebastes north (+) sebastes south (-) canary, yellowtail & bocaccio (-) 13 tons for tribal
OY 00 = sebastes north (+) sebastes south (+) splitnose (-) 13 tons for tribal

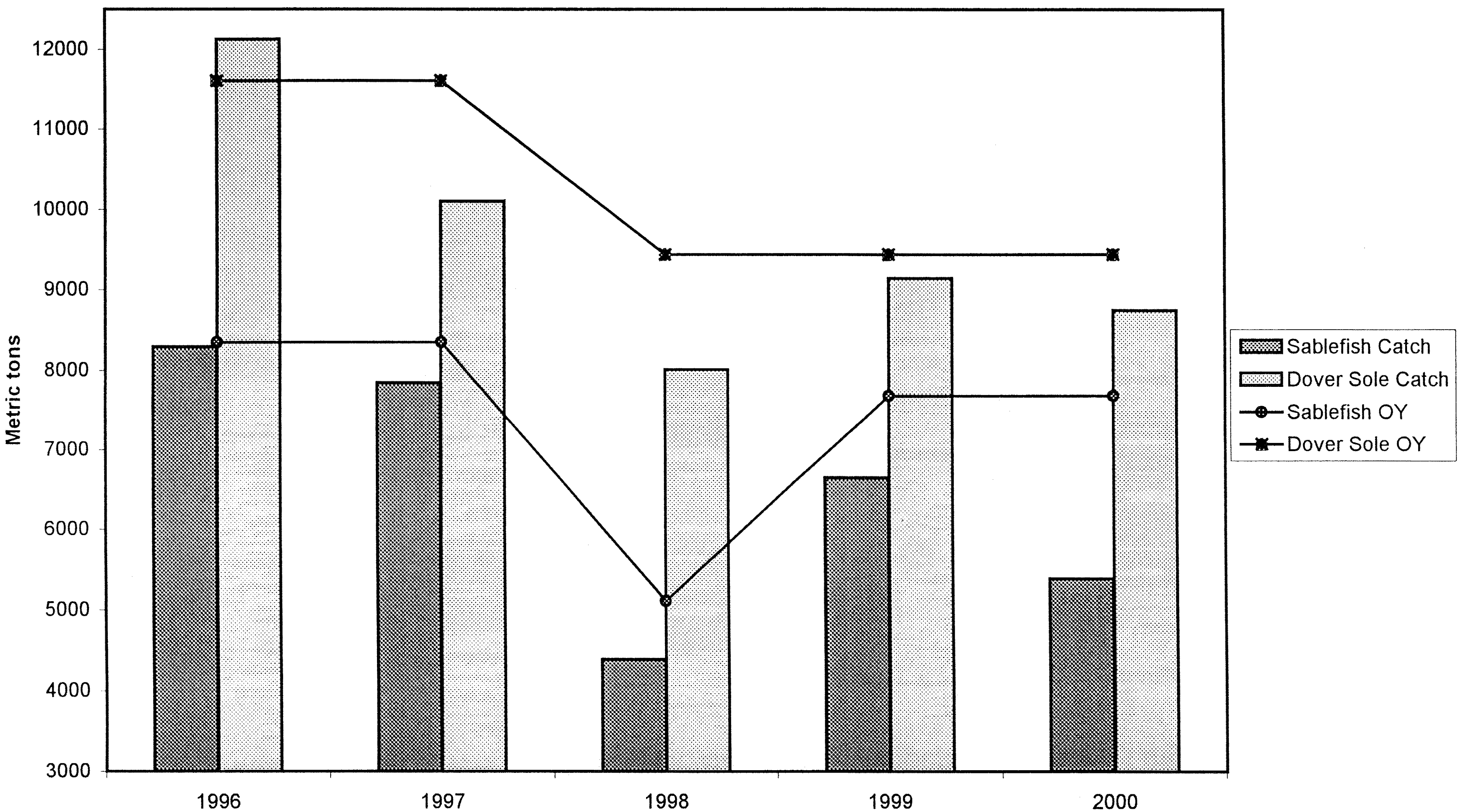
[2] OY reflects 10% reduction for tribal

DATA SOURCE: PacFIN database, Pacific Marine Fisheries Commission (catch)
Stock Assessment & Fisheries Evaluation Report, Pacific Fishery Mgmt. Council (OY)

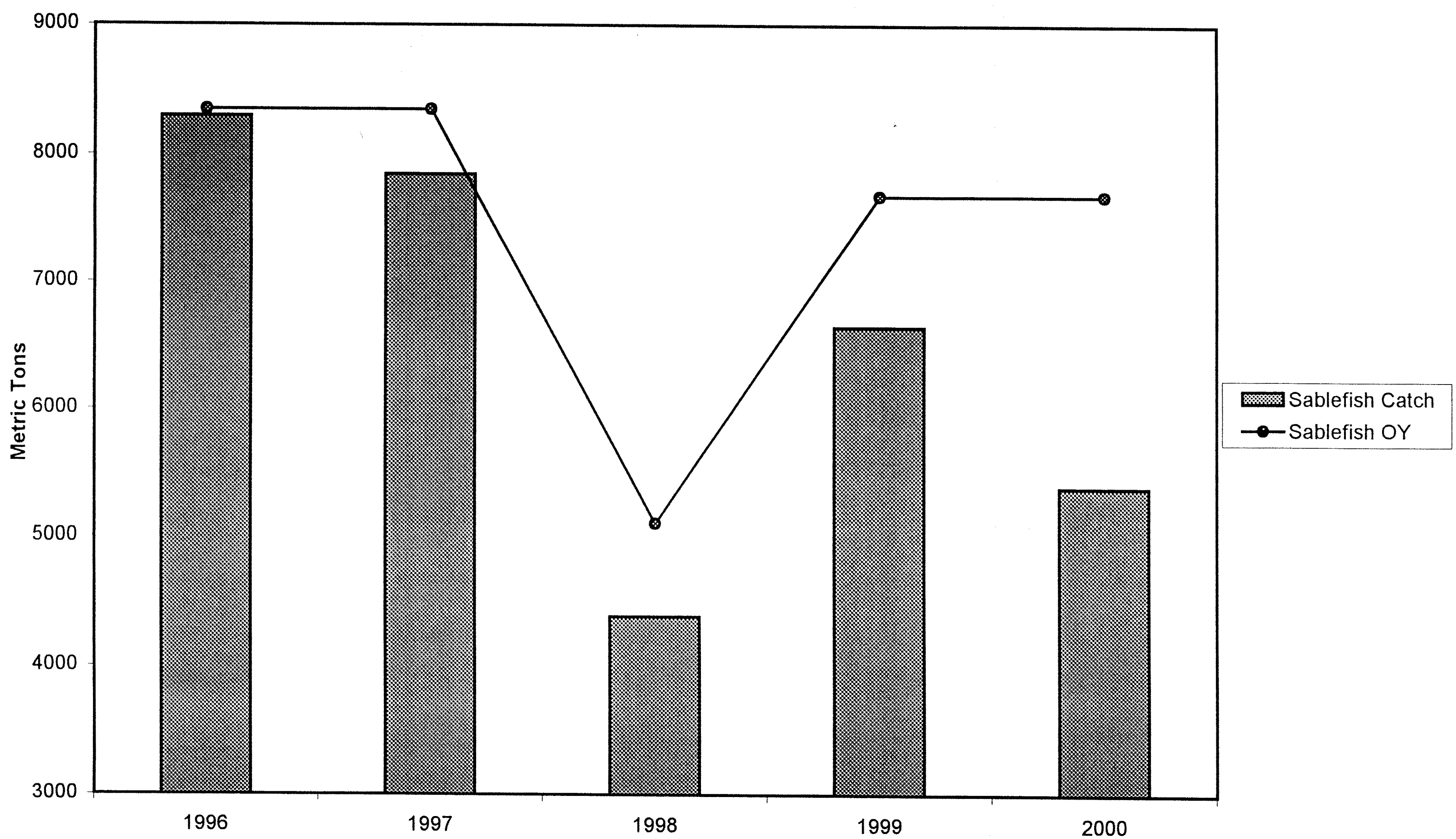
Total OY v. Catch
Misc. Rockfish, Widow, Yellowtail, Bocaccio, Chilipepper, Canary, Lingcod

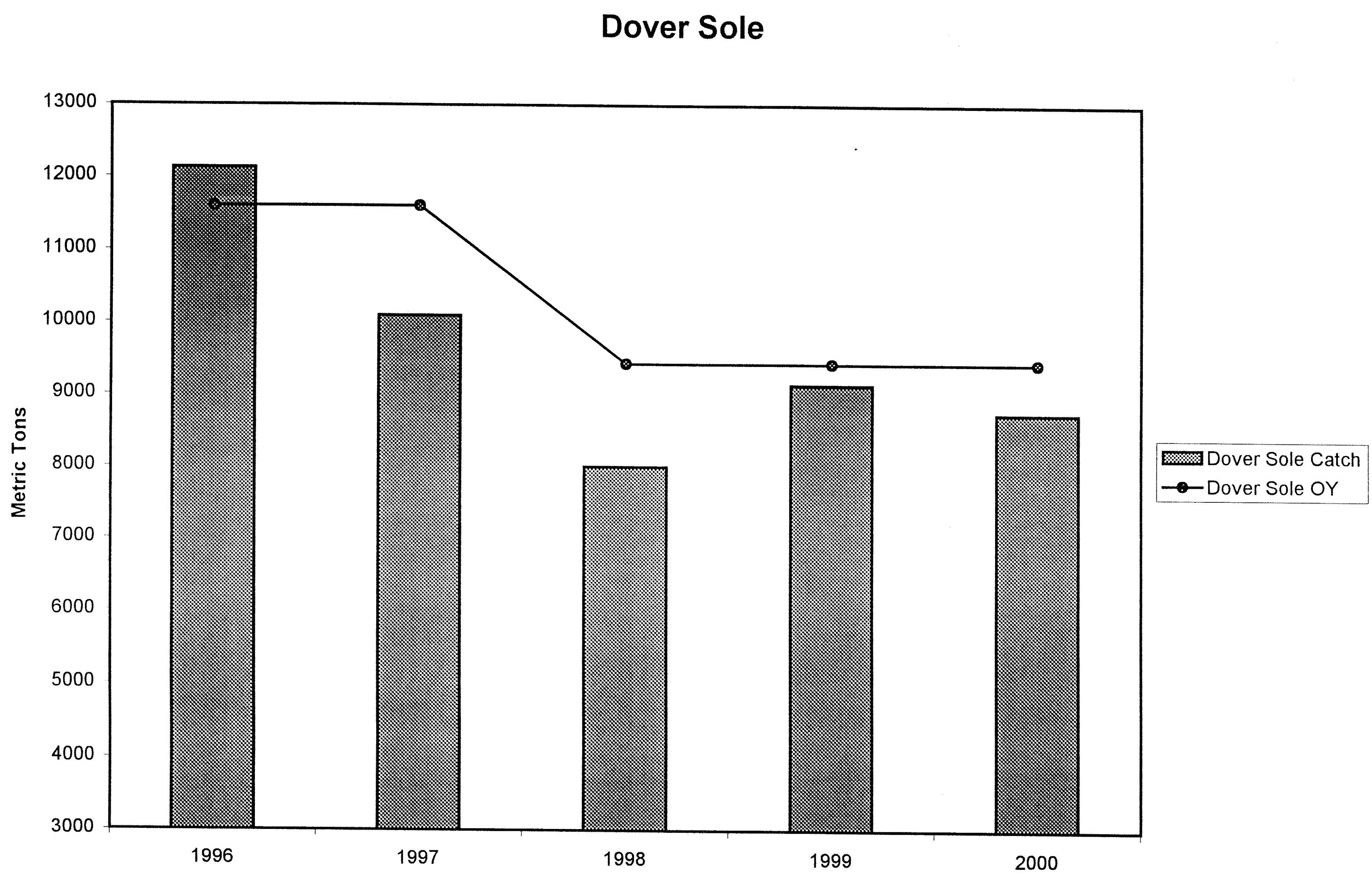


Deepwater Species



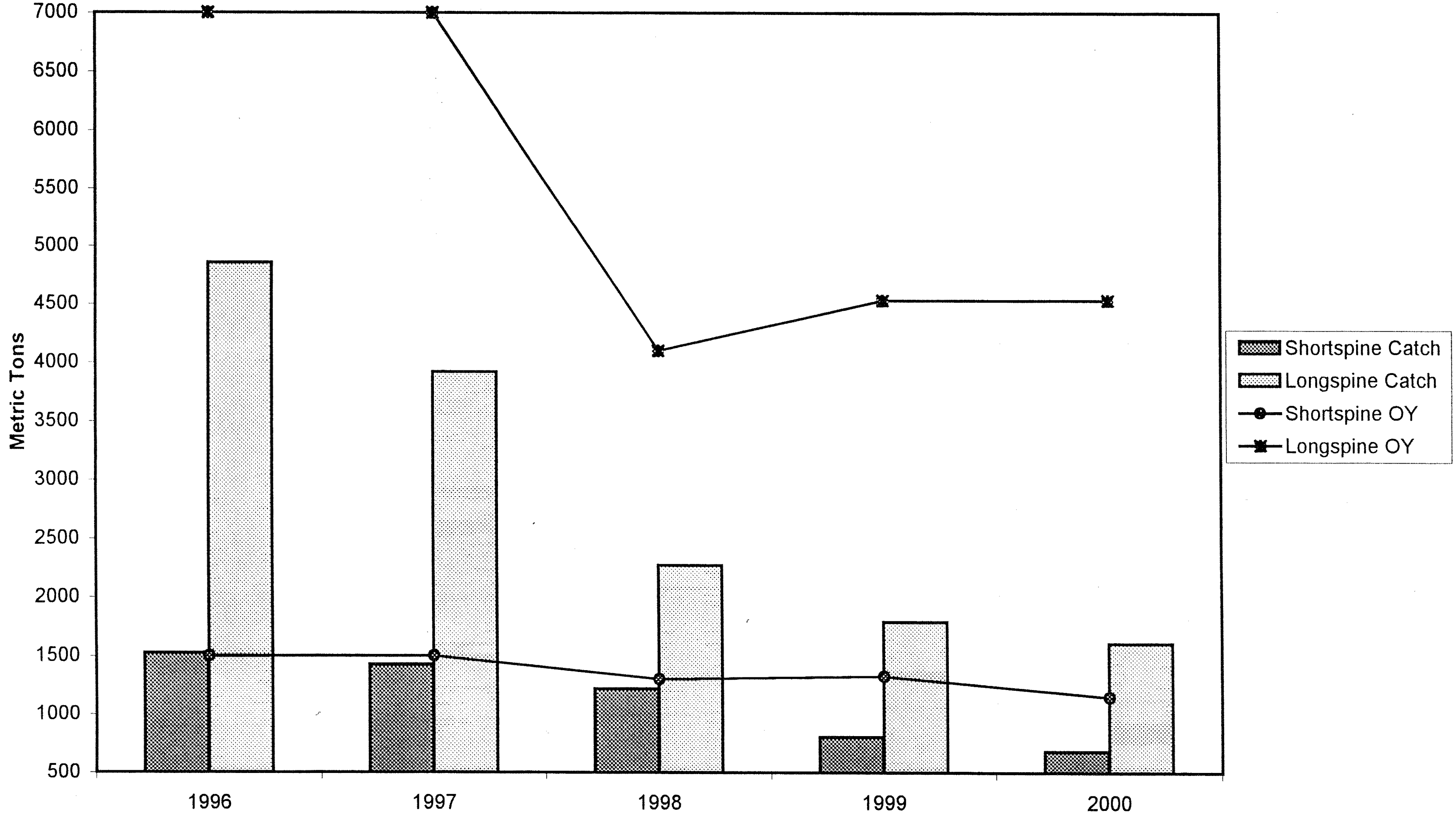
Sablefish

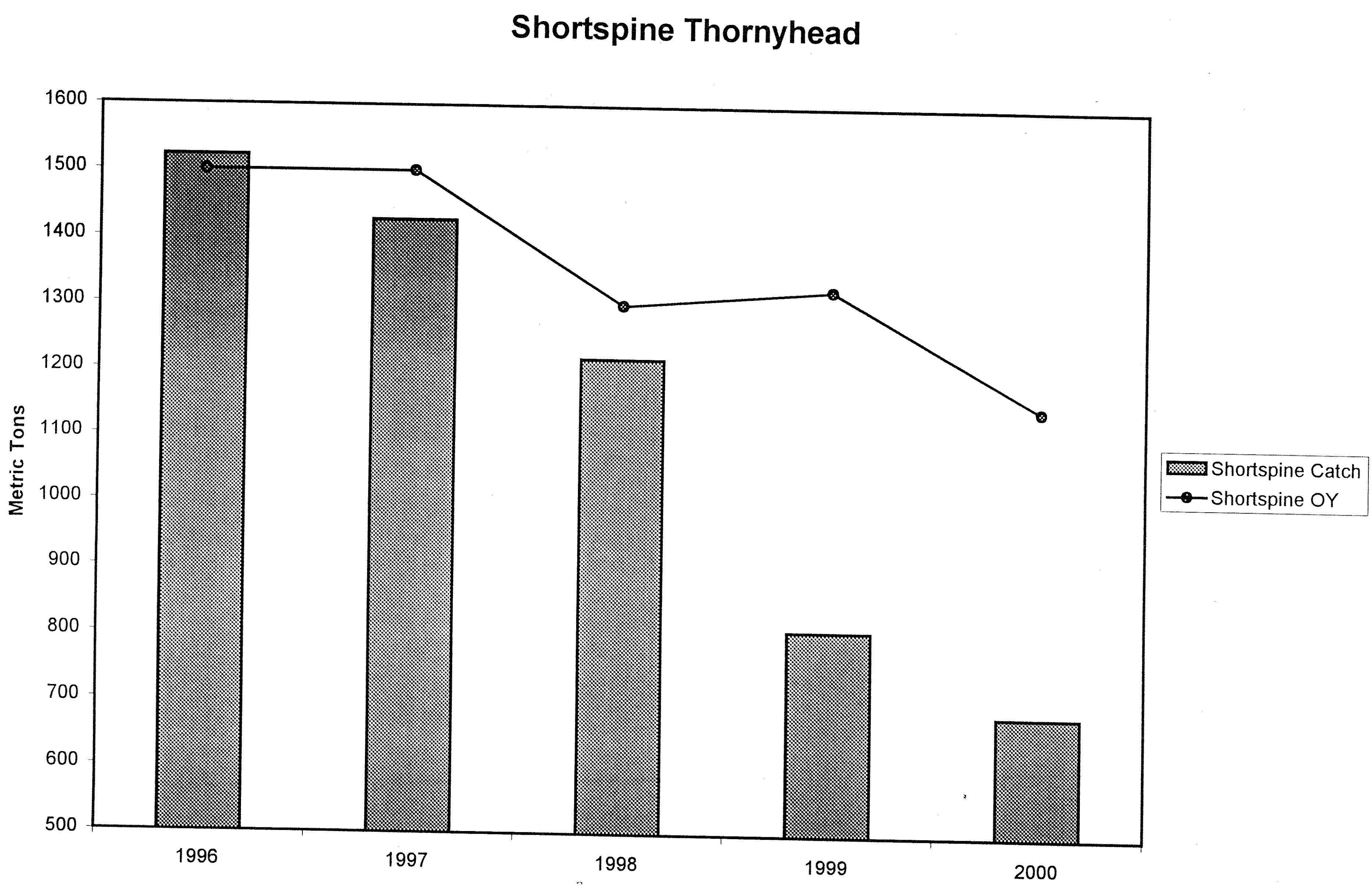

Metric Tons
9000
8000
7000
6000
5000
4000
3000
1996
1997
1998
1999
2000
Sablefish Catch
Sablefish OY



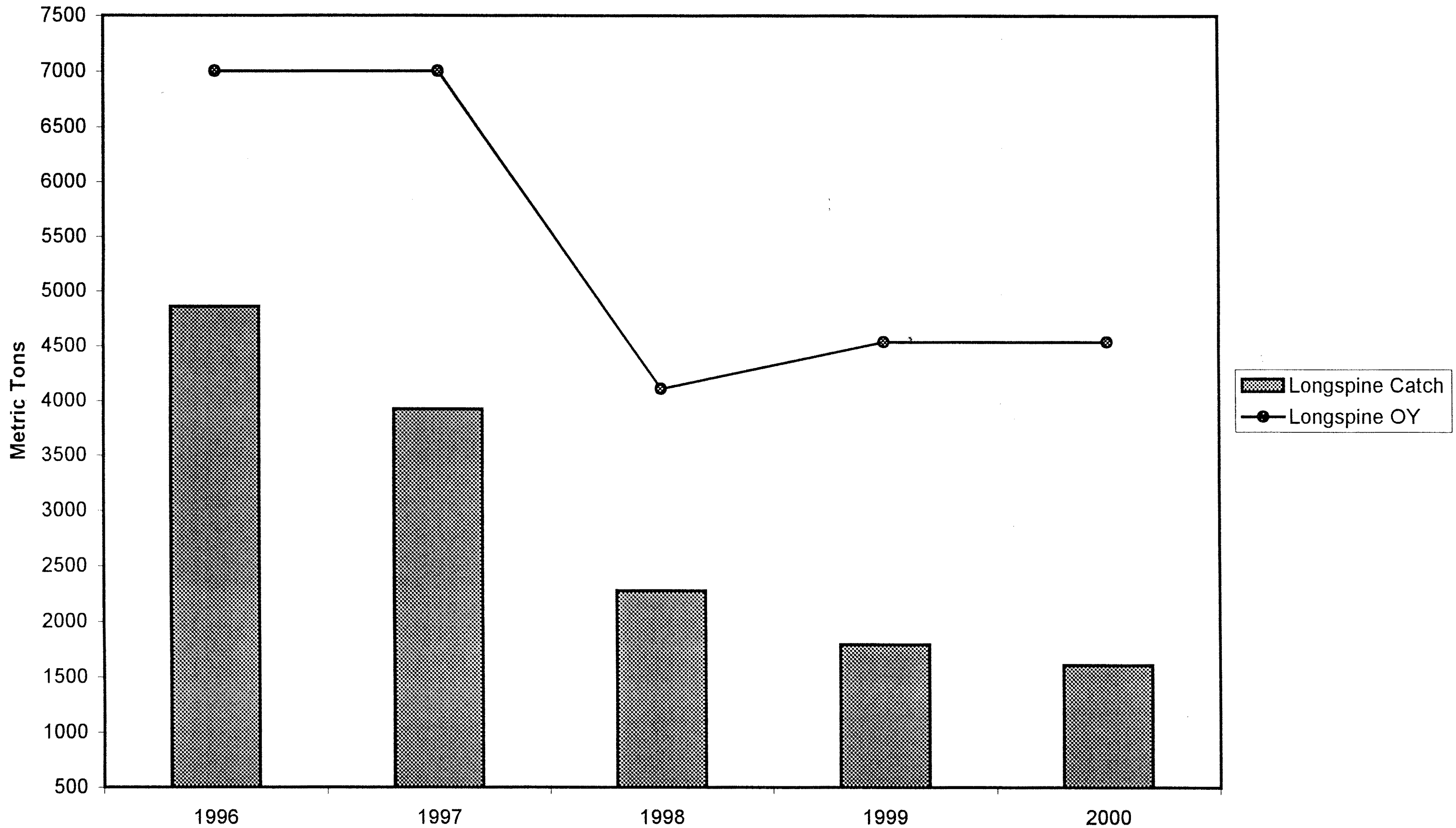
Dover Sole
Metric Tons
13000
12000
11000
10000
9000
8000
7000
6000
5000
4000
3000
1996
1997
1998
1999
2000
Dover Sole Catch
Dover Sole OY

Thornyheads

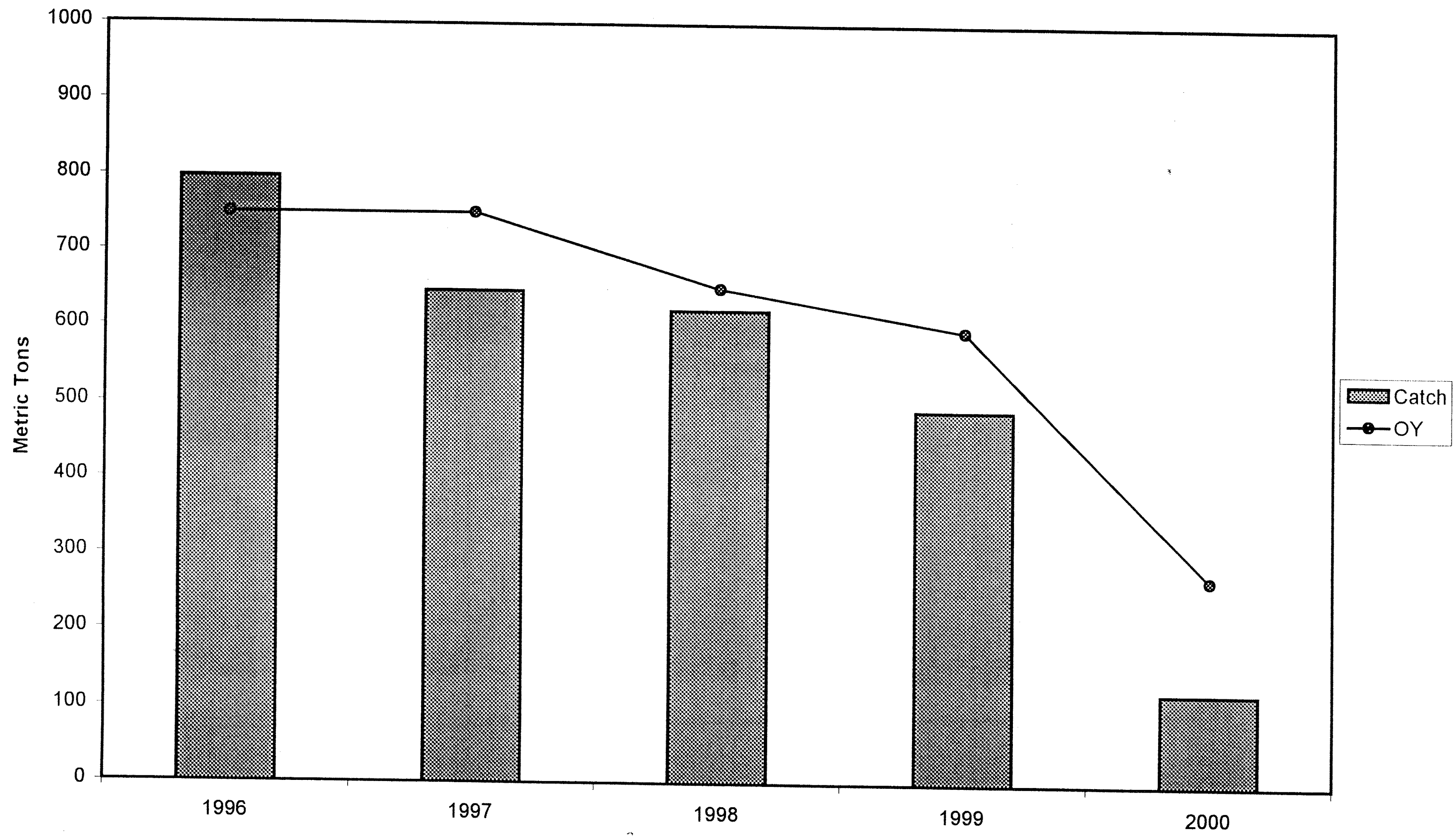



Shortspine Thornyhead
Metric Tons
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
1996
1997
1998
1999
2000
Shortspine Catch
Shortspine OY

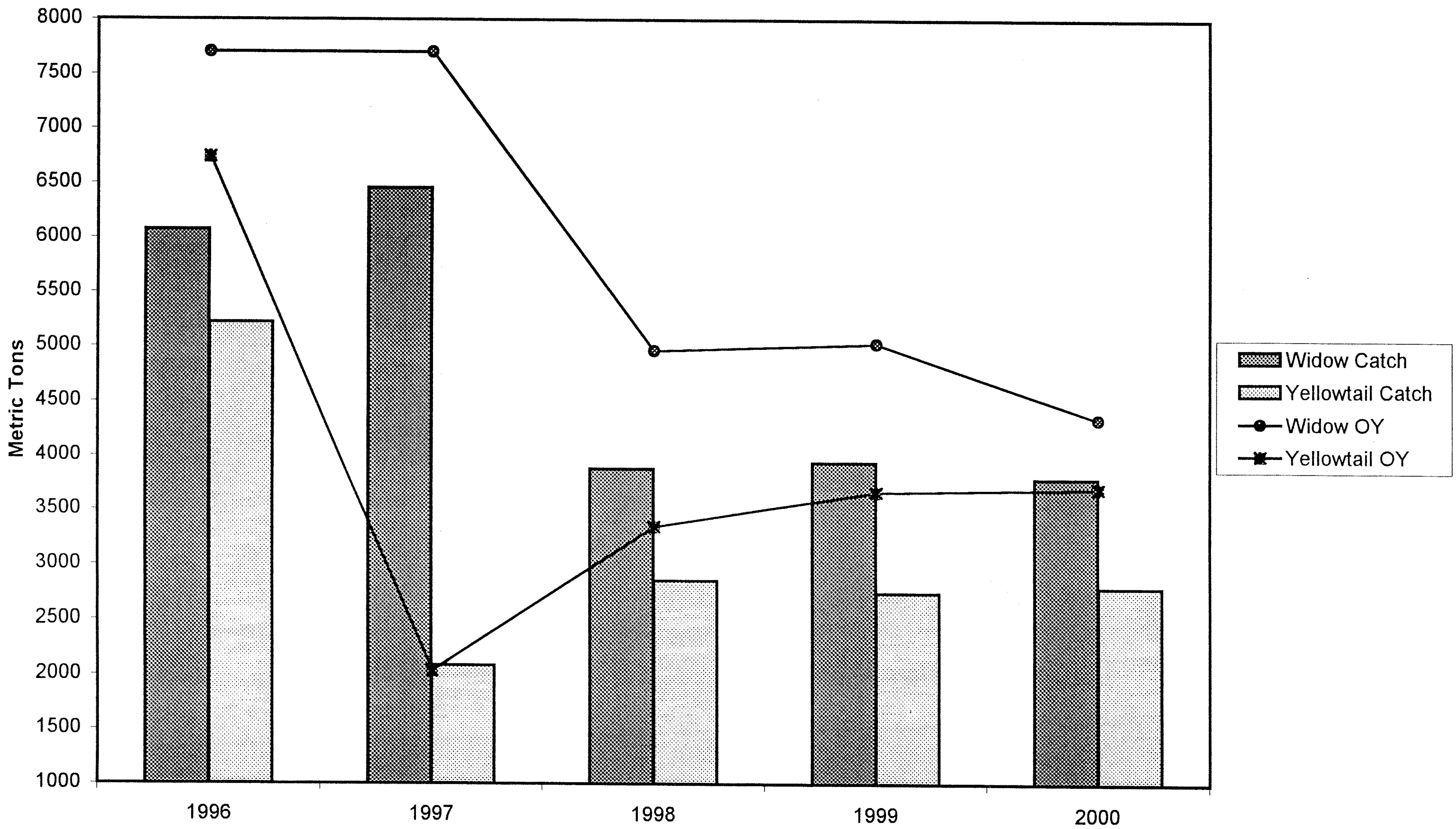
Longspine Thornyhead



Pacific Ocean Perch

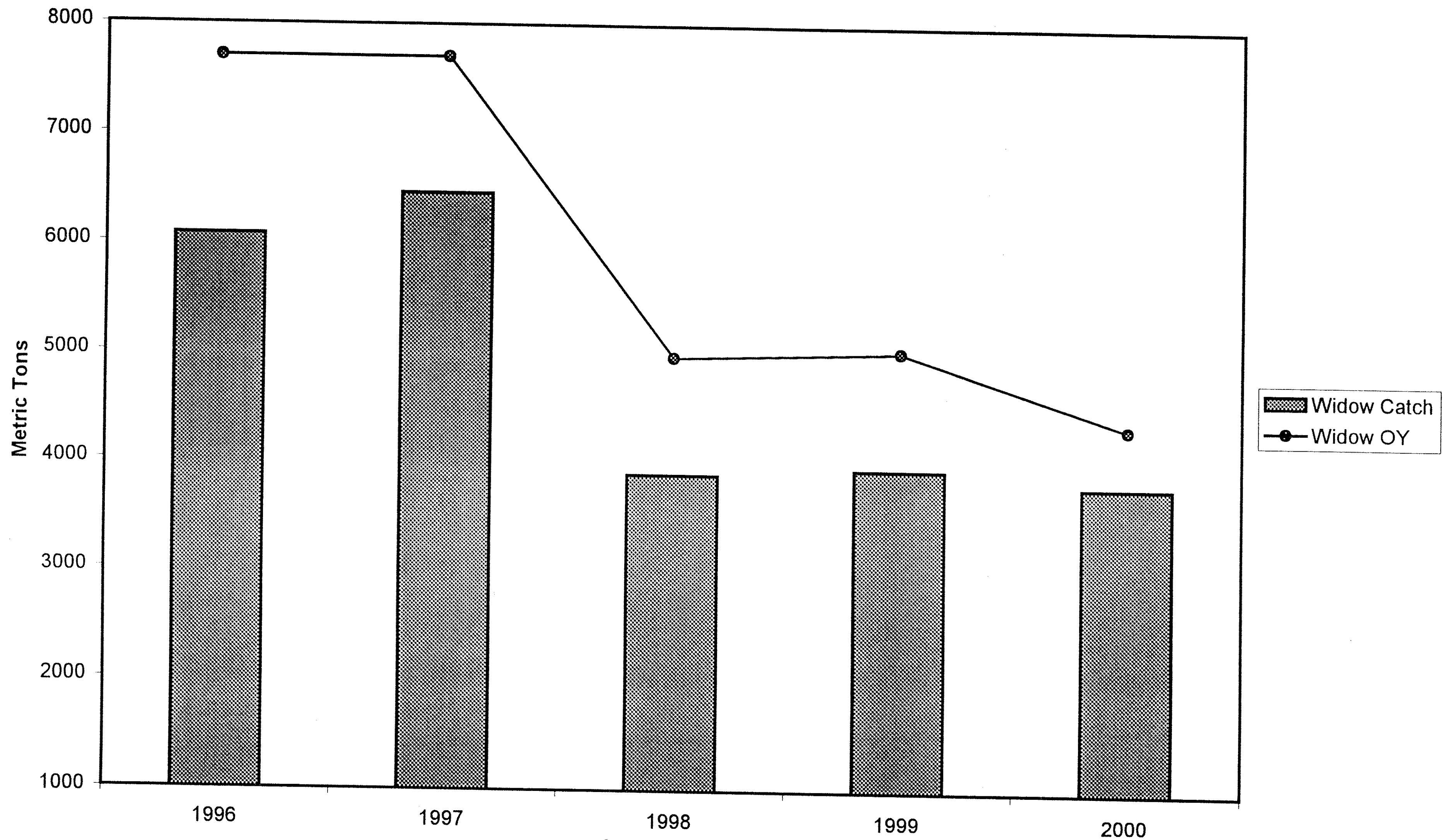


Shelf North



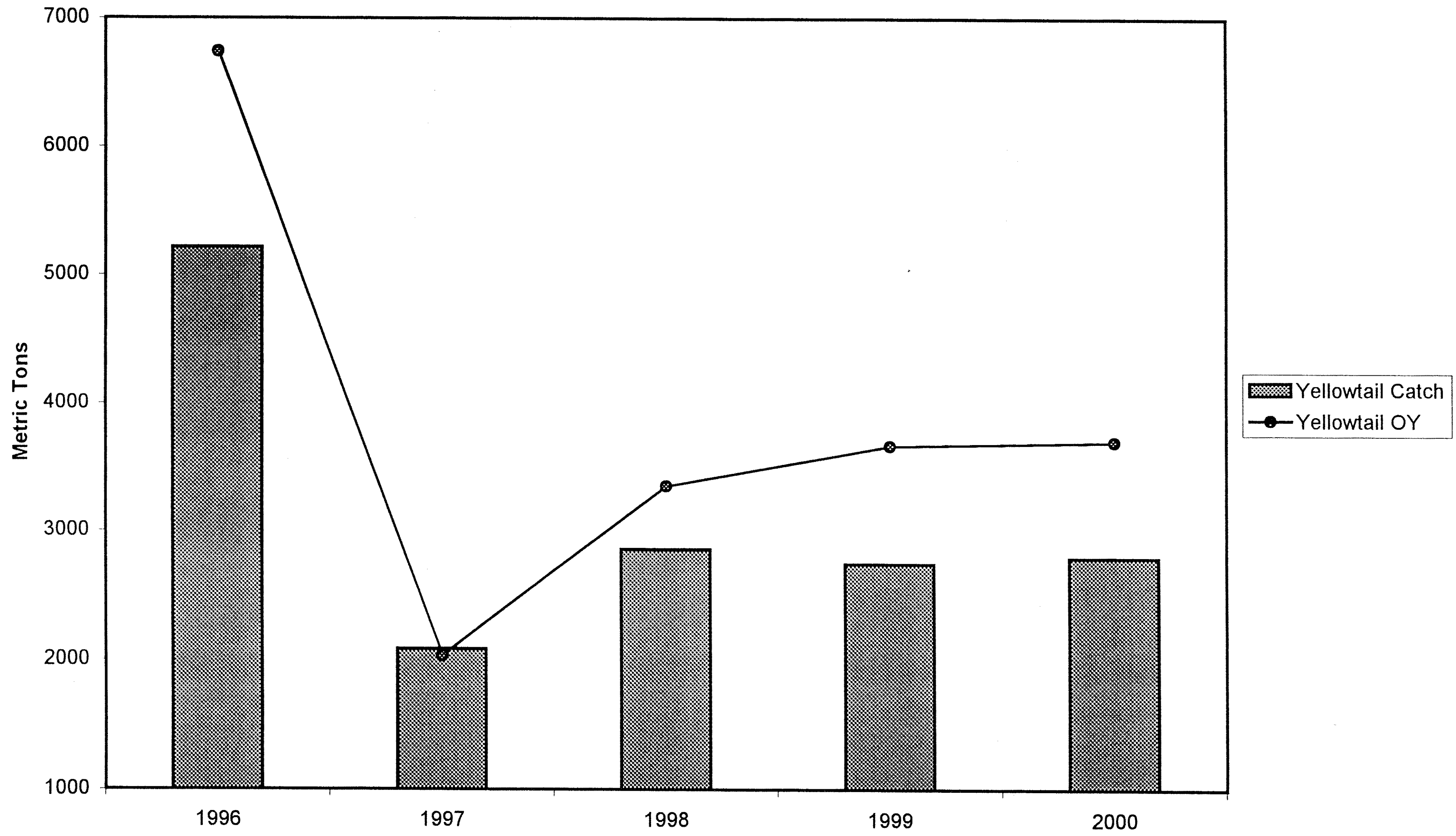
Metric Tons
8000
7500
7000
6500
6000
5500
5000
4500
4000
3500
3000
2500
2000
1500
1000
1996
1997
1998
1999
2000
Widow Catch
Yellowtail Catch
Widow OY
Yellowtail OY

Widow



Metric Tons
8000
7000
6000
5000
4000
3000
2000
1000
1996
1997
1998
1999
2000
Widow Catch
Widow OY

Yellowtail



Metric Tons
7000
6000
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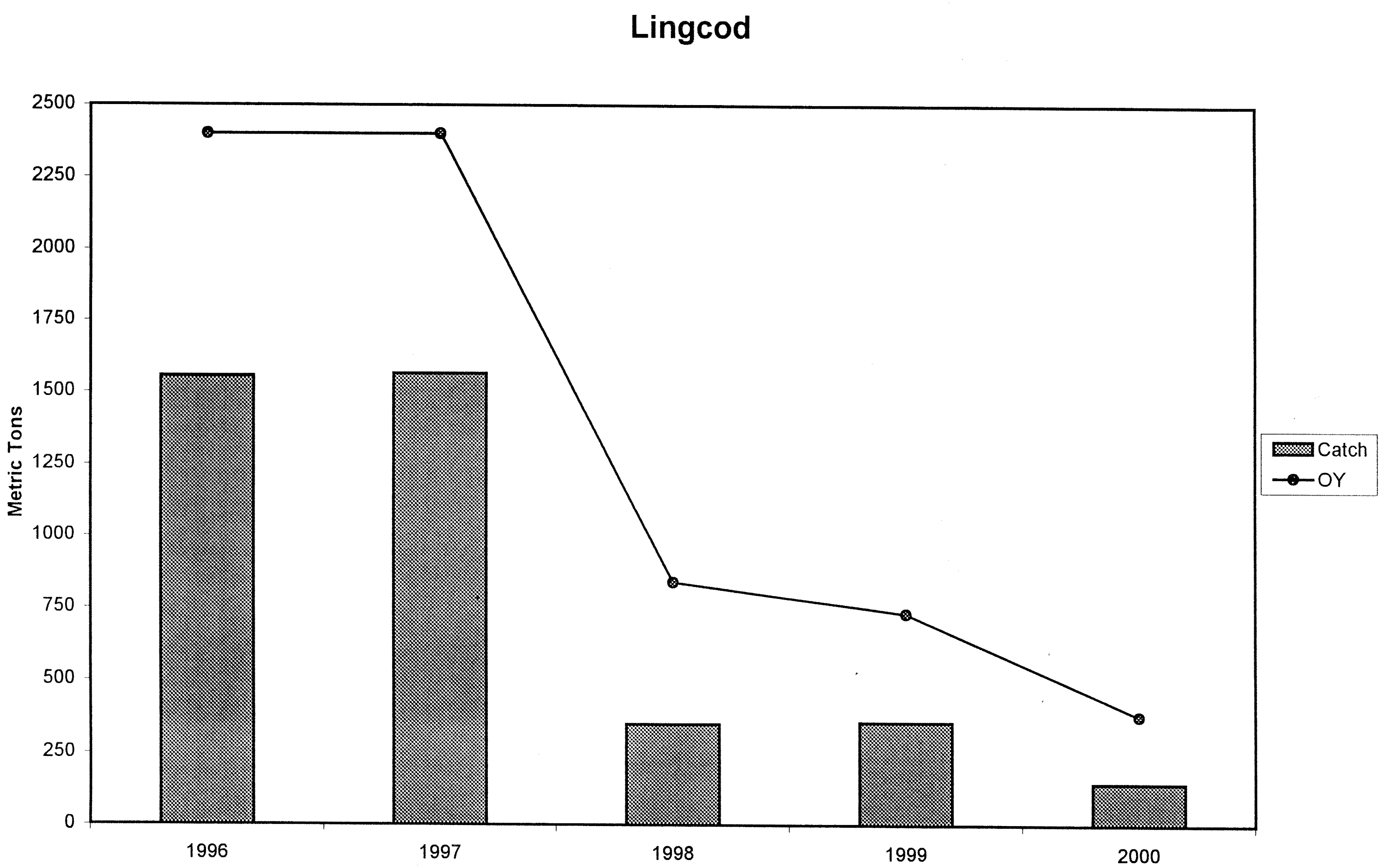
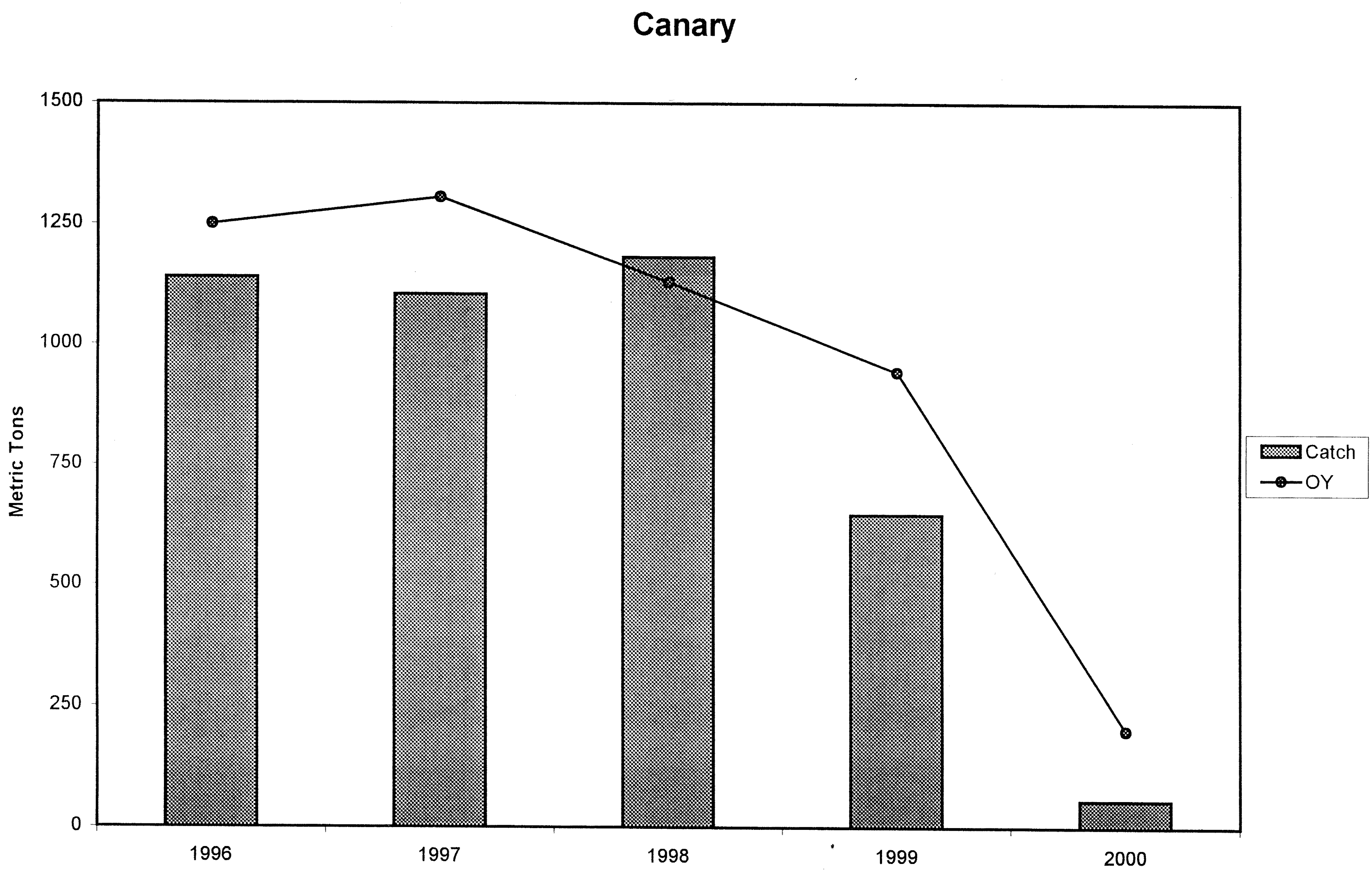
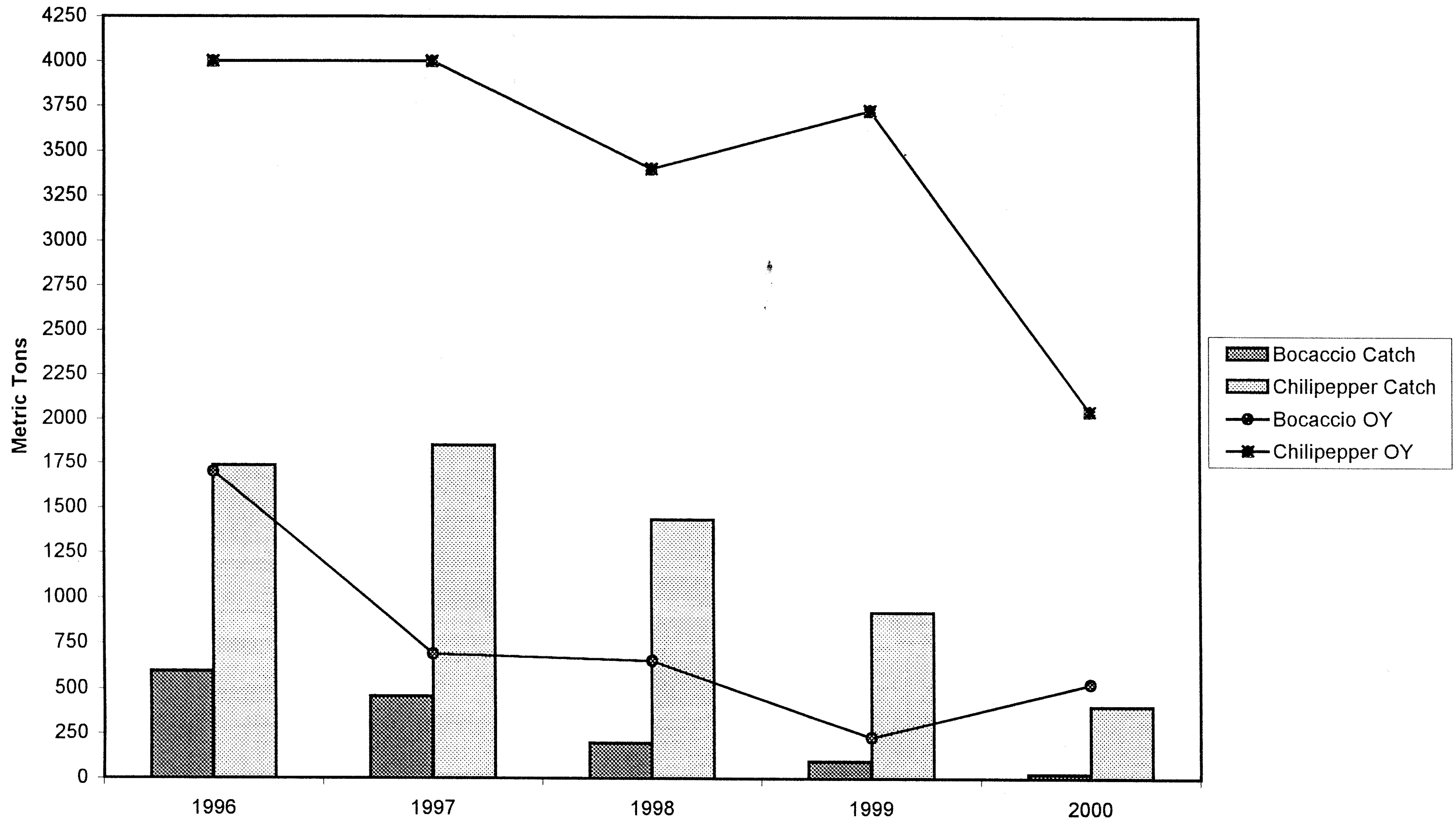
1996
1997
1998
1999
2000
Yellowtail Catch
Yellowtail OY


Lingcod
Metric Tons
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
1996
1997
1998
1999
2000
Catch
OY



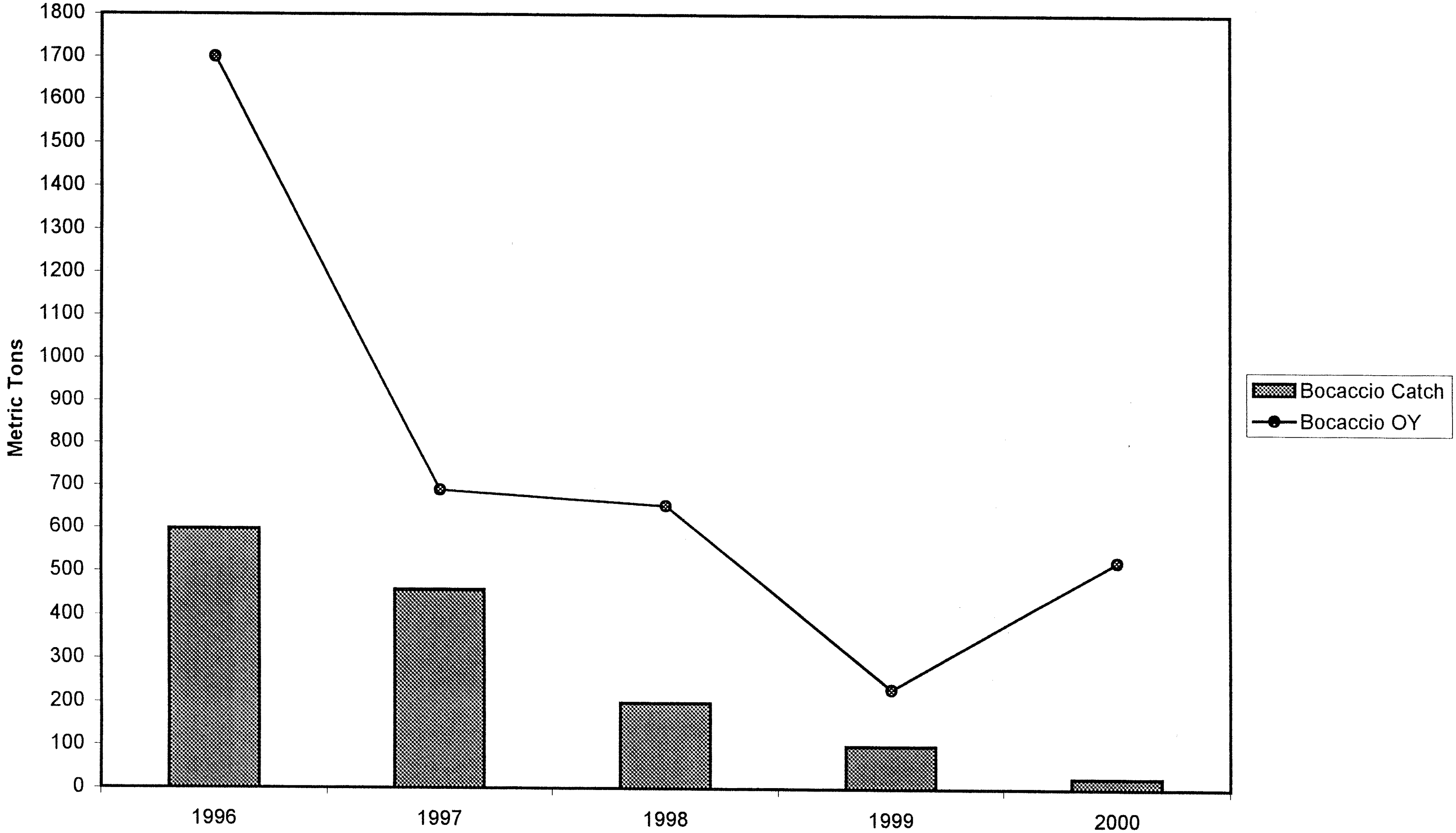
Canary
Metric Tons
1500
1250
1000
750
500
250
0
1996
1997
1998
1999
2000
Catch
OY

Shelf South



Metric Tons
4250
4000
3750
3500
3250
3000
2750
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
1996
1997
1998
1999
2000
Bocaccio Catch
Chilipepper Catch
Bocaccio OY
Chilipepper OY

Bocaccio



Metric Tons
1800
1700
1600
1500
1400
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1100
1000
900
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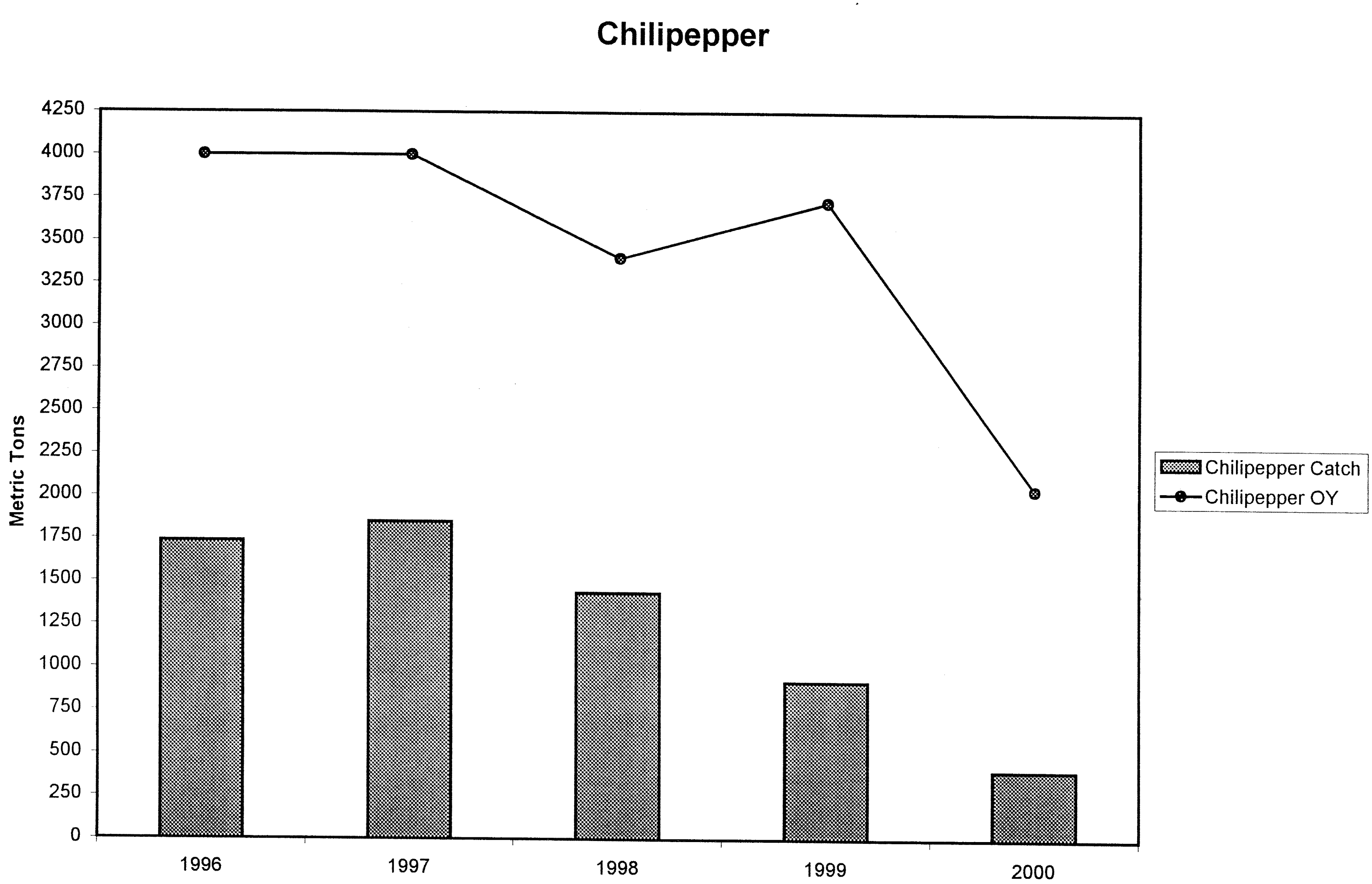
2000
Bocaccio Catch
Bocaccio OY


Chilipepper
Metric Tons
4250
4000
3750
3500
3250
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2750
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2250
2000
1750
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250
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1998
1999
2000
Chilipepper Catch
Chilipepper OY

Miscellaneous Rockfish

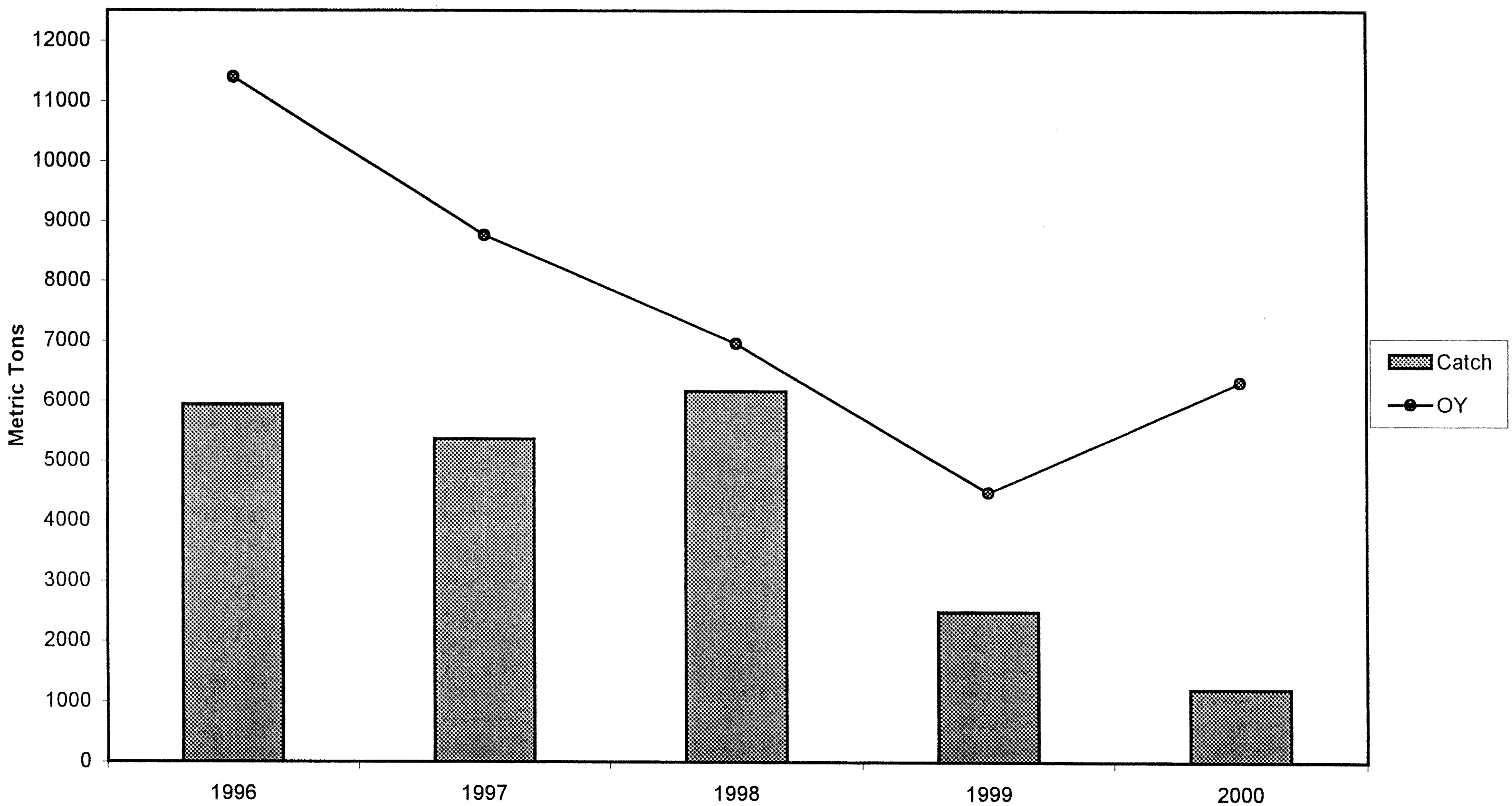

Exhibit C.7.d
Supplemental Public Comment 3
September 2001

September 13, 2001

Shrimp Fishery Excluder / Incidental Canary Issue

Oregon has spent a lot of time and energy working with the shrimp industry developing solutions to problems such as incidental canary catch in the fishery. Oregon has a good logbook program in place with lots of data regarding groundfish catches in the shrimp fishery. They also helped the fishery develop a voluntary excluder program that was implemented prior to the start of the 2001 shrimp season.

All of this cooperation between the industry and management needs to continue with a single goal in sight; to develop a fish excluder to exclude canary rockfish while allowing the fishery to operate with as little economic loss as possible.

In order to accomplish this goal, Oregon started the 2001 season with a voluntary excluder program. This allowed industry experimentation with excluders and the ability for industry to use them when fishing in areas of high incidental canary catch.

2001 is a success in the way management and the industry pulled together to work at solving these difficult issues. The shrimp industry wants 2002 to be just as successful. There is still a lot of work necessary to develop a better fish excluder.

The shrimp fishing industry is very concerned that the Council will perceive the use of current excluders as the solution to the canary bycatch issue. This assumption is far from correct. Mandatory excluder use re-allocates all of the groundfish away from the shrimp fishery, which has a very long history of groundfish harvest. This, along with the poor performance of today's devices, allowing extensive shrimp loss, causes extreme economic hardship on the shrimp fishery. The real solution should be to reduce incidental canary catch and limit the economic hardship to the industry to a minimum. Oregon and the shrimp industry are on the right track to finding a solution.

The Oregon shrimp fishing industry greatly appreciates the help from Oregon, and would like to see help from the other states and the Council to achieve success. The shrimp industry is certain that it can decrease incidental canary catch without suffering the economic loss, from lost product through escapement and or re-allocation. 2002 should provide evidence of this success.

Sincerely,

Brian Petersen
Shrimp Producers Co-op

DRAFT SUMMARY MINUTES
Ad Hoc Allocation Committee

Pacific Fishery Management Council
West Conference Room
7700 NE Ambassador Place, Suite 200
Portland, Oregon 97220-1384
(503) 326-6352
August 27-28, 2001

<u>MONDAY, AUGUST 27, 2001 - 10 A.M.</u>

Members present:
Mr. Phil Anderson, Washington Department of Fish and Wildlife
Mr. Burnie Bohn, Oregon Department of Fish and Wildlife
Mr. LB Boydstun, California Department of Fish and Game
Mr. Bill Robinson, National Marine Fisheries Service

Others present:
Ms. Eileen Cooney, General Counsel, National Oceanic and Atmospheric Administration
Dr. Jim Hastie, National Marine Fisheries Service Northwest Fisheries Science Center
Mr. Jim Glock, National Marine Fisheries Service
Mr. Russell Porter, Pacific States Marine Fisheries Commission
Mr. Wade Van Buskirk, Pacific States Marine Fisheries Commission
Mr. Brian Culver, Washington Department of Fish and Wildlife
Mr. Mark Saelens, Oregon Department of Fish and Wildlife
Mr. Don Bodenmiller, Oregon Department of Fish and Wildlife
Mr. Jim Golden, Oregon Department of Fish and Wildlife
Mr. Dave Thomas, California Department of Fish and Game
Ms. Marija Vojkovich, California Department of Fish and Game
Mr. Rod Moore, West Coast Seafood Processors Association
Mr. Steve Bodnar, Coos Bay Trawlers Association
Mr. Marion Larkin
Mr. Gary Frederic
Mr. Vidar Wespestad, Pacific Whiting Conservation Cooperative
Mr. Joe Easley, Oregon Trawl Commission
Mr. Dan Waldeck, Staff Officer, Pacific Fishery Management Council
Mr. John DeVore, Staff Officer, Pacific Fishery Management Council

A. Call to Order

Mr. Anderson called the meeting to order at 10:15 a.m. A round of introductions was made. Mr. Anderson mentioned the schedule and expectation that there will be breaks through the day to convene scheduled conference calls.

B. Appoint Acting Chair

Mr. Anderson was appointed acting chair.

C. Review and Approve Agenda

Mr. Boydstun suggested the Ad Hoc Allocation Committee (Committee) review the 2000 commercial and recreational catches of overfished groundfish species. This was added to the agenda under item E.

D. Report on Recent Court Ruling

Ms. Cooney reviewed the recent court ruling *Natural Resources Defense Council (NRDC) v. Donald Evans, Secretary of Commerce* regarding bycatch discard estimates used in managing Pacific Coast groundfish fisheries. The first issue regarding bycatch estimation was sufficiency of the record of the methodology and data used to estimate discard. The court ruled the record did not contain sufficient explanation of the discard issue. The second issue involved publication of a proposed rule in the *Federal Register*, followed by public comment and a final rule. The judge said the National Marine Fisheries Service (NMFS) decision not to publish a proposed rule was wrong. The judge ruled the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) and Administrative Procedures Act (APA) both require full notice and comment rulemaking. The third challenge regarded the process for adopting rebuilding plans. The challenge was the Magnuson-Stevens Act requires these rebuilding plans be fishery management plan (FMP) amendments or rules, but Amendment 12 does not require this. The Judge ruled that rebuilding plans must be plan amendments or regulations. Plaintiffs also challenged the "mixed-stock" exception regarding overfishing, and the judge ruled this issue was not ripe because the mixed stock exception has not been used. The final challenge was a NEPA challenge to both the bycatch issues in the annual specifications. The judge found an adequate range of alternatives had not been analyzed.

Mr. Robinson stated they would have to work with Council staff to turn rebuilding plans into FMP amendments. Mr. Bohn thought we should consider integration of alternatives previously discussed regarding Council process. Mr. Robinson agreed there may be greater urgency to do this. Mr. Anderson wondered if the Council process to set annual specifications for groundfish fisheries might require three meetings to accommodate public comments. Mr. Robinson said there is not sufficient time to accommodate rule-making between the November Council meeting and the first of the year. The current process to publish a rule is about 6 weeks. To do a proposed and final rule-making would require a minimum of four months. Mr. Boydstun, referring to page 3 of the judges ruling in the NRDC lawsuit, said it appeared there is insufficient public disclosure of the data and considerations used in decision making. Ms. Cooney stated we work in shorthand where the public may not understand the content of groundfish rule-making. Dr. Hastie explained NMFS has done more work this summer to explain the steps used to estimate bycatch and discard. It is not clear whether this is sufficient.

Mr. Boydstun wondered about a date for meeting the ruling expectations. Ms. Cooney explained no date was given, but we should move ahead right away. She explained that an internal NMFS assessment of Dr. Hastie's work needs to be made. Then the next steps will be decided. Mr. Robinson stated we have two challenges: meeting the ruling expectations for 2001 fisheries and doing a NEPA process for 2002 specifications.

Mr. Boydstun asked whether the scope will need to be broader than bocaccio and lingcod. Ms. Cooney stated we need to fix the 2001 specifications for bocaccio and lingcod only, but broaden the scope for all groundfish species in 2002. Mr. Boydstun wanted to know whether we need to set new optimum yields (OYs) for 2001. Ms. Cooney suggested we need to do a better job documenting how we set OYs.

Mr. Moore asked about the need to turn rebuilding plans into FMP amendments. Ms. Cooney stated the ruling was clear a better job needs to be done. Mr. Moore asked whether regulations alone would suffice or whether they need to be FMP amendments? Ms. Cooney stated they could be regulations; the judge was not definitive.

E. *Status of 2001 Catch Levels (Commercial and Recreational)*

1. Status of 2000 catch levels for overfished species (new agendum):

Stocks	Commercial	Recreational	Total	Total Catch OY	ABC
Bocaccio	25	108	133	100	164
Canary	56	110	166	200	287
Lingcod	144	339	483	378	700
Pacific ocean perch	121	0	121	270	713
Cowcod	3	5	8	<5	24
Widow	3,789	21	3,810	4,333	5,750
Darkblotched	239	0	239	192	256
Yelloweye	13	20-22	33-35	29	39

Mr. Boydstun asked about the above recreational estimates and whether they were all from Recreational Fishery Information Network (RecFIN). Dr. Hastie stated they were but were adjusted with Washington and Oregon independent estimates. Dr. Hastie stated darkblotched, widow, and yelloweye rockfish were not tracked separately in 2000. They were approaching overfished and part of the minor rockfish complex.

2. Inseason Catch Update
3. Discuss Need for Inseason Adjustments

Dr. Hastie produced a Total Fleet quota species monitoring (QSM) table for 2001 and reviewed the landings.

Canary rockfish

Canary rockfish are tracking at 111.4% through August (39 mt landed for a commercial OY of 35 mt). There are 44 mt set aside for recreational fisheries and 22 mt landed through June.

Bocaccio

Bocaccio looks good with 41.7% of the commercial OY landed through August. Recreational catch of bocaccio was 50 mt through June with a set aside of only 52 mt. Dr. Hastie suggested this high catch of bocaccio was indicative of a strong year class recruiting to the fishery. Mr. Boydstun stated there are some Marine Recreational Fisheries Statistics Survey (MRFSS) estimation procedures that have been adopted but don't seem to be incorporated. Mr. Porter stated the new methodology was implemented, alongside the standard phone survey methodology, beginning with Wave 2 (starting in March) in 2001. Data entry took a while, but Wave 2 files have been sent in; and Wave 3 data will be sent in later this week. He stated there will be a conference call tomorrow and he will bring up incorporating the new charterboat effort estimates for the California recreational fishery catch estimates in a more timely manner. Mr. Boydstun stated he needs the best numbers possible to adopt emergency regulations to close recreational fishing for bocaccio. Mr. Porter hopes to have good estimates through Wave 3 by the September Council meeting. Mr. Boydstun wanted to know what proportion of the 50 mt were landed in Wave 1. Mr. Thomas stated 17 mt. Mr. Boydstun said emergency action could not be adopted until October 5 at the earliest. Dr. Hastie corrected the bocaccio annual allocation number (40 not 48) which means landings through mid-August are at 50%.

Lingcod

Lingcod landings are over 50% through mid-August. Recreational landings range between 72 mt and 128 mt. There is a discrepancy between Oregon Department of Fish and Wildlife (ODFW) reported landing in Oregon and MRFSS estimates of Oregon recreational catch. We are in good shape with lingcod. Pacific ocean perch (POP) are at 51.8% through mid-August. The landing limits were increased on July 1. Darkblotched are at nearly 90% through mid-August. There is a problem with being low on slope rockfish while being in danger of going over on darkblotched. Widow and yellowtail rockfish landings are over 70%. We may have to ratchet mid-water trawl fisheries back. Yelloweye landings are not separately tracked, but Dr. Hastie believes commercial landings are low given the small footrope restriction and the pattern of yelloweye landings last year. The recreational fishery has caught an estimated 14 mt through Wave 3 Mr. Culver explained we may be closer to 10 mt due to adjustments in Washington data that have not been incorporated in MRFSS data yet. He also stated there may be some market-driven targeting by line fishers which might drive up commercial landings relative to last year. The Dover sole/thornyhead/trawl-caught sablefish complex (DTS) landings are relatively high, particularly Dover sole (89% through mid-August). It doesn't appear we can entertain the same limits next year and expect a year-round fishery. The problem is exacerbated by the expectation sablefish OY will decrease next year. Southern nearshore rockfish is over 60% through mid-August. However, the recreational nearshore set aside was 550 mt, and MRFSS estimates indicate 120 through Wave 3.

Mr. Anderson thought the Ad Hoc Allocation Committee should not recommend 2002 management measures, but should allow the Groundfish Management Team (GMT) and Groundfish Advisory Subpanel (GAP) to work through the numbers and recommend 2002 management measures. However, the Committee may want to recommend some inseason recreational fishery changes.

Mr. Golden asked what set aside was made for nearshore rockfish for recreational fisheries. Dr. Hastie replied the set aside was 750 mt north of Mendocino. Referring to recommended commercial OYs for nearshore rockfish, Mr. Frederic asked whether the processor closures in Eureka were factored in. Dr. Hastie thought Pacific Seafoods was going to take over. Mr. Moore stated not completely. Dr. Hastie replied that could make a difference.

F. Stock Assessment Update and Recommended Optimum Yields for 2002

Dr. Hastie produced a table, "Preliminary ABCs and OYs Recommended by the GMT for 2002" and reviewed the GMT recommendations by species.

Lingcod
The 577 OY recommendation corresponds to the new rebuilding analysis for coastwide lingcod with a 60% probability of recovering the stock by 2009. This recommended OY is down from the 611 mt in 2001.

Whiting
Whiting OYs may change pending a new stock assessment in 2002.

Sablefish
Three different scenarios for managing sablefish in 2002 were presented. The Stock Assessment Review (STAR) Panel could not resolve which recruitment scenario was most appropriate. Under the "regime shift" scenarios, sablefish are currently at about $B_{35\%}$; the "density dependent" scenarios are closer to an overfished biomass. The best case scenario indicates a significantly smaller OY than in 2001 (4,500 mt versus 6,895 mt). Evidence of recent recruitments in the coming years will sort out these competing scenarios and what OYs are appropriate. Mr. Boydstun asked about the stock assessment presentation at the September Council meeting. Mr. DeVore stated that would occur at 3:30 p.m. Monday, September 10. Dr. Hastie explained the challenge is to keep fishing mortality low enough to allow enough survival of recruits to avoid the stock being declared overfished in the next few years. Mr. Moore, who sat in on the sablefish STAR panel, explained some scenarios projected a downturn in biomass followed by an increase. One of the things, other than recruitment scenarios, that should be considered is the possibility there will be a subsequent increase in recruitment. He urged the Committee to consider this when looking at future management. Dr. Hastie stated the GMT didn't feel comfortable with recommending management options that assumed better future recruitment. Although this is a real possibility, the GMT thought it better to be conservative until there is evidence of better recruitment. Mr. Larkin commented we have seen this in the past. Fishermen have seen lots of juvenile sablefish and maybe that should be considered. Mr. Frederic agreed with Mr. Larkin. He has seen lots of small sablefish (6 inches to 8 inches) while trawling for Petrale sole this summer.

Dover sole
We are currently managing Dover sole at $F_{40\%}$, but the recruits are below that replacement line. An alternative proxy for F_{MSY} should be considered. The GMT recommended looking at $F_{45\%}$ and $F_{50\%}$.

Shortspine thornyhead
New assessment of this stock shows an increasing biomass. The GMT recommendation reflects this with an increased OY.

Longspine thornyhead
The GMT recommends adopting the same OY as last year.

Widow rockfish
Recommendations span a 60%-80% probability of recovery within the stated rebuilding timeframes. All of these recommendations represent a substantial reduction over past OYs. At the low end, these recommendations represent something like 2 months of midwater trawl fishing. If we cannot have a stand alone midwater limit, then we should consider a bycatch allowance limit for widow rockfish in the shoreside whiting fishery.

Canary rockfish
The GMT recommends the same OY as this year.

Pacific ocean perch
The GMT displayed three options bracketing a 60%-80% probability range for recovery. Dr. Hastie cautioned that, if recruitment does not improve as expected, OYs would be about 150 mt in the near future. The low end at 80% probability is close to the 2001 OY. Mr. Wespestad stated fisheries in Alaska and Canada indicate lots of POP in northern waters. The recruitment we have seen may be related to poor environmental conditions in the last ten years (which did not affect northern waters to the same degree). Mr. Frederic asked what the recovery period is. Dr. Hastie explained it will take 30-40 years to recover POP without fishing. The analysis of foreign catch composition will affect our outlook for POP. However, there is some disagreement by scientists that has not yet been resolved.

Darkblotched rockfish
A range of 60%-80% recovery for darkblotched was presented by the GMT. All of these recommendations are slightly better than the 2001 OY.

Bocaccio
The GMT recommends continuation of the agreed three-year plan to keep OYs of about 100 mt. We are scheduled to go to a 3% exploitation rate in 2003. We may need to keep OYs down longer than through 2002. We will need to review the dynamics of bocaccio and consider alternate rebuilding trajectories. Mr. Larkin asked whether there has been a reassessment of the $B_{2\%}$ estimate. Dr. Hastie explained that is standard procedure when a new assessment is done. A new bocaccio assessment is scheduled for next year.

Yelloweye rockfish
Oregon data was used in the yelloweye assessment with some model runs that used Washington data (age data was limited from Washington fisheries). The coastwide 2002 ABC is 27 mt. This is a problem. We may be close to 27 mt by September. Hopefully, we can use the Punt rebuilding model on yelloweye before the September Council meeting. At this time, the GMT is recommending about 2 mt for the Monterey area. The GMT is recommending 9 mt for north of Cape Mendocino (1 for Eureka and 8 for Washington and Oregon). It is expected this is a "best case" scenario. Mr. Boydstun noted the 2001 commercial landing are 13 mt through mid-August, and MRFSS estimates about 14 mt in recreational fisheries. Mr. Bohn asked about 2000 recreational catches. Dr. Hastie stated it was 20 mt-22 mt and about 45 mt in 1999. Mr. Boydstun asked where the commercial catches of yelloweye are occurring. Dr. Hastie stated it was primarily in Oregon and Washington line fisheries. Mr. Easley stated yelloweye are not well surveyed with the gear being used in trawl surveys.

Black rockfish
Dr. Hastie explained that the black rockfish assessment was retracted after the authors realized incorrect catch per unit of effort (CPUE) data was incorporated in the original assessment. A rough analysis with the new data indicates not much change relative to the old assessment. Mr. Saelens remarked this analysis suggests future reductions may be necessary to keep black rockfish from falling below $B_{40\%}$. Dr. Hastie said there is some talk of a new assessment next year or the year after. Mr. Bodenmiller explained Oregon CPUE data will be incorporated into RecFIN next year.

Minor rockfish
Mr. Boydstun asked why the "minor *Sebastes*" OYs are less than last year. Dr. Hastie said that was primarily due to pulling yelloweye out of the complex for separate tracking. There may be a push to decrease allocation of commercial nearshore minor rockfish to accommodate the recreational fishery, particularly with the push to get recreational fishers off shelf species like canary and yelloweye.

G. *Specifications and Management Options for 2002*

The following table was generated to aid discussion of management options for 2002:

	Comm		Rec		Total		Total Catch OY		
Stock	**00**	**01**	**00**	**01**	**00**	**01**	**00**	**01**	**02**
Bocaccio	25	20	108	50	133	70	100	100	100
Canary	56	39	110	22	166	61	200	93	93
Lingcod	144	127	339	72	483	199	378	611	577
POP	121	132	0	0	121	132	270	303	290-410
Cowcod	3	0	5	0	8	0	<5	<5	<5
Widow	3789	1195	21	9	3810	1204	4333	2300	726-856
Darkblotched	239	94	0	0	239	94	192	130	157-181
Yelloweye	13		20-22	12-17	33-35		29	22	4-11
Sablefish	5261		0	NA		NA	7919	6895	3200-4500
Dover		6200						7677	5520-7440

1. California Report
   - Lingcod and shelf rockfish in 20 fm fisheries
   - Yelloweye rockfish data review
   - Need to adjust for bocaccio biomass increase
   - Canary rockfish status

Mr. Boydstun gave the California report. California Department of Fish and Game (CDFG) filed notice for regulation changes. Currently there is a January through February closure for lingcod in the south, and they filed notice to allow retention of lingcod in the 20 fm fisheries during the closures. They are also proposing to allow anglers to take rockfish other than those declared overfished within 20 fm during the closed periods. These regulations will be decided in December.

They filed notice there may be additional regulatory changes following the September Council meeting. They filed notice there may be recreational changes in response to the change in status of yelloweye. CDFG is considering how to react to increasing bocaccio biomass in future fisheries as they rebuild. The same rebuilding paradox may also exist for canary and yelloweye as they rebuild. Mr. Thomas gave a brief overview of yelloweye. They appear to be equally distributed in California waters with no apparent hot spots. Mr. Thomas then displayed some length frequency data for bocaccio showing fast growth rates and evidence of a strong 98 year class.

2. Washington/Oregon Reports

Mr. Bohn gave the Oregon report. Everything adopted for 2001 seems to be working. It is expected regulation changes will be needed for 2002 recreational fisheries, especially for yelloweye. Mr. Bodenmiller stated the canary bycatch in charter fisheries was very low (<2%) based on this year's observer coverage.

Mr. Anderson introduced Mr. Culver who talked about the retention limit for canary and yelloweye in recreational fisheries (2 of either species in combination in the daily bag). These species are primarily caught in the north. There may be effective time/area closures Washington Department of Fish and Wildlife (WDFW) will consider.

Mr. Anderson stated there is much concern with rapid attainment of some quota species monitoring (QSM) species' limits this year. The Council is challenged to keep this fishery open year round.

3. Development of Management Alternatives
   - Limited entry
   - Open access
   - Recreational

The above table was discussed. Mr. Boydstun asked whether the GMT discussed bocaccio discard. Dr. Hastie said it was discussed, but he wasn't sure whether his latest overview of discard assumptions would be accepted in the Council process. Therefore, the discard estimate may or may not stand. Mr. Boydstun remarked he thought the NRDC lawsuit ruling threw out the 16% discard assumption. Ms. Cooney and Dr. Hastie said the ruling was there was inadequate documentation of assumptions used. Dr. Hastie explained the alternative proposed by Dr. Mark Powell (use of co-occurrence ratios from trawl surveys) was discussed by the GMT in August. The GMT was asked to consider Dr. Powell's proposal and recommend whether the SSC should review it during the September Council meeting. He stated the GMT did not recommend it be put on the SSC agenda for September and it was subsequently left off the SSC agenda. Mr. Waldeck confirmed that. Mr. Robinson thought it would be prudent to get this issue before the SSC in September given the recent NRDC lawsuit. Mr. Waldeck thought that could be accomplished given one issue recently dropped off the September SSC agenda. Dr. Hastie explained there is no data for independently estimating discard rates for Monterey and Conception fisheries. Mr. Boydstun stated CDFG may have some spot prawn trawl data that could be useful for these southern areas.

Mr. Robinson stated we have three major management areas we need to focus our attention: DTS complex, shelf rockfish, and slope rockfish. He added there are also problems with bocaccio we need to address. Dr. Hastie explained our DTL fisheries need to be evaluated. Line fishers are targeting yelloweye and sablefish, both species are on the hot list. Dr. Hastie thought we might need to turn off all the shelf rockfish trip limits. Mr. Robinson wondered whether it made sense to consider seasons. Dr. Hastie agreed it might be better to use shelf rockfish to accommodate bycatch in fixed gear fisheries targeting sablefish for instance. This still leaves the open access fisheries in limbo where there are only DTL opportunities.

Mr. Anderson and Mr. Bohn left for a conference call. The rest of the group discussed options for 2002 DTS and shelf fisheries. Ms. Cooney recommended there be careful consideration of discard rates assumed for any management option considered.

The meeting was adjourned at 4:30 p.m..

<u>TUESDAY, AUGUST 28, 2001 - 8 A.M.</u>

Members present:
Mr. Phil Anderson, Washington Department of Fish and Wildlife
Mr. Burnie Bohn, Oregon Department of Fish and Wildlife
Mr. LB Boydstun, California Department of Fish and Game
Mr. Bill Robinson, National Marine Fisheries Service

Others present:
Ms. Eileen Cooney, General Counsel, National Oceanic and Atmospheric Administration
Dr. Jim Hastie, National Marine Fisheries Service Northwest Fisheries Science Center
Mr. Brian Culver, Washington Department of Fish and Wildlife
Mr. Mark Saelens, Oregon Department of Fish and Wildlife
Mr. Don Bodenmiller, Oregon Department of Fish and Wildlife
Mr. Jim Golden, Oregon Department of Fish and Wildlife
Mr. Dave Thomas, California Department of Fish and Game
Ms. Marija Vojkovich, California Department of Fish and Game
Mr. Wade Van Buskirk, Pacific States Marine Fisheries Commission
Mr. Rod Moore, West Coast Seafood Processors Association
Mr. Steve Bodnar, Coos Bay Trawlers Association
Mr. Vidar Wespestad, Pacific Whiting Conservation Cooperative
Mr. Gary Frederic
Mr. Dan Waldeck, Staff Officer, Pacific Fishery Management Council
Mr. John DeVore, Staff Officer, Pacific Fishery Management Council

G. Specifications and Management Options for 2002, (continued)

3. Development of Management Alternatives
    - Limited entry
    - Open access
    - Recreational

Mr. Anderson called the meeting to order at 8:15 a.m..

Dr. Hastie presented an overview of 2001 commercial landings and 2002 allocations for overfished species and respective complexes. Data were stratified by month indicating seasonal patterns of landings for some species. The overview also depicted low and high monthly average landings for 2002 based on the GMT recommendations for Dover, TWL sablefish, shortspine thornyheads, darkblotched rockfish, POP, widow rockfish, canary rockfish, bocaccio, and north nearshore rockfish. For Dover sole, the 2001 management scheme was to frontload catches to keep effort off the shelf early. With lower limits in 2002, this strategy would fail to provide for summer flatfish opportunity. Trawl sablefish in 2002 could sustain a low and high average monthly landing of 100 mt-140 mt (down from the 2001 monthly averages). The Committee should consider a seasonal structure for this fishery. Shortspine thornyheads are not a problem and we may be able to offer slightly higher limits in 2002. Darkblotched rockfish limits will be similar in 2002 as in 2001. Separate limits for darkblotched could be considered if segregation of darkblotched from other slope species could be demonstrated. POP management strategy in 2001 was to offer higher summer limits. We may be able sustain higher limits through the year in 2002. Widow rockfish will be dramatically lower in 2002 (30 mt to 40 mt per month versus 86 mt-213 mt per month in 2001). The shoreside whiting fishery will be directly affected. There might be an ability to craft a summer midwater fishery for yellowtail with some of the widow OY. Canary rockfish can only sustain about 3 mt per month. Canary rockfish will require further constraint of directed line fisheries and recreational fisheries. Most small footrope tows did not catch canary even when limits were higher. The concern is the incidental high catch of canary in flatfish tows. How well can fishermen stay off canary? Mr. Culver said we need to pay attention to midwater trawl fisheries and bycatch of canary. Dr. Hastie said he would analyze (next week) individual attainment of canary, bocaccio, and widow in flatfish fisheries. The 300 pounds per month limits in place for canary after April in 2001 realized higher monthly limits (4 mt-15 mt) than the 3 mt proposed for 2002. Mr. Robinson mentioned the NRDC 3 lawsuit that hasn't been adjudicated yet. This lawsuit, unlike NRDC 1 and 2, deals with substance, not process. The heart of it is the claim that discard increases as trip limits are cranked down. He recommends an alternate strategy to reduce fishing mortality on canary rockfish than lowering limits. Perhaps a seasonal management structure should be considered. This is also appropriate strategy given the need to analyze prudent alternative management regimes. Mr. Anderson thought it wise to look at the effect of reduced trip limits first and then consider alternative regimes. Mr. Robinson thought that was reasonable. Mr. Saelens agreed Dr. Hastie's exercise was a good way to illustrate the potential shortcomings of status quo management. He urged the Committee and Council to document all that is considered when shaping management strategies. Dr. Hastie said trip limit reductions and the effect on discard is more complex than the linear formula claimed in NRDC 3. The true effect should be put in context of how fisheries are prosecuted, relative abundance of overfished species, etc. Bocaccio landings will be sensitive to the rebuilding paradox where efforts to craft management measures to avoid bocaccio will get increasingly more difficult as the 98 year class recruits to fisheries. North nearshore rockfish will only be able to sustain 15 mt-32 mt per month which is less than realized in summer 2001 fisheries. A seasonal management regime may be appropriate for this complex. We may want to consider a pooled limited entry (LE) and open access (OA) limit much as was done in 2001, although we couldn't accommodate the inseason increase adopted this year. Perhaps the 3,000 pound landing limit that was adopted for the beginning of 2001 would be appropriate for the entire 2002 season.

Dr. Hastie ran some PacFIN runs for 2001 landings of canary, bocaccio, and yelloweye by gear type. Line gear accounts for 89% of the yelloweye commercial landings. Trawl gear accounts for the majority of canary commercial catch (46.5%) and bocaccio (78%). Finfish excluders in the shrimp fishery might be able to reduce canary catch by about 15 mt, but may not be helpful to reduce bocaccio landings. Mr. Boydstun asked if species associations by gear type could be analyzed relative to bocaccio landings. He wanted to distinguish chilipepper targeting and bocaccio landings in California. Dr. Hastie said logbook data is not available, but he could look at coincident landings and provide the summary data by the September Council meeting. Mr. Boydstun wondered if he could get a time series of species landings by gear type. Dr. Hastie said these strata can be summarized separately in PacFIN, but not both together. Canary landings in OA fisheries will surpass the 2001 allocation despite the mandate to use bycatch reduction devices (BRDs) in Washington and Oregon (beginning in August).

Mr. Anderson recommended the Committee focus on developing a broad recommendation to the Council and avoid specificity since the GMT and GAP can work that out. One thought is to develop two or more management approaches. These would include trip limit reductions and a year-round fishery (status quo) and one or more principle alternatives. Trip limit management principles may include 1) when making a trip adjustment for a specific species, adjust the trip limits for each species taken in the complex as required to minimize discard mortality, and 2) consider and adjust, if appropriate, the bycatch rate for each of the species taken in the strategy. Mr. Robinson suggested we also consider recommendations for managing recreational fisheries. One principle to consider would be management measures must have a high probability of staying within prescribed catch levels. Mr. Boydstun thought we should also address directed fisheries for other species that catch overfished species. Mr. Anderson thought that was addressed in trip limit management principle number one (listed above). Mr. Robinson wondered if trip limit adjustment could be effective if fisheries are not selective. Mr. Moore related that midwater fishers have stated they can be selective most of the time. Mr. Frederic said there is a point of economic diminishing returns where, if trip limits are too low, fishers won't even fish. This also exacerbates processing capability since processors won't stay open if they don't get enough product. Trip limit adjustment may not be better than a seasonal structure. Mr. Robinson wondered if it would be better to have a smaller limit for a longer period of time or a larger limit for a smaller period of time. Mr. Frederic thought a larger limit for a shorter period of time would be better. Mr. Culver thought scaling gear to available limits should be considered (i.e., smaller trawls for smaller limits). Mr. Culver also thought continued work with selective flatfish trawls should be pursued. Mr. Moore remarked that when a product is pulled out of the market, they can't get back in. Therefore, seasonal management would be disastrous to marketing and processing capability.

Mr. Anderson thought allocation principles should address which species should be considered in the recommendation. Mr. Boydstun agreed and stated yelloweye allocation would be a new issue. Recreational set asides: lingcod 320 mt, canary 44 mt, bocaccio 52 mt (Mendocino south), yelloweye . Mr. Boydstun asked if the proposed yelloweye OY is 11 mt. Dr. Hastie confirmed that was the recommendation from the stock assessment author (Mr. Farron Wallace) and the GMT. The nearshore rockfish recreational catches in 2001 were 575 mt in the north and 550 mt in the south. The 2002 recommendation for the nearshore rockfish recreational set aside is 800 mt in the north and 400 mt in the south. This set aside would potentially accommodate a recreational fishery like we had in 2001. Mr. Boydstun asked the Committee to recommend improved real time data quality in the MRFSS data estimation system. Mr. Boydstun also wanted the Committee to identify the major challenges in Pacific Coast groundfish management. One example is the increasing demographics on the West Coast and the corresponding increase in recreational effort and catch. Other examples were offered and incorporated in the recommendations listed below.

Mr. Frederic expressed frustration there has been a past expectation of minor adjustments in sablefish OYs and that, instead, there are continued cuts in yields. Economic contracts have been made based on this expectation, and fishermen are losing by "a death of a thousand cuts." Mr. Anderson said, with the uncertainty in environmental regime shifts that affect productivity of long-lived species, these types of management changes are inevitable. This is part of making a living off a natural resource. The regime shift we observed in the 1990s was significant and certainly affects how we manage. Dr. Hastie said that sustainable yields can be shaped within these environmental shifts that affected recruitment, but they have to be conservative.

Mr. Boydstun wanted to know if Dr. Hastie was intending to review bocaccio discard rates. Dr. Hastie said much depended on the Scientific and Statistical Committee (SSC) accepting the analyses he is providing for the September Council meeting. Dr. Hastie gave an overview of the two analyses he developed. The continued use of 16% discard rate was not specifically addressed at the last GMT meeting. There may be limited opportunity for the GMT to discuss this at the September Council meeting. Mr. Culver remarked the GMT did endorse the use of the new Observer Program as the superior methodology, although that data will not be immediately available. Mr. Boydstun stated the bocaccio discard/bycatch rate assumptions and rationale need to be on the Council screen when adopting management measures in October/November. Dr. Hastie explained lingcod discard/bycatch rates were not derived from the Pikitch study. Mr. Saelens said the rationale for the lingcod discard rate assumption was previously put in the Council record.

Mr. Anderson turned the Committee's attention to yelloweye allocation. Dr. Hastie said at least 2 mt of yelloweye should probably be allocated to commercial fisheries. Trawl fisheries take about 1 mt, and there is some incidental catch in sablefish line gear fisheries. Dr. Hastie thought, with smaller sablefish limits, fishermen will more likely fish the shelf than the slope to target sablefish which would exacerbate yelloweye bycatch. Mr. Bohn, regarding recreational fishery management, stated there is a huge difference in how the states shape recreational fisheries if the allocation is 2 mt versus 9 mt. Mr. Anderson asked where the 4 mt-11 mt range of OYs for yelloweye came from. Dr. Hastie explained there was uncertainty with the GMT as to projected recruitment of yelloweye in the north. The 4 mt-11 mt seemed to capture the most reasonable range of OYs given the data available. Mr. Anderson thought we should use a range of recreational yelloweye OYs of 2 mt-9 mt and keep talking as better data becomes available.

Mr. Anderson wanted to dedicate time to discuss alternative management measures for 2002. He also wanted to discuss canary catches in 2001. It is expected the recreational fishery will exceed the canary allocation this year. The Committee also needs to provide direction and comment on draft rebuilding plans.

Mr. Moore stated the GAP has recommended in the past that the Council needs to go through a formal allocation process between gear types and between commercial and recreational fisheries. Mr. Robinson thought it a difficult task to reconcile all of the recommendations of the Committee. It may be possible to compress fishing seasons and still meet most of the challenges outlined. Mr. Boydstun wondered why the idea of fishing seasons does not go forward. Mr. Moore said seasons work well for select fisheries like the live-fish fishery, but doesn't work for much of the groundfish market where there is continual market demand. Ms. Cooney thought the concept of platooning could work. Mr. Frederic stated market demand varies regionally. Mr. Moore agreed. Mr. Boydstun wondered if regional differences could be accommodated. Mr. Anderson thought seasonal opportunities might work for some fishing sectors, but may not work for others. Mr. Moore agreed and thought the concept of fishing cooperatives was a good example where it might work well. Mr. Frederic explained seasons should be different in northern and southern areas due to weather considerations. Mr. Robinson asked about full retention of rockfish. There was a general summary of the August 6 full retention meeting. The bottom line was a pilot full retention program is recommended for implementation as the Observer Program gets underway. Results of ongoing exempted fishing permit (EFP) fisheries should also give us good information on how we can implement full retention measures. Mr. Bodnar wondered where the observers for EFP fisheries would come from. He expects, with the limited fishing opportunities available, there would be interest in EFP fisheries. Mr. Culver explained that observers can be funded within the EFP fishery with some of the proceeds derived from the fishery being dedicated to fund observers. Mr. Bohn thought there may be some trepidation by fishers to participate in EFPs since there is much Council scrutiny of EFP fisheries. However, he thought it was a sound strategy the Committee should recommend. Mr. Bodnar thought there was little likelihood of getting a buyback program in place anytime soon. He urged some relief in the form of permit stacking to keep the industry from going under until Congress funds buyback. Mr. Robinson explained the Council put permit stacking below the line temporarily and it is still on the Council screen. Mr. Culver reiterated the need to pursue gear specifications. Mr. Anderson and Mr. Bohn thought that was implicit in the EFP recommendation. Mr. Frederic wants to the Committee to consider individual fishing quotas (IFQs). Mr. Anderson said that tool was not available to us. Mr. Robinson thought IFQs make more sense with the restrictions we are looking at. Mr. Anderson stated the Strategic Plan called for implementation of voluntary permit stacking first, buyback second, and then consideration of measures such as IFQs.

The Committee discussed canary rockfish allocation and 2001 catches. The 2001 allocation was 5 mt for research, 44 mt for recreational fisheries, and 44 mt for commercial fisheries of which 39 mt represents the total catch OY. The current catch estimates are 5 mt for research (assumed), 22 mt for recreational fisheries through June (2 mt in Washington, 5 mt in Oregon, and 15 mt in northern California), and 39 mt in commercial fisheries through August 16. Mr. Anderson asked Dr. Hastie if there were inseason adjustments that could be considered to reduce canary take. Dr. Hastie replied that reducing line fishery opportunities to reduce yelloweye catch should dampen canary catch as well. Mr. Frederic thought, as sablefish move offshore in the fall, these fisheries will move off the shelf, and thereby reduce canary take. Mr. Anderson thought it possible both recreational and commercial fisheries could end up with 50 mt each, resulting in exceeding the canary OY by about 10 mt. Mr. Boydstun questioned the 15 mt estimate for northern California recreational fisheries. Mr. Thomas and Dr. Hastie thought the estimate and California recreational catch projection to be reasonable. Mr. Van Buskirk explained the bocaccio catch estimate was high due to the fact charter observations were not made earlier in the year after California regulation changes. He also explained there was a potential bias in the phone survey which could have resulted in overestimates of California recreational catches. The new methodology will probably result in reduced estimates that may be available by October 1. Unfortunately, the new survey estimates will not have time to be validated when they first become available. The best projection of 2001 canary catch, given Mr. Van Buskirk's judgement, is a total annual recreational catch of 3 mt in Washington, 16 mt in Oregon, and 32 mt in California for a total of 51 mt. Combined with a commercial catch projection of 50 mt, total catch would be 101 mt (best case). Mr. Robinson remarked we are still over the rebuilding objective for 2001. Mr. Bohn asked whether we would still be on the constant catch rebuilding trajectory with this catch. Dr. Hastie said it is a zero sum game where the overage would have to be made up in the future with reduced catches. Mr. Culver said the target would be even harder to achieve next year. Mr. Boydstun said that the California Fish and Game Commission will meet again in early October and could consider management changes for canary and bocaccio. They will make every effort to obtain the best catch projections possible and react accordingly. Mr. Robinson thought it best to take care of the canary problem inseason this year rather than bite two bullets next year. Ms. Cooney agreed immediate action would be the best strategy.

Committee Recommendations

Allocation
1) The Committee endorses the current (2001) allocation of species taken in both commercial and recreational fisheries.
2) Recreational set asides:
   lingcod: 320 mt
   canary: 44 mt
   bocaccio: 52 mt (Mendocino south)
   yelloweye: total (recreational plus commercial) 4 mt-11 mt
      * Manage commercial fisheries for discard mortality (2 mt)
      * Manage recreational fisheries for minimal incidental catch (2 mt-9 mt).
   nearshore rockfish:
      * North: 575 mt (2001), 800 mt (2002)
      * South: 550 mt (2001), 400 mt (2002)

Management Principles
1) Management measures must have a high probability of keeping total mortalities within the harvest ceiling.
2) When making a trip adjustment for a specific species, adjust the trip limits for each species taken in the complex as required to minimize discard mortality.
3) Consider and adjust, if appropriate, the bycatch assumptions for each of the species taken in commercial and recreational fishing strategies.

Data Quality
1) Incorporate estimates derived from the California/MRFSS Commercial Passenger Fishing Vessels Effort Program as soon as possible.
2) Reconcile and incorporate the Oregon Sampling Program data into the RecFIN database by 2002.

Major Management Challenges
1) Keeping recreational harvests within harvest guidelines (eg.,bocaccio, yelloweye).
2) Managing the yellowtail and widow rockfish complex.
3) Accounting for effort shifts in recreational and commercial fisheries from the shelf to nearshore species.
4) Managing the shelf line fishery, including the DTL fishery, to stay within rockfish harvest levels (eg., yelloweye, sablefish allocation [primary versus DTL]).
5) Providing economically viable trip limits while maintaining a year round fishery.
6) Document rationale used to support discard rates (eg., 16% for bocaccio).
7) Reducing harvest capacity.

Alternate Management Strategies
1) Consider shorter timeframes for each fishing sector (eg., longline, trawl, OA) that results in an increase in the economic benefit to the fishing industry and that minimizes bycatch mortalities.
2) Consider additional EFPs that provide individual fishers opportunities to harvest higher quantities of healthy species while staying within specified bycatch limits of depressed species with an observer on board.

H. Recommendations for Draft Rebuilding Plans

Mr. Robinson stated NMFS is working closely with Council staff to produce sound rebuilding plans. He thought the best action of the Committee would be to adopt management measures consistent with rebuilding objectives.

I. Provide Direction to Council Staff, Groundfish Management Team, Groundfish Advisory Subpanel, and Other Council Entities

Mr. Anderson asked how these meeting minutes would be entered in the record. Mr. DeVore stated these would be a supplemental attachment to the briefing book, and Committee members would get a chance to review them for accuracy prior to finalization. Mr. Boydstun asked Mr. Bohn if ODFW was contemplating inseason changes. Mr. Bohn said they were considering changes. Mr. Boydstun asked if they could be apprized of these changes prior to the Council meeting. Mr. Bohn agreed.

The meeting was adjourned at 1 p.m..

PFMC
09/06/01

Received 9-14-01

GROUNDFISH ADVISORY SUBPANEL AND GROUNDFISH MANAGEMENT TEAM REPORT ON STATUS OF FISHERIES AND INSEASON ADJUSTMENTS

Trawl
Dover sole, sablefish, longspine, shortspine - no retention after October 1, 2001; discard mortality rates in the petrale fishery will be assumed as follows:

Dover sole	.8%
Sablefish	5.0%
Shortspine	.5%

For other flatfish discard

Dover sole	.5%
Sablefish	.012%
Shortspine	.1%

Minor northern slope rockfish - no retention after October 1st

Pacific Ocean perch - no retention after October 1st

Other flatfish (small footrope) (large footrope)	- 30,000 lbs/month starting October 1st - 1,000/trip starting October 1sr
Petrale (large and small footrope)	- 30,000 lbs/month starting October 1st
Arrowtooth	- 5000 lbs./trip with monthly limit of 30,000 pounds starting October 1st
Lingcod	- 500 lb/month in October; no retention thereafter
Widow rockfish	- midwater fishery remains closed in October, 25,000 lb/2month midwater fishery November/December
Yellowtail rockfish	- midwater fishery remains closed in October, midwater fishery 15,000 lb/2 month November/December to provide incidental catch in the widow rockfish fishery
Yellowtail as flatfish bycatch	- per trip limit ~~of~~ yellowtail in the 33% of flatfish (except Arrowtooth) by weight plus 10% by weight of Arrowtooth fishery not to exceed 7500 lbs/trip, up to 15,000 pounds /2 months
Minor slope rockfish	- current limits south of Mendocino, no retention north of Mendocino after October 1st
Splitnose rockfish	- current limits apply
Chilipepper rockfish	- current limits apply to midwater gear; 5000 lbs/2 months November/December using small footrope
Minor shelf rockfish	- north 300 lbs/month; south 500 lbs/month starting October 1st
Minor nearshore rockfish	- current limits apply north and south
Bocaccio	- no retention ~~after~~ starting October 1st

Fixed Gear

Non-trawl sablefish	- current limits apply to both limited entry and open access
Canary rockfish	- no retention starting October 1st
Northern nearshore rockfish	- 2,000 lb /month starting October 1st, no more than 800 lbs of which may be species other than black or blue rockfish (limited entry and open access)
Lingcod	- 500 lbs/month in October, no retention thereafter (limited entry and open access)
Northern slope rockfish	- current limits apply (limited entry); open access no retention starting October 1st
Pacific Ocean perch	- no retention starting October 1st (limited entry and open access)
Northern shelf rockfish	- no retention starting October 1st (limited entry and open access)
Southern shelf rockfish	- no retention starting October 1st (limited entry & open access)
Southern nearshore rockfish	- 3,000 lbs / 2 months starting November 1st (limited entry and open access)
~~Lingcod~~	~~- 500 lbs/month October, n retention thereafter~~ in there twice
Bocaccio	- no retention starting October 1st
Chilipepper	- no retention starting October 1st both gears
Bocaccio south of Pt Conception	- no retention starting October 1st (limited entry and open access)
Chilipepper south of Pt. Conception	- no retention starting October 1st both gears
Minor shelf rock south of Pt Conception	- no retention starting October 1st (limited entry and open access)
Sablefish south of Pt Conception	- current limits apply
Shortspine south ~~o~~ of Pt Conception	- current limits apply

FOR ALL GEARS, BOTH LIMITED ENTRY AND OPEN ACCESS, CURRENT REGULATIONS APPLY UNLESS CHANGE NOTED ABOVE

Recommended trip limit changes for October-December 2001

	Landed catch allocations		Landings thru August		Proj. landings thru September			Current schedule		Proposed	
	original	revised	mts	% of orig.	mts	% of rev.		Oct.	Nov.-Dec.	Oct.	Nov.-Dec.
Trawl											
With shift of sablefish from the Fixed-gear DTL fisheries											
Dover sole	7,293	7,600	6,707	**92.0%**	7,307	**96.1%**	South ->	15,000 lb/mo		2,300 lb/mo	
							North ->	7,500 lb/mo		1,500 lb/mo	
Longspine THDS	2,043		1,047	51.2%	1,187	58.1%		6,000 lb/2 mo		6,000 lb/2 mo	500 lb/mo
Shortspine THDS	546		435	**79.7%**	490	89.7%		1,500 lb/2 mo		1,500 lb/2 mo	400 lb/mo
TWL Sable (V&C&E&M)	2,534	[2,730]	2,255	**89.0%**	2,605	**95.4%**		11-14,000 lb/2 mo		11-14,000 lb/2 mo	1,500 lb/mo
North Slope rockfish	975		150	15.4%	170	17.4%		2,000 lb/2 mo		2,000 lb/2 mo	300 lb/mo
Darkblotched Rockfish	106		96	**90.6%**	107	**100.9%**					
POP (V&C&E)	255		137	53.7%	157	61.6%		3,500 lb mo	1,500 lb/mo	1,500 lb/mo	
Other flatfish - sm. Footrope			New limits to be applied coastwide					45,000 lb/mo	No limit	30,000 lb/mo	
large footrope								1,000/trip		1,000/trip	
Petrale - sm. Footrope								sub-lim. 15,000	No limit		
large footrope								100 lb/trip	No limit	30,000 lb/mo	
Arrowtooth - sm. Footrope								7,500/trip			
large footrope								5,000/trip to 30,000/mo	20,000 lb/trip	5,000/trip to 30,000/mo	
Lingcod	201		140	55.8%	170	84.6%		400 lb mo	No retention	500 lb mo	No retention
Widow Rockfish (mid-water)	1,699	1,770	1,117	65.7%	1,132	64.0%	No MW, July-to-Sept.	10,000 lb/mo	10,000 lb/2 mo	No midwater	
Yellowtail (V&C&E) (mid-water)	2,066	2,560	1,498	72.5%	1,548	60.5%		15,000 lb/mo	20,000 lb/2 mo	No midwater	
or										**V range V**	
Widow Rockfish (mid-water)										Scheduled increases	
Yellowtail (V&C&E) (mid-water)										Scheduled increases	
Without shift of sablefish from the Fixed-gear DTL fisheries											
Widow Rockfish (mid-water)	1,699	1,770	1,117	65.7%	1,132	64.0%	No MW, July-to-Sept.	10,000 lb/mo	10,000 lb/2 mo	No midwater	
Yellowtail (V&C&E) (mid-water)	2,066	2,560	1,498	72.5%	1,548	60.5%		15,000 lb/mo	20,000 lb/2 mo	No midwater	
or										**V range V**	
Widow Rockfish (mid-water)										Scheduled increases	
Yellowtail (V&C&E) (mid-water)										Scheduled increases	
TWL Sable (V&C&E&M)	2,534		2,255	**89.0%**	2,605	**102.8%**				**Closure of all other trawl limits beginning October 1**	

motion 19 Bob Alverson

Recommended trip limit changes for October-December 2001

	Landed catch allocations		Landings thru August		Proj. landings thru September		Current schedule		Proposed	
	original	revised	mts	% of orig.	mts	% of rev.	Oct.	Nov.-Dec.	Oct.	Nov.-Dec.
Limited Entry Fixed-gear and Open Access										
With shift of sablefish Trawl									range	
NTW Sable (V&C&E&M)	877.3	681.3	450	51%	540	79%	300 lb/day or		300 lb/day (no weekly option)	
LE	342		160	47%			900 once/wk: 1,800 lb/mo		up to 1,800 lb/mo	
OA	535		290	54%			800 once/wk: 2,400 lb/mo		up to 1,800 lb/mo	
or										
Without shift of sablefish Trawl									-- to: **no change**; to: --	
NTW Sable (V&C&E&M)	877.3		450	51%	540	62%	300 lb/day or		300 lb/day or	
LE	342		160	47%			900 once/wk: 1,800 lb/mo		1,100 once/wk: 2,200 lb/mo	
OA	535		290	54%			800 once/wk: 2,400 lb/mo		900 once/wk: 2,700 lb/mo	
Canary Rockfish (LE+OA)									No retention	
North of 40°10'										
North Near-shore RF (LE+OA)	402	200	243	60%	268	134%				
LE							7,000 lb/2 mo (4,000)		Closed	Evaluate July-
OA							7,000 lb/2 mo (900)		Closed	Aug. sport lbs
Lingcod (LE+OA)									No retention	
Widow Rockfish (LE+OA)									No retention	
Yellowtail (V&C&E) (LE+OA)									No retention	
North Shelf rockfish (LE+OA)									No retention	
or									**V range V**	
North Near-shore RF (LE+OA)	402	200	243	60%	268	134%				
LE							7,000 lb/2 mo (4,000)		2,000 lb/mo	
OA							7,000 lb/2 mo (900)		2,000 lb/mo	
Lingcod (LE+OA)									500 lb/mo	No retention
North Shelf rockfish + widow +yellowtail (LE+OA)									200 lb/mo (no yelloweye retention)	
South of 40°10'										
South Near-shore RF	106	206	71	67%	81	39%				
LE							2,000 lb/2 mo		3,000 lb/2 mo	
OA							1,200 lb/2 mo		3,000 lb/2 mo	
Lingcod (LE+OA)									500 lb/mo	No retention
South Shelf rockfish + widow (LE+OA)									200 lb/mo (no yelloweye retention)	
Bocaccio (LE+OA)									No retention	
Chilipepper (LE+OA)									No retention	
South of Pt. Conception [if bocaccio attainment is not an issue]										
Bocaccio (LE)							500 lb/mo	300 lb/mo	300 lb/mo	
Bocaccio (OA)							200 lb/mo		200 lb/mo	
Chillipepper (LE+OA)							2,500 lb/mo		500 lb/mo	
Minor Shelf rockfish (LE)							1,000 lb/mo	500 lb/mo	500 lb/mo	
Minor Shelf rockfish (OA)							200 lb/mo		200 lb/mo	

Total-fleet QSM: 2001

	State distribution of tonnage thru August 18				2000 Thru	Cumulative tonnage through								Individual months							Annual Allo-	Landings thru Aug	
	WA	OR	CA	Total	August	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Feb	Mar	Apr	May	Jun	Jul	Aug	cation	mts	% of ann.
Dover sole	642	3,422	2,643	6,707	6,157	633	1,490	2,499	3,749	4,546	5,406	6,101	6,707	857	1,009	1,250	797	860	695	606	7,293	6,707	**92.0%**
Longspine THDS	14	481	552	1,047	1,133	74	174	316	430	592	744	910	1,047	100	142	114	162	152	166	137	2,043	1,047	51.2%
Shortspine THDS	32	190	213	435	476	44	87	146	191	268	323	384	435	43	59	45	77	55	61	51	546	435	**79.7%**
TWL Sable (V&C&E&M)	207	1,149	899	2,255	1,543	107	216	378	531	932	1,414	1,885	2,255	109	162	153	401	482	471	370	2,534	2,255	**89.0%**
NTW Sable (V&C&E&M)	241	87	469	797	2,163	17	30	57	83	126	197	333	797	13	27	26	43	71	136	464	877	797	90.8%
Sablefish Conception			113	113	79	8	14	27	35	43	73	104	113	6	13	8	8	30	31	9	(DTL) 212	113	53.3%
Lingcod	19	46	75	140	119	0	0	2	2	33	86	106	140	0	2	0	31	53	20	34	251	140	55.8%
Widow Rockfish	165	729	223	1,117	1,880	171	393	593	851	962	1,086	1,105	1,117	222	200	258	111	124	19	12	1,699	1,117	65.7%
Darkblotched Rockfish	5	51	40	96	155	10	22	33	47	60	72	85	96	12	11	14	13	12	13	11	106	96	**90.6%**
Canary Rockfish	6	17	18	41	40	0	1	4	5	11	20	35	41	1	3	1	6	9	15	6	35	41	**117.1%**
POP (V&C&E)	37	100		137	79	11	24	35	46	63	93	122	137	13	11	11	17	30	29	15	255	137	53.7%
Yellowtail (V&C&E)	564	893	41	1,498	1,494	161	403	688	1,015	1,137	1,338	1,457	1,498	242	285	327	122	201	119	41	2,066	1,498	72.5%
North Near-shore RF		130	113	243	109	8	21	43	77	123	180	219	243	13	22	34	46	57	39	24	402	243	60.4%
North Shelf rockfish	36	29	29	94	84	2	4	9	24	38	66	75	94	2	5	15	14	28	9	19	774	94	12.1%
North Slope rockfish	35	91	24	150	254	17	31	46	65	98	118	132	150	14	15	19	33	20	14	18	975	150	15.4%
(V&C&E) UNSP RCKFSH	2		1	3	33	0	0	0	2	3	3	3	3	0	0	2	1	0	0	0		3	
Bocaccio (MT&CP)			21	21	14	1	3	5	6	9	10	17	21	2	2	1	3	1	7	4	40	21	52.5%
Chilipepper (MT&CP)			298	298	243	18	49	66	82	201	241	257	298	31	17	16	119	40	16	41	1,808	298	16.5%
Splitnose RF (MT&CP)			42	42	41	5	9	15	20	23	30	36	42	4	6	5	3	7	6	6	387	42	10.9%
South Near-shore RF			71	71	90	7	17	20	23	34	44	62	71	10	3	3	11	10	18	9	106	71	67.0%
South Shelf rockfish			16	16	52	2	5	7	8	11	12	13	16	3	2	1	3	1	1	3	285	16	5.6%
South Slope rockfish			158	158	98	14	31	50	66	82	100	131	158	17	19	16	16	18	31	27	529	158	29.9%
(MT&CP) UNSP RCKFSH			3	3	8	0	0	0	1	1	1	3	3	0	0	1	0	0	2	0		3	

Limited-entry QSM: 2001

	State distribution of tonnage thru July				2000 Thru July	Cumulative tonnage through								Individual months							Annual Allo-cation	Landings thru July	
	WA	OR	CA	Total		Jan	Feb	Mar	Apr	May	Jun	Jul	%	Feb	Mar	Apr	May	Jun	Jul	Aug		mts	% of ann.
Dover sole	607	3,285	2,187	6,079	5,637	633	1,489	2,499	3,747	4,542	5,397	6,079	100%	856	1,010	1,248	795	855	682		7,293	6,079	83.4%
Longspine THDS	14	451	437	902	1,052	72	170	312	425	587	739	902	99%	98	142	113	162	152	163		2,043	902	44.2%
Shortspine THDS	22	177	178	377	416	44	87	145	187	264	319	377	98%	43	58	42	77	55	58		546	377	69.0%
TWL Sable (V&C&E&M)	168	991	709	1,868	1,362	107	216	378	530	932	1,408	1,868	99%	109	162	152	402	476	460		2,534	1,868	73.7%
NTW Sable (V&C&E&M)	41	26	58	125	72	3	10	18	30	47	71	125	38%	7	8	12	17	24	54		342 (DTL)	125	36.5%
Sablefish Conception			84	84	55	5	10	19	26	32	48	84	81%	5	9	7	6	16	36		0		
Lingcod	8	16	35	59	44	0	0	0	0	16	49	59	56%	0	0	0	16	33	10		203	59	29.1%
Widow Rockfish	152	718	213	1,083	1,622	160	379	579	834	941	1,064	1,083	98%	219	200	255	107	123	19		1,631	1,083	66.4%
Darblotched Rockfish	4	50	40	94	141	10	22	33	47	60	72	84	99%	12	11	14	13	22	12		103	94	91.3%
Canary Rockfish	2	14	10	26	25	0	1	1	4	7	14	26	74%	1	0	3	3	7	12		30	26	86.7%
POP (V&C&E)	29	93		122	71	10	23	34	46	63	93	122	100%	13	11	12	17	30	29		255	122	47.8%
Yellowtail (V&C&E)	461	848	39	1,348	1,131	147	370	649	957	1,056	1,249	1,348	93%	223	279	308	99	193	99		1,810	1,348	74.5%
North Near-shore RF		30	21	51	16	3	9	15	24	32	43	51	23%	6	6	9	8	11	8		211	51	24.2%
North Shelf rockfish	15	21	22	58	67	2	4	6	16	28	54	58	77%	2	2	10	12	26	4		740	58	7.8%
North Slope rockfish	22	85	16	123	181	17	30	44	59	91	110	123	93%	13	14	15	32	19	13		968	123	12.7%
(V&C&E) UNSP RCKFSH			1	1	7	0	0	0	1	1	1	1	33%	0	0	1	0	0	0				
Bocaccio (MT&CP)			14	14	9	1	2	3	4	7	8	14	82%	1	1	1	3	1	6		29	14	48.3%
Chilipepper (MT&CP)			235	235	177	11	35	52	69	186	226	235	91%	24	17	17	117	40	9		929	235	25.3%
Splitnose RF (MT&CP)			36	36	35	5	9	15	20	23	30	36	100%	4	6	5	3	7	6		387	36	9.3%
South Near-shore RF			5	5	8	1	1	2	3	3	3	5	8%	0	1	1	0	0	2		32	5	15.6%
South Shelf rockfish			9	9	34	2	3	4	6	8	8	9	69%	1	1	2	2	0	1		109	9	8.3%
South Slope rockfish			120	120	70	12	26	44	59	75	93	120	92%	14	18	15	16	18	27		365	120	32.9%
(MT&CP) UNSP RCKFSH					1	0	0	0	0	0	0			0	0	0	0	0					

Open-access QSM: 2001

	State distribution of tonnage thru July				2000 Thru July	Cumulative tonnage through								Individual months							Annual Allo-cation	Landings thru July	
	WA	OR	CA	Total		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Feb	Mar	Apr	May	Jun	Jul	Aug		mts	% of ann.
Dover sole	2	10	10	22	19	0	0	0	2	5	9	22		0	0	2	3	4	13			22	
Longspine THDS			8	8	10	2	4	5	6	6	6	8		2	1	1	0	0	2			8	
Shortspine THDS	3		3	6	20	0	1	2	4	4	4	6		1	1	2	0	0	2		2	6	300.0%
TWL Sable (V&C&E&M)		11	3	14	12	0	0	0	0	0	3	14		0	0	0	0	3	11			14	
NTW Sable (V&C&E&M)	30	24	154	208	93	13	21	39	55	80	128	208		8	18	16	25	48	80		535	208	38.9%
Sablefish Conception			18	18	11	2	4	8	9	10	13	18		2	4	1	1	3	5			18	
Lingcod	6	22	15	43	57	0	0	2	2	15	29	43		0	2	0	13	14	14		48	43	89.6%
Widow Rockfish	13	2	7	22	6	10	14	14	16	21	21	22		4	0	2	5	0	1		68	22	32.4%
Darblotched Rockfish						0	0	0	0	0	0			0	0	0	0	0	0		3		
Canary Rockfish	3	3	2	8	8	0	0	0	1	4	5	8		0	0	1	3	1	3		5	8	160.0%
POP (V&C&E)	1			1		1	1	1	1	1	1	1		0	0	0	0	0	0			1	
Yellowtail (V&C&E)	77	33	1	111	73	14	33	40	56	80	88	111		19	7	16	24	8	23		256	111	43.4%
North Near-shore RF		96	72	168	68	4	13	28	54	92	137	168		9	15	26	38	45	31		181	168	92.8%
North Shelf rockfish	8	2	4	14	6	0	0	3	8	9	11	14		0	3	5	1	2	3		34	14	41.2%
North Slope rockfish	7	1		8	9	0	0	1	6	7	7	8		0	1	5	1	0	1		7	8	114.3%
(V&C&E) UNSP RCKFSH	1			1	17	0	0	0	1	1	1	1		0	0	1	0	0	0			1	
Bocaccio (MT&CP)			3	3	3	1	1	2	2	2	2	3		0	1	0	0	0	1		19	3	15.8%
Chilipepper (MT&CP)			23	23	20	7	13	14	14	15	15	23		6	1	0	1	0	8		879	23	2.6%
Splitnose RF (MT&CP)						0	0	0	0	0	0			0	0	0	0	0					
South Near-shore RF			57	57	52	7	16	17	20	31	41	57		9	1	3	11	10	16		74	57	77.0%
South Shelf rockfish			4	4	12	0	2	2	3	4	5	4		2	0	1	1	1	-1		176	4	2.3%
South Slope rockfish			11	11	2	1	5	7	7	7	8	11		4	2	0	0	1	3		164	11	6.7%
(MT&CP) UNSP RCKFSH			1	1	5	0	0	1	1	1	1	1		0	1	0	0	0	0			1	

National Marine Fisheries Service
Northwest Region

PUBLIC NOTICE

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FOR IMMEDIATE RELEASE: June 27, 2001 NMFS-SEA-01-04

CHANGES TO GROUNDFISH LANDINGS LIMITS OFF WASHINGTON, OREGON, AND CALIFORNIA, EFFECTIVE July 1, 2001

Adjustments to trip limits for groundfish taken off Washington, Oregon, and California are announced by the National Marine Fisheries Service (NMFS). These changes were recommended by the Pacific Fishery Management Council (Council) in consultation with the states of Washington, Oregon, and California, and are **effective July 1, 2001**, unless otherwise specified. These changes are intended to allow fisheries access to groundfish allocations without exceeding the optimum yields for those species, and without negatively affecting overfished and depleted stocks. Trip limit changes are effective July 1, 2001, for the trawl "A" platoon and July 16, 2001, for the "B" platoon.

- The limited entry minor slope rockfish cumulative landing limits for both trawl and fixed gear fisheries will be increased to 25,000 lb (11,340 kg) per two months **south** of 40°10' N. lat. and to 2,000 lb (907 kg) per two months **north** of 40°10' N. lat.

- The limited entry splitnose rockfish cumulative landings limit for both trawl and fixed gear fishery **south** of 40°10' N. lat. will be increased to 25,000 lb (11,340 kg) per two months.

- The limited entry POP cumulative landings limits for both trawl and fixed gear will be increased to 3,500 lb (1,588 kg) per month for the July through October periods, then changed to 1,500 lb (680 kg) per month for the November and December periods.

- The Dover sole limits in both the limited entry trawl and fixed gear fisheries will be reduced to 15,000 lb (6,804 kg) per two months for the area **north** of 40°10' N. lat. and 30,000 lb (13,608 kg) per two months for the area **south** of 40°10' N. lat. For the September through December periods, the two month limits will be converted to monthly limits.

- The structure of **northern** flatfish trawl and fixed gear limits for the July through October periods will be changed. The small footrope trawl limit for flatfish **north** (excluding arrowtooth flounder) is decreased to 45,000 lb (20,412 kg) per month, with a petrale sole sub-limit of no more than 15,000 lb (6,804 kg)of per month. In addition, there will be an arrowtooth flounder **per trip** limit of no more than 7,500 lb (3,402 kg) not to exceed 30,000 lb (13,608 kg) per month. The large footrope limit for arrowtooth flounder remains at 5,000 lb (2,268 kg) **per trip** not to exceed 30,000 lb (13,608 kg) per month. Petrale sole, which has been prohibited with large footrope gear, is increased to 100 lb (45 kg) per trip and all other flatfish remains at 1,000 lb (454 kg) **per trip**. The limited entry fixed gear limits will be the same as the small footrope trawl allowances.

- The mid-water trawl option for widow and yellowtail rockfish **north** will be restructured to the small footrope limit for the July through September periods. The small footrope limits for both species will remain unchanged, 1000 lb (454 kg) for widow and 1,500 lb (680 kg) for yellowtail. To allow for incidental catch of widow and yellowtail rockfish taken during the primary whiting fishery, fishers would be allowed to land cumulative limits that are twice the amount of the small footrope limits, providing that at least 10,000 lb (4,536 kg) of whiting are landed in the same trip. In addition, a per trip limit of 500 lb (227 kg) for widow and yellowtail rockfish combined will apply.

- A once per week delivery option will be re-instated for the limited entry sablefish fisheries **north** of 36° N. lat. Effective July 1 through August 31, the limit will be 300 lb (136 kg) per day or one landing per week up to 900 lb (408 kg), not to exceed 3,600 lb (1,633 kg) per two month period. Beginning on September 1, a monthly limit of 1,800 lb (816 kg) per month will become effective. The landings limits for the open access fisheries north of 36° N. lat. for the July 1 through August 31 period will be 300 lb (136 kg) per day or one landing per week up to 800 lb (363 kg), not to exceed 4,800 lb (2,177 kg) per two month period. Beginning on September 1, a monthly limit of 2,400 lb (1,089 kg) per month will become effective.

An updated set of trip limits tables, effective July 1, 2001, follows.

Table 3. 2001 Trip Limits 1/ and Gear Requirements 2/ for Limited Entry Trawl Gear
Read Section IV.A. NMFS Actions before using this table.

line	Species/groups	JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
	Minor slope rockfish						
	North	1,500 lb/ 2 months			2,000 lb/ 2 months		
3	South	14,000 lb/ 2 months			25,000 lb/ 2 months		
4	**Splitnose - South**	8,500 lb/ 2 months		14,000 lb/ 2 months	25,000 lb/ 2 months		
5	**Pacific ocean perch** 6/	1,500 lb/ month		2,500 lb/ month	3,500 lb/ month		1,500 lb/ month
6	**DTS complex - North**						
7	Sablefish	5,000 lb/ 2 months		14,000 lb/ 2 months			5,000 lb/ 2 months
8	Longspine thornyhead	6,000 lb/ 2 months		6,000 lb/ 2 months			6,000 lb/ 2 months
9	Shortspine thornyhead	1,500 lb/ 2 months		1,500 lb/ 2 months			1,500 lb/ 2 months
10	Dover sole	65,000 lb/ 2 months		20,000 lb/ 2 months	15,000 lb/ 2 months	7,500 lb/ month	
11	**DTS complex - South**						
12	Sablefish	8,000 lb/ 2 months		11,000 lb/ 2 months			8,000 lb/ 2 months
13	Longspine thornyhead	6,000 lb/ 2 months		6,000 lb/ 2 months			6,000 lb/ 2 months
14	Shortspine thornyhead	1,500 lb/ 2 months		1,500 lb/ 2 months			1,500 lb/ 2 months
15	Dover sole	35,000 lb/ 2 months			30,000 lb/ 2 months	15,000 lb/ month	
16	**Flatfish - North**						
17	Arrowtooth flounder	20,000 lb/ trip		Small footrope: 50,000 lb/month, of which no more than 15,000 lb may be petrale sole and 10,000 lb may be arrowtooth; Large footrope: arrowtooth, 15,000 lb/trip for May and 5,000 lb/trip for June; petrale sole, prohibited; all other flatfish, 1,000 lb/trip.	Small footrope: 45,000 lb/month, of which no more than 15,000 lb may be petrale sole; arrowtooth 7,500 lb/trip not to exceed 30,000 lb/month. Large footrope: arrowtooth, 5,000 lb/trip not to exceed 30,000 lb/month; petrale sole 100 lb/trip; all other flatfish, 1,000 lb/trip.		20,000 lb/ trip
18	Petrale sole	No restriction					No restriction
19	Rex sole	No limit					No limit
20	All other flatfish 3/	Small footrope, no limit; large footrope, 1,000 lb/ trip					Small footrope, no limit; large footrope, 1,000 lb/ trip
21	**Flatfish - South**						
22	Arrowtooth flounder	20,000 lb/ trip		small footrope, no limit; large footrope, 5,000 lb/ trip			20,000 lb/ trip
23	Petrale sole	No restriction		No limit (small footrope required)			No restriction
24	Rex sole	No limit					
25	All other flatfish 3/	small footrope, no limit; large footrope, 1,000 lb/ trip					
26	**Whiting shoreside** 4/	20,000 lb/ trip		Primary Season			20,000 lb/ trip
27	**Use of small footrope bottom trawl 5/ or midwater trawl required for landing all of the following species:**						
28	**Minor shelf rockfish**						
29	North	300 lb/ month		1,000 lb/ month			300 lb/ month
30	South	500 lb/ month		1,000 lb/ month			500 lb/ month
31	**Canary rockfish**	100 lb/ month		300 lb/ month			100 lb/ month
32	**Widow rockfish**						
	mid-water trawl	20,000 lb/ 2 months		10,000 lb/ 2 months	July thru September, In trips where 10,000 lb or more of whiting are landed, 2,000 lb/ month, with a combined widow/yellowtail limit of 500 lb per trip, otherwise 1,000 lb/month; October 10,000 lb/month		10,000 lb/ 2 months
34	small footrope trawl	1,000 lb/ month					
35	**Yellowtail - North** 6/						
36	mid-water trawl	30,000 lb/ 2 months		15,000 lb/ 2 months	July thru September, In trips where 10,000 lb or more of whiting are landed, 3,000 lb/ month with a combined widow/yellowtail limit of 500 lb/trip, otherwise 1,500 lb/month; October 15,000 lb/month		20,000 lb/ 2 months
37	small footrope trawl	Without flatfish, 1,500 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, not to exceed 2,500 lb/ trip and 30,000 lb/ 2 months.		Without flatfish, 1,500 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, not to exceed 7,500 lb/ trip and not to exceed 15,000 lb/ 2 months.			Without flatfish, 1,500 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, not to exceed 2,500 lb/ trip and 20,000 lb/ 2 months
38	**Bocaccio - South** 6/	300 lb/ month		500 lb/ month			300 lb/ month
39	**Chilipepper - South** 6/						
40	mid-water trawl	25,000 lb/ 2 months					
41	small footrope trawl	7,500 lb/ 2 months					
42	**Cowcod**	**Retention is Prohibited**					
43	**Minor nearshore rockfish**						
44	North	200 lb/ month					
45	South	200 lb/ month					
46	**Lingcod** 7/	No retention		400 lb/ month			No retention

1/ Trip limits apply coastwide unless otherwise specified. "North" means 40°10' N. lat. To the U.S.-Canada border. "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.
2/ Gear requirements and prohibitions are explained at paragraph IV.A.(14)
3/ "Other" flatfish means all flatfish at 50 CFR 660.302 except those in this Table 3 with a trip limit.
4/ The whiting "per trip" limit in the Eureka area inside 100 fm is 10,000 lb/ trip throughout the year. See IV.B.(3)(c). The 20,000 lb/ trip limit applies before and after the primary season.
5/ Small footrope trawl means a bottom trawl net with a footrope no larger than 8 inches (20 cm) in diameter. Midwater gear also may be used; the footrope must be bare. See paragraph IV.A. (14).
6/ Yellowtail rockfish and POP in the south, and bocaccio, and chilipepper rockfishes in the north are included in the trip limits for minor shelf rockfish in the appropriate area (Table 2).
7/ The size limit for lingcod is 24 inches (61 cm) total length.
To convert pounds to kilograms, divide by 2.20462, the number of pounds in one kilogram.

Table 4. 2001 Trip Limits[1/] for Limited Entry Fixed Gear
Read Section IV.A. NMFS Actions before using this table.

line	Species/groups	JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
1	**Minor slope rockfish**						
2	North	1,500 lb/ 2 months			2,000 lb/ 2 months		
3	South	14,000 lb/ 2 months			25,000 lb/ 2 months		
4	**Splitnose - South**	8,500 lb/ 2months		14,000 lb/ 2 months	25,000 lb/ 2 months		
5	**Pacific ocean perch 5/**	1,500 lb/ month		2,500 lb/ month	3,500 lb/ month		1,500 lb/ month
6	**Sablefish**						
7	North of 36° N. lat.	300 lb/ day, 2,700 lb/ 2 months			300 lb/ day or 1 landing per week up to 900 lb, not to exceed 3,600 lb/ 2 months	300 lb/ day or 1 landing per week up to 900 lb, not to exceed 1,800 lb / month	
8	South of 36° N. lat.	350 lb/ day, or 1 landing per week of up to 1,050 lb					
9	**Longspine thornyhead**	6,000 lb/ 2 months		6,000 lb/ 2 months			6,000 lb/ 2 months
10	**Shortspine thornyhead**	1,500 lb/ 2 months		1,500 lb/ 2 months			1,500 lb/ 2 months
11	**Dover sole**						
12	North	65,000 lb/ 2 months		20,000 lb/ 2 months	15,000 lb/2 months	7,500 lb/ month	
13	South	35,000 lb/ 2 months		35,000 lb/ 2 months	30,000 lb/2 months	15,000 lb/ month	
14	**Flatfish - North**						
15	Arrowtooth flounder	20,000 lb/ trip		30,000 lb/ month for all flatfish except Dover sole	45,000 lb/month, of which no more than 15,000 lb may be petrale sole; arrowtooth no more than 7,500 lb/trip of not to exceed 30,000 lb/month.		20,000 lb/ trip
16	Petrale sole	No restriction					No restriction
17	Rex sole	No limit					No limit
18	All other flatfish 2/	No limit					No limit
19	**Flatfish - South**						
20	Arrowtooth flounder	20,000 lb/ trip		No limit			20,000 lb/ trip
21	Petrale sole	No limit					
22	Rex sole	No limit					
23	All other flatfish 2/	No limit					
24	**Whiting 3/**	20,000 lb/ trip		Primary Season			20,000 lb/ trip
25	**Minor shelf rockfish**						
26	North	300 lb/ month		1,000 lb/ month			300 lb/ month
27	South						
28	40°10' - 34°27' N. lat.	500 lb/ month	CLOSED 4/		1,000 lb/ month		500 lb/ month
29	South of 34°27' N. lat.	CLOSED 4/	500 lb/ month				
30	**Canary rockfish**						
31	North	100 lb/ month		300 lb/ month			100 lb/ month
32	South						
33	40°10' - 34°27' N. lat.	100 lb/ month	CLOSED 4/		300 lb/ month		100 lb/ month
34	South of 34°27' N. lat.	CLOSED 4/	100 lb/ month				
35	**Widow rockfish**						
36	North	3,000 lb/ month					
37	South						
38	40°10' - 34°27' N. lat.	3,000 lb/ month	CLOSED 4/		3,000 lb/ month		
39	South of 34°27' N. lat.	CLOSED 4/	3,000 lb/ month				
40	**Yellowtail - North 5/**	1,500 lb/ month					
41	**Bocaccio - South 5/**						
42	40°10' - 34°27' N. lat.	300 lb/ month	CLOSED 4/		500 lb/ month		300 lb/ month
43	South of 34°27' N. lat.	CLOSED 4/	300 lb/ month				
44	**Chilipepper - South 5/**						
45	40°10' - 34°27' N. lat.	2,500 lb/ month	CLOSED 4/		2,500 lb/ month		
46	South of 34°27' N. lat.	CLOSED 4/	2,500 lb/ month				
47	**Cowcod**	**CLOSED 4/ -- All Retention is Prohibited**					
48	**Minor nearshore rockfish**						
49	North	10,000 lb/ 2 months, no more than 4,000 lb of which may be species other than black or blue rockfish 6/		7,000 lb/ 2 months, no more than 4,000 lb of which may be species other than black or blue rockfish 6/			
50	South						
51	40°10' - 34°27' N. lat.	2,000 lb/ 2 months	CLOSED 4/	Shoreward of 20 ftm depth: 2,000 lb/ 2 months, otherwise CLOSED 4/	2,000 lb/ 2 months		
52	South of 34°27' N. lat.	Shoreward of 20 ftm depth: 2,000 lb/ 2 months, otherwise CLOSED 4/	2,000 lb/ 2 months				
53	**Lingcod 7/**						
54	North	CLOSED 4/		400 lb/ month			CLOSED 4/
55	South						
56	40°10' - 34°27' N. lat.	CLOSED 4/			400 lb/ month		CLOSED 4/
57	South of 34°27' N. lat.	CLOSED 4/		400 lb/ month			CLOSED 4/

1/ Trip limits apply coastwide unless otherwise specified. "North" means 40°10' N. lat. To the U.S.-Canada border. "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.
2/ "Other flatfish" means all flatfish at 50 CFR 660.302 except those in this Table 4 with a trip limit.
3/ The whiting "per trip" limit in the Eureka area inside 100 fm is 10,000 lb/ trip throughout the year. See IV.B.(3)(c).
4/ 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). in the time or area indicated. See IV.A.(7).
5/ Yellowtail rockfish and POP in the south, and bocaccio, and chilipepper rockfishes in the north are included in the trip limits for minor shelf rockfish in the appropriate area (Table 2).
6/ The "per trip" limit for black rockfish off Washington also applies. See paragraph IV.B.(4).
7/ The size limit for lingcod is 24 inches (61 cm) in the north, and 26 inches (66 cm) in the south, total length.
To convert pounds to kilograms, divide by 2.20462, the number of pounds in one kilogram.

Table 5. 2001 Trip Limits[1/] for Open Access Gears

Read Section IV.A. NMFS Actions before using this table. (Exceptions for exempted gears at Section IV.C.)

line	Species/groups	JAN-FEB	MAR-APR	MAY-JUN	JUL-AUG	SEP-OCT	NOV-DEC
1	**Minor slope rockfish**						
2	North	500 lb/ 2 months					
3	South	5,000 lb/ 2 months					
4	**Splitnose - South**	200 lb/ month					
5	**Pacific ocean perch 4/**	100 lb/ month					
6	**Sablefish**						
7	North of 36° N. lat.	300 lb/ day, 2,700 lb/ 2 months			300 lb/ day or 1 landing per week up to 800 lb, not to exceed 4,800 lb/ 2 months	300 lb/ day or 1 landing per week up to 800 lb, not to exceed 2,400 lb/ month	
8	South of 36° N. lat.	350 lb/ day					
9	**Thornyheads (longspine and shortspine combined)**						
10	North of 34°27' N. lat.	CLOSED 3/ -- Retention is Prohibited					
11	South of 34°27' N. lat.	50 lb/ day, no more than 2,000 lb/ 2 months					
12	**Arrowtooth**	200 lb/ month					
13	**Dover sole**	(included in "other" flatfish limit)					
14	**Petrale sole**	(included in "other" flatfish limit)					
15	**Nearshore flatfish**	(included in "other" flatfish limit)					
16	**"Other" flatfish 2/**	300 lb/ month					
17	**Whiting**	300 lb/ month					
18	**Minor shelf rockfish**						
19	North	100 lb/ month					
20	South						
21	40°10' - 34°27' N. lat.	200 lb/ month	CLOSED 3/		200 lb/ month		
22	South of 34°27' N. lat.	CLOSED 3/	200 lb/ month				
23	**Canary rockfish**						
24	North	50 lb/ month					
25	South						
26	40°10' - 34°27' N. lat.	50 lb/ month	CLOSED 3/		50 lb/ month		
27	South of 34°27' N. lat.	CLOSED 3/	50 lb/ month				
28	**Widow rockfish**						
29	North	3,000 lb/ month					
30	South						
31	40°10' - 34°27' N. lat.	3,000 lb/ month	CLOSED 3/		3,000 lb/month		
32	South of 34°27' N. lat.	CLOSED 3/	3,000 lb/ month				
33	**Yellowtail - North 4/ 8/**	100 lb/ month					
34	**Bocaccio - South 4/**						
35	40°10' - 34°27' N. lat.	200 lb/ month	CLOSED 3/		200 lb/ month		
36	South of 34°27' N. lat.	CLOSED 3/	200 lb/ month				
37	**Chilipepper - South 4/**						
38	40°10' - 34°27' N. lat.	2,500 lb/ month	CLOSED 3/		2,500 lb/ month		
39	South of 34°27' N. lat.	CLOSED 3/	2,500 lb/ month				
40	**Cowcod**	**Closed 3/ -- Retention is Prohibited**					
41	**Minor nearshore rockfish**						
42	North 6/	3,000 lb/ 2 months, no more than 900 lb of which may be species other than black or blue rockfish 5/		7,000 lb/ 2 months, no more than 900 lb of which may be species other than black or blue rockfish 5/			
43	South						
44	40°10' - 34°27' N. lat.	1,800 lb/ 2 months	CLOSED 3/	Shoreward of 20 ftm depth: 1,200 lb/ 2 months, otherwise CLOSED 3/	1,200 lb/ 2 months		
45	South of 34°27' N. lat.	Shoreward of 20 ftm depth: 1,800 lb/ 2 months, otherwise CLOSED 3/	1,800 lb/ 2 months	1,200 lb/ 2 months			
46	**Lingcod 7/**						
47	North	CLOSED 3/		400 lb/ month			CLOSED 3/
48	South						
49	40°10' - 34°27' N. lat.	CLOSED 3/			400 lb/ month		CLOSED 3/
50	South of 34°27' N. lat.	CLOSED 3/		400 lb/ month			CLOSED 3/

1/ Trip limits apply coastwide unless otherwise specified. "North" means 40°10' N lat to the U.S. - Canada border "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.

2/ "Other flatfish" means all flatfish at 50 CFR 660.302 except those in this Table 4 with a trip limit.

3/ Closed means that it is prohibited to take, retain, possess, or land the designated species in the time or area indicated. (See IV.A. (7).)

4/ Yellowtail rockfish and POP in the south, and bocaccio, and chilipepper rockfishes in the north are included in the trip limits for minor shelf rockfish in the appropriate area (Table 2).

5/ The "per trip" limit for black rockfish off Washington also applies. See paragraph IV.B.(4).

6/ See IV.C.(4) for limits specific to Pacific City, Oregon.

7/ The size limit for lingcod is 24 inches (61 cm) in the north, and 26 inches (66 cm) in the south, total length.

8/ See IV.C.(5) for limits specific to the salmon troll fishery.

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

NOTE:

Operating in both limited entry and open access fisheries. A vessel that operates in both the open access and limited entry fisheries is not entitled to two separate trip limits for the same species. Please refer to the annual specification and management measures section IV.(A)(11).

Operating in areas with different trip limits. Because trip limits for a species or species group may differ in different geographic areas along the coast "crossover" provisions apply to vessels operating in different geographical areas that have different cumulative or "per trip" trip limits for the same species or species group. Please refer to the annual specification and management measures section IV.(A)(12)

For more information, contact: NMFS NW Region at 206-526-6140 (http://www.nwr.noaa.gov, click on "Pacific Coast Groundfish")or, NMFS SW Region at 562-980-4000; Washington Department of Fish and Wildlife at 360-249-4628; Oregon Department of Fish and Wildlife at 541-867-4741; or the California Department of Fish and Game at 415-688-6361.

# # #

Exhibit C.9
Attachment 1
September 2001

– EXCERPTS FROM (INCLUDING SECTION 1, 2, APPENDIX A) –

Amendment 15

The Pacific Coast Groundfish Fishery Management Plan

Environmental Assessment (EA) / Regulatory Impact Review (RIR) and Determination of the Impact on Small Businesses

September 2001

REVIEW DRAFT

American Fisheries Act EA/RIR/RFA

1.0 INTRODUCTION AND BACKGROUND

1.1 Purpose and Need for Action

The American Fisheries Act of 1998 (AFA) mandates that, "the Pacific Fishery Management Council... shall recommend for approval by the U.S. Secretary of Commerce (Secretary), conservation and management measures to protect fisheries under its jurisdiction and the participants in those fisheries from adverse impacts caused by this Act, or by any fishery cooperatives in the directed pollock fishery." If the Council does not recommend conservation or management measures to the Secretary, the AFA authorizes the Secretary to "implement adequate measures including, but not limited to, restrictions on vessels which harvest pollock under a fishery cooperative which will prevent such vessels from harvesting Pacific groundfish, and restrictions on the number of processors eligible to process Pacific groundfish."

The AFA contains several provisions specific to the Bering Sea and Aleutian Islands (BSAI) pollock fishery and requirements for the Pacific Fishery Management Council (Council) to recommend measures to protect against adverse impacts resulting from the AFA. Among the provisions of the AFA that affect vessels and processors in North Pacific fisheries are (1) allocation of the walleye pollock directed fishery allowance among the catcher vessels of the inshore component, catcher-processors of the offshore component, and catcher vessels harvesting pollock for motherships in the offshore component; (2) declaration of eligible vessels and processors – specifically naming catcher vessels, catcher-processors, and motherships eligible to participate in the offshore component; and (3) specific eligibility requirements for catcher vessels and shoreside processors in the inshore component.

The AFA also contains guidelines for "cooperatives" within each component of the fishery. Through these cooperative arrangements, harvesters and processors may arrange fishing and processing to optimally utilize their respective allocations. The AFA anticipates that, because these AFA entities can arrange their pollock fishery opportunities, these entities may be empowered to increase their participation in non-pollock fisheries (including West Coast fisheries) where they had previously participated only marginally or not at all. At issue is the concern that traditional West Coast groundfish fishery participants could be displaced by AFA entities (catcher vessels, catcher-processors, and motherships) that do not have prior fishing history in West Coast groundfish fisheries. To prevent this harm, the AFA provides the Council the opportunity to recommend management measures to protect fisheries under its jurisdiction and participants in those fisheries.

Protective management measures may be necessary because participants in cooperatives are likely to have increased flexibility to arrange fishing schedules – optimizing participation in their current fisheries and enabling entry into other fisheries. Specifically, historic West Coast groundfish fishery participants could be harmed if AFA vessels participating in pollock fishing cooperatives rearrange their pollock fishing schedules to increase participation in non-pollock fisheries such as the West Coast groundfish fishery. To participate in most limited entry groundfish fisheries, vessels only need to purchase a general limited entry permit, and a permit is not is required to participate in the open access fisheries. Because new limited entry permit holders and entrants into the open access fishery would have access rights that are equal to those who have historically participated in the fishery, entry by AFA entities may occur. Moreover, harm could also occur through the investment of funds derived by benefit of the AFA. That is, investment in the expansion of effort rather than direct transfer of vessels from AFA fisheries to West Coast fisheries. To prevent harm to current participants in West Coast fisheries, the Council is required to recommend protective management measures. Moreover, additional effort entering the groundfish fishery could exacerbate existing management problems and erode the effectiveness of measures recommended by the Council.

The AFA states:

SEC. 211. Protections for other fisheries; conservation measures.

(b) Catcher-processor restrictions.

(5) Fisheries other than the North Pacific.

> The [AFA eligible] catcher/processors... and motherships... are hereby prohibited from harvesting fish in any fishery under the authority of any regional fishery management Council... other than the North Pacific Council, except for the Pacific whiting fishery, and from processing fish in any fishery under the authority of any such regional fishery management Council other than the North Pacific Council, except in the Pacific whiting fishery, unless the catcher/processor or mothership is authorized to harvest or process fish under a fishery management plan recommended by the regional fishery management Council of jurisdiction and approved by the Secretary.

The AFA explicitly prohibits catcher-processors and motherships named in the law from participating in fisheries other than North Pacific fisheries and the Pacific whiting fishery. The catcher-processor and motherships will be unable to use their AFA-eligibility to increase participation in West Coast groundfish fisheries. However, AFA-eligible catcher-processors and motherships could increase or optimize their participation in the Pacific whiting fishery.

The AFA also states:

> SEC. 211. Protections for other fisheries; conservation measures.
>
> (c) Catcher vessel and shoreside processor restrictions.
>
> (3) Fisheries other than the North Pacific.
>
>> (A) By not later than July 1, 2000, the Pacific Fishery Management Council... shall recommend for approval by the Secretary conservation and management measures to protect fisheries under its jurisdiction and the participants in those fisheries from adverse impacts caused by this Act or by any fishery cooperatives in the directed pollock fishery.
>>
>> (B) If the Pacific Council does not recommend such conservation and management measures by such date, or if the Secretary determines that such conservation and management measures recommended by the Pacific Council are not adequate to fulfill the purposes of this paragraph, the Secretary may by regulation implement adequate measures including, but not limited to, restrictions on vessels which harvest pollock under a fishery cooperative which will prevent such vessels from harvesting Pacific groundfish, and restrictions on the number of processors eligible to process Pacific groundfish.

As stated previously, the rationale for establishing protective measures is to restrict AFA entities from using advantages provided by the AFA (and cooperatives) to increase participation in other fisheries.

Section 208 of the AFA (Eligible Vessels and Processors) is scheduled to sunset on December 31, 2004 (AFA, Section 213). However, the North Pacific Council may recommend to the Secretary management measures that "give effect to the measures" thereafter (AFA, Section 213). Because AFA eligibility could affect whether or not these entities receive benefit from the AFA, the Council should state the expected duration of the recommended measures. The duration of the Council's recommended management measures is discussed in Section 2.

In September 1999, the Council began consideration of several proposals for management measures to address impacts of the AFA. These proposals sought to protect existing participants in West Coast fisheries, including harvesters and processors.

The Council requested analysis of the proposed management measures and also requested the National Marine Fisheries Service (NMFS) publish notice of the rules under consideration and a control date of September 16, 1999. The control date applies to participation by catcher vessels in mothership and inshore

Pacific whiting fisheries, and in the inshore groundfish fishery for non-whiting species. On November 24, 1999, NMFS published an advance notice of proposed rulemaking and notice of a control date in the *Federal Register*.

At the June 2000 meeting, the Council gave further consideration to management measures aimed at protecting West Coast groundfish fishery participants from harm caused by the AFA. The Council set aside development of measures to restrict participation in the shoreside processing sector. The Council's rationale was that tangible harm to the processing sector as a result of the AFA has not been demonstrated. Moreover, the delay will allow for the North Pacific Fishery Management Council to complete portions of their AFA analysis pertaining to shoreside processors, which could guide the development of West Coast management measures.

The Council also set a control date of June 29, 2000 as notice to the public and potential purchasers of limited entry permits held by AFA entities. This control date provides advance notice that, based on future Council action, groundfish limited entry permits held by an AFA entity may be revoked or restricted to a specific fishery sector.

On September 13, 2000, NMFS published notice of the June 29, 2000 control date in the *Federal Register* (65*FR*55214). NMFS also noticed the Council is considering restricting future participation in the whiting fishery by AFA motherships and catcher-processors that do not have a history in the fishery. For motherships, the criterion being considered is a certain level of participation in the regular whiting season in either 1998 or 1999. For catcher-processors, the criterion being considered is whether the catcher-processor was licensed to harvest groundfish in 1997, 1998, or 1999 through September 16, 1999. No new AFA motherships or catcher-processors have entered the groundfish fishery since September of 1999.

1.2 Definitions of Terms Used in this Document

Definitions of several key words are included to help clarify the effect of the proposed management measures.

AFA Vessel

A catcher vessel, catcher-processor, or mothership that, because it is named in the AFA or meets qualifications in the AFA **and** holds an AFA permit issued by NMFS[1], is guaranteed a portion of the directed BSAI pollock fishery quota.

AFA Catcher Vessel

A vessel that holds an AFA catcher vessel permit and harvested and/or delivered BSAI pollock to a shoreside processor, mothership, and/or catcher-processor during the AFA's qualifying years.

AFA Catcher-Processor

A vessel that holds an AFA catcher-processor permit and harvested/processed and/or received/processed BSAI pollock during the AFA's qualifying years.

AFA Mothership

A vessel that holds an AFA mothership permit and received/processed BSAI pollock during the AFA's qualifying years.

AFA Cooperative

A cooperative arrangement between vessels and processors for optimally using the portion of the directed BSAI pollock quota allocated to their sector. For example, an inshore cooperative formed by catcher vessels and shoreside processors would share a portion of the inshore sector's pollock allocation. Similarly, an offshore cooperative formed by catcher-processors would share a portion of the offshore allocation of the pollock quota.

1/ Beginning January 1, 2000, all vessels wishing to participate in the non-CDQ Bering Sea and Aleutian Islands pollock fishery are required to have valid AFA permits on board the vessel. AFA permits are issued by the Alaska Regional Office of the National Marine Fisheries Service.

"Spill-Over Vessel."

An AFA vessel that possesses a limited entry permit for West Coast groundfish.

Benefits to Vessels (C/V, C/P, and M/S).

The AFA formalized the ability to form cooperatives and allocated a portion of the directed BSAI pollock fishery quota to each sector in the fishery. Vessels that join cooperatives, or lease their portion of their sector's pollock allocation, gain the advantage of more flexible fishing schedules. This operational advantage could harm West Coast groundfish fisheries, as these vessels would be able to increase their participation in these fisheries.

2.0 PROPOSED ALTERNATIVES

This section discusses issues addressed by the Council in developing management measures to protect West Coast fisheries from harm caused by the AFA. Issues include – qualifying criteria for AFA catcher vessels (**Issue 1**); whether AFA catcher vessel restrictions will be on vessels, permits held by vessels, or both (**Issue 2**); qualifying criteria for AFA catcher processors (**Issue 3**); qualifying criteria for AFA motherships (**Issue 4**); and duration of the restrictions (**Issue 5**).

Non-AFA vessels may participate in all Pacific Coast groundfish fisheries as per their limited entry permit and do not need an eligibility endorsement to do so. These management provisions are not intended to encumber or restrict non-AFA vessels or their limited entry permits.

2.1 **Issue 1** – Catcher Vessels

2.1.1 Perspectives on the Need and Objectives for Catcher Vessels Restrictions

This section discusses differences between West Coast groundfish catcher vessels and AFA catcher vessels. Notably, who are the vessels we are protecting; who are we protecting against; and why and how are we proposing to do it? See Section 4 for information on the specific number of vessels.

The goal of the proposed management restrictions is to prevent destabilization of West Coast groundfish fisheries by AFA vessels. The concern stems from the ability of AFA catcher vessels to use advantages gained through the AFA to disadvantage West Coast fishermen dependent on West Coast groundfish.

Approximately 500 vessels participate in limited entry fisheries for West Coast groundfish.[1] A segment of this fleet also participates in BSAI fisheries, notably the BSAI walleye pollock (*Theragra chalcogramma*) fishery. The most distinct difference between catcher vessels operating in West Coast limited entry groundfish fisheries and AFA catcher vessels is eligibility to participate in the BSAI pollock fishery. The AFA contains specific qualifying requirements for vessels to participate in the BSAI pollock fishery. In addition, allocation provisions in the AFA provide surety to vessels participating in the pollock fishery that they will receive a specific portion of the annual directed fishery allowance of pollock. This certainty allows AFA catcher vessels the opportunity to arrange for optimal participation in the pollock fishery and, because they can schedule their pollock fishing, the opportunity to maximize participation in non-pollock fisheries (including West Coast groundfish). As noted in the introduction, the AFA anticipated that such preemption could occur and, hence, provided for the Pacific Council to recommend protective management measures.

Many AFA catcher vessels hold valid limited entry permits for the West Coast groundfish fishery (see Section 4). The exclusionary provisions proposed by the Council do not seek to restrict or exclude participation of AFA vessels with limited entry permits who have been active in the fishery during the qualifying period. However, AFA catcher vessels with limited participation during the qualifying period could be restricted to the fishery segments in which they participated. As stated previously, the goal of the proposed management measures is to prevent harm to West Coast fishery participants. This would be accomplished by restricting or excluding AFA catcher vessels and/or their limited entry permits that do not meet qualifying criteria for recent participation in the West Coast groundfish fishery. Restrictions could be applied generically across fishery segments or applied to each of three specific fishery segments (at-sea whiting, shoreside whiting, non-whiting groundfish). In summary, the proposed management measures seek to dampen expansion of capacity and effort (by AFA vessels) beyond what is currently active in the fishery.

The potential for capacity expansion stems from the ability of AFA catcher vessels that hold valid limited entry permits, but have not historically participated in the fishery, to enter the West Coast limited entry groundfish fishery. That is, the operational advantage provided to these vessels through the AFA could facilitate

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1/ In 2000, the West Coast groundfish limited entry fleet included 236 fixed gear endorsed permits, 264 trawl endorsed permits held by catcher boats, and 10 trawl endorsed permits held by catcher-processors. (*Draft Report on Overcapitalization in the West Coast Groundfish Fishery*, PFMC, March 2000) expanded participation in West Coast fisheries by these vessels, increasing effort and capacity in the fishery,[2] dissipating profitability of the fishery, and harming current participants.

The Council adopted a control date of September 16, 1999 as notice to the public of the management measures under consideration. The control date applies to participation by catcher vessels in at-sea and shorebased Pacific whiting fisheries, and in the shorebased groundfish fishery for non-whiting species. On November 24, 1999, NMFS published an advance notice of proposed rulemaking and notice of a control date in the *Federal Register.*

The Council also set a control date of June 29, 2000 as notice to the public and potential purchasers of limited entry permits held by AFA entities. This control date provides advance notice that, based on future Council action, groundfish limited entry permits held by an AFA entity may be revoked or restricted to a specific fishery sector. On September 13, 2000, NMFS published notice of the June 29, 2000 control date (65*FR*55214).

Under Issue 1, the Council considered whether to restrict participation in the West Coast groundfish fisheries by AFA catcher vessels. Under Issue 2 (see Section 2.2), the Council considered whether restrictions would be placed on an AFA catcher vessel and/or limited entry permits held by an AFA catcher vessel. Accordingly, qualified AFA catcher vessels could be required to obtain a medallion indicating their eligibility to participate in West Coast groundfish fisheries; and a permit held by an AFA catcher vessel could be "branded" with the specified AFA restrictions.

2.1.2 Options Considered by the Council

Option 1.a AFA Catcher Vessel Qualifies Separately for Each of Three Groundfish Fishery Sectors

An AFA catcher vessel that did not harvest at least the minimum tonnage or number of deliveries during the qualifying period will be restricted. Under Option 1.a, an AFA catcher vessel must qualify separately for each of three sectors in the groundfish fishery, i.e., at-sea whiting, shorebased whiting, and non-whiting groundfish.

Qualifying criteria under Option 1.a include – catch history and qualifying period.

The Council considered the following minimum landings/delivery options and selected a preferred alternative for each sector.

Minimum Landings/Deliveries Options		
At-Sea Whiting Deliveries	Shorebased Whiting Landings	Non-Whiting Groundfish Landings
50 mt	50 mt	50 mt
100 mt	100 mt	100 mt
500 mt	500 mt	500 mt
10 deliveries	10 deliveries	10 deliveries

The Council considered the following time periods during which the catch history must have been obtained and selected a preferred alternative.

2/ The groundfish fishery is currently overcapitalized. The Council's Scientific and Statistical Committee concluded "[o]vercapitalization in the groundfish fishery is significantly affecting the manner in which the fishery is managed and the effectiveness of management." (*supra* note 1)

Qualifying Period Options
1994 through 1997
1994 through September 16, 1999

Option 1.b AFA Catcher Vessels Qualify for the Groundfish Fishery (GAP June 2001)

An AFA catcher vessel –

- which had a groundfish permit as of October 1, 1998, and
- which delivered at least 500 mt of groundfish in any year during the period January 1, 1994 to October 1, 1998, would be allowed unrestricted participation in the Pacific groundfish fishery.

An AFA catcher vessel which does not meet these criteria may not participate in the Pacific groundfish fishery. Under this option, AFA catcher vessels would qualify generically for all three segments of the groundfish fishery, i.e., shorebased whiting, at-sea whiting, and non-whiting groundfish.

Option 1.c Status Quo – No restrictions on AFA catcher vessels

Do not recommend management measures to restrict AFA catcher vessel participation. It is possible the Secretary of Commerce, through NMFS, may determine that protective measures are warranted and implement, through regulation, such measures.

2.1.3 Council Preferred Alternative

RESERVED

2.2 **Issue 2** – Restrictions Tied to AFA Catcher Vessels **or** Limited Entry Permit Held by AFA Catcher Vessels, **or** Vessels and Permits.

2.2.1 Perspectives on the Need and Objectives for Restrictions on Catcher Vessels, Permits, or Both

Out of concern about the effectiveness of placing restrictions solely on AFA catcher vessels, the Council considered several alternatives for restricting AFA catcher vessel participation. Under the groundfish FMP, a limited entry permit is required for harvesters to participate in West Coast groundfish trawl fisheries. Currently, the limited entry fleet includes 236 fixed gear endorsements, 264 trawl endorsements held by catcher boats, and 10 trawl permits held by catcher-processor. Many of these permits are held by AFA catcher vessels (see Section 4).

The proposed options seek to restrict catcher vessels that benefit from the AFA from participating in West Coast groundfish fisheries if they did not substantially participate in the past. It has been proposed that this could be accomplished by restricting the participation of an AFA catcher vessel, the limited entry permit held by an AFA catcher vessel, or placing restrictions on both the vessel and permit. With respect to restricting the permit, at issue, is concern that owners of an AFA catcher vessel, excluded from West Coast fisheries, would be able to sell or transfer their limited entry permit. The Council believes that if restrictions are not placed on the permit, it would be possible for a catcher vessel owner to sell the permit to a non-AFA catcher vessel or transfer the permit to a newly built boat. If this produces an increase effort or capacity, current participants could be harmed even though the AFA catcher vessel which originally held the permit has been excluded.

2.2.2 Options Considered by the Council

The Council considered three options: Option 2.a, 2.b, and 2.c. Under each option, the Council considered several subissues (permit requirement; medallion transferability, i.e., substitution; and permit transferability). Depending on the option recommended by the Council, the Council will also act upon several suboptions corresponding to the subissues for that option. For example, if the Council recommends Option 2.c, the Council will also recommend options to address permit requirements (2.c.1), medallion transferability (2.c.2), and permit transferability (2.c.3).

Option 2.a Vessel restricted (medallions issued)

- if qualifying criteria not met, AFA catcher vessel is prohibited from participating in West Coast groundfish fisheries. However, if the Council selects Suboption 2.a.2.A, a non-qualified AFA catcher vessel could be allowed to substitute for a qualified AFA catcher vessel.

- if qualifying criteria met, AFA catcher vessel receives a medallion. If Council selects Option 1.a, the medallion will indicate the segment of the fishery the vessel is eligible to participate in (at-sea whiting, shorebased whiting, and non-whiting groundfish). If the Council selects Option 1.b, medallion would apply generically to the groundfish fishery.

- if some qualifying criteria met, AFA catcher vessel participation could be restricted to specific fishery segments (if combined with Option 1.a).

- limited entry permits held by non-qualified AFA catcher vessels will not be restricted under Option 2.a. Permits holders will be free to sell or lease these permits.

- an AFA catcher vessel must hold an appropriate groundfish permit and an AFA catcher vessel medallion.

  Subissue 1 – Permit Requirement (note: there are no suboptions for the Subissue)

    AFA catcher vessel with an AFA medallion must also obtain at least one groundfish limited entry permit. This permit could be any trawl A permit. (GAP June 2000).

  Subissue 2 – Medallion transferability (substitution)

  - Suboption 2.a.2.A – medallions are **transferable**. A non-qualified AFA catcher vessel may substitute for a qualified AFA catcher vessel. (GAP June 2000); or
  - Suboption 2.a.2.B – medallions are **not transferable**. A non-qualified AFA catcher vessel may not substitute for a qualified AFA catcher vessel. (GAP June 2001).

Option 2.b Limited entry permit restricted

- If qualifying criteria not met, permit held by AFA catcher vessel confers no access to the groundfish fishery (Option 1.a or 1.b).

- If some qualifying criteria met, permit provides restricted access to the groundfish fishery (Option 1.a only). Vessel with restricted permit ("AFA-branded") could acquire additional permits to allow for participation in other fishery sectors. This could be a feature under Option 1.a, where groundfish fishery sectors are separated (at-sea whiting, shorebased whiting, non-whiting groundfish). This feature would not apply under Option 1.b, which does not separate fishery sectors.

  Subissue 1 – Permit Requirement – If qualifying criteria met, but AFA catcher vessel does not have a limited entry permit, qualified AFA catcher vessel must obtain at least one groundfish limited entry permit –

    - Suboption 2.b.1.A – trawl A permit (GAP June 2000); or
    - Suboption 2.b.1.B – AFA-branded trawl A permit.

Under Option 2.b.1.A, no restrictions are placed on a non-qualified AFA catcher vessel. That is, a non-qualified AFA catcher vessel's limited entry permit could become invalid, but the vessel would not be restricted from obtaining another limited entry permit and continuing to participate in the fishery. Under, Option 2.b.1.B, the Council could specify that non-qualified AFA catcher vessels are only allowed to enter the fishery by obtaining at least one AFA-branded permit from a qualified AFA catcher vessel.

Subissue 2 – Permit Transferability

Suboption 2.b.2.A – restricted (AFA-branded) permit is transferable – sale or lease allowed.[3] (GAP June 2001). The **AFA-brand stays active** and may restrict a non-AFA vessel; or

Suboption 2.b.2.B – restricted (AFA-branded) permit is transferable – sale or lease allowed. The **AFA-brand does not stay active** on a non-AFA vessel. That is, if a permit from an AFA catcher vessel is placed on a non-AFA catcher vessel, the permit will not be encumbered by the AFA-brand while it is on the non-AFA catcher vessel.

Suboption 2.b.2.C – AFA-branded permit is not transferable – sale or lease not allowed. In essence, a permit held by a non-qualified AFA catcher vessel would be revoked. (GAP June 2000).

Option 2.c Vessel and Permit Restricted

- If qualifying criteria not met, AFA catcher vessel is disqualified from participating in West Coast groundfish fisheries and limited entry permit confers no access to the groundfish fishery. However, if the Council selects Suboption 2.c.2.A, a non-qualified AFA catcher vessel could be allowed to substitute for a qualified AFA catcher vessel through transfer of the vessel medallion. Similarly, if the Council selects Suboption 2.c.3.A or 2.c.3.B, permit could be transferred to a non-AFA catcher vessel.

- If qualifying criteria met, vessel receives medallion and permit (held for the vessel as of June 29, 2000[4]) is given an AFA- brand, which indicates the fishery segments they are qualified to participate in. An AFA catcher vessel with a branded permit could acquire additional medallions and permits to allow for participation in other fishery sectors. This could be a feature under Option 1.a, where groundfish fishery sectors are separated (at-sea whiting, shorebased whiting, non-whiting groundfish). This feature would not apply under Option 1.b, which does not separate fishery sectors.

Subissue 1 – Permit Requirement – AFA catcher vessel must hold at least one groundfish limited entry permit –

- Suboption 2.c.1.A – trawl A permit (GAP June 2000); or
- Suboption 2.c.1.B – AFA-branded trawl A permit.

Subissue 2 – Medallion transferability (substitution)

- Suboption 2.c.2.A – medallions are **transferable**. A non-qualified AFA catcher vessel may substitute for a qualified AFA catcher vessel. (GAP June 2000); or
- Suboption 2.c.2.B – medallions are **not transferable**. A non-qualified AFA catcher vessel may not substitute for a qualified AFA catcher vessel. (GAP June 2001).

3/ Rules for combining permits: If the AFA brands on a permit do not match, the most restrictive brand in terms of number of segments to which the vessel has access will be carried over to the resulting permit. Within this restriction on the number of segments for which a combined permit will be branded, where a choice must be made as to the segment(s) for which a combined permit will be branded, the person combining the permits will be allowed to choose among the segments for which the permits being combined are branded. Once this choice is made the choice may not be changed.

4/ This corresponds to the June 29, 2000 control date, which noticed the public and potential purchasers of limited entry permits held by AFA entities that, based on future Council action, groundfish limited entry permits held by an AFA entity may be revoked or restricted. (65*FR*55214).

Subissue 3 – Permit transferability

Suboption 2.c.3.A – restricted (AFA-branded) permit is transferable – sale or lease allowed.[5] (GAP June 2001). The **AFA-brand stays active** on a non-AFA vessel; or

Suboption 2.c.3.B – restricted (AFA-branded) permit is transferable – sale or lease allowed. The **AFA-brand does not stay active** while the permit is held by a non-AFA vessel. That is, if a permit from an AFA catcher vessel is placed on a non-AFA catcher vessel, the permit will not be encumbered by the AFA-brand while it is on the non-AFA catcher vessel.

Suboption 2.c.3.C – AFA-branded permit is not transferable – sale or lease not allowed. In essence, a permit held by a non-qualified AFA catcher vessel would be revoked. (GAP June 2000).

2.2.3 Council Preferred Alternative

The Council's PREFERRED OPTION is Alternative 2.c. The Council believes restricting participation of AFA vessels (that do not meet qualifying requirements) and limited entry permits held by those vessels would provide the greatest protection against harm. Restricting both the vessel and the limited entry permit associated with that vessel reduces the likelihood that an AFA beneficiary would be able to participate in West Coast groundfish fishery to the detriment of the current fishery participants.

[Preferred alternatives for permit requirements, medallion transferability, and permit transferability have not yet been specified.]

2.3 **Issue 3** – AFA Catcher-Processor Restrictions

2.3.1 Perspectives on the Need and Objectives for Catcher-Processor Restrictions

The AFA explicitly prohibits catcher-processors named in the AFA from participating in fisheries other than North Pacific fisheries and the Pacific whiting fishery. Catcher-processors will be unable to use their AFA-eligibility to increase participation in West Coast groundfish fisheries. However, AFA-eligible catcher-processors could increase or optimize their participation in the Pacific whiting fishery.

Therefore, as with catcher vessels, the goal of the proposed management restrictions for catcher-processors is to prevent destabilization of current participation in West Coast groundfish fisheries by AFA vessels. This concern stems from the ability of AFA catcher-processors to use advantages gained through the AFA to disadvantage West Coast fishermen dependent on West Coast groundfish. Moreover, members of the public have expressed concern that, without restrictions on participation, the hard fought Pacific whiting allocation framework could be negated by the entry of AFA vessels that have not traditionally participated in West Coast groundfish fisheries.

The whiting allocation framework was adopted by the Council in October 1996 and implemented by NMFS on May 20, 1999 (62*FR*27519). The allocation framework was developed to address a series of problems identified by the Council in 1996 (*Preliminary Whiting Analysis – Section 1: Allocation and Season Framework*. Supplemental Attachment c.7.a. PFMC. October 18, 1996.):

- Harvest capacity exceeds the amount of whiting available for harvest.
- Processing capacity exceeds the amount of whiting available.

5/ Rules for combining permits: If the AFA brands on a permit do not match, the most restrictive brand in terms of number of segments to which the vessel has access will be carried over to the resulting permit. Within this restriction on the number of segments for which a combined permit will be branded, where a choice must be made as to the segment(s) for which a combined permit will be branded, the person combining the permits will be allowed to choose among the segments for which the permits being combined are branded. Once this choice is made the choice may not be changed.

- The allocation regulation expiring at the end of 1996 contributed to industry stability, elimination of federal management would negate previous gains.
- Absent federal regulation, the Council believes there would not be an equitable distribution of economic benefits.

The objectives of the allocation framework were to (*Preliminary Whiting Analysis – Section 1: Allocation and Season Framework*. Supplemental Attachment c.7.a. PFMC. October 18, 1996.):

- Provide for orderly attainment of the annual whiting harvest guideline.
- Provide an equitable opportunity for industry sectors to participate in the fishery.
- Reduce the need for speed in prosecuting the fishery.
- Encourage the industry to work cooperatively to solve its problems.

As described in Section 4, all current participants in the catcher-processor component of the whiting fishery are AFA catcher-processors. However, because of their participation in the West Coast groundfish fishery, these vessels could also be defined as traditional participants and, thus, deserving of protective management measures. This protection could include exclusion of AFA catcher-processors that do not meet the qualifying requirements. However, as defined, these protective measures would only apply to AFA catcher-processors. Non-AFA catcher-processors would still be free to purchase limited entry permits and take up participation in the fishery.

As for AFA catcher vessels, the Council set a control date of June 29, 2000 as notice to the public and potential purchasers of limited entry permits held by AFA entities. This control date provides advance notice that, based on future Council action, groundfish limited entry permits held by an AFA entity (including catcher-processors) may be revoked or restricted.

On September 13, 2000, NMFS published notice of the June 29, 2000 control date in the *Federal Register* (65*FR*55214). The September 13, 2000 notice also notified the public the Council is considering restricting future participation in the whiting fishery by AFA motherships and catcher-processors that do not have a history in the fishery.

2.3.2 Options Considered by the Council

Option 3.a If an AFA catcher processor was licensed to harvest groundfish in the years 1997, 1998, or 1999 through September 16, 1999 it will be allowed to participate.

Option 3.b Status quo – Do not recommend management measures to restrict AFA catcher processor participation. It is possible the Secretary of Commerce, through NMFS, may determine that protective measures are warranted and implement, through regulation, such measures.

As written, Option 3.a does not address limited entry permits held by non-qualified AFA catcher processors. Thus, if the Council adopts this as the preferred option an AFA catcher processor will either qualify or not qualify for participation in the groundfish fishery. However, there are no provisions for determining the disposition of limited entry permits held by non-qualified AFA catcher processors. The Council could opt to specify options similar to those under Issue 2 (for AFA catcher vessels) to address whether restrictions under Option 3 apply to catcher processors, or their limited entry permits, or both.

2.3.3 Council Preferred Alternative

RESERVED

2.4 **Issue 4** – AFA Mothership Restrictions

2.4.1 Perspectives on the Need and Objectives for Mothership Restrictions

As for catcher-processors, the AFA explicitly prohibits motherships named in the AFA from participating in fisheries other than North Pacific fisheries and the Pacific whiting fishery. Motherships will be unable to use their AFA-eligibility to increase participation in West Coast groundfish fisheries. However, AFA-eligible motherships could increase or optimize their participation in the Pacific whiting fishery.

Thus, the arguments for management measures to protect the mothership component are essentially the same as for catcher vessels and catcher-processors. As for catcher-processors in the whiting fishery, the mothership sector also worked in good faith to construct the whiting allocation framework. Therefore, it is also reasonable for this component of the industry to seek to protect that arrangement by restricting entrance of AFA motherships that have not traditionally participated in the West Coast groundfish fishery.

Similar to the catcher-processor sector, all three motherships participating in the whiting fishery are AFA motherships. Because of their participation in the West Coast groundfish fishery, these vessels could also be defined as traditional participants and, thus, deserving of protective management measures. This protection could include exclusion of AFA motherships that do not meet the qualifying requirements. However, as defined, these protective measures would only apply to AFA motherships.

As noted previously, on September 13, 2000, NMFS published notice of a control date (June 29, 2000) in the *Federal Register* (65 *FR* 55214). This notice notified the public that the Council is considering restricting future participation in the whiting fishery by AFA motherships and catcher-processors that do not have a history in the fishery.

2.4.2 Options Considered by the Council

Option 4.a If an AFA mothership received at least 1000 mt of Pacific whiting during the regular whiting season in 1998 or 1999 it will be allowed to participate. This option could require issuance of "mothership medallions," which could be operationally similar to catcher vessel medallions.

Option 4.b Status quo – Do not recommend management measures to restrict mothership participation. It is possible the Secretary of Commerce, through NMFS, may determine that protective measures are warranted and implement, through regulation, such measures.

Currently, there is no permit system for motherships participating in West Coast groundfish fisheries. Option 4.a could entail development of a permit system for motherships.

2.4.3 Council Preferred Alternative

RESERVED

2.5 **Issue 5** – Duration of Restrictions

2.5.1 Perspectives on the Need and Objectives for Duration of Restrictions

The proposed management measures seek to prevent AFA vessels from using benefits derived from the AFA to harm West Coast groundfish fishery participants. If benefits derived through the AFA are perceived to be permanent, then the proposed measures could be permanent features of the West Coast groundfish fishery. Conversely, if benefits derived through the AFA are perceived to be linked to AFA provisions for fishery cooperatives, then protective measures could expire when the measures in the AFA are no longer in effect.

2.5.2 Options Considered by the Council

The Council considered two alternatives for the duration of the proposed management measures: permanent or only in effect for the duration of the AFA.

Option 5.a Restrictions permanent.

Option 5.b Restrictions only in effect for the duration of the AFA or measures developed by the NPFMC pursuant to the AFA (i.e., December 31, 2004).[6]

2.5.3 Council Preferred Alternative

RESERVED

2.6 Permit Review Board

For Issues 1 through 5, no role is specified for the Council Permit Review Board. Any appeals of a NMFS decision to issue or not issue a permit would not be dealt with through the Council process. This is similar to what is done for sablefish endorsements and tier assignments. Modifications are proposed to the FMP section covering the permit review board (Appendix A). These modifications will take issues, such as the number of seats on the review board, out of the FMP and specify them as part of Council Operating Procedures. This would be consistent with what is done for Council advisory committees.

6/ As noted above, Section 208 of the AFA (Eligible Vessels and Processors) is scheduled to sunset on December 31, 2004 (AFA, Section 213). However, the North Pacific Council may recommend to the Secretary management measures that "give effect to the measures" thereafter. (AFA, Section 213).

Appendix A
Proposed Modifications to the Groundfish Fishery Management Plan (FMP)

Table of Contents

Appendix A
Proposed Modifications to the Groundfish Fishery Management Plan (FMP)

This appendix contains the changes to the language of the groundfish FMP which would be made to implement the AFA related measures identified in this document. New text is underlined and deleted text is struck through.

Issues 1, 2 and 5

OPTION 1a OR 1b

14.2 Management, Allocation and General Rules on the Issuance and Use of Groundfish LE Permits, Gear Endorsements, Size Endorsements, Fixed Gear Sablefish Endorsements [OPTION 2B OR 2C: and AFA Endorsements ("Brands")] [OPTION 2A OR 2C: and AFA Catcher Vessel Medallions]

14.2.1 Federal LE Permits Required Only for Gears Fishing on the Limited Access Quota

3. Permit Requirements for AFA Catcher Vessels

An AFA catcher vessel[1/] must hold a trawl endorsed groundfish LE permit (Options 2a or 2c: and an AFA medallion (Section 14.6)) in order to participate in the West Coast groundfish fishery.

OPTION 1a and (OPTION 2a or 2c): The AFA medallion will provide access only to particular segments of the West Coast groundfish fishery, as those segments are defined in Section 14.6.

OPTION 2.b.1.B or OPTION 2.c.1.B: The trawl endorsed permit must be AFA branded. (OPTION 1a: The permit brand will provide access only to particular segments of the West Coast groundfish fishery, as those segments are defined in Section 14.5.)

OPTION 1a

4. Holding Multiple Permits

OPTION 2.a.2.A or 2.c.2.A: A catcher vessel may hold multiple medallions in order to access more segments of the groundfish fishery, as those segments are defined in Section 14.2.7. Other rules for holding multiple medallions and the applicable harvest regulations may be determined through regulatory amendments, and subsequent routine management measures, in accordance with paragraph 3 of Section 14.2.4.

OPTION 2.b.2.A OR 2.c.3.A: A catcher vessel may hold multiple permits (branded or unbranded) in order to access more segments of the groundfish fishery, as those segments are defined in Section 14.2.7. Restrictions pertaining to the cumulative limits for multiple permits will be determined through

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1/ An AFA vessel is a catcher vessel, catcher-processor, or mothership that, because it is named in the AFA or meets qualifications in the AFA **and** holds an AFA permit issued by NMFS, is guaranteed a portion of the directed Bering Sea and Aleutian Islands (BSAI) pollock fishery quota.

An AFA catcher vessel is a vessel that holds an AFA catcher vessel permit and harvested and/or delivered BSAI pollock to a shoreside processor, mothership, and/or catcher-processor during the AFA's qualifying years.

AFA catcher-processor is a vessel that holds an AFA catcher-processor permit and harvested/processed and/or received/processed BSAI pollock during the AFA's qualifying years.

regulatory amendments and routine management measures. Other rules for holding multiple permits and the applicable harvest regulations may be determined through regulatory amendments, and subsequent routine management measures, in accordance with paragraph 3 of Section 14.2.4.

. . . .

OPTIONS 2.b OR 2.c

14.2.5 Gear Endorsements

. . . .

4. A gear endorsement for a particular gear authorizes the catch of all Council-managed groundfish species with that gear, except: in the case of the designated species "B" gear endorsements, ~~and~~ for fishing for which a fixed gear sablefish endorsement is required (see Section 14.2.6) and for vessels fishing with AFA endorsed ("branded") permits (see Section 14.2.6). Designated species "B" gear endorsements authorize catch of only the designated species specified in the endorsement and bycatch as specified for the joint venture fishery for that species. Limited entry vessels using longline and fishpot gear to catch sablefish against the limited entry quota north of 36°N latitude are required to hold fixed gear sablefish endorsements during periods specified in the regulations, in addition to the required gear endorsement.

. . . .

OPTION 1a OR 1b

14.2.7 AFA Endorsement ("AFA Brands")

1. Permits held for AFA catcher vessels will be branded based on the West Coast catch history of the AFA catcher vessel holding the permit as of June 29, 2000 (see Section 14.5).

OPTION 1a

The AFA brand will restrict the scope of activities authorized under the permit to some combination of the following segments of the fishery: (a) whiting deliveries to motherships, (b) shoreside deliveries of whiting, (c) shoreside deliveries of all groundfish species other than whiting. The permit will be branded for those fisheries for which the vessel holding the permit as of June 29, 2000 meets the minimum landing requirements (see Section 14.5).

OPTION 2.b.2.A. OR 2.c.3.A	The AFA brand restricts the permit regardless of what vessel it is associated with.
OPTION 2.b.2.B OR 2.c.3.B	The AFA brand restricts the permit only when the permit is registered to an AFA vessel.

It is possible that an AFA catcher vessel will not meet any of the minimum landing requirements, and its permit would be branded such that no groundfish activities would be allowed by the associated AFA catcher vessel. In such a case, the endorsement(s) for the gear(s) used under the AFA by the AFA catcher vessel would be

OPTION 2.b.1.A OR 2.c.3.A	
OPTION 5.a.	invalid and expire.
OPTION 5.b.	invalid for the duration of the AFA restrictions imposed by Congress and subsequently the North Pacific Fishery Management Council.
OPTION 2.b.2.B OR 2.c.3.B	no longer valid for participation in West Coast fisheries when the permit is registered to an AFA vessel.

A permit attached to an AFA catcher vessel qualifying for all three segments of the fishery will essentially continue to allow a vessel to take part in the full range of activities typically engaged in by vessels with unbranded permits.

OPTION 1b

The brand will specify that the AFA catcher vessel registered with the permit may participate in any West Coast groundfish fishery in compliance with the associated gear and length endorsements.

OPTION 2.b.2.A. OR 2.c.3.A The AFA brand restricts the permit regardless of what vessel it is associated with.

OPTION 2.b.2.B OR 2.c.3.B The AFA brand restricts the permit only when the permit is registered to an AFA vessel.

If Section 14.5 qualifying requirements are not met, the brand will specify the endorsement(s) for the gear(s) used under the AFA by the AFA catcher vessel is (are)

OPTION 2.b.1.a OR 2.c.3.A

Option 5.a. invalid and expires.

Option 5.b. invalid for the duration of the AFA restrictions imposed by Congress and subsequently the NPFMC.

OPTION 2.b.2.b OR 2.c.3.A no longer valid for participation in West Coast fisheries when the permit is registered to an AFA catcher vessel.

OPTION 2.b.1.A OR 2.c.1.A Any AFA vessel that does not hold a West Coast groundfish permit may enter the fishery only by acquiring such a permit.

OPTION 2.b.1.B OR 2.c.1.B Any AFA vessel that does not hold a West Coast groundfish permit may enter the fishery only by acquiring at least one AFA-branded permit. This will limit the number of AFA vessels participating in the fishery to the number of West-Coast qualifying vessels holding permits as of June 29, 2000.[2/3/]

OPTION 1a OR 1b

2. AFA brands will be affixed to permits.
3. Transferability:

OPTIONS 2.b.2.A OR 2.c.3.A The AFA brand will remain with the permit when it is transferred *and will restrict the use of the permit as designated in paragraph 1 of this section.*

OPTIONS 2.b.2.B OR 2.c.3.B The AFA brand will remain with the permit when it is transferred *but will have effect, as specified in paragraph 1 of this section, only when the permit is registered for use with an AFA vessel.*

OPTIONS 2.b.2.C OR 2.c.3.C An AFA branded permit is not transferable

4. AFA brands are not separable from the LE permit and therefore may not be transferred separately from the LE permit.
5. Limitations which apply based on the AFA brand and fishing thereunder shall not restrict the endorsements on LE permits for any gears other than those gears used under the

---

2/ Without this language, under Option 2.b, AFA vessels that do not hold a branded permit could enter the fishery by acquiring a branded or nonbranded permit, i.e. without this addition, the only new restrictions would apply to West-Coast/AFA vessels and subsequent holders of AFA branded permits.

3/ This language would cause Option 2.b to mimic Option 2.c where both the medallion and the permit are required. Option 2.b would essentially combine the permit and medallion into a single document such that the permit and medallion could not be separated from one another.

qualifying/nonqualifying vessel's AFA permit. It is expected that the primary gear used under AFA permits will be trawl gear.

6. Rules on the branding of West Coast groundfish LE permits and other characteristics of the branded permits are specified in Section 14.5.

(renumber all subsequent sections)

. . . .

OPTIONS 2.b OR 2.c

14.2.9 A LE Permit and Necessary Gear and Sablefish Fixed Gear Endorsements Will Be Held by the Owner of Record of the Vessel and the Vessel Will be Fished in Compliance with the Restrictions on the Permit

. . . .

8. A vessel owner may not use a vessel, or allow a vessel to be used, to catch any Council-managed groundfish where such catch is restricted by an AFA brand on the vessel's permit (see Sections 14.2.7 and 14.5).

14.2.11 Combining LE Permits

. . . .

3. When LE permits are combined, "A" endorsements identical on both LE permits will remain valid. Provisional "A", "B" and designated species "B" gear endorsements will generally become invalid because they are not separable from the vessel for which they are initially issued. Fixed gear sablefish endorsements will remain valid only if all the longline or fishpot permits being combined have fixed gear sablefish endorsements.

   If the permits being combined both have identical AFA brands, the resulting combined permit will have the brand on it. If one permit is branded and the other permit is not, the resulting permit will have the brand on it.

   OPTION 1.a: If the AFA brands on a permit do not match, the most restrictive brand in terms of number of segments to which the vessel has access will be carried over to the resulting permit. Within this restriction on the number of segments for which a combined permit will be branded, where a choice must be made as to the segment(s) for which a combined permit will be branded, the person combining the permits will be allowed to choose among the segments for which the permits being combined are branded. Once this choice is made the choice may not be changed.

   . . . .

OPTIONS 2.b OR 2.c

14.3.1 "A" Gear Endorsement

14.3.1.2 Description, Use and Transferability of the "A" Endorsement

. . . .

2. The vessel for which the LE permit is registered will be allowed to catch all Council-managed groundfish with the gear specified in the "A" endorsement, except for fixed gear sablefish as specified in Section 14.2.6 except as restricted by any AFA brand placed on the permit, as specified in Section 14.2.7.

. . . .

14.3.2 Provisional "A" Gear Endorsement

14.3.2.2 Description, Use and Transferability of the Provisional "A" Endorsement

. . . .

2. The vessel identified in the provisional "A" endorsement will be allowed to catch all Council-managed groundfish with the gear specified in the provisional "A" endorsement, except for sablefish harvested north of 36°N latitude during times and with gears for which a fixed gear sablefish endorsement is required, and except as restricted by any AFA brand placed on the permit, as specified in Section 14.2.7.

. . . .

OPTIONS 2.a or 2.c

14.5 AFA Endorsement ("Brand") Qualifying Criteria

1. An AFA brand will be affixed to any LE permit held by an AFA vessel as of June 29, 2000.

OPTION 1a

2. For AFA catcher vessels under 200' in length, the AFA brand minimum landing requirements for each segment of the fishery are as follows (Council to choose one for each sector):

Whiting Delivered At-sea	Whiting Delivered Shoreside	All Other Groundfish Delivered Shoreside
50 mt	50 mt	50 mt
100 mt	100 mt	100 mt
500 mt	500 mt	500 mt
10 deliveries	10 deliveries	10 deliveries

The period during which these landing must have been made will be (Council to choose one):

1994-1997 **or**
1994-September 16, 1999

The catch history considered is deliveries or landings of Council managed groundfish.

. . . .

(renumber all subsequent sections)

OPTION 1b

2. For AFA catcher vessels under 200' in length, the AFA brand minimum landing requirement is 500 mt of groundfish caught from January 1, 1994 though October 1, 1998. The catch history considered is deliveries or landings of Council managed groundfish.

OPTIONS 2.a OR 2.c.

14.6 AFA Catcher-Vessel Medallions

1. An AFA medallion will be issued to AFA catcher vessels meeting the landing requirements specified in this paragraph.

OPTION 1a

The AFA medallion will be valid for segments of the fishery for which the vessel meets the specified minimum landing requirements. For AFA catcher vessels under 200' in length, the AFA medallion minimum landing requirements for each segment of the fishery are as follows (Council to choose one for each sector):

Whiting Delivered At-sea	Whiting Delivered Shoreside	All Other Groundfish Delivered Shoreside
50 mt	50 mt	50 mt
100 mt	100 mt	100 mt
500 mt	500 mt	500 mt
10 deliveries	10 deliveries	10 deliveries

The period during which these landing must have been made will be (Council to choose one):

1994-1997
1994-September 16, 1999

The catch history considered is deliveries or landings of Council managed groundfish.

OPTION 1b

For AFA catcher vessels under 200' in length, the AFA medallion minimum landing requirement is 500 mt of groundfish caught from January 1, 1994 though October 1, 1998. The catch history considered is deliveries or landings of Council managed groundfish.

2. A medallions is a type of limited entry license that is separate from the groundfish limited entry permit.
3. In order to participate in the groundfish fishery an AFA vessel is required to hold at least one medallion in addition to the groundfish limited entry permit it is required to hold.
4. Vessel owners are responsible for acquiring the medallions necessary for their AFA vessels to participate in West Coast fisheries. The owner of an AFA vessel may not use the AFA vessel, or allow the AFA vessel to be used, to catch any Council-managed groundfish where such catch is restricted by an AFA medallion held for the vessel.

OPTION 2.a.2.A OR 2.c.2.A

5. Medallions are transferable. An AFA vessel may hold multiple medallions in order to access more segments of the groundfish fishery, as those segments are defined in Section 14.2.7.

. . . .

OPTION 2.a.2.B OR 2.c.2.B

5. Medallions are not transferable.

OPTION 5.A

6. The medallion system for AFA catcher vessels and requirements for AFA catcher vessel medallions will expire with the expiration of the AFA restrictions imposed by Congress **and** those restrictions subsequently recommended by the NPFMC to extend the duration of effect of the AFA.

Issue 3 and 5

OPTION 3.a

14.7 West Coast Catcher-Processor Medallions

1. A catcher-processor medallion will be issued to catcher-processors with AFA catcher-processor permits meeting the following qualifying requirements: the catcher processor must have held an LE groundfish permit in the years 1997, 1998, or 1999 through September 16, 1999.
2. A catcher-processor medallion is a type of limited entry license that is separate from the groundfish LE permit.
3. In order to participate in the groundfish fishery as a catcher-processor an AFA vessel is required to hold a catcher-processor medallion in addition to the required groundfish LE permit. ***NonAFA vessels may enter as catcher-processors without a medallion but still require appropriate groundfish limited entry permits.*** **(Italicized text needs Council confirmation with respect to intent.)**
4. Vessel owners are responsible for acquiring the medallions necessary for their vessels to participate in West Coast groundfish fisheries. The owner of an AFA vessel may not use the AFA vessel or allow the AFA vessel to be used to catch and process Council-managed groundfish without holding an AFA catcher-processor medallion for the vessel.
5. Medallions are transferable. **(This needs Council confirmation with respect to intent.)**
6. There is no size endorsement on the medallions. **(This needs Council confirmation with respect to intent.)**

OPTION 5.b

7. The medallion system for catcher-processor vessels and requirements for catcher-processor medallions will expire with the expiration of the AFA restrictions imposed by Congress **and** those restrictions subsequently recommended by the NPFMC to extend the duration of effect of the AFA.

Issue 4 and 5

OPTION 4a

14.8 West Coast Mothership Medallions

1. A mothership medallion will be issued to motherships with AFA permits meeting the following qualifying requirements: The mothership must have received at least 1,000 mt of Pacific whiting during the regular whiting season in 1998 or 1999.
2. A mothership medallion is a type of limited entry license that is separate from the groundfish LE permit.
3. In order to participate in the groundfish fishery as a mothership an AFA vessel is required to hold a mothership medallion. ***NonAFA vessels may enter as motherships without acquiring a medallion.*** **(Italicized text needs Council confirmation with respect to intent.)**
4. Vessel owners are responsible for acquiring the medallions necessary for their AFA vessels to participate in West Coast fisheries. The owner of an AFA vessel may not use the AFA vessel, or allow the AFA vessel to be used, to receive any Council-managed groundfish without holding an AFA medallion for the vessel.
5. Medallions are transferable. **(This needs Council confirmation with respect to intent.)**
6. There is no size endorsement on the medallions. **(This needs Council confirmation with respect to intent.)**

OPTION 5.b

7. The medallion system for AFA motherships and requirements for AFA mothership medallions will expire with the expiration of the AFA restrictions imposed by Congress and those restrictions subsequently recommended by the NPFMC to extend the duration of effect of the AFA.

Issues 1, 2, 3, and 4 (and Technical Amendment)

14.59 LE Permit Issuance Review Board

. . . .

14.59.4 Nominations, Membership, Terms and Action

~~Nominations for the board may be made by anyone. Selction will be made by the Counil or its desgnee.~~ Seats, terms, nominations, appointments and procedural rules will be as designated in Council operating procedures.

~~14.5.5 Membership~~

~~1. "knowledgeable" fishing industry members.~~
~~2. 7 to 10 voting members.~~
~~3 Two-thirds of the members must be present for a quorum.~~

. . . .

~~14.5.6 Majority Vote~~

~~A simple majority of those present and voting shall be necessary to take action on a review.~~

~~14.5.7 Terms of Members~~

~~The term for a board member shall be three years. Terms will be staggered.~~

. . . .

14.9.8 Review of {OPTION 3a AFA catch-processor medallions; OR 4a AFA mothership medallions; OPTION 2a AFA catcher vessel medallions; OPTION 2b AFA catcher vessel brands; OPTION 2c AFA catcher vessel brands and medallions}.

The Council and Council's limited entry permit review board will not take part in the review of appeals of {OPTION 3a AFA catch-processor medallions, OR 4a AFA mothership medallions; OPTION 2a AFA catcher vessel medallions; OPTION 2b AFA catcher vessel brands; OPTION 2c AFA catcher vessel brands and medallions}.

14.610 Implementation, Application and Appeals Process

. . . .

8. NMFS will establish a reasonable application period for the {OPTION 3a AFA catch-processor medallions, OR 4a AFA mothership medallions; OPTION 2a AFA catcher vessel medallions, OPTION 2b; AFA catcher vessel brands; OPTION 2c AFA catcher vessel brands and medallions}. If an applicant disagrees with the {OPTION 3a AFA catch-processor medallions, OR 4a AFA mothership medallions; OPTION 2a AFA catcher vessel medallions; OPTION 2b AFA catcher vessel brands; OPTION 2c AFA catcher vessel brands and medallions} issued for the applicants permit, the applicant may appeal to the NMFS regional director. NMFS will set and publish in the *Federal Register* a date after which requirements for AFA {OPTION 3a AFA catch-processor medallions, OR 4a AFA mothership medallions; OPTION 2a AFA catcher vessel medallions, OPTION 2b; AFA catcher vessel brands; OPTION 2c AFA catcher vessel brands and medallions} will be in effect.

The Council authorizes renumbering of sections in the plan and cross references as necessary in order to incorporate this plan amendment.

ANALYSIS OF MANAGEMENT ALTERNATIVES

The issues and options before the Council are outlined in the decision path provided as Figure 1 (page 5). Options proposed under the AFA agenda item appear to be focused on two primary objectives:

Amendment 15	Objective 1:	Protect from adverse impacts of the AFA (as authorized by the AFA)
	Objective 2:	Reduce latent capacity in the groundfish permit system.

Evaluation of the performance of these management options in terms of these two objectives reveals significant performance differences and similarities between the options. In the draft amendment developed for public review, options will also be evaluated in terms of other goals and objectives of the groundfish fishery management plan (FMP), the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), the Regulatory Flexibility Act and other applicable laws.

The following is the count of each category of AFA permitted vessels; the number of such vessels with some West Coast presence for periods described in Issues 2, 3 and 4 for each respective category; and the number of non-AFA vessels.

	Count of AFA Permitted Vessels	AFA Permitted Vessels with Some West Coast Presence	Number of Non-AFA Vessels In the West Coast groundfish fishery
Catcher Vessels	112	35 (26 held permits as of 06/29/00)	248 (trawl permits held by non-AFA vessels)
Catcher-Processor Vessels	21	10[a/]	0
Motherships	3	3	0

a/ Note there is one additional catcher processor active on the West Coast during the Issue 3 qualifying period, however, that vessel is prohibited from participating in US fisheries under the terms of the AFA.

Catcher Vessel Issues (Issues 1 and 2)

Issue 1 - Qualification Requirements and Subdivision of the Fishery

Under Issue 1, the Council would establish the **qualifying requirements and possible subdivision of the fishery (Option 1.a).** Issue 1 can be divided into three questions as follows.

Question 3. What Landing/Delivery Requirement Should be Used?

Option 1.a	minimum landings/deliveries	50 mt; 100 mt; 500 mt; or 10 deliveries
	qualifying periods	1994 - 1997; or 1994 - Sept 16, 1999
Option 1.b	minimum landings/deliveries	500 mt
	qualifying period	1994 - Sept 30, 1998

Resolution of the questions as they pertain to Option 1.a and 1.b may be mixed and matched to some degree. For example, Option 1.a could be selected with the addition of the Option 1.b requirement that a permit be held as of October 1, 1998. Or, Option 1.b might be selected with AFA vessels earning West Coast access privileges by meeting any of the 1.a landing requirements.

Issue 2- Restrictions Imposed for Catcher Vessels

Under Issue 2 the Council would establish the **restrictions imposed** (vessel restriction, permit restriction, or both vessel and permit restriction). Issue 1 determined which catcher vessels would be restricted. Issue 2 determines how the restrictions will be imposed.

Restriction of AFA vessel participation will involve one of the following (1) the creation of a new type of permit (Option 2a, vessel medallions), (2) modification of the existing permit system (Option 2b, new groundfish limited entry permit restrictions and requirements), or (3) creation of a new type of permit and modification of the existing permit system (Option 2c, vessel medallions and new groundfish limited entry permit restrictions and requirements). Regardless of the mechanism used to impose the restrictions, qualification will be based on vessel history and will be determined as part of the consideration of Issue 1. Within each of these options, in most cases choices will need to be made regarding groundfish limited entry permit requirements and transferability.

Option 2a Vessel Restricted (Medallion System Created)

AFA vessels qualifying under the criteria established under Issue 1 would be issued medallions (groundfish permits held by AFA vessels will not be affected).

In order to participate in the West Coast groundfish fishery an AFA vessel must possess an catcher vessel medallion and a groundfish limited entry permit.

If Option 1.a is also selected, the medallions would specify the sector(s) in which the vessel is allowed to particpate.

Subissue 2.a.1 Groundfish Limited Entry Permit Requirement

No suboptions. AFA vessels would have to continue to hold at least one groundfish trawl permit in order to enter the fishery.

Subissue 2.a.2 Medallion Transferability

Suboption 2.a.2.a Medallion **can** be transferred between AFA vessels (no length or other capacity restriction)

Suboption 2.a.2.b Medallion **cannot** be transferred between AFA vessels (the Council may consider allowing substitution if a vessel is completely lost)

Option 2b Limited Entry Permit Restricted and New Permit Requirement

Groundfish limited entry permits would be affixed with an AFA "brand" based on the catch history of the vessel holding the permit as of June 29, 2000. The brand would indicate the qualifying criteria met by the AFA vessel holding the permit or that the AFA vessel did not meet qualifying criteria. The brand on the permit held by an AFA vessel that did not meet the qualifying criteria (see Issue 1) would render the permit invalid on a temporary or permanent basis (depending on permit transferability restrictions and decisions made under Issue 5). If Option 1.a is adopted the brand would indicate the sector(s) in which the vessel may participate (those sectors for which the vessel met that qualifying requirements)

Subissue 2.b.1 Groundfish Limited Entry Permit Requirement

Suboption 2.b.1.a	An AFA vessel would be required to hold at least one groundfish trawl permit **(branded or unbranded)** in order to participate in the fishery.
Suboption 2.b.1.b	An AFA vessel would be required to hold at least one **branded** groundfish trawl permit in order to participate in the fishery.

Subissue 2.b.2 Permit Transferability

Suboption 2.b.2.a	Permits are transferable and the AFA brand restricts the permit whether it is on an AFA or nonAFA vessel.
Suboption 2.b.2.b	Permits are transferable and the AFA brand restricts the permit only when it is on an AFA vessel.
Suboption 2.b.2.c	Permits with AFA brands are not transferable.

Option 2c **Vessel Restricted (Medallion System Created) Limited Entry Permit Restricted and New Permit Requirement**

This option combines Options 2a and 2b. In doing so it would create a West Coast catcher-vessel medallion system for AFA vessels and restrict permits by placing a brand on permits held by an AFA vessel as of June 29, 2000. AFA vessels would be required to hold an AFA medallion to participate in West Coast fisheries, but may or may not be required to hold an AFA branded permit, depending on the suboption selected.

Subissue 2.c.1 Groundfish Limited Entry Permit Requirement

Suboption 2.c.1.a	An AFA vessel would be required to hold at least one groundfish trawl permit **(branded or unbranded)** in order to participate in the fishery.
Suboption 2.c.1.b	An AFA vessel would be required to hold at least one **branded** groundfish trawl permit in order to participate in the fishery.

Subissue 2.c.2 Medallion Transferability

Suboption 2.c.2.a	Medallion **can** be transferred between AFA vessels (no length or other capacity restriction)
Suboption 2.c.2.b	Medallion **cannot** be transferred between AFA vessels (the Council may consider allowing substitution if a vessel is completely lost)

Subissue 2.c.3 Permit Transferability

Suboption 2.c.3.a	Permits are transferable and the AFA brand restricts the permit whether it is on an AFA or nonAFA vessel.
Suboption 2.c.3.b	Permits are transferable and the AFA brand restricts the permit only when it is on an AFA vessel.
Suboption 2.c.3.c	Permits with AFA brands are not transferable.

Currently, catcher-processors must hold groundfish trawl permits, but there is no separate limited entry system for catcher-processors. Any catcher-processor that can acquire a limited entry permit with a large enough length endorsement may enter the fishery. The Council may consider creating a new program for catcher-processors in order to limit the number of AFA vessels entering as catcher processors. This program would not prevent non-AFA catcher processors from acquiring general limited entry groundfish permits and combining them into a permit large enough to enter the fishery.

Option 3a. Require that AFA catcher-processors hold West Coast catcher-processor medallions. Issue catcher-processor medallions for any AFA catcher-processor vessel that held a groundfish limited entry permit in 1997, 1998, or 1999, through September 16, 1999. The requirement for the catcher-processor medallion would be in addition to the requirement that a groundfish limited entry permit be held. ***NonAFA catcher-processors could enter the fishery without a medallion. Medallions would not be length specific and would be transferable to other AFA catcher-processors*** **(Council should confirm intent)**

Option 3b Status quo. Place no new restrictions on entry by AFA catcher-processors to the West Coast groundfish fishery.

Mothership participation in the West Coast groundfish fishery is not restricted by a limited entry program. The Council may consider creating a new program for motherships in order to limit the number of AFA vessels entering the fishery as motherships. This program would not prevent expansion of the mothership fleet through entry of non-AFA motherships.

Option 4a. Require that AFA vessels operating as motherships hold West Coast mothership medallions. Issue mothership medallions for any AFA vessel that received at least 1000 mt of Pacific whiting during the regular whiting season in 1998 or 1999. ***NonAFA motherships could enter the fishery without a medallion. Medallions would not be length specific and would be transferable to other AFA motherships*** **(Council should confirm intent)**

Option 4b Status quo. Place no entry restriction on AFA vessels operating as motherships in the West Coast groundfish fishery.

Many of the restrictions imposed by the AFA will expire December 31, 2004. The North Pacific Fishery Management Council may continue the restrictions set to expire by recommending regulations to NMFS. West Coast restrictions to prevent harm may terminate with termination of the AFA restrictions or continue.

Option 5.a Restrictions would be permanent, until changed by the Council or NMFS

Option 5.b Restrictions would automatically expire with the expiration of the AFA or regulations recommended by the AFA which have largely the same impact as the AFA, whichever comes last.

Under Option 6.a, the Council would not be consulted on any appeal of NMFS actions taken under the qualification standards the Council recommends under Issues 1, 3 or 4. Under Option 6.b, NMFS would consult with the Council on any appeals related to the issuance of medallions and permits pursuant to this amendment. To increase Council flexibility to meet its responsibilities for consulting with NMFS on permit appeals, a technical amendment is proposed such that the specifics of the membership and other aspects of the Council's permit review board, currently specified in Section 14.5, would be deleted from that section and maintained as part of the Council operating procedures.

Figure 1. Display of options, page number for analysis in parentheses.

1. AFA CV Restrictions (6)

1.a Restrictions (by sector)
1.b Restrictions (general)
1.c No restrictions

If 1.a or 1.b is preferred alternative

2. AFA CV Restrictions (14)

2.a On Vessel
2.b On Groundfish Permit
2.c On Vessel and Permit

3. AFA C-P Restrictions (19)

3.a Restrictions
3.b No restrictions

4. AFA MS Restrictions (20)

4.a Restrictions
4.b No restrictions

5. Duration of Restrictions (21)

5.a Permanent
5.b Expire

6. Appeals and Technical Amendment (22)

6.a No Council role
6.b Council role

If 2.a preferred

2.a.1 G'fish Permit Requirement	2.a.2 Medallion Transferable
Trawl A permit required, does not need to be from another AFA CV.	2.a.2.A Yes, substitution 2.a.2.B No, substitution

If 2.b preferred

2.b.1 G'fish Permit Requirement	2.b.2 Permit Transferable
2.b.1.A Trawl A permit (any) 2.b.1.B One Trawl A permit (AFA)	2.b.2.A Yes, AFA brand on 2.b.2.B Yes, AFA brand off 2.b.2.C No

If 2.c preferred

2.c.1 G'fish Permit Requirement	2.c.2 Medallion Transferable	2.c.3 Permit Transferable
2.c.1.A Trawl A permit (any) 2.c.1.B One trawl A permit (AFA)	2.c.2.A Yes, substitution 2.c.2.B No, substitution	2.c.3.A Yes, AFA brand on 2.c.3.B Yes, AFA brand off 2.c.3.C No

If 1.a is the preferred alternative –

1.a Qualifying Requirements

Specify qualifying requirements for each of the three sectors.	At-Sea Whiting	Shorebased Whiting	Non-whiting Groundfish
	50, 100, 500 mt, or 10 deliveries	50, 100, 500 mt, or 10 deliveries	50, 100, 500 mt, or 10 deliveries
	1994 - 1997 or 1994 - 9/16/1999	1994 - 1997 or 1994 - 9/16/1999	1994 - 1997 or 1994 - 9/16/1999

Issue 1 - Question 1. Should AFA Vessel Participation be Limited?

The primary choice for Issue 1 is a decision on

> whether or not there is a need to prevent harm caused by the AFA by excluding or limiting AFA vessel participation in the West Coast groundfish fishery (i.e., select 1.a or 1.b, vs. 1.c as preferred alternative).

Once this decision is made, then it can be determined whether there is a need to consider the qualifying requirement options analyzed for Issue 1 options (1.a or 1.b) and other features of the types of restrictions that are considered as part of Issue 2. Supplementary to this question is one of whether and the degree to which the Council wishes to pursue reduction of latent permit capacity (the second objective identified in the introduction). Only Option 1.a could significantly reduce latent permit capacity. The relative performance of Options 1.a and 1.b are summarized in Table 1 and discussed in more detail on the following pages.

Has There Been Harm from the AFA?

The primary impetus for consideration of this amendment is the AFA and its requirement that the Pacific Council recommend regulations to limit harm that AFA firms may cause West Coast firms. This provision does not require that harm be demonstrated but allows preventive action to be taken. However, given the length of time that has now passed since the enactment of the AFA, it is possible to consider whether any of the feared consequences have come to pass. While data is not available for a complete economic analysis and isolation of causes of the changing economic fortunes in the groundfish fishery, a review of changes in catcher vessel (1) gross landings and (2) entry and exit is instructive. For this analysis, two years prior to the 1998 enactment of the AFA (1996-1997) are compared to the two years after enactment of the AFA (1999-2000).

Expanded Participation (Changes in Landings)

Landings by AFA vessels expanded only moderately after enactment of the AFA. However, non-AFA vessels of similar size experienced a substantial decrease in average landings.

	Number of Vessels			Average Annual Vessel Landings (mt)	
	Total	With Decreased Landings	With Increased Landings	'96-'97	'99-'00
			West Coast AFA Vessels		
Groundfish and Whiting	22	10	12	2,835	3,104
Whiting	21	10	11	2,931	3,141
Non-whiting Groundfish	13	8	5	62	48
	West Coast Non-AFA Vessels of Size Similar to AFA Vessels (groundfish trawl vessels >70')				
Groundfish and Whiting	91	69	22	838	633
Whiting	28	20	8	1,714	1,400
Non-whiting Groundfish	91	69	22	280	202

Note: This table is an extract of data presented in Tables 2 and 3 and developed by Dr. James Hastie (GMT, NWFSC-NOAA).

New Entry and Exit

There was only slightly more entry by AFA vessels than by similar sized non-AFA-vessels, however new AFA vessels entering the fishery harvested more than the average AFA vessel while new non-AFA vessels averaged nearly 90% less harvest than vessels already in the fishery. Substantially more West Coast non-AFA vessels left the fishery, as compared to AFA vessels.

Number of Vessels and Average Landings ('99-'00 compared to '96-'97)	West Coast AFA Vessels	West Coast Non-AFA Vessels of Similar Size
New Entrants	3 (3,325 mt)	2 (67 mt)
Exits	2 (1,011 mt)	18 (472 mt)

Of the AFA vessels that did not participate in 1996 or 1997 but participated after enactment of the AFA (1999 or 2000), all three held permits as of October 1, 1998 and had over 500 mt of whiting landings (or 50 mt of non-whiting groundfish) from 1994 through September 30, 1998. Therefore, these vessels would likely qualify to continue participation, regardless of which Option 1.a or Option 1.b qualifying criteria were selected.

Limiting Access of AFA Vessels (Option 1.a and 1.b, vs. Option 1.c)--West Coast Vessels (non-AFA and AFA) vs. non-West Coast AFA Vessels

Option 1.a or 1.b would prevent approximately 80 AFA vessels from acquiring groundfish trawl limited entry permits and entering the West Coast fishery when combined with most of the options under Issue 2.

Both Option 1.a and 1.b may be specified to prevent non-West Coast AFA vessels from using the advantages presented them by the AFA to expand their West Coast activities. However, there are some suboptions such as 2.b.1.a that could nullify this benefit. Under 2.b.1.a, the permit would be permanently restricted to a particular sector but an AFA vessel could enter by acquiring any trawl limited entry permit.

Limiting Access by Sector vs. Limiting Access to the Groundfish Fishery as a Whole (Option 1.a vs. 1.b)--West Coast non-AFA Vessels vs. West Coast AFA Vessels

- Option 1.a could limit the expansion of activity by 11 to 33 AFA vessels (depending on qualifying requirements and choices made under Issue 2).
- Option 1.a may reduce latent permit capacity. Option 1.b does not significantly reduce latent permit capacity.
- Option 1.a is more complex than Option 1.b.

Using a vessel based restriction (see Issue 2) the differences between Option 1.a and 1.b primarily affect up to between 24 to 33 vessels AFA vessels active on the West Coast.

Under Option1.a, access privileges for some AFA vessels may be reduced such that many qualifying AFA vessels could only fish in particular segments of the groundfish fishery, rather than the whole fishery. Thus Option 1.a would make it more difficult for West Coast AFA vessels to use the advantages presented them by the AFA to expand their West Coast activities. That is, future participation could be restricted based on past participation. Thus, for a comparable number of qualifying vessels, under Option 1.a West Coast non-AFA vessels would receive more protection from expansion of activity by West Coast AFA vessels than they would under Option 1.b.

AFA vessels qualifying for all three sectors would not experience diminished access to the fishery. Depending on the qualifying criteria, between 0 and 15 AFA vessels may qualify for all three sectors, leaving between 11 and 33 AFA vessels with more restricted access than they would have under Option 1.b. The numbers of vessels allowed in the fishery under Option 1.a would be somewhat less if permits are restricted rather than vessels.

Option 1.a may be specified in such a way that latent (unused) permit capacity could be reduced (see Issue 2). An example of unused permit capacity is an at-sea whiting vessel that never uses its permit to land non-whiting groundfish. Issue 2 suboptions that maintain sector restrictions on permits can permanently reduce latent capacity. However, there are some options such as 2.a.1 that would nullify this benefit. Under 2.a.1 only the medallion would be restricted and an AFA vessel could transfer its permit to a non-AFA vessel that would be able to use it in any sector of the groundfish fishery.

Issue 1 - Question 2. Should Qualification Require that a Permit Be Held on a Specific Date?

Option 1.a has no requirement that a West Coast groundfish trawl permit be held as of any specific date. Option 1.b requires that such a permit be held as of October 1, 1998, the day the AFA became effective.[1]

Requiring that a permit be held on a certain date is a criteria that can be used to consider and take into account present participation, historical fishing practices in and dependence on the fishery, and other relevant considerations (MSA Section 303(b)(6)), such as meeting the intent of the AFA. Possession of West Coast groundfish permits represent fishing privileges that are capital assets to the firm holding the permit. The firm or vessel holding the permit is dependent on the fishery to recover revenues in compensation for the cost of keeping the capital asset committed to the fishery. For the qualifying period selected for Option 1.b every vessel must have held a permit in order to participate in the fishery. The specification of October 1, 1998 (the date the AFA became effective) is based on the presumption that any vessel divesting itself of a permit prior to that time had already committed to leaving the fishery and AFA vessels entering the fishery after that time may have done so in anticipation of the flexibility and other benefits that would be forthcoming as a result of the AFA. The AFA specifies that the Pacific Council consider management measures to prevent harm resulting from the AFA. It is therefore relevant to consider permit ownership on this date as a qualifying requirement.

Another date which might be used in combination with this date or as a substitute for the date is June 29, 2000. An advance notice of proposed rulemaking was published specifying that permits held by AFA vessels as of this date may be restricted or invalidated.

In considering whether to use a requirement that a permit be held as of a certain date as part of the qualifying requirements, it is relevent to consider changes that may have occurred in the fishery between the specified date and a more recent date that might be used to define current participation. For purposes of this analysis June 29, 2000 will be used as the more recent date. Between October 1, 1998 and June 29, 2000 four AFA vessels changed their permits. Two AFA vessels that had no permit as of October 1, 1998 acquired a permit by June 29, 2000 and two AFA vessels that had a permit on October 1, 1998 divested themselves of permits by June 29, 2000. One permit transferred from one AFA vessel to another and the other permit changes involved transfers between AFA and non-AFA vessels.

The following are the number of vessels meeting the permit holding and landing/delivery qualifying requirements for Option 1.b. Comparable information is displayed for Option 1.a to provide a comparison between an October 1, 1998 permit holding requirement and an June 29, 2000 permit holding requirement. Six vessels that met the Option 1.b landing/delivery requirement, are disqualified because they did not meet the permit holding requirement.

1/ The effective date for the AFA is October 1, 1998. This is the start of the '98/'99 fiscal year. The effective date was established when the AFA was signed into law on October 21, 1998 (Public Law 105-277).

Option 1.a (based applying the specified landing requirement to all 3 sectors and a '94-9/16/99 qualifying period)	Number of AFA Vessels: 50 mt Lndg/Del Requirement	Number of AFA Vessels: 500 mt Lndg/Del Requirement	Option 1.b	Number of AFA Vessels
Met Landing/Del Requirement but Does Not Have a Permit as of 6/29/00	7	6	**Met Only Landing/Del Requirement** (Did not have a permit as of 10/1/98)	6 (2 of these have since acquired permits)
Vessel Had a Permit as of 6/29/00 but Meets No Landing/Del Requirements	0	0	**Met Only Permit Requirement** (held a permit on 10/1/98)	0
Vessel Met Landing/Del Requirement and Has a Permit as of 6/29/00	26 (two of these vessels entered after 10/1/98)	26 (two of these vessels entered after 10/1/98)	**Met Permit and Landing Requirement**	26 (two of these vessels have since divested themselves of their permit)
Did Not Meet Landing/Del Requirement and Did Not Hold Permit as of 6/29/00	2	3	**Met Neither** Lndg/Del nor Permit Requirement	3

The effects of the permit holding date would be modified further by options selected under Issue 2, specifically whether the vessel would be restricted (a medallion required), the permit would be restricted (the permit branded), or the vessel and permit would be restricted (both medallion and permit). The first column in the following table shows the number of vessels qualifying under each Issue 2 option with Option 1.b as specified. The second column shows the number of vessels that would qualify if Option 1.b did not include the permit holding requirement.

Number of Qualifying Vessels	Option 1.b as specified	Option 1.b without the permit holding requirement (10/1/98) Option 2b
Option 2a - vessels restricted by medallions	26	32
Option 2b - permits restricted by brands	24	26
Option 2c - permits and vessels restricted	24	24

Issue 1 - Question 3. What Landing/Delivery Requirement Should be Used?

Under Option 1.a, there are 128 possible combinations of landing/delivery requirements. Under Option 1.b there is one. The number of vessels qualifying under Option 1.b is adequately described in the discussion of Question 2 above (see page 9). This section will focus first on vessels qualifying under Option 1.a and then discuss issues related to leasing, geographic distribution, and biological impacts.

Option 1.a Qualifying Requirement Choice

Narrowing the Option 1.a Qualifying Requirements

Where two or more landing requirements result in the same vessels qualifying, the landing requirements can be collapsed into a single requirement. The analysis in Appendix A identifies the landing requirements that can be collapsed. On the basis of this analysis, the following is the matrix of remaining landing/delivery requirement options to be applied for each of the two qualifying periods. The result is that the number of landing/delivery requirement options can be narrowed to 24 (12 landing/delivery requirement combinations times 2 qualifying periods).

	At-Sea Whiting	Shoreside Whiting	Non-Whiting Groundfish
50 mt	X	X	X
100 mt			X
500 mt		X	X
10 deliveries		X	X

Note that the at-sea whiting landing/delivery requirement could be specified as 50 mt, 100 mt, 500 mt, or 10 deliveries and the same vessels would qualify. Similarly the 50 mt shoreside whiting landing/delivery requirement could be specified as 50 mt or 100 mt and the same vessels would qualify.

Vessels Qualifying Under Option 1.a[2]

For the 1994-1997 qualifying period, there were **32** AFA catcher vessels that took part in West Coast fisheries.

For the 1994-1999 qualifying period, there were **35** AFA catcher vessels that took part in West Coast fisheries.

Two of the AFA vessels landed only albacore on the West Coast.

For the 1994 through 1997 qualifying period, every AFA vessel with some West Coast groundfish participation during the period could qualify for participation in at least one segment of the fishery, so long as the shoreside whiting and groundfish qualifying requirements are not raised above 100 mt and the 10 delivery requirement is not used for the shoreside whiting landing requirement. Table 4 shows the number of vessels qualifying for each of the relevant[3] combinations of qualifying requirements for each segment of the fishery. Dashed lines divide the table into twelve sections. As an example of how to read the table, the first (left) box on the top row shows the number of qualifiers when the requirements are set at 50 mt for shoreside groundfish (other than whiting), 50 or 100 mt of shoreside whiting, and 50

2/ AFA catcher vessels participating in West Coast harvest (including tribal harvest allocations) are included in this analysis. The analysis is based on a June 2000 extract of PacFIN landing receipt data for 1994-September 16, 1999 and a May 4 tabulation of data on the offshore fishery. The tabulation for the offshore fishery includes all of 1999 less the tribal fishery occurring after September 16, 1999.

3/ Options for different levels of qualification for the at-sea catcher vessel segment of the fishery are not displayed because the same vessels qualify under all the options specified by the Council.

mt of at-sea whiting.[4] There are 14 AFA vessels that qualify only for at-sea whiting participation, 5 that qualify for at-sea whiting and shoreside whiting participation, 2 that qualify for at-sea whiting and shoreside groundfish participation, one that qualifies only for shoreside whiting participation, one the qualifies only for shoreside groundfish (other than whiting) participation, and 9 that qualify for participation in all three segments. All together, 30 vessels qualify for at-sea whiting, 15 for shoreside whiting, and 12 for shoreside groundfish. Many vessels qualify for more than one segment. The total number of vessels qualifying for at least one endorsement is 32.

Similar information is displayed in Table 5 for a 1994 through 1999 qualifying period. For the 1994 through 1999 qualifying period, there are 2 vessels with some participation in the West Coast groundfish fishery that would not have sufficient landings to qualify under any of the landing requirement options specified by the Council.

Permits Held by Qualifying Vessels Under Option 1.a

While the vessel landing/delivery history may be the basis for qualifying, under Issue 2 the qualifying basis may be used to restrict the vessel (through issuance of a medallion, Option 2a), restrict the permit held by the vessel as of June 29, 2000 (through the branding of the permit, Option 2b), or restrict both the vessel and permit (Option 2c). Therefore, discriminating between the landing/delivery history options requires consideration of some of the Issue 2 choices. If Option 2a is selected, the number of medallions issued and the sectors for which the medallions provided access would mirror the number of qualifying vessels, described in the previous section. If Option 2b is selected, the permits held by AFA vessels as of June 29, 2000 would be branded. Tables 6 and 7 provide information on the number of permits that would qualify under each combination of landing/delivery requirements, as determined by the landing/delivery history of the vessels holding those permits. While between 31 and 33 AFA vessels would qualify for at least one segment of the West Coast groundfish fishery, only between 24 and 26 of these vessels held permits. Only those vessels holding permits would be initially granted some access to the West Coast groundfish fishery.

Summary of Option 1.a AFA Catcher Vessel Access Privileges as Modified by Issue 2 Choices

Qualifying requirements cannot be set independently of Issue 2 choices. The following summarizes the modification of access privileges that would occur as a result of Option 1.a qualification choices, as affected by Issue 2 option choices.

Option 1.a	Number of access privileges modified
Option 2a - vessels restricted by medallions	If the 1994-1997 qualifying period is used 31-32 medallions would be issued to AFA vessels (sector combinations as per Table 4) If the 1994-1999 qualifying period is used 32-33 medallions would be issued to AFA vessels (sector combinations as per Table 5)
Option 2b - permits restricted by brands	If the 1994-1997 qualifying period is used 24-25 permits held by AFA vessels would be branded (sector combinations as per Table 6) 1-2 permits held by AFA vessels would be rendered invalid If the 1994-1999 qualifying period is used 26 permits held by AFA vessels would be branded (sector combinations as per Table 7) No permits would be rendered invalid
Option 2c - permits and vessels restricted	The number of medallions would be as per Option 2a The number of permits branded would be as per Option 2b For either qualifying period 6-7 medallions would be issued to vessels without branded permits

4/ Or 100 mt, or 500 mt, or 10 deliveries of at-sea whiting.

Geographic Distribution of Ownership and Vessels

Option 1.a

Under Option 1.a, the residence of the vessel owners affected by the choice of qualification requirements are all in the Seattle area (Table 8). There are 21 AFA vessel owners in the Seattle area. Of these, between 16 and 19 have vessels that meet Option 1.a qualifying requirements for at least one sector. The primary delivery areas of the affected vessels are Astoria, Newport, Coos Bay and at-sea.

Considering only vessels for which permits were held as of June 29, 2000, again all affected permits were held for vessels with owners that lived in the Seattle area (Table 9). A comparison of Table 8 and 9 shows that vessel owners outside the Seattle area held permits for their vessels as of June 29, 2000. Nine Seattle residents would be excluded from qualifying because they held no permit for their AFA vessel as of June 29, 2000. An additional 1 or 2 (also from the Seattle area) could be excluded on the basis of the landing requirements selected.

Option 1.b

Under Option 1.b the number of vessels qualifying also varies by Options selected in Issue 2.

Number of Qualifying Vessels	Option 1.b as specified
Option 2a - vessels restricted by medallions	26
Option 2b - permits restricted by brands	24
Option 2c - permits and vessels restricted	24

The geographic distribution of these vessels in terms of the residence of the vessel owners and the areas in which the vessels fish is shown in Table 10. The residence of all owners of AFA vessels affected by the choice between Option 1.a and 1.b is in the Seattle area (compare Table 8 and 10).

Vessels that Did Not Hold Permits as of June 29, 2000

Of the 35 AFA vessels with some participation from 1994 through 1999, 26 held permits as of June 29, 2000. Of the 9 AFA vessels that did not hold permits as of June 29, 2000:

- 2 never held groundfish permits, making only tuna landings on the West Coast
- 4 vessels last held permits in 1997 or earlier, and the permits have since been transferred. Three of these permits were transferred to other AFA vessels.
- 1 vessel held a permit through 1999. The permit appears to have been transferred to a different owner and has not yet been registered for use with a new vessel.
- 1 vessel held a "B" permit, which has since expired.
- 1 vessel held a permit that has been combined with another permit.

The Leasing Complication

When permits are to be restricted and a permit is associated with a vessel through a lease arrangement, equity concerns can arise as to whether a non-AFA entity should be penalized because that entity had leased its permit to an AFA vessel.

As of June 29, 2000, 26 permits were held by AFA vessels. Only one of these permits appears to have been held in a lease arrangement. That AFA vessel leased its permit from the owner of another AFA qualified vessel. Both the lessee and the lessor owned vessels that would qualify for at-sea whiting participation on the West Coast. Therefore, it appears leasing arrangements will not present equity complications with respect to qualifying requirements and the possible restriction or revocation of permits.

Biological Impacts

Discards. Subdivision of the AFA vessel fishery (Option 1.a) could create a situation in which vessels not qualifying for both a whiting and nonwhiting sector might be forced to discard species in the sector they did not qualify for. It appears only one AFA vessel might receive a "nonwhiting groundfish" endorsement and not a "whiting" endorsement. About half or more of the AFA fleet would receive whiting endorsements and not endorsements for "nonwhiting groundfish" species.

Number of vessels qualifying for nonwhiting groundfish	Qualifying Period	
	1994-1997	1994-1999
Other groundfish	1-15 of 31-32	1-18 of 32-33

Roughly, ond-third to one-half of the fleet would qualify only for the at-sea whiting sector. Option 1.b would not subdivide the fishery and have no appreciable effects on discards.

Issue 2- Restrictions to be Imposed

The primary decision under Issue 2 is whether to restrict

- the vessel (Option 2a: create a medallion system which would act as a permit system for AFA vessels in parallel with the current groundfish permit system);
- the permit (Option 2b: brand the groundfish limited entry permits held by AFA vessels as of June 29 2000); or
- the vessel and permit (Option 2c: create a medallion system and brand permits held by AFA vessels).

Within the primary options there are three subissues which may need to be addressed, depending on the primary option:

- Permit Requirement
- Medallion Transferability
- Permit Transferability

Permit Requirement Subissue

To participate in the West Coast groundfish fishery all catcher vessels, including AFA catcher vessels, must hold a groundfish limited entry permit. Suboptions for the permit requirement issue are provided only for Options 2.b and 2c. The suboptions address the question of whether the AFA vessel can hold any groundfish permit or must hold an AFA branded permit.

For Option 2.b, the only way to address the objective of reducing harm from the AFA would be to require that an AFA vessel hold a branded limited entry groundfish permit in order to participate in the West Coast groundfish fishery (Option 2.b.1.B). Otherwise (Option 2.b.1.A), any of the 112 AFA catcher vessels could acquire an unbranded permit (e.g. from a nonAFA vessel) and enter the fishery. Thus, under Option 2.b.1.A the brand would only be of benefit to the degree that it reduces latent capacity (Objective 2).

For Option 2c, AFA vessel participation is limited, and AFA harm reduced, by the medallion requirement. To require that an AFA vessel also hold an AFA branded permit (Option 2.c.1.B) makes a small reduction in the total number of AFA vessels that may participate. Under Option 2.c.1.A (a vessel may enter with any groundfish permit) a maximum of 33 vessels may qualify in, when this option is implemented in combination with Option 1.a (26 in combination with Option 1.b). Under Option 2.c.1.B (a vessel must hold an AFA branded groundfish permit) a maximum of 26 vessels may qualify, when this option is implemented in combination with Option 1.a (24 in combination with Option 1.b).

Medallion Transferability

The subissue on medallion transferability pertains only to Options 2.a and 2.c and addresses whether one AFA catcher vessel may be allowed to substitute for another at the vessel and medallion owners. Even if medallions are not transferable (Option 2.a.2.B or 2.c.2.B) it is expected that vessel substitution would still be allowed if a vessel is totally lost. Medallions would not have size endorsements therefore, if medallions are transferable (Option 2.a.2.A or 2.c.2.A), larger AFA catcher vessels could be substituted for smaller ones. However, vessels would still be required to hold a groundfish permit and the groundfish permit would constrain the size of the vessel.

Permit Transferability

The subissue on permit transferability pertains only to Options 2.b and 2.c. If permits are to be transferable (Options 2.b.2.A, 2.b.2.B, 2.c.3.A, or 2.c.3.B), then the question is whether or not the AFA brand will stay active when the permit is associated with a non-AFA vessel. When combined with Option 1.a (brands for three sectors), the AFA brand may substantially constrain the activity of the permit for between 18 and 33 permits. When combined with Option 1.b, there are up to two permits that could be rendered inactive by their AFA brands. Under Option 1.b, all other branded permits would provide access to all three sectors of the West Coast groundfish fishery. By keeping the restrictions of the brand active when the permit is attached to a non-AFA vessel (Options 2.b.2.A or 2.c.3.A), the reduction in latent permit capacity achieved by the branding process is maintained. Alternatively, the brands and their constraining effect on permit latent capacity can be maintained by prohibiting permit transfers (Option 2.b.2.C or 2.c.3.C).

Releasing the brand constraint when a permit is transferred to a nonAFA vessel (Option 2.b.2.B or 2.c.3.B) will on the one hand allow permit latent capacity to be re-established, which would reduce progress toward Objective 2. However, on the other hand, relief of the constraint would be more likely to induce the transfer of permits from AFA to nonAFA vessels (i.e., permits would be relieved of the sector constraints when transferred to a nonAFA vessel). The transfer from an AFA to a nonAFA vessel could increase the achievement of Objective 1 so long as the nonAFA vessel is not more active than the AFA vessel would have been. If the nonAFA vessel is bidding the permit away from the AFA vessel because the nonAFA vessel anticipated a greater profitability than the AFA vessel, then the transfer to the nonAFA vessel could reactivate latent capacity, presuming that greater profitability comes from catching more fish and not other types of efficiencies. However, compared to the status quo, there would still be less active capacity than if this amendment had not been implemented (i.e. if the nonAFA vessel could generate more profit from catching more fish than the AFA vessel, then the nonAFA vessel would bid the permit away from the AFA vessel even in the absence of this proposed plan amendment.)

Option 2c and Interaction of Medallion and Permit Transferability Subissues

Depending on the transferability options selected, Option 2c may perform in a fashion qualitatively similar to Option 2a or 2b with respect to the primary objectives. While Option 2c may, in some cases, appear qualitatively identical to either Option 2a or 2b with respect to performance in meeting the two primary objectives, there may be differences in the number of AFA vessels able to participate under each option. The differences in number of participating vessels is summarized in the following section ("Summary of Main Impacts").

Performance of Option 2c relative to Options 2.a and 2.b, assuming the same number of vessels would be able to participate under any of the options.

	Medallion Transferability	
Permit Transferability	Yes (Option 2.c.2A)	No (Option 2.c.2.B)
Yes, brand active (Option 2.c.3.A)	Same as 2.a for Objective 1 Better performance on Objective 2	Same as 2.a for Objective 1 Better performance on Objective 2
Yes, brand inactive (Option 2.c.3.B)	Same as 2.a for Objectives 1 and 2	Same as 2.a for Objectives 1 and 2
No (Option 2.c.3.C)	For Objectives 1 and 2 performs the same as requiring AFA vessels to hold a nontransferable AFA branded permit under Option 2.b	For Objectives 1 and 2 , performs the same as requiring AFA vessels to hold a nontransferable AFA branded permit under Option 2.b for Objectives 1 and 2

Summary of Main Impacts

The following is a general summary of how the primary options would address the two objectives:

Objective 1: prevention of AFA harm and
Objective 2: removal of latent permit capacity

The degree to which the primary options meet the objectives often depend on suboptions selected. In the following text tables, suboptions that substantially influence the result are indicated (and in some cases provided a separate summary line). Separate tables are provided for consideration of Issue 2 options in combination with Issue 1 options (Option 1.a and 1.b).

Option1.a (Limit AFA catcher vessel entry separately for each sector) performance with respect to primary objectives.

Option 1.a	Licenses required for AFA vessels to participate (groundfish limited entry permit and/or medallion)	Objective 1 Prevent AFA Harm	Objective 2 Remove Latent Capacity
Option 2a restrict vessel	Must hold a groundfish permit (any) and AFA medallion	+ **30-33** AFA vessels would receive medallions. See tables 5 & 6. **79-82** AFA vessels would not be able to participate in the fishery	0 AFA vessels could exit the West Coat groundfish fishery, transferring permits to nonAFA vessels and eliminating any gain from the sector restrictions on the permit.
Option 2b restrict permit	Must hold a groundfish permit (any) (Option 2.b.1.A)	0 Does not prevent AFA vessels from entering the fishery **24-26** permits would be branded. See Tables 6 & 7.	+ (performance, net zero if brand becomes inactive with transfer, Option 2.b.2.B) 0-15 permits would be branded for all sectors, 0-2 permits would be branded for no sectors (and become invalid).
	Must hold an AFA branded groundfish permit (Option 2.b.1.B)	+ **24-26** permits would be branded and available for use by AFA vessels, **84-86** AFA vessels would not be able to participate in the fishery. See Tables 6 & 7.	+ (net zero if brand becomes inactive with transfer, Option 2.b.2.B) 0-15 would be branded for all three sectors, 0-2 permits would be branded for no sectors (and become invalid).
Option 2c restrict vessel and permit	Option 2.c.1.A Must hold a groundfish permit (any) (Option 2.c.1.A) and an AFA medallion	+ **30-33** AFA vessels would receive medallions **79-82** AFA vessels would not be able to participate in the fishery for lack of a medallion. See Tables 4 & 5.	+ (net zero if brand becomes inactive with transfer, Option 2.c.3.B) 0-15 medallions would be endorsed for all three sectors, the remainder. 0-2 permits would be branded for no sectors (and become invalid).
	Must hold an AFA branded groundfish permit (Option 2.c.1.B) and an AFA AFA medallion	+ **24-26** permits would be branded and available for use by AFA vessels, **84-86** AFA vessels would not be able to participate in the fishery. Some vessels would have permits but no AFA medallions. See Tables 6 & 7.	+ (net zero if brand becomes inactive with transfer, Option 2.c.3.B) 0-15 permits would be branded for all sectors, 0-2 permits would be branded for no sectors (and become invalid).

In the above table it can be seen that Option 2.b combined with suboption 2.b.1.B (i.e. vessel and permit restricted, must hold an AFA branded permit) has effects virtually identical to Option 2.c combined with suboption 2.c.1.B (i.e. permit restricted, must hold an AFA branded permit).

Option 1.b (Limit AFA catcher vessel entry to the groundfish fishery as a whole) performance with respect to primary objectives.

Option 1.b	Licenses required for AFA vessels to participate (groundfish lmited entry permit and or medallion)	Objective 1 Prevent AFA Harm	Objective 2 Remove Latent Capacity
Option 2a restrict vessel	Any groundfish permit AFA medallion	+ 26 AFA vessels would receive medallions. 86 AFA vessels would not be able to participate in the fishery	0
Option 2b restrict vessel	Option 2.b.1.A Any groundfish permit	0 Does not prevent AFA vessels from entering the fishery 24 permits would be branded.	**Slightly positive** 2 permits could be rendered inactive (Option 2.b.2.A and 2.b.3.C) OR **No effect** if brand becomes in inactive when permit is transferred to a non-AFA vessel (Option 2.b.2.B)
	Option 2.b.1.B AFA branded groundfish permit	+ 24 permits would be branded and available for use by AFA vessels, 88 AFA vessels would not be able to participate in the fishery.	**Slightly positive** 2 permits could be rendered inactive (Option 2.b.2.A and 2.b.3.C) OR **No effect** if brand becomes in inactive when permit is transferred to a non-AFA vessel (Option 2.b.2.B)
Option 2c restrict vessel and permit	Option 2.c.1.A Any groundfish permit AFA medallion	+ 26 AFA vessels would receive medallions, 24 permits would be branded, 86 AFA vessels would not be able to participate in the fishery for lack of a medallion. See Tables 6 & 7.	**Slightly positive** 2 permits could be rendered inactive (Option 2.b.2.A and 2.b.3.C) OR **No effect** if brand becomes in inactive when permit is transferred to a non-AFA vessel (Option 2.b.2.B)
	Option 2.c.1.B AFA branded groundfish permit AFA medallion	+ 26 AFA vessels would receive medallions, 24 permits would be branded and available for use by AFA vessels, 88 AFA vessels would not be able to participate in the fishery for land of a branded permit. See Tables 6 & 7.	**Slightly positive** 2 permits could be rendered inactive (Option 2.b.2.A and 2.b.3.C) OR **No effect** if brand becomes in inactive when permit is transferred to a non-AFA vessel (Option 2.b.2.B)

Under Option 1.b, up to 2 vessels would have their permits branded as nonqualifying permits. These permits would become invalid, temporarily (Options 2.b.2.B, 2.c.3.B, or 5.b) or permanently (Options 2.b.2.A, 2.b.2,C, 2.c.3.A, 2.c.3.C combined with Option 5.a). The vessels holding the permits that would be invalidated met the 500 mt landing requirement but did not hold a permit as of October 1, 1998 (acquired a permit after that date).

The effects of the primary decisions on which type of asset will be restricted (vessel, permit or both vessel and permit) are strongly impacted by other decisions having to do with exactly what licenses (permit and/or medallion) would be required for participation in the fishery and the degree of transferability of those assets.

Catcher-Processors (Issues 3)

Under Issue 3, the Council will determine whether or not there is a need to protect West Coast catcher-processors from AFA catcher processors. The West Coast groundfish fishery does not require catcher-processor permits. Appropriately sized trawl permits are required for trawl catcher-processor vessels. There are currently only 10 appropriately sized trawl permits but more can be created by the combination of permits for smaller trawl vessels.

Number of Permits by Size Class									
<100'	100'-125'	125'-150'	150'-175'	175'-200'	200'-225'	225'-250'	250'-275'	275'-300'	>300'
250	12	2	0	0	0	0	2	3	5

As of June 29, 2000, 9 of the catcher-processor sized permits were held by AFA permitted catcher-processor vessels that meet the qualifying requirements and one permit was not registered to a vessel. One of the nine permits appeared to be the subject of an internal lease (a firm leasing the permit to another incarnation of itself). All other permits were registered to vessels owned by the permit owner.

Number of Catcher-Processor Vessels Participating on the West Coast by Year					
1994	1995	1996	1997	1998	1999
9	9	10	10	7	6

Traditionally, catcher-processors have participated only in the Pacific Whiting portion of the groundfish fishery. Relatively small cumulative limits generally make participation in other segments of the groundfish fishery economically infeasible. Currently, the catcher-processor segment of the whiting harvest is taken under a producers cooperative. All catcher-processors holding West Coast licenses participate in the cooperative and all are AFA vessels. Under the arrangements of the cooperative, not all of the catcher-processors fish the West Coast fishery while all cooperative catcher-processors take part in the profits.

Under Option 3a new vessel entry would be restricted through a license system that parallels the groundfish permit system: a catcher-processor medallion system. Issuance of medallions to vessels meeting the qualification requirement would result in medallions issued for all 10 catcher processors active on the West Coast from 1997 though September 16, 1999. Even with the medallion system, catcher-processor vessels would still be required to hold groundfish limited entry licenses.

If instead of issuing medallions, groundfish limited entry permits held by qualifying vessels were given AFA catcher-processor brands then only 9 of the 10 permits would receive the needed brands. The 10^{th} permit could only be used with a non-AFA vessel. A non-AFA catcher processor might still enter the fishery with the unbranded permits or combine a number of smaller permits into a larger permit. However, at present there are a very limited number of non-AFA catcher-processors that are domestically owned and could be made available for West Coast groundfish fishery.

As it is presently specified it is presumed that AFA catcher-processor medallions would be transferable between AFA catcher-processors, providing a market for the permit of any AFA catcher-processor that may wish to leave the fishery.

Motherships (Issue 4)

Mothership participation in the West Coast groundfish fishery is not restricted by a limited entry program. There are 21 AFA catcher processors and 3 AFA motherships. Because there is not a limited entry system for motherships, all of these vessels could potentially participate as motherships in the West Coast groundfish fishery. Of these 24 vessels, there are 6 catcher-processors/motherships that would meet the participation requirements specified for a mothership limited entry system (mothership medallions, Option 4.a). Of these vessels 3 are AFA licensed motherships and 3 are licensed as catcher-processors under the AFA.

	Number of Motherships Participating on the West Coast by Year					
	1994	1995	1996	1997	1998	1999
Catcher-Processors Acting as Motherships	8	5	5	3	3	3
AFA Motherships	3	3	3	3	3	3
Total Motherships	11	8	8	6	6	6

Duration of Restrictions (Issue 5)

The duration of the West Coast provisions to prevent harm for the AFA could be linked to the duration of management measures benefitting AFA vessels (Option 5a, an automatic sunset provision) or be established as permanent until revised or revoked (Option 5b). One rationale for linking the measure to the duration of the AFA is that any harm flowing from the AFA will likely be substantially dimished if the AFA related measure expire. On the other hand, the West Coast fleet is overcapitalized and once the measures are implemented there may be some progress made in reduction of latent permit capacity. Making permanent the measures to protect the West Coast fleet from the AFA (Option 5b) may help achieve needed reduction in capacity.

Appeals and Technical Amendment (Issue 6)

Issue 6 is primarily technical in nature.

Option 6a. The Council will not advise NMFS on appeals.
Option 6.b. The Council will advise NMFS on appeals.

Regardless of whether or not the Council takes a role in the qualification appeals process certain technical changes in the FMP may be made to make administration of the Council role in groundfish permit appeals more efficient.

The main item of substance under this issue is the recommendation that the Council would not have a formal role in any appeal over a NMFS decision on whether or not to issue or modify limited entry access privileges in conjunction with Council recommendations made for Issues 1, 3 or 4. The Council Limited Entry Review Board was established to hear appeals generated in conjunction with the implementation of the groundfish license limitation program. Since that time there have been two major modifications to the license limitation program, the first was the issuance of sablefish endorsements for fixed gear vessels and the second was the categorization of those endorsements into tiers. The Council did not include itself in the appeals process for either of these modifications. Similarly, no proposal has been made for a Council role in appeals related to the issuance of AFA medallions or the branding of permits held by AFA vessels.

Related to exclusion of the Council review board from hearing appeals related to this amendment are some adjustments to the language of the FMP in order to provide the Council with procedural flexibility that is more in line with the flexibility the Council has with respect to its other advisory committees. Specifically, it is proposed that a number of details related to the composition of the review board and other such issues be removed from the language of the FMP. These specifications for the review board are covered by a Council operating procedure. Maintaining the specification as part of the groundfish FMP is unnecessarily cumbersome, making it difficult for the Council to modify procedures related to the review board to take into account the changing needs of the groundfish limited entry system. For example, now that the program has been implemented for several years, this board's function as an appeals board has become obsolete. It might make sense to assign review board responsibilities to the groundfish advisory panel, however, a plan amendment would be required to do this. The proposed modification will give the Council the flexibility to change the composition and rules governing the review board to meet the changing needs of the groundfish license limitation program.

TABLE 1. Summary comparison of Options 1.a and 1.b.

1.a Restrictions by Sector **1.b Restrictions (general)**	Primary Impact	Comparisons are to status quo, no action Obj 1 Prevent AFA Harm	Obj 2 Remove Latent Permit Capacity
1.a Restrictions (by Sector)	○ Prevention of AFA harm (Objective 1). For comparable qualifying requirements, 1.a would do a better job of reducing competition from AFA vessels than 1.b because vessels would only be allowed into the segments of the fishery for which the qualifying requirements were met. Unless vessels were allowed to enter through acquisition of any groundfish trawl permit (Option 2.b.1.A). ○ Options under 1.a would constrain participation to 24-33 AFA vessels, depending on the qualifying requirements. These vessels would be further constrained in the sectors of the fishery in which they could participate. See Tables 4-7. ○ Up to 112 AFA catcher vessels could participate the fishery if no action is taken.	+ or 0 if Option 2.b.1.a is selected (AFA vessels can enter with any permit)	+ or 0 if Option 2.a.1 is selected (medallions, AFA vessels may exit and transfer permits to non-AFA vessels)
1.b Restrictions (general)	• If qualifying requirements were comparable between 1.a and 1.b (i.e. similar numbers of vessels qualifying, in the short term), 1.b would do less to prevent AFA harm because the segments in which AFA vessels participate would not be restricted. • **24-26 AFA** vessels would qualify for access to all segments of the fishery. • Up to 2 permits would be rendered invalid on a permanent or temporary basis, depending on options to be specified under Issue 2.	**+**	**0 or small effect**

Table 2.--Comparison of average annual landings by AFA vessels, for three species aggregations, during the two-year periods immediately preceding and following the year in which the Act was implemented (1998).

	Did not participate in 1999-2000					Participated in 1999-2000				
	# of vessels	Avg. # of years with landings during:		Avg. annual vessel tonnage		# of vessels	Avg. # of years with landings during:		Avg. annual vessel tonnage	
		96-'97	99-'00	96-'97	99-'00		96-'97	99-'00	96-'97	99-'00
Landings of all groundfish and whiting										
Non-qualifiers										
Not in '96-'97	5	0.0	0.0	0	0					
In '96-'97	1	1.0	0.0	820	0	3	1.7	2.0	3,395	3,341
Qualifiers										
Not in '96-'97						3	0.0	2.0	0	3,325
In '96-'97	1	2.0	0.0	1,203	0	22	1.9	1.8	2,835	3,104
Lower landings in '99-'00						10	1.9	1.6	2,618	1,660
< 2000 mt in '96-'97						4	1.8	1.8	1,415	1,161
>= 2000 mt in '96-'97						6	2.0	1.5	3,421	1,993
Higher landings in '99-'00						12	1.9	2.0	3,015	4,306
< 2000 mt in '96-'97						4	1.8	2.0	1,155	2,079
>= 2000 mt in '96-'97						8	2.0	2.0	3,945	5,420
Landings of all whiting										
Non-qualifiers										
Not in '96-'97	5	0.0	0.0	0	0					
In '96-'97	1	1.0	0.0	820	0	3	1.7	1.7	3,359	3,327
Qualifiers										
Not in '96-'97						4	0.0	2.0	0	2,913
In '96-'97	1	2.0	0.0	1,203	0	21	1.9	1.8	2,931	3,141
Lower landings in '99-'00						10	1.9	1.5	2,579	1,628
< 2000 mt in '96-'97						4	1.8	1.5	1,377	1,123
>= 2000 mt in '96-'97						6	2.0	1.5	3,380	1,965
Higher landings in '99-'00						11	1.9	2.0	3,252	4,516
< 2000 mt in '96-'97						3	1.7	2.0	1,470	2,186
>= 2000 mt in '96-'97						8	2.0	2.0	3,920	5,389
Landings of all non-whiting groundfish										
Non-qualifiers										
Not in '96-'97	7	0.0	0.0	0	0					
In '96-'97						2	1.5	2.0	53	20
Qualifiers										
Not in '96-'97	10	0.0	0.0	0	0	3	0.0	1.7	0	9
In '96-'97						13	1.9	1.8	62	48
Lower landings in '99-'00						8	2.0	1.8	66	26
< 50 mt in '96-'97						6	2.0	1.8	34	23
>= 50 mt in '96-'97						2	2.0	1.5	162	35
Higher landings in '99-'00						5	1.8	2.0	56	82
< 50 mt in '96-'97						3	1.7	2.0	26	55
>= 50 mt in '96-'97						2	2.0	2.0	101	122

Vessels were categorized as "qualifiers" if they had at least one year with at least 500 mt of landings from 1994 through September 30, 1998, and had a permit attached to the vessel on October 1, 1998.

Table 3.--Comparison of average annual landings by non-AFA, limited-entry trawl vessels of at least 70 feet in length, for three species aggregations, during the two-year periods immediately preceding and following the year in which the Act was implemented (1998).

	Did not participate in 1999-2000					Participated in 1999-2000				
	# of vessels	Avg. # of years with landings during:		Avg. annual vessel tonnage		# of vessels	Avg. # of years with landings during:		Avg. annual vessel tonnage	
		96-'97	99-'00	96-'97	99-'00		96-'97	99-'00	96-'97	99-'00
Landings of all groundfish and whiting										
Not in '96-'97	22	0	0	0	0	2	0	1	0	67
In '96-'97	18	2	0	472	0	91	2	2	838	633
Lower landings in '99-'0	18	2	0	472	0	69	2	2	973	555
< 2000 mt in '96-'97	16	1	0	121	0	57	2	2	416	207
>= 2000 mt in '96-'97	2	2	0	3,276	0	12	2	2	3,620	2,206
Higher landings in '99-'00						22	2	2	414	877
< 2000 mt in '96-'97						22	2	2	414	877
>= 2000 mt in '96-'97										
Landings of all whiting										
Not in '96-'97	74	0	0	0	0	9	0	1	0	4
In '96-'97	22	1	0	403	0	28	2	2	1,714	1,400
Lower landings in '99-'0	22	1	0	403	0	20	2	2	2,249	1,335
< 2000 mt in '96-'97	20	1	0	146	0	8	1	1	484	218
>= 2000 mt in '96-'97	2	2	0	2,978	0	12	2	2	3,426	2,079
Higher landings in '99-'00						8	2	2	375	1,563
< 2000 mt in '96-'97						8	2	2	375	1,563
>= 2000 mt in '96-'97										
Landings of all non-whiting groundfish										
Not in '96-'97	22	0	0	0	0	2	0	1	0	67
In '96-'97	18	2	0	135	0	91	2	2	280	202
Lower landings in '99-'0	18	2	0	135	0	69	2	2	301	175
< 50 mt in '96-'97	7	1	0	15	0	2	2	2	37	24
>= 50 mt in '96-'97	11	2	0	212	0	67	2	2	308	180
Higher landings in '99-'00						22	2	2	214	284
< 50 mt in '96-'97						5	2	2	37	74
>= 50 mt in '96-'97						17	2	2	266	345

TABLE 4. Number of vessels meeting qualification requirements for the indicated segment of the fishery (at-whiting, shoreside whiting, and or shoreside groundfish other than whiting) for 1994-1997.

		Qualifying Requirements for Shoreside Whiting Deliveries														
		50 or 100 mt					500 mt					10 Deliveries				
			Shoreside					Shore Based					Shore Based			
Qualifying Requirements for Shoreside Groundfish Deliveries	AFA Vessel Endorsement	At-Sea Whiting	Whiting	Groundfish	All Three	Tot	At-Sea Whiting	Whiting	Groundfish	All Three	Tot	At-Sea Whiting	Whiting	Groundfish	All Three	Tot
50 mt	At-Sea Whiting	14	5	2		30	15	4	2		30	16	3	2		30
	Shore Whiting		1	0		15		0	0		13		0	0		12
	Shore Groundfis			1		12			1		12			1		12
	All Three				9	32				9	31				9	31
100 mt	At-Sea Whiting	14	10	2		30	15	9	2		30	16	8	2		30
	Shore Whiting		1	0		15		0	0		13		0	0		12
	Shore Groundfis			1		7			1		7			1		7
	All Three				4	32				4	31				4	31
500 mt	At-Sea Whiting	15	14	1		30	16	13	1		30	17	12	1		30
	Shore Whiting		1	0		15		0	0		13		0	0		12
	Shore Groundfis			0		1			0		1			0		1
	All Three				0	31				0	30				0	30
10 Deliveries	At-Sea Whiting	14	2	2		30	15	1	2		30	15	1	2		30
	Shore Whiting		1	0		15		0	0		13		0	0		12
	Shore Groundfis			1		14			1		14			1		14
	All Three				11	32				11	31				11	31

TABLE 5. Number of vessels meeting qualification requirements for the indicated segment of the fishery (at-whiting, shoreside whiting, and or shoreside groundfish other than whiting) for 1994-September 16, 1999.

Qualifying Requirements for Shoreside Groundfish Deliveries	AFA Vessel Endorsement	Qualifying Requirements for Shoreside Whiting Deliveries: 50 or 100 mt					500 mt					10 Deliveries				
		At-Sea	Shoreside				At-Sea	Shoreside				At-Sea	Shoreside			
		Whiting	Whiting	Groundfish	All Three	Tot	Whiting	Whiting	Groundfish	All Three	Tot	Whiting	Whiting	Groundfish	All Three	Tot
50 mt	At-Sea Whiting	12	6	1		31	13	5	1		31	15	3	1		31
	Shore Whiting		1	1		20		0	1		18		0	1		16
	Shore Groundfis			0		14			0		14			0		14
	All Three				12	33				12	32				12	32
100 mt	At-Sea Whiting	12	11	1		31	13	10	1		31	15	8	1		31
	Shore Whiting		1	1		20		0	1		18		0	1		16
	Shore Groundfis			0		9			0		9			0		9
	All Three				7	33				7	32				7	32
500 mt	At-Sea Whiting	12	18	1		31	13	17	1		31	15	15	1		31
	Shore Whiting		2	0		20		1	0		18		1	0		16
	Shore Groundfis			0		1			0		1			0		1
	All Three				0	33				0	32				0	32
10 Deliveries	At-Sea Whiting	12	2	1		31	13	1	1		31	14	0	1		31
	Shore Whiting		1	1		20		0	1		18		0	1		16
	Shore Groundfis			0		17			0		17			0		17
	All Three				15	33				15	32				15	32

TABLE 6. Number of vessels meeting qualification requirements for the indicated segment of the fishery (at-whiting, shoreside whiting, and or shoreside groundfish other than whiting) for 1994-1997 **and holding permits as of June 29, 200**.

Qualifying Requirements for Shoreside Groundfish Deliveries	AFA Vessel Endorsement	Qualifying Requirements for Shoreside Whiting Deliveries: 50 or 100 mt					500 mt					10 Deliveries				
		At-Sea Whiting	Shoreside Whiting	Non-Whtg Groundfish	All Three	Tot	At-Sea Whiting	Shore side Whiting	Non-Whtg Groundfish	All Three	Tot	At-Sea Whiting	Shoreside Whiting	Non-Whtg Groundfish	All Three	Tot
50 mt	At-Sea Whiting	9	5	2		24	10	4	2		24	11	3	2		24
	Shore Whiting		0	0		13		0	0		12		0	0		11
	Non-whtg Groundfis			1		11			1		11			1		11
	All Three				8	25				8	25				8	25
100 mt	At-Sea Whiting	9	10	2		24	10	9	2		24	11	8	2		24
	Shore Whiting		0	0		13		0	0		12		0	0		11
	Non-whtg Groundfis			1		6			1		6			1		6
	All Three				3	25				3	25				3	25
500 mt	At-Sea Whiting	10	13	1		24	11	12	1		24	12	11	1		24
	Shore Whiting		0	0		13		0	0		12		0	0		11
	Non-whtg Groundfis			0		1			0		1			0		1
	All Three				0	24				0	24				0	24
10 Deliveries	At-Sea Whiting	9	2	2		24	10	1	2		24	10	1	3		24
	Shore Whiting		0	0		13		0	0		12		0	0		11
	Non-whtg Groundfis			1		14			1		14			1		14
	All Three				11	25				11	25				10	25

TABLE 7. Number of vessels meeting qualification requirements for the indicated segment of the fishery (at-whiting, shoreside whiting, and or shoreside groundfish other than whiting) for 1994-September 16, 1999 **and holding permits as of June 29, 200**.

Qualifying Requirements for Shoreside Groundfish Deliveries	AFA Vessel Endorsement	Qualifying Requirements for Shoreside Whiting Deliveries: 50 or 100 mt					500 mt					10 Deliveries				
		At-Sea Whiting	Shoreside Whiting	Non-Whtg Groundfish	All Three	Tot	At-Sea Whiting	Shoreside Whiting	Non-Whtg Groundfish	All Three	Tot	At-Sea Whiting	Shoreside Whiting	Non-Whtg Groundfish	All Three	Tot
50 mt	At-Sea Whiting	8	5	1		25	9	4	1		25	10	3	1		25
	Shore Whiting		0	1		17		0	1		16		0	1		15
	Non-whtg Groundfis			0		13			0		13			0		13
	All Three				11	26				11	26				11	26
100 mt	At-Sea Whiting	8	10	1		25	9	9	1		25	10	8	1		25
	Shore Whiting		0	1		17		0	1		16		0	1		15
	Non-whtg Groundfis			0		8			0		8			0		8
	All Three				6	26				6	26				6	26
500 mt	At-Sea Whiting	8	16	1		25	9	15	1		25	10	14	1		25
	Shore Whiting		1	0		17		1	0		16		1	0		15
	Non-whtg Groundfis			0		1			0		1			0		1
	All Three				0	26				0	26				0	26
10 Deliveries	At-Sea Whiting	8	1	1		25	9	0	1		25	9	0	2		25
	Shore Whiting		0	1		17		0	1		16		0	1		15
	Non-whtg Groundfis			0		17			0		17			0		17
	All Three				15	26				15	26				14	26

TABLE 8. Number of AFA vessels by principle area if landing and vessel owner's home port for different Option 1.a qualifying periods and landing/delivery requirements applied uniformly across all three sectors (offshore landing area is specified only when there were **no** shoreside landings made).

	Vessel Owner's City of Residence						
Landing Area	Kodiak	Seattle	Neah Bay	Astoria	Newport	Half Moon Bay	Total
			All Vessels				
Northern Puget Sound		1					1
Coastal Washington		1					1
Astoria		3	1		3		7
Newport		2		1	2		5
Coos Bay		1					1
Crescent					1		1
Offshore	1	13			3	2	19
Total	1	21	1	1	9	2	35
			1994-1997 Qualifying Period				
			50 mt or 100 mt Landing/Delivery Requirement				
Northern Puget Sound		1					1
Coastal Washington		1					1
Astoria		2	1		3		6
Newport		1		1	2		4
Coos Bay		1					1
Crescent					1		1
Offshore	1	12			3	2	18
Total	1	18	1	1	9	2	32
			500 mt Landing/Delivery Requirement				
Northern Puget Sound		1					1
Coastal Washington		1					1
Astoria		2	1		3		6
Newport		0		1	2		3
Coos Bay		0					0
Crescent					1		1
Offshore	1	12			3	2	18
Total	1	16	1	1	9	2	30
			10 Deliveries Requirement				
Northern Puget Sound		1					1
Coastal Washington		1					1
Astoria		2	1		3		6
Newport		0		1	2		3
Coos Bay		1					1
Crescent					1		1
Offshore	1	12			3	2	18
Total	1	17	1	1	9	2	31
			1994-1999 Qualifying Period				
			50 mt or 100 mt Landing/Delivery Requirement				
Northern Puget Sound		1					1
Coastal Washington		1					1
Astoria		2	1		3		6
Newport		1		1	2		4
Coos Bay		1					1
Crescent					1		1
Offshore	1	13			3	2	19
Total	1	19	1	1	9	2	33
			500 mt or 10 deliveries Landing/Delivery Requirement				
Northern Puget Sound		1					1
Coastal Washington		1					1
Astoria		2	1		3		6
Newport		0		1	2		3
Coos Bay		1					1
Crescent					1		1
Offshore	1	13			3	2	19
Total	1	18	1	1	9	2	32

TABLE 9. Number of AFA vessels **with permits** by principle area if landing and vessel owner's home port for different Option 1.a qualifying periods and landing/delivery requirements applied uniformly across all three sectors (offshore landing area is specified only when there were **no** shoreside landings made).

	Vessel Owner's City of Residence						
Landing Area	Kodiak	Seattle	Neah Bay	Astoria	Newport	Half Moon Bay	Total
				All Vessels			
Northern Puget Sound		1					1
Coastal Washington		1					1
Astoria		1	1		3		5
Newport		0		1	2		3
Coos Bay		1					1
Crescent					1		1
Offshore	1	8			3	2	14
Total	1	12	1	1	9	2	26
				1994-1997 Qualifying Period			
				10 mt or 50 mt, or 10 Landing/Delivery Requirement			
Northern Puget Sound		1					1
Coastal Washington		1					1
Astoria		1	1		3		5
Newport		0		1	2		3
Coos Bay		1					1
Crescent					1		1
Offshore	1	7			3	2	13
Total	1	11	1	1	9	2	25
				500 mt Landing/Delivery Requirement			
Northern Puget Sound		1					1
Coastal Washington		1					1
Astoria		1	1		3		5
Newport		0		1	2		3
Coos Bay		0					0
Crescent					1		1
Offshore	1	7			3	2	13
Total	1	10	1	1	9	2	24
				1994-1999 Qualifying Period			
				50 mt, 100 mt, 500 mt, or 10 Landing/Delivery Requirement			
Northern Puget Sound		1					1
Coastal Washington		1					1
Astoria		1	1		3		5
Newport		0		1	2		3
Coos Bay		1					1
Crescent					1		1
Offshore	1	8			3	2	14
Total	1	12	1	1	9	2	26

TABLE 10. Number of AFA vessels by principle area if landing and vessel owner's home port for different Option 1.b qualifying requirements ("offshore" landing area is specified only when there were **no** shoreside landings made).

	Vessel Owner's City of Residence						
Landing Area	Kodiak	Seattle	Neah Bay	Astoria	Newport	Half Moon Bay	Total
				All Vessels			
Northern Puget Sound		1					1
Coastal Washington		1					1
Astoria		3	1		3		7
Newport		2		1	2		5
Coos Bay		1					1
Crescent					1		1
Offshore	1	13			3	2	19
Total	1	21	1	1	9	2	35
				Vessels Meeting Option 1.b Requirements			
				50 mt or 100 mt Landing/Delivery Requirement			
Northern Puget Sound		1					1
Coastal Washington		0					0
Astoria		1	1		3		5
Newport		0		1	2		3
Coos Bay		1					1
Crescent					1		1
Offshore	1	9			3	2	15
Total	1	12	1	1	9	2	26

Appendix

Qualifying Requirements for the At-Sea Whiting Sector

The Council specified four landings level options for consideration as qualifying requirements: 50 mt, 100 mt, 500 mt, or 10 deliveries. The following are the number of vessels that would qualify under each combination of landing requirement and qualifying period.

Number of AFA Vessels Qualifying for At-Sea Whiting	Qualifying Period	
	1994-1997	1994-1999
50 mt	30	31
100 mt	30	31
500 mt	30	31
10 deliveries	30	31

For the 1994 through 1997 qualifying period, **all** of the 30 AFA catcher vessels that participated in the at-sea whiting fishery landed over 1,000 mt and had more than 20 deliveries (Table A-1). **Two** of the 32 AFA catcher vessels that participated on the West Coast did not participate in the at-sea fishery. There were **6** at-sea whiting AFA catcher vessels that had between 20 and 50 deliveries. The remainder had 50 deliveries or more.

For the 1994 through 1999 qualifying period, **all** of the 31 AFA catcher vessels that participated in the at-sea whiting fishery landed over 1,000 mt and had more than 20 deliveries (Table A-1). **Four** of the 35 AFA catcher vessels that participated on the West Coast did not participate in the at-sea whiting fishery (two of which participated in the shoreside groundfish fishery). There were **7** at-sea whiting AFA catcher vessels that had between 20 and 50 deliveries. The remainder had 50 deliveries or more.

Conclusion: On the basis of these results for the remainder of the analysis for each qualifying period (1994 through 1997, and 1994 through 1999), only two categories of at-sea whiting AFA vessels will be evaluated, those that would qualify for the at-sea whiting fishery and those that would not qualify.

Qualifying Requirements for the Shoreside Whiting Sector

The Council specified the same four landings level options for shoreside whiting as it did for the at-sea catcher vessels. The following are the number of vessels that would qualify under each combination of landing requirement and qualifying period.

Number of AFA Vessels Qualifying for Shoreside Whiting	Qualifying Period	
	1994-1997	1994-1999
50 mt	15	20
100 mt	15	20
500 mt	13	18
10 deliveries	12	16

For the 1994 through 1997 qualifying period, there were **15** AFA catcher vessels with no participation in the shoreside whiting fishery (Table A-2). There were **2** vessels that participated in the shoreside whiting fishery but would not qualify under any of the four landing requirement options. **All** vessels that landed at least 50 mt landed at least 100 mt. **Three** vessels with more than 100 mt had fewer than 10 deliveries.

For the 1994 through 1997 qualifying period, there were **14** AFA catcher vessels with no participation in the shoreside whiting fishery (Table A-2). There was **1** vessel that participated in the shoreside whiting fishery but would not qualify under any of the four landing requirement options. **All** vessels that landed at least 50 mt landed at least 100 mt. **Four** vessels with more than 100 mt had fewer than 10 deliveries.

Conclusion: For each qualifying period (1994 through 1997, and 1994 through 1999) two of the landing requirement options yield the same results (50 mt and 100 mt), therefore of the four specified for analysis, only three landing requirement options need be evaluated in the remainder of the analysis:

100 mt
500 mt
10 deliveries

Qualifying Requirements for the Non-Whiting Groundfish Vessels

The Council specified the same four landings level options for shoreside groundfish as it did for the whiting catcher vessels. The following are the number of vessels that would qualify under each combination of landing requirement and qualifying period.

Number of AFA Vessels Qualifying for Shoreside Groundfish	Qualifying Period	
	1994-1997	1994-1999
50 mt	12	14
100 mt	7	9
500 mt	1	1
10 deliveries	15	18

For both qualifying periods, there were **10** AFA catcher vessels with no participation in the shoreside groundfish fishery (Table A-3). There were **7** vessels that participated in the shoreside groundfish fishery but would not qualify under any of the four landing requirement options.

For 1994 through 1997 there were **3** vessels that would qualify only on the basis of the number of deliveries.

For 1994 through 1999 there were **4** vessels that would qualify only on the basis of the number of deliveries.

For both periods, every vessel that would qualify on the basis of a poundage requirement made more than 10 deliveries (i.e., every vessel that landed at least 50 mt made at least 10 deliveries).

Conclusion: The four landing requirements would each qualify a different group of vessels and need to be evaluated in the remainder of the analysis.

TABLE A-1. AFA catcher vessel count for largest number of **at-sea whiting** landings (mt) and **at-sea whiting** deliveries in any one year for the indicated period.

Mt Delivered	Number of Landings/Deliveries[b/]							
	0[c/]	1-4	5-9	10-14	15-19	20-49	≥50	Total
				1994-1997				
0[c, b/]	2							2
0-24								0
25-49								0
50-99								0
100-250								0
250-500								0
500-700								0
700-1,000								0
≥1,000						6	24	30
Total	2	0	0	0	0	6	24	32
				1994-September 16, 1999				
0[c, b/]	4							4
0-24								0
25-49								0
50-99								0
100-250								0
250-500								0
500-700								0
700-1,000								0
≥1,000						7	24	31
Total	4	0	0	0	0	7	24	35

b/ Deliveries are approximated by hauls for offshore landings and by the highest number of fish tickets issued for a single species for onshore landings.

c/ This column/row is for vessels which did not have offshore landings out of the total that had either offshore or onshore landings.

TABLE A-2. AFA catcher vessel count for largest number of **onshore whiting** landings (mt) and **onshore whiting** deliveries in any one year during the analysis period.

Mt Delivered	Number of Landings/Deliveries[a/] 0[b/]	1-4	5-9	10-14	15-19	20-49	≥50	Total
				1994-1997				
0[c, b/]	15							15
0-24								0
25-49		2						2
50-99								0
100-250		1						1
250-500			1					1
500-700			1					1
700-1,000								0
≥1,000				1		3	8	12
Total	15	3	2	1	0	3	8	32
				1994-September 16, 1999				
0[c, b/]	14							14
0-24								0
25-49		1						1
50-99								0
100-250		1						1
250-500			1					1
500-700			1					1
700-1,000			1					1
≥1,000				1		6	9	16
Total	14	2	3	1	0	6	9	35

a/ Deliveries are approximated by hauls for offshore landings and by the highest number of fish tickets issued for a single species for onshore landings.

b/ This column/row is for vessels which did not have onshore landings out of the total that had either offshore or onshore landings.

TABLE A-3. AFA catcher vessel count for largest number of **onshore groundfish** (other than whiting) landings (mt) and **onshore groundfish** deliveries in any one year during the analysis period.

	Number of Landings/Deliveries[a/]							
Mt Delivered	0[b/]	1-4	5-9	10-14	15-19	20-49	≥50	Total
				1994-1997				
0[c, b/]	10							10
0-24		5	2					7
25-49				1		2		3
50-99						3	2	5
100-250				1	1	2	1	5
250-500							1	1
500-700					1			1
700-1,000								0
≥1,000								0
Total	10	5	2	2	2	7	4	32
				1994-September 16, 1999				
0[c, b/]	10							10
0-24		5	2	1		1		9
25-49				1		1		2
50-99						2	3	5
100-250						4	3	7
250-500							1	1
500-700					1			1
700-1,000								0
≥1,000								0
Total	10	5	2	2	1	8	7	35

a/ Deliveries are approximated by hauls for offshore landings and by the highest number of fish tickets issued for a single species for onshore landings.

b/ This column/row is for vessels which did not have onshore groundfish (other than whiting) landings out of the total that had either offshore or onshore landings.

Exhibit C.10
Attachment 1
September 2001

SCOPING SUMMARY REPORT

PACIFIC COAST GROUNDFISH FISHERY
SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT
NATIONAL MARINE FISHERIES SERVICE NORTHWEST REGION

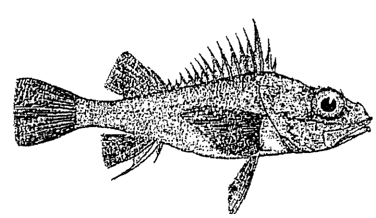
AUGUST 2001

The National Marine Fisheries Service (NMFS) is preparing a comprehensive Supplemental Environmental Impact Statement (SEIS) on the federal management of the Pacific Coast groundfish fishery in the Exclusive Economic Zone (3-200 nautical miles) off Washington, Oregon and California. NMFS is preparing the SEIS to evaluate current groundfish management and assess management options for the future. NMFS first announced this SEIS in a Federal Register *Notice of Intent to Prepare an EIS* (66 FR 18586, 4/10/01). NMFS held public scoping hearings in six West Coast cities between May 22-June 12 and accepted written comments until June 30 to get public input on the range of actions, alternatives and impacts to be considered within the SEIS. The Pacific Fishery Management Council (Council) and its advisory groups also provided comments during their June meeting. This document provides a summary of all comments received and the key issues identified during the scoping process.

Why is NMFS preparing an SEIS on the groundfish fishery now?

Major federal actions, such as the Pacific Coast Groundfish Fishery Management Plan (FMP), must be analyzed in an EIS. The original EIS for the Trawl Fishery FMP off the Pacific Coast was prepared in 1977 and then supplemented with an EIS for the Pacific Coast Groundfish FMP in 1982. More recent documents have focused only on the effects of specific management proposals and their alternatives. The cumulative effects of overall groundfish management on the physical, biological, chemical and socioeconomic environments has not been reviewed since the original EIS.

There have been many changes in the groundfish fishery over the past 20 years and the Council is working on several difficult issues to chart the fishery's future. The Council's recent Groundfish Fishery Strategic Plan, *Transition to Sustainability,* is a guide for future management. These considerations, along with recent litigation on essential fish habitat (EFH), have made this SEIS timely and necessary to evaluate where we have been and where we are going with Pacific Coast groundfish management in a process that is transparent to the public.



What exactly is an EIS or SEIS?

An Environmental Impact Statement (EIS) is a broad analysis document that considers the effects of government actions or activities on the human and natural environment before any major federal decision is made, as required by the National Environmental Policy Act (NEPA). NEPA, signed into law in 1970, is our national charter for protecting the environment. In addition to requiring all federal agencies to evaluate the potential environmental effects of a planned major federal action, NEPA also creates an avenue for public awareness and input early in the

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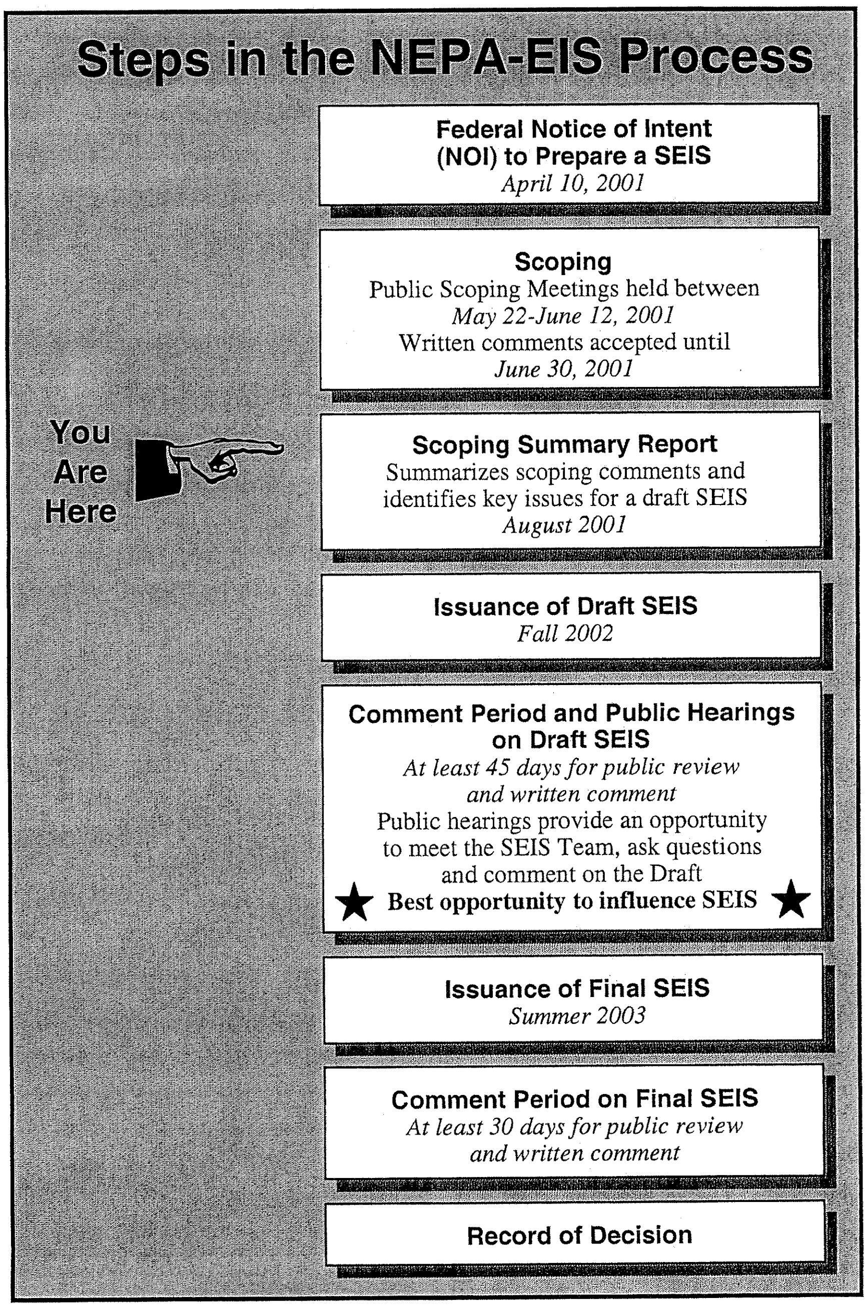
planning stages of major federal actions. NEPA is intended to develop a dialogue between government, stakeholders, and other interested parties.

Different federal actions require different levels of analysis and evaluation based on the expected impacts of the action. Certain actions are excluded from the NEPA process as "categorical exclusions," if they have been previously evaluated and were found to have no significant impact or if they are similar to previous actions that had no significant impact. If the proposed action is not excluded, then either an Environmental Assessment (EA) or an EIS must be prepared. EAs are appropriate for most Council fishery management actions.

An EIS is only prepared once, before a major federal action or decision like the original FMP. After the original EIS is conducted and a decision is made, a Supplemental Environmental Impact Statement (SEIS) may be conducted to reevaluate the actions that have since taken place, as well as considering possible alternatives for future management measures and their impacts. Since the original EIS was prepared in 1977, this new EIS is considered a SEIS. However, both terms are used interchangeably to refer to the current SEIS process.

Where are we in the NEPA-EIS process?

The NEPA-EIS process has a structured feedback system that allows public input along the various stages of the EIS. After the initial scoping period, which ended on June 30, NMFS began preparing a draft EIS. NMFS must analyze potential impacts of the proposed actions, as well as a suite of alternatives, and make its findings available for public and agency review. The diagram on the right summarizes the steps in the NEPA-EIS process and notes which steps include public comment. The entire NEPA-EIS process for the Pacific Coast Groundfish Fishery should take about two years, with a final draft expected in the Summer of 2003.



Pacific Coast Groundfish SEIS Scoping Hearings	
City	**Date**
Newport, OR	May 22
Astoria, OR	May 23
Eureka, CA	May 29
Los Alamitos, CA	May 30
Seattle, WA	June 5
Burlingame, CA *(at Council meeting)*	June 12

What is the purpose of Scoping?

NEPA mandates that "[t]here shall be an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action." This process, termed scoping, allows the public to comment on what the EIS should cover in order to help determine possible alternatives, issues and impacts to be analyzed. The overall purpose of the scoping process is to identify the affected public, identify public and agency concerns, define issues that will be examined, and assign EIS preparation tasks.

For the Pacific Coast Groundfish SEIS, the scoping process included a written comment period from April 10-June 30 along with a series of public hearings in six West Coast cities from May 22-June 12. A briefing document was available at the public scoping hearings and is available on the NMFS website at http://www.nwr.noaa.gov/1sustfsh/groundfish/gf_eis.htm. Click on the link *May 2001 EIS Scoping Document*. The briefing document provides an overview of groundfish issues along with a useful summary of all FMP amendments and a draft outline for the SEIS.

What issues were identified during Scoping?

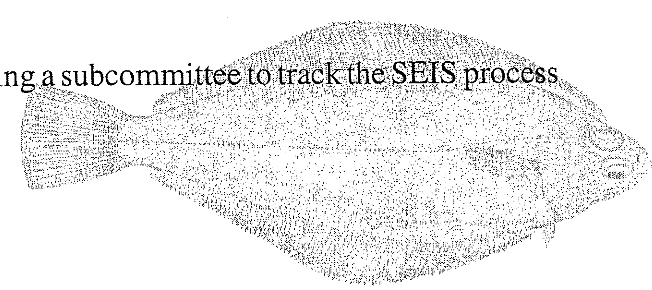
The issues identified during the scoping process for the SEIS are derived from both the government and interested public. Comments for each are synthesized separately, then merged to identify the key issues for the SEIS as a whole. From the key issues, alternatives for the draft SEIS will be proposed.

Summary of Issues Identified from Government Scoping

The Council forwarded to NMFS the comments of its Habitat Steering Group (HSG) on the SEIS. The HSG had the following recommendations on issues that should be addressed and alternatives that should be considered:

- Management tools identified in the Council's Groundfish Fishery Strategic Plan should help guide the analyses conducted in the SEIS. Specifically, habitat protection and restoration and the establishment of marine reserves should be included in the alternatives.
- Alternatives for the identification and establishment of habitat areas of particular concern for groundfish should be included in the SEIS.
- Alternatives for the assessment of gear impacts on habitat should also be included in the SEIS.

The Council commented that they are considering forming a subcommittee to track the SEIS process and provide input along the way.



Summary of Comments and Issues Identified from Public Scoping

The following table summarizes the comments received by NMFS at the six public scoping hearings and comments received in writing during the formal scoping period. Comments may or may not be verbatim. Where multiple commenters made similar comments, those comments were consolidated. Comments are grouped in the table by topic. The table is broadly divided into comments on the NEPA/SEIS process, the development of SEIS alternatives and general comments/observations. The development of SEIS alternatives section is subdivided further by issue: time/area management, fleet capacity, resource allocation, bycatch/discards, stock status, habitat, gear, stakeholder relations, and fishing industry/coastal communities.

ACRONYMS IN TABLE

CDQ: community development quota
Council: Pacific Fishery Management Council
DTS complex:: Dover sole, thornyhead (long and short-spined), and sablefish
EDCP: enhanced data collection program
EEZ: exclusive economic zone (3-200 nautical miles)
EFH: essential fish habitat
EFH IFR: essential fish habitat interim final rule
EIS: environmental impact statement
FMP: fishery management plan
HAPC: habitat area of particular concern
IFQ: individual fishing quota
ITQ: individual transferable quota
MPA: marine protected area
MSA: Magnuson-Stevens Fishery Conservation and Management Act
NEPA: National Environmental Policy Act
NMFS: National Marine Fisheries Service
SEIS: supplemental environmental impact statement

NEPA/SEIS PROCESS

- Scope of EIS should be broad to address broad questions; Consider whether EIS will look at specific management measures; Make scope of EIS manageable to complete on time
- *Spectrum of SEIS alternatives:* SEIS needs suite of options (not just status quo/no action) including alternatives not listed in the Strategic Plan and not within NMFS' jurisdiction; Consider fishing hard versus no fishing; Consider no fishing with harmful gear versus status quo; Evaluate full range of alternatives to minimize effects of fishing on EFH and environment
- Identify a preferred alternative
- EIS and all alternatives should be action precipitating
- Ensure EIS alternatives comply with current fisheries laws
- Make alternatives easy to comprehend
- Express management alternatives as proposed FMP amendments
- Completion of SEIS should await revision of the NMFS EFH IFR by the new administration; NMFS should not proceed with EFH amendments to the FMP or implementation of the EFH program until the revised final regulations and guidelines are promulgated
- View this SEIS as an opportunity to consider habitat conservation in the broad sense that Congress intended, as a tool for rebuilding overfished stocks and preventing overfishing of "unknown" stocks as well as complying with the EFH provisions of the MSA
- EIS process should be iterative, so that new information is incorporated as the EIS is being drafted
- Include anecdotal information in SEIS
- Analyze effects of actions on cultural/economic interests of non-tribal groups also
- Poor advertising and attendance at scoping hearings; NMFS and Council should use telephone surveys, personal interviews and questionnaires to obtain additional input from affected public

Development of SEIS Alternatives

Time/Area Management

- Consider discontinuing year-round fishery policy
- Move management from traditional single-species management to ecosystem-based approach

Fleet Capacity

- Reduce capacity, keep number of harvesters consistent with number of fish available
- Consider where and how to position large capacity vessels
- Overcapitalized, that's capitalism (i.e., don't subsidize, let capacity reach equilibrium)
- Overcapacity is too narrow an issue for an option in EIS analysis
- If limit capacity, don't need MPAs
- Revise scoping document to mention that FMP Amendments 9 & 14 reduce sablefish fleet capitalization

Resource Allocation

- Promote IFQs/ITQs
- Consider whether flexibility of ITQs will harm coastal communities
- Keep effort/people spread along coast
- Consider port quotas, like CDQs and Cooperatives, for West Coast communities
- Allow permit transfers between gear types in the limited entry program
- Hard to discern what is fair, making allocation politically difficult, just bite the bullet, allocate and move on
- Allocate resource equitably between recreational and commercial sectors
- Coordinate inshore species allocation for recreational and commercial sectors with States
- Consider gear impacts and efficiency during allocation (favor low impact, less efficient gear)
- Allocate catch to particular vessels rather than gear types based on "clean" fishing practices (low bycatch, minimal habitat disturbance by gear)
- Too hard to get an international agreement with Mexico or Canada on transboundary stock total allowable catch, they are too demanding
- Washington should allow commercial fishing, including live fish fishing, within 3 miles, especially for sablefish pots which have almost no bycatch; State denied access before a problem was demonstrated

Bycatch/Discards

- Bycatch and discards created by regulations; Analyze year-round fishery for bycatch/discards; Verify effectiveness of time/area management as a bycatch reduction measure
- Higher limits would reduce discards
- Standardize a reporting method for bycatch; Ask fishers to provide bycatch information in logbooks
- Lack of data on discards (number, type, mortality)
- Lack of research on bycatch-friendly gear; Hook-and-line fishery has no bycatch
- Create incentives to reduce bycatch
- Use bycatch/discard overages instead of throwing them away
- Recreational fishery should increase efforts to help discarded fish survive, especially undersized fish
- Reevaluate bycatch estimates for fisheries (EDCP results changed DTS complex bycatch estimates)
- Use bycatch caps to close target fishery
- If it's legal for you to sell, it's not bycatch
- Ocean ecosystem linked tighter than land ecosystem, therefore if protein taken out, effects felt elsewhere

Stock Status

- Quantify total mortality in the fishery
- *Prevent overfishing and rebuild overfished stocks*: Pacific Ocean perch (POP) almost rebuilt; Give a stock 20 years, set fishing at minimal bycatch levels and it will recover; Important to verify effectiveness of rebuilding plans; Consider impacts of rebuilding plans that are ecosystem based rather than single species
- Need full slope rockfish complex protection
- Need to study non-commercial species as well
- Foreign trawlers and seismic impacts from the petroleum industry have devastated stocks
- Natural cycles (ocean regime shifts) have more impact on stocks than overfishing

Habitat

- What did we miss first time EFH was analyzed? Spent a lot of time on it
- *Narrow the designation of EFH*: Otherwise unnecessarily encumbers non-fishing activities with EFH consultation
- *Support current designation of entire EEZ as EFH*: Use HAPCs to further concentrate conservation efforts; Current designation allows NMFS to address non-fishing activities; Support precautionary approach of designating entire EEZ as EFH; Support EFH based on general oceanic and coastal habitat types as a proxy for habitat mapping, until further information is available
- Measures to protect EFH and the marine environment will also promote the recovery of degraded and the protection of healthy ecosystems; Marine habitats play important role in marine ecosystems by sustaining high levels of marine diversity and enhancing productivity
- NMFS should take aggressive approach to protecting EFH, including no-take marine reserves, area-based gear restrictions, gear modifications and a total ban on gear modifications designed to allow bottom trawls access to high relief, hard bottom areas; For species where fixed gear is available, trawl gear must be prohibited (maybe allow mid-water trawl); For species where there is no alternative to trawl gear, gear should not be constructed so that it destroys complex habitats (e.g., rockhopper, large roller and/or chafing gear); Consider only allowing trawling on flatfish; Evaluate/implement maximum diameter size limit on rockhopper and roller gear
- *HAPCs*: Council should improve its HAPC designation process to: (1) conduct a systematic approach for the identification and designation of HAPC for all groundfish species by a certain date, (2) identify general EFH habitat types sensitive to fishing disturbance for priority HAPC designation, and (3) research should start with the habitats of the most depleted species; Propose areas important to multiple species, serve multiple purposes; Create HAPCs to protect areas of high ecological importance; HAPC for key life stages of overfished and "unknown" stocks; One HAPC designation approach could be to designate areas within a species EFH that historically have the highest abundance levels or are important to juveniles; Creation of HAPC network- all of which are closed to bottom trawling (including mid-water trawling that might contact the bottom)- for the *Sebastes* complex in areas defined by Oregon Department of Fish & Wildlife as locations of high catch per unit effort (CPUE) rockfish tows from 1993-1995; HAPC should encompass rockfish areas and maximize enforceability (large rectangular areas > 1000 square miles); Create at least 2 off Washington, 2 off N. Oregon, 1 off S. Oregon
- *Emphasize MPAs*: Means of meeting multiple MSA requirements; MPAs are a precautionary tool; Evaluate existing MPAs; Network MPAs to increase benefits, include spectrum of habitats and ecological processes found; Consider implementation of marine refuges consistent with the process outlined by Auster, "Defining thresholds for precautionary habitat management actions in a fisheries context;" Consensus Statement on Marine Reserves and MPAs by the National Center for Ecological Analysis and Synthesis states that reserves result in increases in the abundance, diversity and productivity of marine organisms due to decreased mortality, decreased habitat destruction and indirect ecosystem effects
- Establish habitat research areas
- *Incentives*: Create incentives for habitat protection and/or use of habitat-friendly gear; Precautionary approach creates incentive for habitat innovation and research; Analyze use of incentives such as allowing exemptions in sensitive habitat areas if a particular fishing practice/gear type is shown not to be detrimental to habitat
- Precautionary management approach should include: (1) preventative action to protect habitats in advance of scientific proof of causality; (2) the proponent of an activity, rather than the public, bearing the burden of proof to show that a fishing practice or gear will not result in environmental harm; (3) a reasonable range of alternatives, including a no-action alternative (for new activities) considered when there may be evidence of harm caused by an activity; and (4) decision making that is open, informed, democratic and includes all potentially affected parties, including indirect stakeholders
- *Fishing/Gear effects on EFH*: Main issue for SEIS; Minimize adverse effects of fishing; Lack of data; Look at physical disturbances (rolling boulders, smoothing out ocean floor, sediment resuspension), biological (removal of benthic organisms, predator-prey relationships among targeted and non-targeted species) and chemical disturbances; Environmental effects should be analyzed by experts in biology, ecology, and oceanography as required by NEPA; Include conclusions on spatial extent, level and type of disturbance

(Habitat continued)

Habitat (con't)

- *Fishing/Gear effects on EFH* (con't): Cases where data are limited, SEIS must identify potential adverse impacts that are occurring and the risks involved in delaying precautionary action; Small footrope requirement not enough to protect shelf; Mid-water trawl gets roller gear out of rockpiles, gives bottom a break; Trawl gear doesn't damage habitat (Alaska study that trawling doors tread lightly on bottom); Over 450 studies worldwide that document the adverse effects of trawl gear on fish habitat; Scope of EIS should include information such as the "Review of the fishing gear utilized within the Southeast Region and their potential impacts on essential fish habitat" by Barnette; Prior environmental and EFH analyses are inadequate because they: (1) do not assess the known and potential gear impacts on environment and EFH and (2) do not use scientific studies conducted in the Pacific and worldwide on fishing gear impacts on habitat; Categorize gear types used in the groundfish fishery by level of impact on various habitats (Could provide future guidance on targeting buyout money or developing conservation provision for a quota allocation system); Analysis should focus on applying existing scientific data to predict short and long-term effects of each fishing gear on each EFH; Analyze impacts of gear types on species managed under other FMPs and on non-commercial species (tube worms and sponges); EFH assessment alone will not do, NEPA requires broader analysis of effects of fishing on environment; Awaiting clear and conclusive scientific evidence is unnecessary, cannot be used as an excuse for delaying action on the time-sensitive mandate in MSA to minimize effects of fishing gear on EFH by 10/1998
- *Discuss non-fishing effects on the environment*: Major natural shifts happen (rivers and floods flushing to the sea); Whales destroy bottom more than trawling; Cruise ships (sewage affects bottom); Military dumping of dangerous/potent poisons; Cable-laying disturbances to bottom heal quickly, within hours (videos available)
- Evaluate an alternative that limits identification of non-fishing activities that adversely affect EFH to those substantial, identifiable effects that are appropriate for the Council to address; Previous NMFS and Council approaches of identifying a broad universe of upland and other activities that might have an impact on EFH is unrealistic and counterproductive to effective EFH program implementation
- Evaluate direct and indirect economic and social effects on non-fishing entities, including small entities, of the designation of EFH, activities that adversely affect EFH, and recommended conservation measures; These impacts include delay and requests for modification of analysis and project design for activities subject to EFH consultation, and attendant costs; Costs include those borne by federal, state and local agencies, and private applicants required to conduct and/or pay for impact analysis and other prerequisites to obtaining a federal authorization or funding

Gear

- Lack of data on relative selectivity of gear
- Favor more selective gear types
- Evaluate gear performance standards vs. design standards
- *Gear restrictions*: Create incentives/penalties rather than mandating gear changes/restrictions; Do not ban gear; Must be a better way to protect red rockfish than requiring small footropes; Prohibit rockhopper gear; Evaluate if small footrope requirement is working

Stakeholder Relations

- Public not given adequate representation in decisions
- Logistics of Council meetings poor (hard for working person to attend week long meeting)
- Distrust between fishers and management; Fishermen don't know where restrictions and regulations are coming from; No incentive for fishermen to give information to managers; Do not want observers, but that is the only way management can get information on fishery
- Regulations too complex; No one reads the *Federal Register*
- All fishermen need to band together to survive
- Need partnership between industry and government to move information for better future management

Fishing Industry/Coastal Communities

- Examine how can fishers improve their products and make more money from limited catches

(Fishing Industry/Coastal Communities continued)

Development of SEIS Alternatives *(con't)*

Fishing Industry and Coastal Communities (con't)

- Commercial fishing not just about money, fishermen love to fish, love seeing their food in restaurants/stores
- Consider effects on fishing communities (including processors, commercial and recreational fishermen, suppliers, coastal communities, tribes) through a holistic approach; Driving fishing communities broke; Look at economics both short and long-term (especially small seaside communities with no economic income outside of the industry); Council data ignores economic impacts of sportfishing and support businesses on coastal communities (including estimated potential income if stocks were abundant)
- FMP/Council must consider non-charter recreational as well as commercial and charter recreational fleet
- *Processing plants*: Supported by groundfish; Consolidation of fish processing industry not healthy
- *Fishing supply/service companies*: Affected by greater fishing community health; Few left on West Coast; Tough to deal with quick gear changes; Few suppliers to consolidate orders with; Can't buy gear/supplies in bulk therefore products in store are more expensive for fishermen; Changing gear requirements are confusing (never know what's legal); Suppliers act as credit line for fishermen (banks won't provide loans); More cutbacks in landings will begin to see breakdown in supply/service sector; Increase agency dialogue with supply/service sector; Harbors will have trouble being functional with groundfish disaster
- States and coastal communities need economic data and regulatory action to extract maximum economic value from the depleted groundfish stocks
- States/coastal communities need help evaluating restrictions on recreational take to maximize value while protecting easily accessible areas for charter and small boats; Solve puzzle of overlapping jurisdictions
- NMFS has allowed commercial fishermen to strip-mine the ocean to detriment of groundfish species, difficult for commercial and recreational fishermen and associated businesses; Public was not given adequate representation as required by law; Higher level of abundance would have been desirable for sportfishing, therefore more protective measures for resource if we had been managing for sport fisheries, rather than commercial
- Consider provisions of law to protect recreational fishing
- Recreational fishermen are trying to stir up recreational versus commercial issues

General Comments/Observations

- General lack of data (biological, socio-economic); Current data out of date; Knowledge about fish and ocean too poor to manage properly; Not enough science to close down fishery
- Revise FMP goals to meet Strategic Plan goals
- Phrase "to the extent practicable" should be used for all fishery management, not just bycatch reduction
- Best way to manage fishery might be to not go as far out and to catch fewer fish
- NMFS should use the [National Standard Guidelines NS1] mixed-stock exception and get sued so that the courts can figure out what Congress meant
- Analyze methods to make fishery self-supporting (no tax dollars); Tax dollars shouldn't support overfishing
- Need observers; Perform economic analysis for transition to industry-paid full observer coverage; Industry should pay for observers or else close fishery
- If no money for proper enforcement, take precautionary approach and don't allow harvest until enforcement adequate (example of study on live-fish not getting reported on fish tickets in California)
- Devote adequate resources to regulating fisheries if want sustainability
- Recreational catch not being monitored enough
- No one fishes for just one species, it's a multi-species fishery
- Consider that fishers only use about 10% of EEZ
- Use information about ocean bottom/habitat from fishers onboard submarine cable layers' boats off Oregon
- Heceta Bank off Oregon full of fish vitality
- Mid-80s to 1990s, dramatic decline in abundance and size of nearshore reef fish (and groundfish) off California, possibly due to recreational and commercial overfishing; Lingcod decline in abundance and size particularly near the Sonoma and Mendocino coasts; *Sebastes* and shallow reef species decline sharply in 1990s in California; Rarely see large lingcod outside of no-take reserve such as Point Lobos in Monterey County, numerous in reserve; Mature sheepshead seem even rarer in California
- NMFS must act now to stop the harvest of depleted species
- Uncertainty should be resolved in favor of the fish, with economic and other considerations subsumed completely to the long-term imperative to sustain and improve the condition of these species

SUMMARY MINUTES
Ad Hoc Full Retention Committee

Pacific Fishery Management Council
West Conference Room
7700 NE Ambassador Place, Suite 200
Portland, OR 97220-1384
(503) 326-6352
August 6, 2001

Members Present:

Dr. Jim Hastie, National Marine Fisheries Service Northwest Fisheries Science Center
Mr. Rod Moore, West Coast Seafood Processors Association
Mr. Brian Culver, Washington Department of Fish and Wildlife
Capt. Mike Cenci, Washington Department of Fish and Wildlife
Capt. Ted Lindstrom, U.S. Coast Guard
Ms. Eileen Cooney, National Oceanic and Atmospheric Administration- General Counsel

Others Present:

Mr. Dave Thomas, California Department of Fish and Game
Mr. Mark Saelens, Oregon Department of Fish and Wildlife
Dr. Elizabeth Clarke, National Marine Fisheries Service
Mr. Steve Bodnar, Coos Bay Trawlers Association
Mr. Rob Jones, Northwest Indian Fisheries Commission
Mr. Joe Easley, Oregon Trawl Commission
Mr. Farron Wallace, Washington Department of Fish and Wildlife
Dr. Kevin Piner, National Marine Fisheries Service Northwest Fisheries Science Center
Dr. Alec MacCall, National Marine Fisheries Service Southwest Fisheries Science Center
Ms. Janice Green, Groundfish Advisory Subpanel Representative
Ms. Yvonne deReynier, National Marine Fisheries Service (via conference call)
Ms. Becky Renko, National Marine Fisheries Service (via conference call)
Ms. Jamie Goen, National Marine Fisheries Service (via conference call)
Ms. Carrie Nordeen, National Marine Fisheries Service (via conference call)
Mr. Dan Waldeck, Council Staff Officer, Pacific Fishery Management Council
Mr. John DeVore, Council Staff Officer, Pacific Fishery Management Council

The meeting was called to order at 10:34 a.m. by Mr. Moore.

Public comments were added to the agenda which will be solicited at the end of each item. An Observer Program update was added under "Management Concerns".

The first issue discussed was coverage for full retention: rockfish only or all groundfish? Mr. Culver referred to the GMT comments from the April 2001 Council meeting (Exhibit F.9, GMT Report). An argument for limiting full retention to rockfish only is concern with high mortality of discarded rockfish. Volume of catch may not be as big a factor (relative to other groundfish bycatch), allowing higher marketing potential of bycatch with full retention.

Dr. Hastie thought it also desirable to start with rockfish only as a pilot program for full retention. Mr. Culver remarked that rockfish is the biggest concern.

Mr. Moore suggested we could start this as a pilot by limiting it to just a few ports. Dr. Hastie thought it important to have a good geographic spread. We would need ports in each state strategically picked to cover the species of greatest concern (i.e. bocaccio, canary, etc.). We need a good representation of important shelf and slope species.

There was a general discussion about the need to start the program with all or other groundfish species than just rockfish. Mr. Thomas brought up the problem of unmarketable fish taken in a full retention program. Mr. Culver thought this was another reason to start with rockfish since they are generally more marketable. Mr. Moore asked if this was limited to just trawl gear? Does it include fixed gears? Dr. Hastie replied this would be for all gears. Mr. Moore suggested we might need to include nearshore species/fisheries as well. Mr. Culver thought it didn't make as much sense to limit a live fish fishery where discard may not be as big a problem. He thought we should start with shelf and slope fisheries as a pilot. Mr. Moore asked about nearshore trawl or other commercial fisheries? Dr. Hastie replied that there may not be as big a discard mortality problem for nearshore fisheries. He didn't want to preclude eventual inclusion of nearshore fisheries for full retention.

Mr. Moore went back to the first item- what are we going to recommend in September? Mr. Thomas thought it better to focus on shelf and slope and work out the mechanisms for full retention. Dr. Hastie said that although he didn't expect a consensus recommendation at today's meeting, he'd like to find some limited consensus to get started. Mr. Saelens agreed that we need to start getting better discard information, especially since the National Marine Fisheries Service (NMFS) Observer Program is getting a slow start. Ms. Cooney added that we need to provide reasons for any program recommendation. Mr. Culver replied that we need to get better total mortality information since some of our management assumptions need a better basis. Mr. Culver would hate to see this initiative delayed by getting hung up on problems with the nearshore live fish fishery. Mr. Thomas was still concerned with mechanics.

Dr. Hastie asked if anyone wants to promote retention of all groundfish? Mr. Moore said yes.

Mr. Easley thought any money generated in a full retention program needs to be dedicated to groundfish research. He didn't think logistics would be as difficult to implement as people think. Mr. Moore thought that depended on whether the program was mandatory or voluntary. Mr. Bodnar thought the program should start as a voluntary program to work out logistics and wanted to see Charleston, Oregon as a participatory port. Dr. Clarke wanted everyone to consider sampler needs (port and on-board). She was concerned that this program could sap personnel from the almost-existing NMFS Observer Program. Dr. Hastie thought we could rely on examination/comparison of trip limit attainment/overage in observed versus unobserved periods. Mr. Culver thought limiting the program as a pilot will avoid logistic problems associated with market limits associated with other groundfish species. Mr. Thomas wondered about fishers that are high grading to survive. How does that work into the program mechanics? Mr. Culver said you could set it up like Washington razor clam management- i.e. keep the first 500 pounds of the target species for sale with the remainder retained and sold separately. Mr. Bodnar said industry needs to develop market-added value of otherwise unmarketable product. This would make the program workable for processors as well.

Mr. Culver asked whether we could narrow our discussion. Dr. Hastie thought we could limit full retention to trip limit species. Mr. Moore agreed and added that we need to get select processors to volunteer. He said that everything depends on how it gets set up. Dr. Hastie suggested voluntary measures could work if, once fishers and processors volunteered, their participation would become mandatory.

Ms. deReynier agreed with Dr. Hastie on the last point but questioned whether species under trip limits that have a low discard mortality should be included in the program. Mr. Moore laid out his vision of how a voluntary program would be conducted. Field test this with fishers and processors that are willing. Ms. Cooney asked whether this would be analogous to an exempted fishing permit (EFP)? Mr. Culver said they would have to have an EFP since they would be landing fish in excess of trip limits. Capt. Lindstrom asked whether there could be incentives put in for volunteers? Mr. Culver thought we could adjust trip limits upwards for participants. Mr. Easley would rather see value added to the program by putting any profit dedicated to research. This would provide the industry with potential long-term value. Mr. Culver thought we could consider adjusting trip limits in the future after we get better discard information from the program. Perhaps our current trip limits would be improved with this information. Capt. Lindstrom wondered how you would control fishers who volunteered and wanted to back out afterwards?
There was a discussion on what constitutes a "marketable" species? Mr. Culver suggested that we separate this discussion between species that have a short-term market potential and those that are generally universally marketable. Mr. Moore questioned what is fair market value? He asked what fair

market value is in Washington? Capt. Cenci said, for whiting, it is defined by statute. Mr. Culver thought this could be a significant complication. He cautioned that limiting full retention based on marketing considerations alone would be problematic. Mr. Moore and Mr. Easley explained how Canadian imports and other factors can influence these “market” limits.

It was agreed to run this meeting through 1400 hours (through the first hour of the GMT meeting).

Mr. Moore asked what Council expectations were on full retention. Mr. DeVore explained the Council set up this ad hoc committee at the request of the GMT which is proposing full retention of rockfish. He was not aware of any Council-mandated deadlines. Dr. Clarke explained that she is under the gun to get a full retention pilot program the NMFS Observer Program. The Observer Program is getting underway and she would like to see this initiative go forward in concert.

Mr. Culver suggested we decide on the scope of full retention for the September Council meeting. Mr. Moore wondered if the Observer Program could provide the pilot information we need to for full retention measures. Mr. Culver agreed that full coordination of full retention and the Observer Program would be beneficial. Dr. Clarke thought on-deck video monitoring of commercial fishers, which NMFS may test this year, could also help. Mr. Moore wondered if it made sense to recommend to the Council that full retention measures get started after we receive input from existing EFPs and the NMFS Observer Program? Mr. Culver thought that might make sense. Mr. Thomas asked Mr. Culver about the Washington Department of Fish and Wildlife arrowtooth EFP? Mr. Culver responded that the program just began on August first but appears to be going well. Mr. Moore asked about unmarketable bycatch - how is it handled? Mr. Culver explained a 0-value fish ticket is filled out to account for these fish. He was also encouraged by Mr. Easley’s comments relative to processor initiative to develop value-added products of these otherwise unmarketable fish.

Mr. Moore asked Dr. Clarke whether any of these points may influence her program? Dr. Clarke explained that this discussion was helpful to her in designing the Observer Program. Dr. Hastie thought it would be helpful to consider adding all trip limit species except whiting and arrowtooth, where volume of landed fish beyond the trip limit could be logisitically impossible. Mr. Culver agreed and also wondered whether it was smart to require retention of fish with a low discard mortality. Mr. Easley said that assumed discard mortality rates of 100% are probably wrong. Mr. Culver said discard mortality rate is a factor when recommending optimum yields (OYs). Dr. Hastie replied this was true for lingcod, nearshore rockfish, and sablefish. He thought it best to recommend conducting a pilot full retention program for all trip limit species except whiting, sablefish, and possibly lingcod. Dr. Clarke thought she could poll folks in Coos Bay on this recommendation. Dr. Hastie wondered whether full retention of some of the flatfish species that could come in high volume should be part of this pilot program. Mr. Culver said some of the flatfish bycatch are unmarketable (i.e. slender sole). Mr. Moore suggested we provide a formal recommendation after September? Mr. Culver thought we should target the November Council meeting. Dr. Hastie thought this could be developed over the winter and brought to the Council in March. He explained we could take it up in a meeting in December and/or at a February GMT meeting.

Dr. Hastie asked whether we should discuss any of the other issues on the agenda for Dr. Clarke’s or anyone else’s benefit? Mr. Moore asked for public comment. Mr. Easley brought up problems with potential penalties for volunteers (processors and fishers). Mr. Culver replied that this was a good point and should be carefully considered. Dr. Clarke said she will be meeting with some processors next week and could have this discussion with them. She may be able to solicit some creative options from them. She will present their comments to the Ad Hoc Full Retention Committee. Mr. Easley held out hope that incentives and creative solutions to groundfish problems in general could be found with deliberate planning of a full retention program. Dr. Hastie wondered whether we should concentrate on short-term or long-term incentives. Mr. Moore thought short-term incentives were important given the dire straits the groundfish industry is in. Mr. Culver agreed we need short-term incentives.

Mr. Moore asked for enforcement input. Capt. Cenci explained it was too early. He wanted to see how the program develops first. He said that we need to define potential criminal and civil penalties to address fraud if it comes with the adoption of some sort of full retention. Mr. Moore said, under the voluntary program proposed in 1999, a contract would be entered by all parties. Fraud would be dealt with as a breach of contract. Capt. Cenci asked who would be the contractor? Pacific States Marine

Fisheries Commission? Mr. Moore said it could be. Capt. Cenci explained that with some EFPs, violations were addressed by pulling the EFP permit because there was no criminal or civil penalties defined. Mr. Moore presumed there would be state and federal penalties if the program became mandatory. Ms. Green explained that civil penalties are set up with other federal regulatory permitting agencies such as EPA and that this could be handled this way. Ms. Cooney said that most of NMFS enforcement is through civil penalties. In Capt. Cenci’s case, problems were handled with contracts.

Ms. Cooney suggested we flesh out as much detail here and now and let other committee’s/entities weigh in on these details.

Mr. Moore thought we could expand our list of objectives. Dr. Hastie said you could add Mr. Easley’s suggestion to dedicate funds from selling overages to research. Ms. Cooney mentioned that money forfeited to the federal government is directed by statute. She mentioned there more flexibility if the money were forfeited to the states.

Dr. Hastie wondered about the detail of what kind of overage limit should be applied with full retention? He thought it would be useful to solicit ideas for a structured cap to avoid fishers targeting marketable species without concern for bycatch of overfished species such as canary. Mr. Culver thought you couldn’t get all the information needed in a full retention program with a landing cap. Dr. Hastie thought a cap should be placed, after which the fisherman would be prohibited from fishing. Mr. Moore had problems with the cap idea in that it might increase discard or penalties to fishermen. Dr. Hastie acceded that point. Dr. Clarke asked how to limit fishermen then? Dr. Hastie suggested vessels with overages could be published. Dr. Clarke asked whether that was allowed? Mr. Culver explained this is done in the whiting fishery and that peer pressure to avoid bycatch is a strong incentive. Mr. Moore agreed. He said piling on too many restrictions in the pilot program could cripple this initiative.

Mr. Culver asked whether the group was generally interested in forging ahead with full retention? Mr. Easley and Mr. Moore agreed that industry was a proponent of full retention. Mr. Culver said he wanted to see this stay above the line in the Council process. Capt. Lindstrom thought full retention should have incentives instead of disincentives because enforcement resources will be limited.

The Committee asked Mr. DeVore whether he had enough for a Council briefing in September. He agreed and summarized the consensus of the group.

PFMC
08/27/01

Exhibit C.11.a
Supplemental Ad Hoc FRC Report
September 2001

REPORT OF THE AD HOC FULL RETENTION COMMITTEE

The Council’s Ad Hoc Full Retention Committee (Committee) met in Portland, Oregon on August 6, 2001. The Committee discussed a number of the issues surrounding any potential program requiring full retention of catch in the West Coast groundfish fishery. These issues included:

- Which species to include.
- Coastwide versus pilot program.
- Disposition of revenue generated by surrender of overages.
- Calculation of fair market value.
- Impacts upon vessels and processors from the requirement to handle nonmarketable catch.
- Integration with the newly implemented Observer Program.
- How to create incentives for compliance, or disincentives for noncompliance.
- Monitoring and enforcement issues.

The Committee felt that these, as well as other issues, need to be further developed. The committee believes that full retention measures should be included in the Council’s "toolbox" and would like to see work on the issue remain above the workload priority line. The committee feels it would be useful to meet over the winter after information becomes available from the rockfish retention measures in the Washington exempted fishing permit program, or any full retention program that might be developed as part of the NMFS Observer Program. Having such information in hand should provide insight into the issues already discussed by the Committee or illuminate other issues which the Committee has not yet identified.

PFMC
09/13/01

Proposed STAR Schedule for 2002

NMFS Pre-Assessment Workshop: January 23-24 Portland, Oregon

PANEL	ASSESSMENT LEAD	DATE	LOCATION	DOCUMENT DUE
Panel #1: Pacific Whiting	DFO & NWFSC	Feb 20-22	British Columbia	March 6
Panel #2: Bocaccio	SWFSC	April 15-19	Santa Cruz	May 6
Canary Rockfish	NWFSC			
Cabezon	CDFG & SWFSC			

PRELIMINARY UPDATE ON THE WASHINGTON DEPARTMENT OF FISH AND WILDLIFE (WDFW) ARROWTOOTH FLOUNDER EFP

- Started on August 1, and will continue through September 30, 2001
  - WDFW has hired 7 at-sea observers and one observer coordinator who is stationed in Bellingham
  - Observers had extensive 6-day training session which included:
    - Following NMFS Observer Manual for safety and sampling methods
    - U.S. Coast Guard safety training–including survival suit immersion test and vessel safety
    - Department training on:
      - Fish Identification
      - Random Sampling Theory
      - Data Collection Methods
      - Current Groundfish Management Issues
      - Safety
- 7 vessels participating in August and September
- Observers are collecting data on a per tow basis for:
  - Volume of total discard
  - Species composition of discard
  - Volume of canary rockfish
  - Species composition of retained catch
- As a reminder, WDFW is requiring participating vessels to retain all of their rockfish under the EFP. As a result, shoreside port samplers are collecting data on a per trip basis for:
  - Volume and species composition of unmarketable rockfish
- WDFW has agreements with vessels and NMFS that we will not release any data resulting from EFP until the EFP is completed and reviewed by all parties involved
- Preliminary information indicates that the program is working well; participants have been able to retain quantities of arrowtooth flounder and petrale sole in excess of current trip limits while staying within the allowed canary rockfish bycatch limit

Exhibit C.12.a
Supplemental GAP Report
September 2001

GROUNDFISH ADVISORY SUBPANEL STATEMENT ON
2002 STOCK ASSESSMENT SCHEDULE

The Groundfish Advisory Subpanel (GAP) discussed 2002 stock assessment priorities with NMFS personnel and offers the following comments.

The GAP supports the NMFS plan to complete stock assessments on Pacific whiting, bocaccio rockfish, and canary rockfish. The GAP also supports NMFS efforts to better evaluate survey methodology as survey responsibilities are transferred from the Alaska Fisheries Science Center to the Northwest Fisheries Science Center.

However, the GAP is concerned that no effort will be made to update the sablefish and Dover sole stock assessments with new information that will be available from 2001 surveys. The 2001 assessments have preferred models that were reviewed by a Stock Assessment Review (STAR) Panel and generally approved. These models could easily be updated with the new survey information and the results could be applied to the 2003 fisheries specifications. The economic effect of reductions in sablefish and Dover sole harvests in 2002 based on the current stock assessments will be devastating. It is unconscionable to continue those reductions if - as appears to be the case - new information allows the Council to provide some relief.

The GAP understands the Scientific and Statistical Committee may have reservations about conducting simple updates without appropriate peer review. As a strong proponent of the STAR Panel process, the GAP appreciates those reservations. However, STAR Panel and Stock Assessment Team (STAT) Team members have also expressed concern over a cumbersome process being used to review models which have already met with scientific approval.

The GAP believes NMFS and the Council should convene another work group early next year to further streamline the STAR process, especially as it applies to updating models which have previously been reviewed. In the meantime, a simple update of the sablefish and Dover sole assessments need to be conducted using 2001 survey data.

PFMC
09/13/01

NATIONAL MARINE FISHERIES SERVICE REPORT

Situation: The National Marine Fisheries Service (NMFS) will report on its regulatory activities since the June 2001 Council meeting. NMFS will report on the implementation of the permit stacking program for the fixed gear sablefish fishery which began on August 15, 2001. NMFS will also report on its progress in its plans to implement the on-board Observer Program. Observers have been placed on selected vessels in the fixed gear fishery beginning August 15 and selected vessels in the trawl fishery since September 1. In addition, NMFS will report on miscellaneous research and other ongoing regulatory and nonregulatory activities.

Council Task: Discussion.

Reference Materials:

1. Exhibit C.1, Attachment 1, Letter from Donna Darm, NMFS
2. Exhibit C.1, Supplemental NMFS Report (if any).

Groundfish Fishery Strategic Plan (GFSP) Consistency Analysis

This agenda item is not expected to require Council decision making that raises issues of consistency with the GFSP.

PFMC
08/28/01

Exhibit C.1.
Supplemental NMFS Report
September 2001

NMFS Implementation Report on the 2001 Limited Entry, Primary Fixed Gear Sablefish Fishery

In early August, NMFS published three final rules that affected the 2001 limited entry, primary fixed gear sablefish fishery. Effective August 1, NMFS finalized the rule allowing limited entry permit transfers to occur once per calendar year (published August 6, 2001, 66 FR 40918). Effective August 2, NMFS finalized the rule implementing Amendment 14 for the 2001 primary sablefish season (published August 7, 2001, 66 FR 41152).As NMFS has reported in past Council meetings, this initial Amendment 14 final rule implemented the following provisions for 2001 and beyond: up to three sablefish endorsed permits may be registered for use with a single vessel; the limited entry, fixed gear primary sablefish season will be held from August 15 through October 31; a vessel may fish for sablefish during the primary season with any of the fixed gears specified on at least one of the limited entry sablefish endorsed permits registered for use with that vessel; no person may hold (own or lease) more than three sablefish endorsed limited entry permits unless that person owned more than three permits as of November 1, 2000; no partnership or corporation may own a sablefish endorsed limited entry permit unless that partnership or corporation owned a permit as of November 1, 2000; cumulative limits for species other than sablefish and for the sablefish daily trip limit fishery remain per vessel limits and are not affected by permit stacking; the limited entry daily trip limit fishery for sablefish will be open during the primary season. NMFS will report on the proposed rule to implement Amendment 14 for 2002 and beyond at the November Council meeting.

In addition to the permit transfer rule and the Amendment 14 rule, NMFS published and made effective the final rule allowing incidental halibut retention in the primary longline sablefish fishery north of Point Chehalis, Washington on August 10, 2001 (66 FR 42154).

The final rule implementing Amendment 14 allowed permit owners wishing to transfer their sablefish-endorsed permits to do so August 2-14 and have those transfers effective on August 15. This allowance ensured that permit owners could transfer and stack their permits without being constrained by the regulatory requirement that permit transfers be effective only on the first day of a major cumulative limit period. During those two weeks, NMFS approved 35 requests to stack sablefish-endorsed permits. A total of 52 permits were stacked on top of base permits.

Tier Levels of all Sablefish Endorsed Permits	Number of Permits
Tier 1	27
Tier 2	43
Tier 3	94
Total	164

Tier Levels of Permits that were *Stacked*	Number of Permits
Tier 1	11
Tier 2	10
Tier 3	31
Total	52

Of the vessels participating in the primary season, 35 vessels are registered with stacked permits. Of those 35 vessels, 18 are registered with two permits per vessel, and 17 are registered with three permits per vessel.

Bringing the three rules together simultaneously and implementing the many permit stacking requests made for fairly intense workloads for NMFS staff in July and August. We particularly appreciated the sablefish fleet’s patience and understanding as we worked through all of the regulatory requirements needed for the 2001 primary season. We were only able to move as swiftly as we did because of the cooperative support received from the fleet throughout the summer.

MARINE RECREATIONAL FISHERIES STATISTICS SURVEY UPDATE

Situation: An update on the status of the Recreational Fishery Information Network (RecFIN) program will be provided by Mr. Russell Porter of Pacific States Marine Fisheries Commission (PSMFC). RecFIN is administered by PSMFC. 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).

At the Council's June meeting, Mr. Porter reported to the Council that a budget shortfall may result in cancellation of field sampling in Wave 6 (November-December) 2001, and Wave 1 (January-February) 2002. Subsequently, several Council members and two PSMFC representatives met with National Oceanic and Atmospheric Administration's (NOAA) Acting Assistant Administrator for Fisheries, Dr. William Hogarth. Dr. Hogarth promised to provide funds needed for year-round field sampling and indicated an intent to meet the Council's request for an additional $50,000 for meetings to evaluate possibilities for development of a better system to meet West Coast data needs. Subsequent to that meeting, different interpretations have been given on the intended use of the $50,000. This led Mr. Randy Fisher, Director of PSMFC to draft the attached letter requesting further clarification.

Council Task:

1. **Comment and guidance as appropriate on evaluation and possible redesign of the recreational data system.**

Reference Materials:

1. Briefing paper for the July 5 Hogarth meeting (Exhibit C.2, Attachment 1).
2. Letter from Randy Fisher to Dr. William Hogarth (Exhibit C.2.b, PSMFC Letter).

Groundfish Fishery Strategic Plan (GFSP) Consistency Analysis

The GFSP calls for data collection, monitoring and analysis: "To provide comprehensive, objective, reproducible, and credible information in an understandable and timely manner to meet our conservation and management objectives." Recommendations reference the need to create cooperative interagency-industry partnerships, implement the West Coast Fisheries Economic Data Plan and integrate Council research and data needs into the NOAA budget process. Council activity with Dr. Hogarth is entirely consistent with the GFSP.

PFMC
08/23/01

Exhibit C.2.c
Supplemental GAP Report
September 2001

GROUNDFISH ADVISORY SUBPANEL COMMENTS ON
MARINE RECREATIONAL FISHERIES STATISTICS SURVEY UPDATE

The Groundfish Advisory Subpanel (GAP) received a briefing on the Marine Recreational Fisheries Statistics Survey (MRFSS) and offers the following comments. The GAP appreciates the efforts of MRFSS staff.

While the MRFSS program has shown some improvements, the GAP believes more efforts can be expended to make MRFSS a useful tool for fisheries management, especially when the need for inseason adjustments in the recreational fisheries become more important. The GAP recommends:

- the MRFSS program improve its public outreach in order to obtain more timely data from recreational participants who are unaware of the need to supply accurate data;
- MRFSS continue efforts to refine its analyses, as MRFSS catch data appears to continually over report recreational catches. This is important as it affects all sectors;
- the MRFSS move towards a coast-wide logbook effort for charter/party boats as logbook data appear to more accurately reflect harvest than do phone surveys; and
- the MRFSS make greater efforts to use coordinated data gathering programs from the 3 coastal states.

PFMC
09/11/01

Exhibit C.2.c
Supplemental SSC Report
September 2001

SCIENTIFIC AND STATISTICAL COMMITTEE REPORT ON MARINE RECREATIONAL FISHERIES STATISTICS SURVEY UPDATE

Mr. Russell Porter of the Pacific States Marine Fisheries Commission (PSMFC) and Dr. Dave Van Voorhees of the National Marine Fisheries Service, Fishery Statistics Division briefed the Scientific and Statistical Committee (SSC) regarding current and potential future efforts to improve estimates of recreational harvest and effort on the West Coast.

The Marine Recreational Fishery Statistics Survey (MRFSS) customarily utilizes a random digit dialing (RDD) procedure to estimate recreational fishing effort. Because of the low prevalence of households that fish in party/charter (PC) mode, the RDD methodology tends to produce very imprecise and perhaps biased estimates of PC effort. This imprecision is accentuated during the winter months, when fishing activity tends to be low anyway. While effort and harvest estimates for Oregon and Washington are based largely on ocean boat sampling programs designed and administered by those states, estimates for California are based largely on the MRFSS.

In an attempt to improve PC effort estimates for California, a weekly effort survey was initiated in that state in March 2001 based on a sampling frame of PC vessels that fish in marine waters. The protocol for this new survey involves drawing a random sample of PC operators each week from the sampling frame, sending these operators a letter requesting that they keep a written log of their effort in a subsequent week, and contacting them at the end of that week to collect their log information. Although this sampling protocol has been used successfully in the southeastern U.S., it is new to the West Coast and work remains to be done with regard to refining the sampling frame and expansion methods and validating the survey against logbook data collected by the California Department of Fish and Game (CDFG). The weekly effort survey holds much promise as a method of providing more precise effort estimates than the MRFSS RDD methodology.

Although the MRFSS is based on a temporal stratification of the year into six two-month sampling periods, the MRFSS is not designed as a tool for inseason monitoring. However, lack of other options has prompted the Council to utilize the MRFSS to serve that function for groundfish. Specifically, two estimates of bocaccio harvest during waves 1-3 of 2001 have been produced from MRFSS data: (1) a 51 mt estimate, based on a two-way stratification of the California fishery, and (2) a 37 mt estimate, based on a five-way stratification of the fishery. The 37 mt estimate is an improvement over the 51 mt estimate, in that it does a better job of ensuring that localized differences in catch-per-unit-effort are reflected in the population estimate.

In addition to the MRFSS-based bocaccio harvest estimates, additional bocaccio estimates based on effort expansions from the PC weekly effort survey for waves 2-3 of 2001 will be made available in October to CDFG for possible consideration by the California Fish and Game Commission. The SSC notes that these effort estimates will represent the first tentative results from a new survey and should therefore be considered preliminary.

The Council is interested in developing a program that would provide inseason estimates of recreational harvest and effort. The SSC recommends that the RecFIN Committee be considered as an appropriate venue for developing such a program. The RecFIN Committee includes representatives from the three states, Pacific States Marine Fisheries Commission, NMFS, and the Council. RecFIN Committee members have expertise in recreational survey methodologies, as well as specific knowledge and experience regarding the MRFSS and state recreational sampling programs. The RecFIN Statistical Subcommittee - which includes statisticians from NMFS and the three states - should also be actively involved, given the technical contributions they could make to the development of an inseason monitoring program.

Should the RecFIN Committee become involved in assisting the Council in developing a monitoring program, close and regular interaction between the Council and RecFIN Committee will be needed to ensure that the program meets Council needs. This will require that the Council develop program objectives in terms of the fishing modes and species that will need to be covered and the target level of precision for the harvest and effort estimates. The program should be geared to providing such estimates according to the time intervals at which the Council expects to consider inseason adjustments; the time intervals needed by the Council will not necessarily be consistent with the two-month intervals used for the MRFSS. From a statistical standpoint it is important to note that the target level of precision identified by the Council should pertain to the cumulative harvest and effort estimates from the beginning of the season up to each point of inseason adjustment, as well as to the end-of-season estimates.

Development of an inseason monitoring program will be a major undertaking that will require considerable commitment of time and resources of those involved. The current sense of urgency regarding such a program must be maintained if it is to be developed in a timely manner. The SSC is willing to assist the Council in identifying program objectives and reviewing program elements as they are being developed.

PFMC
09/11/01

2001 Specifications of Acceptable Biological Catch (ABC), Optimum Yields (OYs) and Limited Entry and Open Access Allocations, by International North Pacific Fisheries Commission (INPFC) Areas (weights in metric tons).

Species	ACCEPTABLE BIOLOGICAL CATCH (ABC)						OY (Total Catch)	Commercial OY (Total Catch)	Allocations Total Catch			
	Vancouver[a/]	Columbia	Eureka	Monterey	Conception	Total Catch			Limited Entry		Open Access	
									mt	%	mt	%
ROUNDFISH												
Lingcod[b/]		610			509	1,119	611	251	203	81	48	19.0
Pacific Cod		3,200		c/		3,200	N/A	3,200	–-	-–	-–	--
Pacific Whiting[d/]					190,400	190,400	190,400	162,900	–-	-–	-–	--
Sablefish[e/] (north of 36^{O})				7,661	--	7,661	6,895	6,181	5,600	90.6	581	9.4
Sablefish[f/] (south of 36^{O})		--			425	425	212	212	–-	-–	-–	--
FLATFISH												
Dover Sole[g/]				7,151	1,053	8,204	7,677	7,610	–-	-–	-–	--
English Sole		2,000			1,100	3,100	N/A	–	–-	-–	-–	--
Petrale Sole[h/]		1,262	500	800	200	2,762	N/A	–	–-	-–	-–	--
Arrowtooth Flounder					5,800	5,800	N/A	–	–-	-–	-–	--
Other Flatfish	700	3,000	1,700	1,800	500	7,700	N/A	–	–-	-–	-–	–

2001 Specifications of Acceptable Biological Catch (ABC), Optimum Yields (OYs) and Limited Entry and Open Access Allocations, by International North Pacific Fisheries Commission (INPFC) Areas (weights in metric tons).

Species	ACCEPTABLE BIOLOGICAL CATCH (ABC)						OY (Total Catch)	Commercial OY (Total Catch	Allocations Total Catch			
	Vancouver	Columbia	Eureka	Monterey	Conception	Total Catch			Limited Entry		Open Access	
									mt	%	mt	%
ROCKFISH												
Pacific Ocean Perch[i/]		1,541		--		1,541	303	303	--	--	--	--
Shortbelly[j/]					13,900	13,900	13,900	13,900	--	--	--	--
Widow[k/]					3,727	3,727	2,300	2,260	2,192	97.0	68	3.0
Canary[l/]					228	228	93	44	39	87.7	5	12.3
Chilipepper[m/]		c/			2,700	2,700	2,000	1,985	1,106	55.7	879	44.3
Bocaccio[n/]		c/			122	122	100	52	29	55.7	23	44.3
Splitnose[o/]		c/			615	615	461	461	--	--	--	--
Yellowtail[p/]		3,146		c/		3,146	3,146	3,086	2,830	91.7	256	8.3
Shortspine Thornyhead North of 36[oq/r/]		757			--	757	689	685	683	99.7	2	0.27
South of 36[os/]		--			123	123	62	62	62	99.7	0	0.27
Longspine Thornyhead North of 36[oq/t/]		2,461			--	2,461	2,461	2,453	--	--	--	--
South of 36[ou/]		--			390	390	195	195	--	--	--	--
		c/		19		19	2.4	0				
Cowcod[v/]		c/			2.4	2.4	2.4	0				

Darkblotched[w/]	302-349	302-349	130	130	127	97.7	3	2.3

2001 Specifications of Acceptable Biological Catch (ABC), Optimum Yields (OYs) and Limited Entry and Open Access Allocations, by International North Pacific Fisheries Commission (INPFC) Areas (weights in metric tons).

	ACCEPTABLE BIOLOGICAL CATCH (ABC)						OY (Total Catch)	Commercial OY (Total Catch	Allocations Total Catch			
Species	Vancouver	Columbia	Eureka	Monterey	Conception	Total Catch			Limited Entry		Open Access	
									mt	%	mt	%
Minor Rockfish North[x/]			4,823	--		4,823	3,137	2,492	2,254	90.4	238	9.6
Minor Rockfish South[y/]		--			3,556	3,556	2,040	1,090	597	55.7	493	44.3
REMAINING ROCKFISH			2,755		854	--	--	--	--	--	--	--
Bank[z/]		c/			350	350	--	--	--	--	--	--
Black[aa/]			1,115			1,115	--	--	--	--	--	--
Blackgill[bb/]		c/			343		--	--	--	--	--	--
Bocaccio - North			318			318	--	--	--	--	--	--
Chilipepper-North			32			32	--	--	--	--	--	--
Redstripe			576	c/		576	--	--	--	--	--	--
Sharpchin			307		45	352	--	--	--	--	--	--
Silvergrey			38	c/		38	--	--	--	--	--	--
Splitnose			242	c/		242	--	--	--	--	--	--
Yelloweye			29	c/		29	--	--	--	--	--	--
Yellowmouth			99	c/		99	--	--	--	--	--	--
Yellowtail-South					116	116	--	--	--	--	--	--
Other Rockfish[cc/]			2,068		2,702	--	–	--	--	--	--	--

OTHER FISH[dd/]	2,500	7,000	1,200	2,000	2,000	14,700 N/A	–	–-	-–	-–	–

OYs for Minor Rockfish by Depth Sub-groups (Weights in Metric Tons).

Species	Total Catch ABC	OY (Total Catch)			Allocations (Total Catch)			
		Total Catch OY	Recrea-tional Estimate	Commercial OY for Minor Rockfish and for Depth Sub-groups	Limited Entry		Open Access	
					mt	Percent	mt	Percent
Minor Rockfish North[x/]	4,823	3,137	645	2,492	2,254	90.4	238	9.6
Nearshore		987	575	412	222	N/A	190	N/A
Shelf		990	70	920	880	N/A	40	N/A
Slope		1,160		1,160	1,152	N/A	8	N/A
Minor Rockfish South[y/]	3,556	2,040	950	1,090	597	55.7	493	44.3
Nearshore		662	550	112	34	N/A	78	N/A
Shelf		739	400	339	129	N/A	210	N/A
Slope		639		639	434	N/A	195	N/A

a/ ABC applies to the U.S. portion of the Vancouver area, except as noted under individual species.

b/ Lingcod was designated as overfished in 1999 when the biomass was believed to be at 10% of the unfished biomass. A coastwide assessment was conducted in 2000 and confirmed that the stock is overfished coastwide. Separate ABCs were calculated for the northern (Vancouver-Columbia) and southern (Eureka-Monterey-Conception) areas based on $F_{45\%}$ F_{MSY} proxy. The stock assessment included parts of Canadian waters; however, the U.S. portion of the ABC for the Vancouver area was set at 44% of the total for that area. The total catch OY of 611 mt is the sum of the yield for the northern (307 mt) and the southern (304 mt) assessments where a constant exploitation rate that results in a 60% probability of rebuilding the stock to F_{MSY} within 9 years was used. The total catch OY is reduced by 360 mt for the amount that is estimated to be taken by the recreational fishery, resulting in a commercial OY of 251 mt. Tribal vessels land a small amount of lingcod, but do not have a specific allocation at this time. No discards are assumed.

c/ "Other Species", these are neither common nor important to the commercial and recreational fisheries in the areas footnoted. Accordingly, Pacific cod is included in the non-commercial OY of "other fish" and rockfish species are included in either the "other rockfish" or "remaining rockfish" for the areas footnoted only.

d/ Whiting is believed to be at less than 40% of its unfished biomass. The 1998 assessment was updated for 2000 using limited new data. The U.S.-Canada ABC (266,000 mt) is based on the updated assessment with the application of an F_{MSY} proxy of $F_{40\%}$. Because the biomass is estimated to be within the precautionary zone, the 40-10 default harvest policy was applied reducing the coastwide ABC to 238,000 mt. The whiting U.S. ABC is 80% (190,400 mt) of the 238,000 mt. The U.S. total catch OY was then set equal to the U.S. ABC. The commercial OY for whiting is 162,900 mt (the 190,400 mt OY minus the 27,500 mt tribal allocation), and is allocated 42% to the shore-based sector, 24% to the mothership sector, and 34% to the catcher-processor sector. Discards of whiting are estimated from observer data and counted towards the OY inseason.

e/ Sablefish north of 36^{O} N latitude is believed to be at 37% of its unfished biomass. The 7,661 ABC for the area north of 36^{O} N latitude is based on a F45% F_{MSY} proxy. The total catch OY (6,895 mt) is based on the application of the 40-10 harvest rate policy, because the biomass is estimated to be in the precautionary zone. The total catch OY is reduced by 690 mt for the tribal set aside and by 24 mt for the compensation to vessels that conducted resource surveys. The remaining 6,181 is the commercial total catch OY. The open access allocation of 9.4% of the commercial OY results in a total catch OY of 581 mt. The limited entry allocation of 90.6% of the commercial OY results in a total catch OY of 5,600 mt. The limited entry OY is further divided with 58% (3,248 mt) allocated to the trawl fishery and 42% (2,352 mt) allocated to the nontrawl fishery. For the first time in 2000, discard rates will be applied by sector to obtain landed catch value.

f/ Sablefish in the Conception area has an ABC (425 mt) based on historical landings. To address uncertainty in stock assessment due to limited information, the ABC was reduced by 50% to obtain the OY (212 mt). There are no limited entry or open access allocations in the Conception area at this time.

g/ Dover sole north of 36^{O} N latitude was assessed as a unit in 1997 and provided an ABC (7,151 mt) for landed catch based on a $F_{40\%}$ F_{MSY} proxy. The Conception area ABC (1,053 mt) is at the level established in the original FMP, and was based on average landings. To address uncertainty in stock assessment due to limited information, the Conception area landed catch ABC was reduced by 50% to obtain the landed catch value. The ABC in this table represents total catch and was determined by estimating that 5% of the total catch was discarded to obtain the landed catch. Therefore, the coastwide ABC and total catch OY is 7,677 mt. The OY is further reduced by 67 mt as compensation to vessels that conducted resource surveys, resulting in a commercial OY of 7,610 mt.

h/ Petrale sole was believed to be at 42% of its unfished biomass following a 1999 assessment. For 2000, the final ABC for the Vancouver-Columbia area (1,262 mt) is based on a $F_{40\%}$ F_{MSY} proxy. The ABCs for the Eureka, Monterey, and Conception areas (1,500 mt) continues at the same level as 2000.

i/ Pacific ocean perch (POP) was designated as overfished in 1999. The ABC (1541 mt) is based on the 2000 assessment for the Vancouver-Columbia area (1,523 mt at $F_{50\%}$ F_{MSY} proxy), plus 18 mt for the Eureka area. The 2001 OY of 303 mt for the Vancouver-Columbia-Eureka area was set in the rebuilding plan. Discards are assumed to be 16% for a landed catch value of 255 mt.

j/ Shortbelly rockfish remains an unexploited stock and is difficult to assess quantitatively. The 1989 assessment provided 2 alterative yield calculations of 13,900 mt and 47,000 mt. NMFS surveys indicate poor recruitment in most years since 1989, indicating low recent productivity and a naturally declining population in spite of low fishing pressure. The ABC and OY therefore are reduced to 13,900 mt, the low end of the range in the assessment.

k/ Widow rockfish is believed to be at 24% of its unfished biomass indicating that its overfished at this time. The ABC (3,727 mt) is based on the 2000 assessment with a $F_{50\%}$ F_{MSY} proxy. Two OY options were presented to the Council ranging from 2,864 (based on $F_{50\%}$ F_{MSY} proxy and the 40-10 harvest policy) to 1,775 mt (based on $F_{65\%}$ F_{MSY} proxy and the 40-10 harvest policy). The Council adopted the average of the option range resulting in a total catch OY of 2,300 mt. The OY is reduced by 40 mt for the amount estimated to be taken as recreational catch resulting in a commercial OY of 2,260 mt. The open access allocation (68 mt) is 3% of the commercial OY. The limited entry allocation (2,192 mt) is 97% of the commercial OY. The limited entry allocation is further reduced by 250 mt for anticipated bycatch in the offshore whiting fishery, and the remainder (1,942 mt) is reduced by 16% (311 mt) to account for trip limit induced discards, resulting in a landed catch equivalent for the limited entry fishery of 1,631 mt (excluding harvest in the whiting fishery).

l/ Canary rockfish is believed to be at 22% of its unfished biomass in the north (north of Cape Blanco) and 8% of its unfished biomass in the south (south of Cape Blanco). Canary rockfish was declared overfished in 2000. In 1999, two assessments addressed the northern and southern portions of the stock. Although each area was assessed separately, there is no definitive evidence of separate northern and southern stocks. The coastwide ABC (228 mt) is based on a F_{MSY} proxy of $F_{50\%}$. The coastwide OY (93 mt) is based on the rebuilding plan and is the sum of 73 mt for the northern area, plus 20 mt for the southern area. The OY is reduced by 44 mt for the estimated recreational catch and 5 mt for research surveys, resulting in a commercial OY of 44 mt. Tribal vessels land a small amount of canary rockfish, but do not have a specific allocation at this time. The open access allocation (5 mt) is 12.3% of the commercial OY. The limited entry allocation (39 mt) is 87.7% of the commercial OY. The limited entry allocation is further reduced by 3 mt for anticipated bycatch in the offshore whiting fishery, and the remainder (36 mt) is reduced by 16% (6 mt) to account for trip-limit-induced discards, resulting in a landed catch equivalent for the limited entry fishery of 30 mt (excluding harvest in the whiting fishery). However, the specific open access/limited entry allocation has been suspended during the rebuilding period as necessary to meet the overall rebuilding target while allowing harvest of healthy stocks.

m/ Chilipepper rockfish - the ABC (2,700 mt) for the Monterey-Conception area is based on the 1998 stock assessment with the application of $F_{50\%}$ F_{MSY} proxy. Because the biomass is believed to be above 40% of unfished, plus the default OY could be set equal to the ABC. However, the OY is set at 2,000 mt, near the recent average landed catch, to discourage effort on chilipepper which is known to have bycatch of bocaccio rockfish. The OY is reduced by 15 mt for the amount estimated to be taken in the recreational fishery, resulting in a commercial OY of 1,985 mt. Open access is allocated 44.3% (879 mt) of the commercial OY and limited entry is allocated 55.7% (1,106 mt) of the commercial OY. The assumed discard in the limited entry fishery is 16%, resulting in a landed catch value of 929 mt.

n/ Bocaccio rockfish is believed to be at 2% of its unfished biomass and was designated as overfished in 1999. The ABC of 122 mt is based on a $F_{50\%}$ F_{MSY} proxy. The OY (100 mt) is based on the rebuilding plan which is designed to rebuild the stock to MSY in 38 years. The OY is reduced by 48 mt for the amount estimated to be taken as recreational harvest, resulting in a 52 mt commercial OY. No discard amount is assumed within this OY.

o/ Splitnose rockfish (also called “rosefish”) - The 2001 ABC of 615 mt in the southern area (Monterey-Conception) is based on the F_{MSY} proxy of $F_{50\%}$. The 461 mt OY for the southern area reflects a 25% precautionary adjustment, because of the less rigorous assessment for this stock. In the north, splitnose is included in the minor rockfish OY. The assumed discard is 16% for a landed catch value of 387 mt.

p/ Yellowtail rockfish is believed to be at 63% of its unfished biomass. The ABC of 3,146 mt is based on a 2000 stock assessment for the Vancouver-Columbia-Eureka areas with the F_{MSY} Proxy of $F_{50\%}$. The OY (3,146 mt) was set equal to the ABC. To derive the commercial OY (3,086 mt) the OY is reduced by 60 mt, the amount estimated to be taken in the recreational fishery. The open access allocation (256 mt) is 8.3% of the commercial OY. The limited entry allocation (2,830 mt) is 91.7% of the commercial OY. The limited entry landed catch allocation (1,810 mt) is determined by subtracting 675 mt for anticipated bycatch in the whiting fishery then deducting 16% from the remainder.

q/ Thornyheads – The treaty tribes estimate that 3 mt to 4 mt of thornyheads will be taken in 2001 under a trip limit of 300 pounds per trip. This small amount is not subtracted from the thornyhead OYs at this time.

r/ Shortspine thornyhead was believed to be at 32% of its unfished biomass in 1999. The ABC (757 mt) in the north (Vancouver-Columbia-Eureka-Monterey) is based on a synthesis of two stock assessments conducted in 1998 with the application of a $F_{50\%}$ F_{MSY} proxy. The OY (689 mt) is based on applying the 40-10 harvest policy, because the biomass is in the precautionary zone. The commercial OY is reduced by 4.1 mt deducted for compensation fishing as compensation to vessels that conducted resource surveys. Open access is allocated 0.27% (2 mt) of the commercial OY and limited entry is allocated 55.7% (683 mt) of the commercial OY. A 20% rate of discard is applied to the limited entry allocation to obtain the landed catch value of 546 mt.

s/ Shortspine thornyhead - A separate ABC (120 mt) is established for the Conception area and is based on historical catch for the portion of the Conception area north of $34^{O}27'$ N latitude (Point Conception). To address uncertainty in the stock assessment due to limited information, the ABC was reduced by 50% to obtain the OY(62 mt). There is no ABC or OY for the southern Conception area.

t/ Longspine thornyhead is believed to be above 40% of its unfished biomass. The ABC (2,461 mt) in the north (Vancouver-Columbia-Eureka-Monterey) is based on the average of the 3-year individual ABCs at a $F_{50\%}$. The total catch OY (2,461 mt) is set equal to the ABC. The commercial OY (2,453 mt) is determined by deducting 8 mt for compensation to vessels that conducted resource surveys. To derive the landed catch equivalent of 2,043 mt, the limited entry allocation is reduced by 17% (410 mt) for estimated discards.

u/ Longspine thornyhead - A separate ABC (390 mt) is established for the Conception area and is based on historical catch for the portion of the Conception area north of $34^{O}27'$ N latitude (Point Conception). The ABC was reduced by 50% to obtain the OY (195 mt). This was done to address uncertainty in stock assessment due to limited information. There is no ABC or OY for the southern Conception area.

v/ Cowcod in the Conception area was assessed in 1999 and is believed to be less than 10% of its unfished biomass and was therefore declared as overfished in 2000. The ABC in the Conception area (5 mt) is based on the 1999 assessment, while the ABC for the Monterey (19 mt) is based on average landings from 1993-1997. An OY of 4.8 mt (2.4 mt in each area) was set to allow for rebuilding.

w/ Darkblotched rockfish was assessed in 2000 and is believed to be at 22% of its unfished biomass. The stock is considered to be overfished at this time. Historical catch assumptions from 1965-1978 affect the estimate of unfished biomass and a ABC range is presented at this time. The lower ABC (302 mt) is based on the assumption that 10% of the red rockfish catch during the 1960s and 1970s was darkblotched rockfish; the upper ABC (349 mt) assumes 0% was darkblotched. The OY (130 mt) is the constant annual catch that would rebuild the stock in 10 years, based on the assumption that 5% of the catch was darkblotched. Open access is allocated 2.3% (3 mt) of the commercial OY and limited entry is allocated 97.7% (127 mt) of the commercial OY (130 mt). Limited entry discard is assumed to be 16% of the allocation resulting in a limited entry landed catch value of 106 mt.

x/ Minor rockfish north includes the "remaining rockfish" and "other rockfish" categories in the Vancouver, Columbia, and Eureka areas combined. These species include "remaining rockfish", which generally includes species that have been assessed by less rigorous methods than stock assessment, and "other rockfish", which includes species that do not have quantifiable assessments. The ABC is the sum of the individual "remaining rockfish" ABCs plus the "other rockfish" ABCs. To obtain total catch OY (3,137 mt), the remaining rockfish ABCs were reduced by 25% and the other rockfish ABCs were reduced by 50%. This was a precautionary measure due to limited stock assessment information. The OY is reduced by 645 mt for the amount estimated to be taken in the recreational fishery, resulting in a commercial OY of 2,492 mt. Open access is allocated 9.6% (239 mt) of the commercial OY and limited entry is allocated 90.4% (2,253 mt) of the commercial OY. The discard is assumed to be 16% (353 mt), resulting in a landed catch value of 2139 mt.

y/ Minor rockfish south includes the "remaining rockfish" and "other rockfish" categories in the Monterey and Conception areas combined. These species include "remaining rockfish", which generally includes species that have been assessed by less rigorous methods than stock assessment, and "other rockfish", which includes species that do not have quantifiable assessments. The ABC (3,556 mt) is the sum of the individual "remaining rockfish" ABCs plus the "other rockfish" ABCs. To obtain total catch OY (2,040 mt), the remaining rockfish ABCs were reduced by 25% and the other rockfish ABCs were reduced by 50%. This was a precautionary measure due to limited stock assessment information. The OY is reduced by 950 mt for the amount estimated to be taken in the recreational fishery, resulting in a commercial OY of 1,090 mt. Open access is allocated 44.3% (483 mt) of the commercial OY and limited entry is allocated 55.7% of the commercial OY.

z/ Bank rockfish -- The ABC is 350 mt which is based on a 2000 assessment for the Monterey and Conception areas. This stock contributes 200 mt towards the minor rockfish OY in the south.

aa/ Black rockfish -- the ABC (1,115 mt), which is based on a 2000 assessment, is the sum of the assessment area (615 mt) plus the average catch in the unassessed (500 mt). This stock contributes 865 mt towards the minor rockfish OY in the north.

bb/ Blackgill rockfish is believed to be at 51% of its unfished biomass. The ABC for the Conception area (268 mt) was based on a F_{MSY} proxy of $F_{50\%}$, and 75 mt were added for the Monterey area. The ABC for the Monterey area is the OY it reduced by 25% for precautionary measures, because of lack of information. This stock contributes 306 mt towards the minor rockfish south OY.

cc/ "Other rockfish" includes rockfish species listed in 50 CFR 660.302 and California scorpionfish. The ABC is based on the 1996 review of commercial *Sebastes* landings and includes an estimate of recreational landings. These species have never been quantifiably assessed.

dd/ "Other fish" includes sharks, skates, rays, ratfish, morids, grenadiers, and other groundfish species noted above in footnote [b/].

OVERVIEW OF MANAGEMENT ACTIONS TAKEN BY THE PACIFIC FISHERY MANAGEMENT COUNCIL TO ACCOUNT FOR AND MINIMIZE BYCATCH OF GROUNDFISH

Regulatory efforts to reduce bycatch fulfill multiple management goals -- from protecting overfished and depleted species, to preventing over-harvest of species of unknown abundance, to acknowledging that vessels using different gear types require different harvest strategies, to matching within-year harvest rates to within-year abundance and congregation habits of managed species. These goals must be balanced with the mandate to achieve the optimum yield (OY) from the fishery as a whole, over time. For a multi-species fishery, the catching of species other than the particularly targeted species is not necessarily a problem. Discard of non-targeted species, whether for economic or regulatory reasons, is a problem, and one the Council has worked to reduce through ongoing changes to the management system.

Since the groundfish fishery management plan (FMP) went into effect in 1982, the Pacific Fishery Management Council (Council) has taken a number of steps designed to improve the manner in which annual specifications account for discard mortality and to reduce discard mortality through changes in the fishery's management and regulatory environment. The following summarizes the major changes which have transpired in both of these areas since the FMP's inception.

Actions Intended to Reduce Discard Mortality

One of the original objectives of the FMP was to, "Provide a favorable climate for existing domestic commercial and recreational groundfish fisheries within the limitations of other objectives and guidelines. When change is necessary, institute the regulation which accomplishes the change while minimizing disruption of current domestic fishing practices, marketing procedures, and environment." (PFMC, 1982) This objective of "minimizing disruption of current domestic fishing practices" has remained a management objective through various iterations of the FMP, and has been combined with current objectives to "promote year-round availability of quality seafood to the consumer," and "promote year round marketing opportunities and establish management policies that extend those sectors (for which year round marketing is beneficial) fishing and marketing opportunities as long as practicable during the fishing year" (PFMC, 1982; PFMC, 1990) Taken together, these objectives have resulted in the Council's enduring policy of year-round trip limit management for most groundfish fisheries.

Active groundfish management began in 1983, when the Council introduced the first numerical OYs for several managed species, trip limits for widow rockfish, the *Sebastes* complex, and sablefish. The first landing limits the Council used were "per trip" limits, which were intended to slow landings somewhat, so the fleet would not achieve species' annual harvest guidelines early in the year. Almost all domestic discards in the early years of groundfish management were market-induced, where fishers discarded unmarketable species or unmarketable sizes of targeted species. Domestic fisheries management did not account for these discards; targets for landed catch were set equal to acceptable biological catch (ABC).

Over time, the Council introduced trip limits for a greater number of species taken in the domestic fisheries. Effort increased in the domestic fishery, and trip limits became more restrictive to control harvest rates. The Council realized that managing a variety of species under trip limits could lead to increased rates of discards for some species. Bycatch and discards can result from a regime of multiple trip limits, because a fisher might target an assemblage of species, and then find that in order to catch the full limit on one species, he has to exceed the limit on another species, discarding the excess. To address this issue, the Council shifted away from per trip limits, converting most to monthly cumulative limits by the 1994 season. Cumulative limits were preferable to per trip limits, because a fisher could accumulate species at different rates over different trips, without having to discard fish each trip because of exceeding per trip limits. In an effort to further reduce the likelihood fishermen would have to discard overages of particular species within a multi-species fishery, the Council began extending the cumulative limit period length to two months for most major species throughout most of the 1997 season.

In addition to these efforts to modify the trip limit regime to reduce discards, the Council used several regulatory measures to reduce incidental catch of juvenile fish that would be discarded as unmarketable. In the early 1990s, the Council experimented with different combinations of gear regulations, first requiring larger trawl mesh sizes in net codends, and then moving to requirements for larger mesh sizes throughout trawl nets. By 1995, bottom trawl nets were required to have a minimum of 4.5 inch mesh, double-walled (lined) codends were prohibited, and the use of chafing gear was restricted (60 FR 13377, March 13, 1995, codified at 50 CFR 660.322.) All of these measures were intended to give smaller-size fish the opportunity to escape from the trawl net, reducing the likelihood those fish would be caught and then discarded.

Additional gear restrictions were also introduced during the 2000 fishery. Previously, fishers had been allowed to use footropes equipped with large rollers--often truck tires--to target shelf rockfish species (see 2000 management description, below) residing in high-relief habitat. Beginning in 2000, trawl landings of shelf rockfish were prohibited if large footrope trawls (gear with footropes or rollers greater than 8 inches in diameter) were onboard the vessel; small amounts of shelf rockfish bycatch were allowed to be landed if footropes less than 8 inches in diameter were onboard, and higher limits were provided for targeting healthy shelf rockfish stocks when only midwater nets were onboard. Although the effect of these gear requirements on bycatch of depleted rockfish species has yet to be validated through observation, a review of tow locations from 1999 and 2000 trawl logbooks does suggest many areas where canary rockfish were previously caught are no longer being trawled.

In addition to changes in trip limit duration and gear usage, management measures have incorporated a variety of other strategies to reduce bycatch in the groundfish fishery. For trawl vessels, cumulative landings limits for the "Dover sole/thornyhead/trawl-caught sablefish (DTS) complex" have been constrained by management-imposed ratios between the two or more species in the complex -- Dover sole, thornyheads (shortspine and longspine), and sablefish. These ratios reflect the species mix in the fishery catch data. In circumstances where an imbalance has been observed between species OY ratios and species catch ratios, basing trip limits on catch ratios reduces the likelihood of discard occurring for a species whose proportion of assemblage catch is greater than its proportion of the assemblage OY. In the DTS complex, these constraints have resulted in substantial amounts of OYs for more abundant species going unharvested, in order to reduce the chances of over-harvesting shortspine thornyhead. As examples, during 1999 and 2000, less than 46% of the available longspine thornyhead OY was harvested in either year, and only 84% and 77% of the trawl sablefish allocations were taken in the two years, respectively.

For the 2000 fishery, the Council also revised its historical practice of managing the "minor" *Sebastes* complex species through two broad northern and southern units. Since rockfish generally cannot be released alive, regardless of the method of catch, the Council's challenge has been to eliminate targeting of depleted species and to reduce the likelihood of their incidental catch, while still allowing small amounts of these species to be retained when they are incidentally caught in other target fisheries. In previous years, rockfish species without assessments and those with less rigorous assessments were managed under generic *Sebastes* complex landings limits for the northern and southern areas. In 2000, each of these geographic areas was divided into three sub-groups of rockfish -- nearshore, shelf, and slope--for the northern (U.S. Vancouver, Columbia and Eureka subareas combined) and Southern (Monterey and Conception subareas combined) areas. Rockfish occupy a wide variety of habitats along the West Coast, from shallow kelp forests and nearshore reefs to depths beyond the continental shelf that reach 600 fathoms or more. They also exhibit varying degrees of mobility with regard to geographic location and position in the water column. The assignment of species to one of these categories was based on the depth strata in which they are most commonly found--shallow nearshore areas, moderate depths along the continental shelf, or the greater depths descending to the deep-sea floor--and also upon the tendency of species to be caught with other species in a group. Most of the species currently designated as overfished are found primarily in rocky habitat along the continental shelf.

Cumulative limits for minor shelf rockfish were set at minimal levels for all gear groups in order to reduce incidental catch of canary and bocaccio rockfish and lingcod. During 2000, these restrictions resulted in less than 10% of the commercial OYs for minor shelf rockfish being landed in both the southern and northern areas. The fishery is projected to utilize a similar percentage in 2001 and an even lower percentage in 2002, in order to protect yelloweye rockfish. In 2001, similar limit reductions were implemented for the northern slope sub-group, in order to protect darkblotched rockfish. Commercial landings of the northern slope species are expected to comprise less than one-third of their 2001 OY. Similarly, constraining ratios were used in 1999 in establishing cumulative limits for the healthy chilipepper rockfish stock in an effort to protect bocaccio. As a result, less than 800 mt of the 3,700 mt chilipepper commercial OY was landed. Beginning in 2000, the Council also reduced the chilipepper OY from 3,700 mt to 2,000 mt; however, the restrictive limits approved by the Council allowed landings of just 400 mt.

Logbook data have been used by the Council's Groundfish Management Team (GMT) in estimating coincident catch rates of depleted rockfish species that may occur during the prosecution of small-footrope fisheries for species such as flatfish. However, interpretation of these data is complicated by the absence of recorded discards as well as changes in gear usage, unreliable recording of the gear type used prior to 2000, and substantial changes in retention limits, and thus targeting opportunities for many species. Although considerable inference and filtering of these data, and input from fishers, is required to develop coincident catch rates that reflect the current fishery, these rates are grounded in the best available information regarding fishing practices. They have been used to develop trip limit recommendations for target species through assessment of the expected, associated catches of depleted species, and comparison of those amounts with limit opportunities for the depleted species. As a result, shelf flatfish fisheries which previously had no management limits, now have overall flatfish limits in conjunction with lower sub-limits on species which have exhibited higher historic coincident catch of depleted rockfish species. These types of analyses, as well as the knowledge of fishers, have also been used to craft seasonal variations in limit opportunities in an effort to harvest healthy stocks when they can be most cleanly targeted. An example of this would be the structure of Dover sole limits. Dover sole reside primarily in deeper slope areas throughout the winter and are distributed through the continental shelf during the summer. This migrational pattern factored into the scheduling of larger trip limits for Dover sole at the beginning of the year than during the summer in order to reduce impacts on depleted shelf rockfish.

<u>Actions Taken to Better Account for Discard Mortality</u>

Prior to the 2001 fishing season, the domestic commercial groundfish fishery off the West Coast has not been subject to routine at-sea monitoring by scientific observers. However, two studies, which included fishing vessels carrying observers on a voluntary basis, have provided information on catch rates and discards under the prevailing trip limits. The first study included observations during the 1985-1987 seasons (Pikitch, *et al.*, 1988). Observations for the second study (Enhanced Data Collection Project, EDCP) occurred about ten years later, beginning in late 1995 and continuing through 1998.

The Pikitch study observed five major fishing strategies which were, 1) bottom rockfish trawling (BRF), using roller gear; 2) midwater trawling (MID); 3) deepwater Dover sole trawling (DWD), using a mix of gears, generally outside of 100 fathoms; 4) nearshore-mixed trawling (NSM), using mud (small footrope) gear primarily to target flatfish; and 5) shrimp trawling (SHP), for pink shrimp. The survey sampled 1,470 tows during 139 trips over a range of tow locations from roughly Cape Blanco, in Oregon to the Canadian border.

In the text of the Pikitch report, widow rockfish is the only rockfish species for which discard rates are discussed. Ratios of estimated total catch-to-landings are reported for 1985,1986, and 1987 as being 1.19, 1.13, and 1.15, respectively, representing an average of 1.157 across these three years. Since 1991, this 16% rate has been employed by the Council as an estimate for discarded widow rockfish, as well as an increasing number of other *Sebastes* (rockfish) species. Over time, as the number of rockfish species with assessments has increased, the Council has removed additional species from the generic *Sebastes* complex, and assigned individual OYs incorporating this discard rate. For example, the Council first specified an OY for canary rockfish individually in 1994, and management has incorporated an assumed discard rate at or near 16% since. For bocaccio, the 16% rate was used in 1993 and 1994, but discontinued from 1995-1999 based on GMT analysis that bocaccio trip limits were not being achieved. Beginning in 2000, the 16% discard assumption was re-instituted, in conjunction with imposition of lower trip limits needed to rebuild bocaccio.

In recent years, excess fleet capacity and declining trends for many groundfish stocks have forced the Council to lower cumulative limits substantially in order to preserve year-round supplies of groundfish to harvesters and processors while constraining catches to allowable levels. This pattern of trip limit reductions has led some to question the current appropriateness of the 16% discard estimate, which was derived from a period in which limits were far higher. One finding reported by Pikitch that the estimated discard rate for widow rockfish rose from 5.7% to 52.3% when limits were reduced from 30,000 pounds per week to 3,000 pounds per week, has been cited to support this concern.

In 2001, the GMT re-evaluated the appropriateness of the current 16% discard assumption for *Sebastes* species in general, and depleted species in particular, as it relates to observations described in the Pikitch study. Several key issues were considered including: gear usage on observed trips versus that in the current fishery, alternative shelf target opportunities available during low-limit periods, and changes in relative biomass of species over time.

The predominant gear for on-bottom targeting of widow and most other rockfish in 1985-1987 would have been some form of roller gear, which allows greater access to rocky habitat than the small footrope gear now required for landing any shelf rockfish. Within the Pikitch study, the nearshore-mixed strategy, targeting primarily flatfish with smaller footrope gear, represents the best analogy to the current shelf fishery. Data from the Pikitch study were obtained, and tows where "mud gear" was used in a "nearshore-mixed" strategy were examined separately with regard to coincident catch rates of shelf *Sebastes* species in general, and widow and canary rockfish in particular.

Table 1 shows a summary of catch for the 261 tows meeting this criterion and also for a "flatfish-target" subset (137) of these tows where at least 500 pounds of flatfish was caught, and flatfish comprised at least 70% of the total retained catch. In the larger group, 79% of tows had no canary rockfish catch with a higher percentage (89%) in the flatfish-target group. Of the 912 pounds of canary rockfish which was discarded in all 261 tows, 877 pounds was attributed to a single tow. Although the "reason for discard" was recorded for many tows in the study, no response is recorded for this tow. Regardless, since the total amount of *Sebastes* caught during the trip on which this tow occurred was less than 1,500 pounds, and the Sebastes limit at the time was 25,000 pounds once per week, it appears likely this discard resulted from size-related or other market factors and not limit attainment. It should be noted that greater processor acceptance of smaller rockfish and the mandated use of larger mesh trawl gear (described above) have likely lowered the incidence of size-related discards since the Pikitch study was conducted.

Excluding this tow, the canary rockfish discard rate was 4% for flatfish tows and 1% for the larger set of nearshore-mixed tows. The coincident catch rate of canary rockfish, relative to the weight of all retained flatfish, ranges from 0.9% to 0.3% depending on whether the large discard tow is included. This range is consistent with rates determined from examination of more recent logbook data and considered in the development of 2001 flatfish limits. Beyond canary rockfish, there were no catches of widow or yellowtail rockfish in any of the nearshore-mixed "mud-gear" tows. This also underscores the differences in rockfish encounters between this strategy and the other bottom trawl strategies which contributed to the overall 16% discard estimate for widow rockfish. These results suggest that, even during a period when trip limits would have allowed the retention of large amounts of rockfish, fishermen targeting flatfish with small footrope gear had minimal encounters with rockfish species, including canary rockfish.

The second issue is the magnitude of alternative rockfish fishing opportunities that were available during the portions of these years in which the 3,000 pounds per-trip limits were in place for widow rockfish. Limits for widow rockfish were lowered during September-December in 1985, and during October-December in 1986-87. During these periods, however, limits for other rockfish species remained, in general, very similar to their levels earlier in each year. Limits for the *Sebastes* complex were as high as 40,000 pounds per trip in the southern management area, and 30,000 pounds once per week in the northern area. Additionally, there were no landing limits on lingcod during these years. Therefore, it is likely significant fishing effort <u>utilizing roller gear</u> continued to be directed towards species in rocky habitat during these periods of reduced widow limits. With continuing opportunity to target all other rockfish species, it is not surprising discard rates for widow rockfish increased dramatically during these periods.

In contrast, during the 2000 fishery, the small footrope limits for minor shelf rockfish did not exceed 1,000 pounds per month throughout the year. Other shelf limits included widow rockfish (1,000 pounds per month), yellowtail rockfish in the north (1,500 pounds per month), Pacific ocean perch (POP) (500 pounds to 2,500 pounds per month), bocaccio (300 pounds to 500 pounds per month), canary rockfish (100 pounds to 300 pounds per month), chilipepper rockfish (3,750 pounds per month), and lingcod (0 to 400 pounds per month). Thus, not only was much of the gear used during the Pikitch study more suitable for on-bottom targeting of most rockfish than that with which shelf rockfish can be landed today, the opportunities that existed for targeting other rockfish species when widow rockfish limits were low are not comparable to the present trip limit regime. When the limit for a single component species of an assemblage is lowered relative to the remainder of the assemblage it is reasonable to conclude discard of the single species will tend to increase. However, when all limits within the assemblage are reduced in concert it is considerably more difficult to infer, for any of the species individually, the mere presence of a lower limit will result in a higher discard rate.

A third consideration involves changes in relative biomasses since the Pikitch study. Flatfish now represent the bulk of on-bottom trawling effort on the shelf. Flatfish abundance is currently believed to have been relatively stable and perhaps even increased since the mid-1980s. On the other hand, recent assessments suggest the current exploitable biomass of canary rockfish is less than one-third of what it was during the mid-1980s. Other rockfish species currently viewed as "overfished" have experienced similar, if not greater, declines over this period. In addition to changes in gear restrictions and targeting opportunities, such changes in relative abundance suggest rockfish encounter rates in other target small-footrope fisheries on the shelf should be lower now than during the Pikitch study period.

The later EDCP study was also focused on the fishery off Oregon, with some observations off northern California and Washington. Data from this study were analyzed during 1999 and 2000 and a preliminary report of findings presented to the Council in September of 2000. Because the major focus of vessels participating in the voluntary study was DTS species, the first analytical efforts focused on these four species. The analysis went beyond a simple calculation of discard rates on observed trips, to the development of models that projected discard amounts for all trawl trips in which DTS species were landed, based upon DTS volume and the amount of individual limits that remained at the time of each trip. The projected fleet discards were then combined with documented landings to estimate overall trawl discard rates for the four species. The Council promptly incorporated these new assumed discard rates in their recommendations for landed-catch OYs for the 2001 season.

Further examination of the EDCP data with regard to rockfish bycatch and discard in shelf flatfish fisheries is anticipated though has not yet been initiated. However, across all observed tows, discard rates were calculated for a number of species. Among these, the observed discard rate for widow rockfish was 1%, for canary rockfish 12%, for yellowtail rockfish 20%, for lingcod 10%, and for shortspine thornyhead 20%.

In addition to utilizing results from these major studies in setting landed-catch targets for the fishery, the Council has also incorporated findings from analyses conducted by the GMT and other scientists into this process. In 1997, independent projects examined potential discards in the fisheries for shortspine thornyheads and lingcod. The shortspine analysis was motivated by concerns over size-related discards and was based on comparison of length distributions in the survey and fishery landings. The lingcod analysis arose from concerns over management-induced discard that might be associated with drastic limit reductions anticipated for lingcod rebuilding. This analysis used logbook data to identify the extent to which lingcod had been targeted, and landings data to assess the degree to which previous cumulative limits had been attained. As a result of these efforts, the Council adjusted its discard assumptions for shortspine from 8% in 1997 to 30% in 1998, and from 0% to 25% for lingcod. The 2001 OYs for landed catch assume 20% discard rates for both species based on the EDCP results, in the case of shortspine, and subsequent analysis by the GMT in the case of lingcod.

In an effort to allow continuance of a summer target fishery for arrowtooth flounder, the Council supported in June of 2001 a request by the State of Washington to conduct an experimental fishery during the months of August and September. Vessels participating in the program must carry observers on all trips during this period, and in return gain the opportunity to land higher amounts of arrowtooth flounder provided they can remain within their canary rockfish allowance. For 2002, the Council has also supported a request by the State of California to conduct an experimental fishery to measure the rate of bocaccio bycatch in the small footrope trawl chilipepper fishery. Data from these experiments as well as the NMFS observer program which is also beginning in 2001 should provide an improved basis for evaluating the appropriateness of current management assumptions regarding discard and catch rates. If successful, these experimental programs may also lay a foundation for designing other such programs that would allow healthy species to be targeted while providing a full accounting of the discard of other species.

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TABLE 1. Coincident catch rates of flatfish and *Sebastes* species observed during the Pikitch discard study (1985-1987) for tows made with "mud gear" (no rollers) using a "nearshore-mixed" strategy and the subset of those where at least 500 pounds of flatfish were caught and flatfish comprised at least 70% of the retained catch.

	All Nearshore-mixed Strategy "Mud Gear" Tows	Flatfish Tows
Number of Tows	261	137
# Without Canary	207	122
% Without Canary	79.3%	89.1%
All Flatfish, *Sebastes*, Sablefish, and Lingcod		
Retained + Discard (pounds)	360,915	255,315
Retained (pounds)	265,326	182,924
% Retained	73.5%	71.6%
All Flatfish		
Retained + Discard (pounds)	292,613	202,748
Flatfish Retained (pounds)	213,076	143,151
% Retained	72.8%	70.6%
All *Sebastes* Species		
Retained + Discard (pounds)	18,700	2,544
% of Retained Flatfish	7.0%	1.8%
Sebastes Discard (pounds)	2,947	1,178
Sebastes Discard/Catch	16%	46%
-Excluding the Largest Single Canary Discard Tow		
Retained + Discard (pounds)	17,813	1,657
% of Retained Flatfish	6.7%	1.2%
Sebastes Discard (pounds)	2,060	291
Sebastes Discard/Catch	12%	18%
Canary Rockfish		
Retained + Discard (pounds)	5,676	1,352
% of Retained Flatfish	2.1%	0.9%
Canary Discard (pounds)	912	907
Canary Discard/Catch	16%	67%
-Excluding the Largest Single Canary Discard Tow		
Retained + Discard (pounds)	4,789	465
% of Retained Flatfish	1.8%	0.3%
Canary Discard (pounds)	25	20
Canary Discard/Catch	1%	4%
Widow Rockfish		
Retained + Discard (pounds)	181	14
% of Retained Flatfish	0.1%	0.01%
Widow Discard (pounds)	0	0
Widow Discard/Catch	0%	0%
Yellowtail Rockfish		
Retained + Discard (pounds)	2,405	447
% of Retained Flatfish	0.9%	0.3%
Yellowtail Discard (pounds)	0	0
Yellowtail Discard/Catch	0%	0%

Preliminary ABCs and OYs Recommended by the GMT for 2002.

All amounts in metric tons		2001 ABC	2002 ABC	Optimum Yield (OY) Total Catch	Total Landed	Tribal	Rec.	2001 Comp.	Non-trib. Comm.	Open-Access %	Total catch	Landed catch	Limited-entry Total catch	At-sea Bycatch	Landed	Limited-entry Trawl	FG
Lingcod	1-yr	1,119	745	577			320		257	19%	49	39	208		167		
Whiting (pending new assess.)		238,000	238,000	190,400	190,400	27,500			162,900								
Sablefish NoC	1-yr																
2001		7,661	7,661	6,895	6,039	690					583	537	5,622		4,716	2,543	2,172
High			4,786	4,500	3,942	450					381	350	3,669		3,078	1,660	1,418
Ramp down				4,000	3,504	400					338	311	3,262		2,736	1,476	1,260
Low			4,062	3,200	2,803	320					271	249	2,609		2,189	1,180	1,008
Conception (new area)		425	191	96	96				96								
Dover sole F40%	3-yr	7,677	8,510	7,440	7,068			67	7,373				7,373		7,068		
F45%			7,221	6,410	6,090			67	6,343				6,343		6,090		
F50			6,142	5,520	5,244			67	5,453				5,453		5,244		
English sole		3,100	3,100														
Petrale sole		2,740	2,740														
Arrowtooth flounder		5,800	5,800														
Other flatfish		7,700	7,700														
Thornyheads																	
Shortspine N. of Pt.C a/	1-yr	880	1,004	955	765			4	951	0.27%		3	948		759		
Longspine	1-yr	2,461	2,461	2,461	2,052			8	2,453				2,453		2,043		
Conception		390	390		195				390				390		195		
Widow																	
60% recovery		3,727	3,727	856	531		40		816	3.0%	24	21	792	250	471		
70% recovery		3,727	3,727	777	465		40		737	3.0%	22	19	715	250	407		
80% recovery		3,727	3,727	726	422		40		686	3.0%	21	17	665	250	365		
Canary		228	228	88	78		44		44	12.3%	5	5	39	3	30		
POP																	
60% recovery	1-yr	1,541	640	410	344				410				410		344		
70% recovery			640	350	294				350				350		294		
80% recovery			640	290	244				290				290		244		

Preliminary ABCs and OYs Recommended by the GMT for 2002.

All amounts in metric tons		2001 ABC	2002 ABC	Optimum Yield (OY) Total Catch	Total Landed	Tribal	Rec.	2001 Comp.	Non-trib. Comm.	Open-Access %	Total catch	Landed catch	Limited-entry Total catch	At-sea Bycatch	Landed	Limited-entry Trawl	FG
Yellowtail	2-yr	3,146	3,146	3,146	2,117		60		3,086	8.3%	256	215	2,830	675	1,842		
Chilipepper		2,700	2,700	2,000	1,682		15		1,985	44.3%	879	739	1,106		929		
Splitnose (Rosefish)		615	615	461	387								461		387		
Bocaccio	1-yr	122	122	100	92		52		48	44.3%	21	18	27		22		
Cowcod (Conception)		5	5	2.4	0				0			0			0		
Cowcod (Monterey)		19	19	2.4	0				0			0			0		
		24	24	4.8													
Darkblotched	1-yr																
60% recovery		302	187	181	152				181		6	5	175		147		
70% recovery		302	187	168	141				168		5	4	163		137		
80% recovery		302	187	157	132				157		4	3	153		129		
Yelloweye	1-yr																
Coastwide			27	11													
Monterey			5	2							1	0.84	1		0.84		
N of 40o10'			22	9							1.2	1	7.8		6.6		
Minor Sebastes	1-yr																
North		4,823	4,794	3,115	2,064		850		2,265	8.7%	198	182	2,067		1,741		
Near-shore (Remaining+Other)				987	122		800		187		148	141	39		37		
Shelf (Remaining+Other)				968	968		50		918		39	33	879		739		
Slope (Remaining+Other)				1,160	974				1,160		11	9	1,149		965		
South		3,556	3,556	2,015	1,831		650		1,365	44.8%	611	538	754		643		
Near-shore (Remaining+Other)				662	646		350		312		225	214	87		83		
Shelf (Remaining+Other)				714	648		300		414		269	226	145		122		
Slope (Remaining+Other)				639	537				639		117	98	522		438		

Preliminary ABCs and OYs Recommended by the GMT for 2002.

	2002 ABCs		2002 OYs	
	North	South	North	South
Chilipepper (Eureka)	32		32	
'Remaining' rockfish	2,726	854	2,081	689
bank		350		263
yellowtail		116		87
blackgill (Conception)		268		268
sharpchin	307	45	230	34
splitnose	242		181	
boccacio	318		239	
redstripe	576		432	
silvergrey	38		29	
yellowmouth	99		74	
black (assessed area)	615		615	
blackgill (Monterey)		75		38
black (S. OR-Cape Mend.)	500		250	
'Other' rockfish	2,068	2,702	1,034	1,351
ABC	4,794	3,556		
OYs			3,115	2,040

a/ In 2002, the shortspine thornyhead ABC represents combined ABCs from north and south of 36 deg. N. lat. The 2001 ABC was modified to represent the same combined area as for 2002 for direct comparison.

PRELIMINARY HARVEST LEVELS AND OTHER SPECIFICATIONS FOR 2002

Situation: Each year, the Council recommends harvest specifications for the upcoming year. This year, the task remains a two-meeting process that begins with the Council making preliminary recommendations at the September meeting and final recommendations at the November meeting. The fishery management plan (FMP) requires the Council to establish reference points for each major species or species complex: an acceptable biological catch (ABC), an optimum yield (OY), and overfishing threshold. In addition to the OYs, some species are allocated between the open access, limited entry, tribal, and recreational fisheries.

Process for Developing Preliminary ABC and OY Levels

Draft assessment documents, Stock Assessment (STAT) Team summaries and Stock Assessment Review (STAR) Panel reports were mailed to Council family and others in August 2001. (**Please bring your copies to the meeting.**) Oral summaries of each new assessment, including the scientific conclusions, will be presented at a special briefing Monday, September 10, at 3:30 p.m. in the Riverview Ballroom. Assessment authors and other scientists will be available at that time to answer technical questions. **This information will not be presented again during the formal Council session on this topic.** The Groundfish Management Team (GMT) will present its ABC and OY recommendations during the Tuesday Council session. After deciding the preliminary ABC and OY levels, the Council will need to decide any changes to the list of species and species complexes that are allocated between limited entry and open access fisheries. Management measures to achieve the harvest targets will be discussed during the Thursday Council session under agenda item C.7.

Preliminary Assessment Results and Other Recommendations

Stock assessments were prepared in 2001 for sablefish, Dover sole, shortspine thornyhead, yelloweye rockfish, and black rockfish (the black rockfish assessment was subsequently retracted by the assessment authors upon discovering inaccurate input data). Additionally, updated rebuilding analyses were prepared for lingcod (coastwide), darkblotched rockfish, and Pacific ocean perch (POP). The Council also endorsed, at its June 2001 meeting, a range of rebuilding trajectories and 2002 OYs for widow rockfish. New ABC recommendations will result from these assessments and updated rebuilding analyses. Note that, under agenda item C.5, the Council is requested to specify targets, checkpoints, and strategies for widow and darkblotched rockfish to guide development of those rebuilding plans. These decisions will directly influence the 2002 ABCs and OYs for these two stocks. The preliminary ABCs and OYs recommended by the GMT for 2002 (Exhibit C.3, Attachment 1) indicate a Council-adopted range for widow and darkblotched rockfish. The Council is asked to wait for agenda item C.5 to address these specifications.

The GMT met with STAR Panel, STAT Team, and Groundfish Advisory Subpanel (GAP) members in early August to review the new assessments and scientific advice. The GMT developed several preliminary ABCs and OYs based on those discussions (Exhibit C.3, Attachment 1). The GMT also calculated preliminary ABCs using default harvest rates for every stock with enough information. For comparison, the year 2001 ABCs and OYs are provided in Exhibit C.3, Attachment 2.

Limited entry and open access allocation shares are based on landings during the limited entry window period. In the northern area, the open access allocation is based primarily on groundfish harvest in the pink shrimp fishery. In the southern area, the open access allocation share reflects groundfish harvest by setnet gear during that period. The setnet fishery now catches only a small fraction of the open access share, while other gear types expanded substantially during the 1990s. The geographic distribution of open access harvest has undoubtedly changed, along with the species composition of the catch. However, much of the harvest, especially in California, was recorded as generic *Sebastes* rockfish. Division of the rockfish complex into slope, shelf, and nearshore components has made it difficult to establish allocation shares that match both the current and historic harvest patterns. The GMT is attempting to develop options for Council consideration so each sector has access to its representative share.

Rationale for Discard Estimates

The National Marine Fisheries Service (NMFS) has prepared an analysis of discarding, entitled "Overview of Management Actions Taken by the Pacific Fishery Management Council to Account for and Minimize Bycatch of Groundfish" (Exhibit C.3, Attachment 3). In order to establish landed catch targets for various stocks and for various fishing sectors, the Council subtracts anticipated discards from the total catch OY. The NMFS analysis compares current discard assumptions with alternatives and provides a rationale for current discard assumptions. A letter from Dr. Mark Powell, The Ocean Conservancy, also addresses the assessment of bycatch and discards (Exhibit C.3.e).

Council Action:

1. **Adopt preliminary ABCs and OYs for 2002.**
2. **Adopt preliminary tribal allocations.**
3. **Provide guidance to the GMT regarding species allocations between limited entry and open access sectors and identify options.**

Reference Materials:

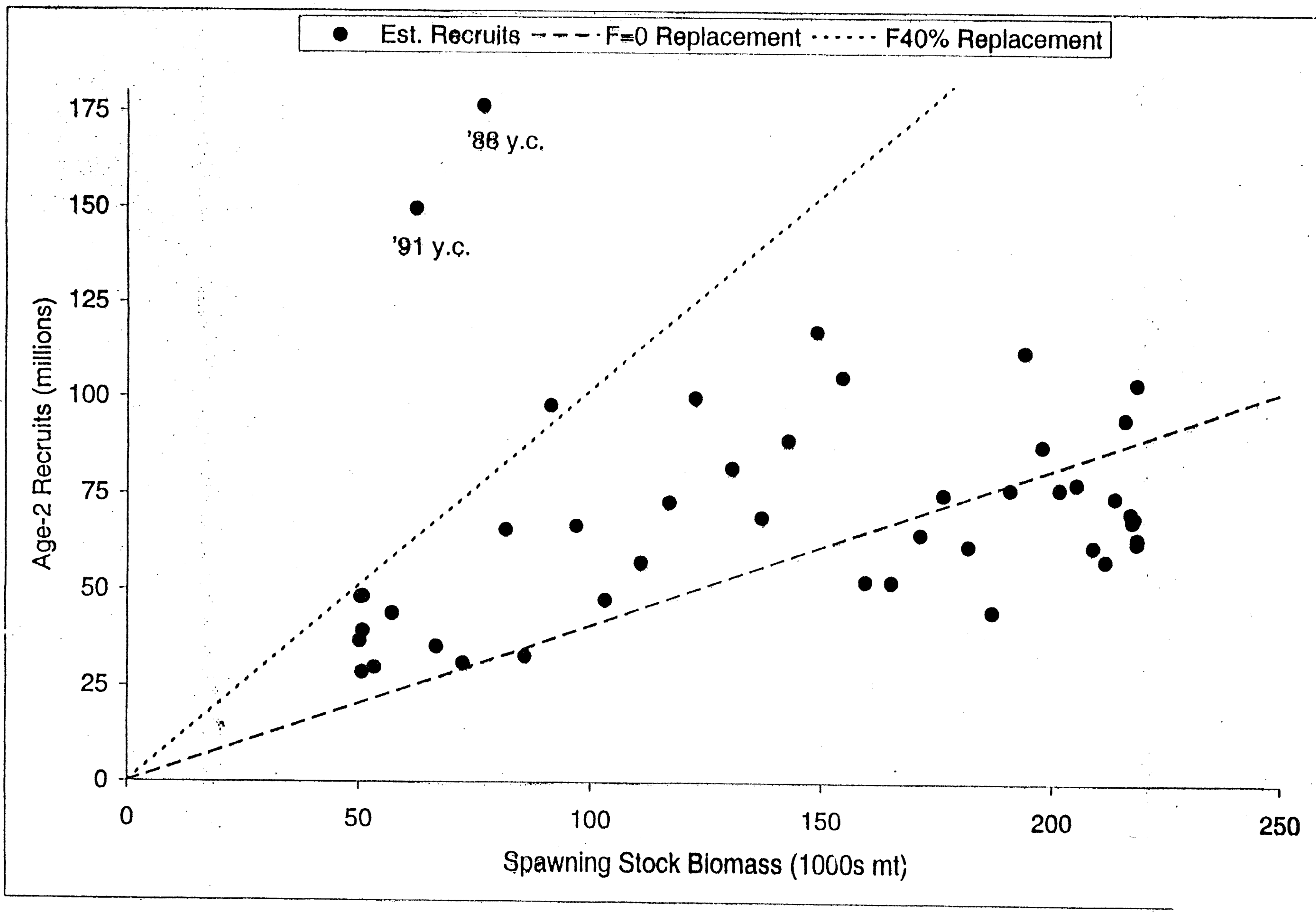
1. Preliminary ABCs and OYs Recommended by the GMT for 2002 (Exhibit C.3, Attachment 1).
2. 2001 Specifications of Acceptable Biological Catch (ABC), Optimum Yields (OYs) and Limited Entry and Open Access Allocations, by International North Pacific Fisheries Commission (INPFC) Areas (Exhibit C.3, Attachment 2).
3. Overview of Management Actions Taken by the Pacific Fishery Management Council to Account for and Minimize Bycatch of Groundfish (Exhibit C.3, Attachment 3).
4. Evaluation of Existing *Sebastes* Discard Assumptions and Possible Alternatives (Exhibit C.3, Attachment 4.
5. Letter from Dr. Mark Powell, The Ocean Conservancy (Exhibit C.3.e, Public Comment).

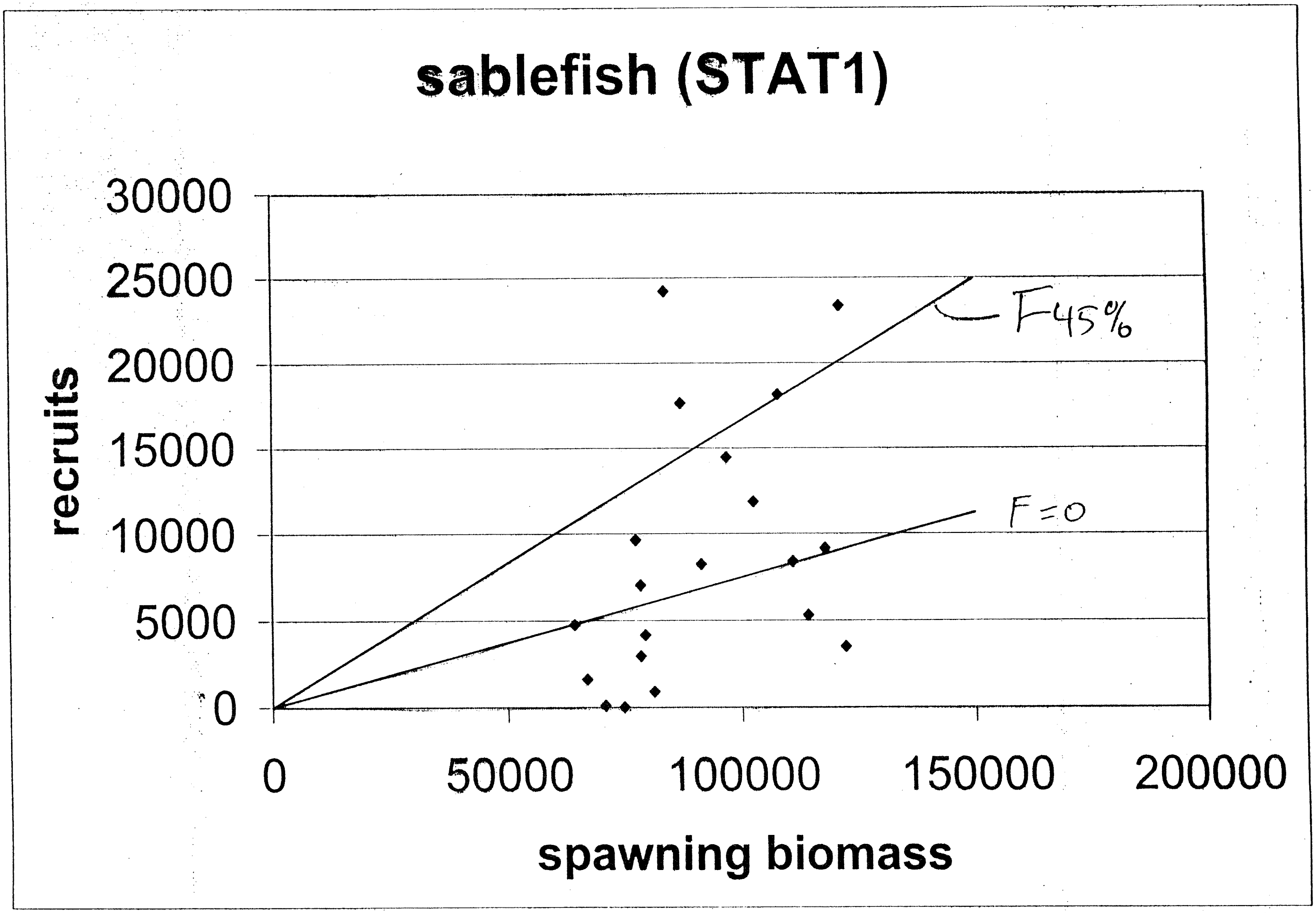
Groundfish Fishery Strategic Plan (GFSP) Consistency Analysis

The GFSP supports establishing an allowable level of catch that prevents overfishing while achieving OY based on best available science (Sec. II.A.2). The GFSP also supports establishing and maintaining a management process that is transparent, participatory, understandable, accessible, consistent, effective, and adaptable (Sec. II.C). The Council process of adopting harvest levels and other specifications is consistent with these GFSP principles.

PFMC
08/23/01

Figure 14. Estimated recruitment versus parental spawning stock biomass from the preferred model scenario.




sablefish (STAT1)
recruits
30000
25000
20000
15000
10000
5000
0
0
50000
100000
150000
200000
spawning biomass
F45%
F=0

GROUNDFISH ADVISORY SUBPANEL STATEMENT ON
PRELIMINARY HARVEST LEVELS AND OTHER SPECIFICATIONS FOR 2002

The Groundfish Advisory Subpanel (GAP) met with the Groundfish Management Team (GMT) to discuss proposed harvest levels for 2002. Because many of the proposed levels are unchanged from 2001 or are mandated by previous management actions such as rebuilding plans, the GAP chose to comment specifically on only certain species.

Sablefish: This is by far the most controversial of the species being considered. Two stock assessments were completed for sablefish this year and reviewed by a Stock Assessment Review (STAR) Panel. Both assessments found current biomass to be roughly in the same range. However, the range of harvest levels recommended by the GMT reflect uncertainty as to whether the recruitment decline observed several years ago reflects environmental factors or density factors; and whether stocks will continue on a downward trend or rebound with more recent recruitment.

The GAP urges the Council to adopt the higher harvest level recommended by the GMT, using the assumption that lower recruitment was caused by environmental factors. The GAP notes that several scientific publications have demonstrated a regime shift occurring; that 2001 stock survey data (which was not included in the assessment) shows preliminary signs of large numbers of juvenile sablefish; and coast-wide data from fishermen reflects heavy concentrations of young sablefish being caught in fishing gear.

Further, as a practical matter, the GAP notes that if all scientific assumptions are considered equally valid, the Council should then look at the effect of management actions on fishing communities. The reduction in sablefish harvests - even to the higher level recommended - will have a substantial adverse economic impact. A reduction below that level will be disastrous, especially considering other harvest reductions that have been made and will be made next year.

Dover sole: The GAP recommends the Council continue managing Dover sole at the $F_{40\%}$ level. Based on data supplied by the author of this year's stock assessment, harvest at the $F_{40\%}$ level after application of the Council's 40-10 control rule will result in an increase in biomass over the next several years based on the preferred assessment model. The GAP further notes that although this model assumes average recruitment, the same average recruitment was used to determine virgin biomass. The GAP suggests that science which works in one direction will also work in the other. Finally, the same situation involving economic effects as noted in discussion of sablefish applies here as well. We have a valid peer reviewed stock assessment that provides a modest harvest level which in turn will continue to provide an economically viable fishery.

Widow rockfish, Pacific ocean perch, Darkblotched rockfish: The GMT provided the Council with a range of potential harvest levels based on assumptions of chances of recovery of these species. In the past, the Council has generally chosen a recovery chance of 60% as a reasonable target. Given the interaction of these species (and especially widow rockfish) with other healthy species, we believe the 60% chance of recovery target makes sense for these species too. We recommend the Council adopt acceptable biological catch/optimum yield levels reflecting a 60% chance of full rebuilding within the specified time frame.

PFMC
09/11/01

SCIENTIFIC AND STATISTICAL COMMITTEE REPORT ON PRELIMINARY HARVEST LEVELS AND OTHER SPECIFICATIONS FOR 2002

Dr. Jim Hastie presented an overview of the Groundfish Management Team (GMT) preliminary acceptable biological catch/optimum yield determinations for 2002 (Exhibit C.3, Attachment 1). We wish to highlight that the new EDCP model-based estimates of discard rates (reviewed by the SSC in Sept 2000) were used to estimate total catch of sablefish, Dover sole, shortspine, and longspine thornyhead. This is a major improvement over the standard Pikitch *et al.* (1988) adjustments which are calculated as a fraction of the landed catch of the species being estimated. All rockfish discard adjustments (16% of landed catch) continue to come from Pikitch *et al.* (1988).

Based on Dr. Hastie's presentation, the Scientific and Statistical Committee (SSC) notes:

Lingcod - The OY is based on a rebuilding analysis and will incorporate a 20% discard rate landing adjustment.

Whiting - There will be a new stock assessment in winter 2002.

Sablefish - This was a 2001 Stock Assessment Review (STAR) Panel species. Uncertainties in the assessment pivot on density dependent versus environmentally driven recruitment, estimates of current relative to virgin biomass, and the level of F_{MSY}. The bottom line is that the levels of recruitment observed in the 1990s cannot sustain very high harvests. Three OY options were presented. The SSC notes that the low option (3,200 mt) is estimated to prevent the population from falling below the $B_{25\%}$ rebuilding trigger for the next 5 years under 3 out of 4 of the scenarios evaluated. For this reason, the SSC supports this option. In addition, given the low recruitments in the 1990s, it seems prudent to consider moving to a more conservative $F_{50\%}$ harvest strategy. The discard rate landing adjustment was approximately 13% overall based on the EDCP trawl rate of 20%.

Dover sole - The GMT had the same concerns about Dover sole recruitment as sablefish - that recruitment levels observed in the 1990s cannot sustain high harvest levels. The GMT estimates a downward biomass trajectory in the absence of substantial boosts in recruitment. The discard adjustment was estimated based on EDCP data (~5%).

Shortspine - The discard adjustment was 20% based on EDCP. The ABC/OY has increased marginally from last year.

Longspine - There was no new assessment. The discard adjustment was 17% based on EDCP.

Widow - The GMT presented a range of OYs based on 60%, 70%, 80% likelihood of recovery in the allotted time. Dr. Hastie pointed out that a major drop in widow OY could impact yellowtail management, particularly as regards bycatch rates in the midwater trawl fishery.

Pacific ocean perch - OY estimates are based on a new rebuilding analysis. Concerns were expressed over the magnitudes of recent year classes as well as anticipated downward adjustments of historical foreign POP catches. The latter should reduce estimates of historic biomass and current estimates of OY. The SSC thus recommends adopting the lower OY associated with a higher likelihood (80%) of recovery in the allotted time.

Yellowtail - Once again, Dr. Hastie expressed concern about the yellowtail/widow catch ratios in the midwater trawl fishery and how these might affect the yellowtail fishery.

Chilipepper - Recent harvests have been below OY, because of bocaccio bycatch.

Bocaccio - Dr. Hastie expressed concern that the bocaccio harvest may have exceeded the 3 year 100 mt OY due to uncertainties in the recreational catch data. As a result, OY may need to be adjusted downward.

Yelloweye - This is a new stock assessment. Dr. Hastie said that the recreational fishery may need additional regulation to protect both bocaccio and yelloweye rebuilding.

Black - This was a STAR Panel species. However the Oregon/Northern California assessment had to be retracted after the STAR panel met, because errors were discovered in the input data provided to the STAR Panel process. The SSC suggests that in the future individuals responsible for the input data to a stock assessment be fully integrated into Stock Assessment Team (STAT) Team activities. If this is not possible, then the raw data and documentation should be supplied to the STAT Team.

Dr. Hastie then presented an overview of his *Sebastes* discard paper (Exhibit C.3, Attachment 4). He pointed out a number of problems associated with using the Pikitch *et al.* (1988) study as a discard baseline.

1) The gear has changed substantially since the study was done.

2) Stock biomasses have changed substantially since the study was done. For example based on the NMFS survey, the ratios of widow, canary, and yellowtail to flatfish are much lower now than they were at the time of the study.

3) Trip limits today are substantially lower than they were in the late 1980s.

Dr. Mark Powell (The Ocean Conservancy) presented an overview of his groundfish bycatch and discard assessment (Exhibit C.3.e, Public Comment). His major recommendation is that “bycatch must be recognized as resulting from fishing activities that target other species, and bycatch estimates should link bycatch to the level of catch of the target species.” He recommends that this be done by using the NMFS triennial survey to estimate species co-occurrence ratios as a baseline. However no explicit estimation algorithm or method is proposed to estimate bycatch and, subsequently, discard. The SSC agrees with his basic premise - that bycatch and discard should be estimated from specific targeted fishing activities and not from landings of the species being estimated. However the estimation process is much more complicated than Dr. Powell suggests and will require a major long-term research effort in order to develop (see item 2 below).

The SSC discussed the whole issue of bycatch and discard estimation and has the following recommendations:

1) The SSC groundfish subcommittee will work closely with the GMT in developing and refining short-term discard estimates to be presented at the November 2001 meeting. In addition, the SSC will carefully examine any changes in discard estimates which the GMT presents in November based on their upcoming reanalysis. The GMT will be using Pikitch *et al.* (1988), EDCP, logbook and the current Washington exempted fishing permit program to attempt to identify discard rates by target fishery, trying to make adjustments for changes in trip limits and stock biomass levels between the time the data were collected and the present. The SSC looks forward to seeing the results of this analysis.

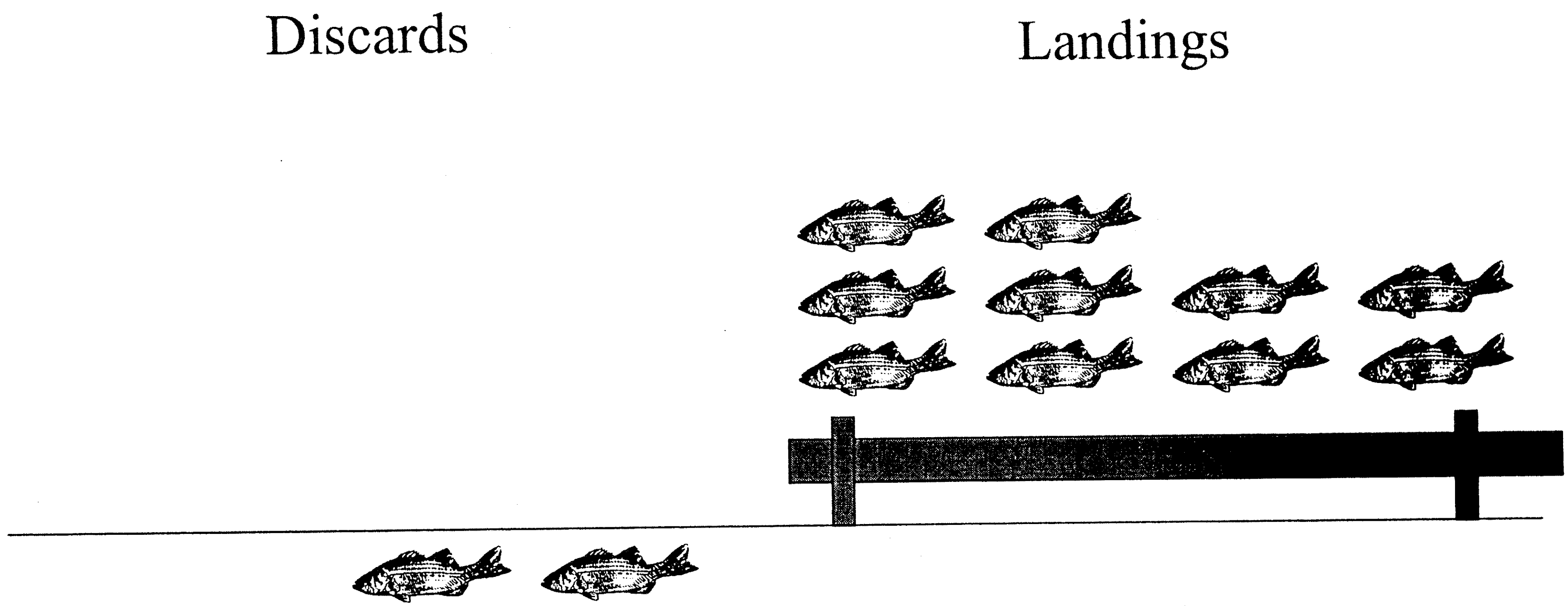
2) In our view, simple analyses of co-occurrence (essentially catch ratios) in the NMFS survey will not provide a better discard estimation procedure than that currently used by the GMT. However, over the longer term, this type of analysis - coupled with the more comprehensive development of a multispecies model which incorporates fishery, observer, and survey data - should be encouraged. In order to come to fruition, this process needs to be initiated as soon as possible.

3) The SSC expects the new observer data will be used to estimate discards for the 2003 cycle. In addition, as this data set matures we anticipate that it will be used as an aid to inseason

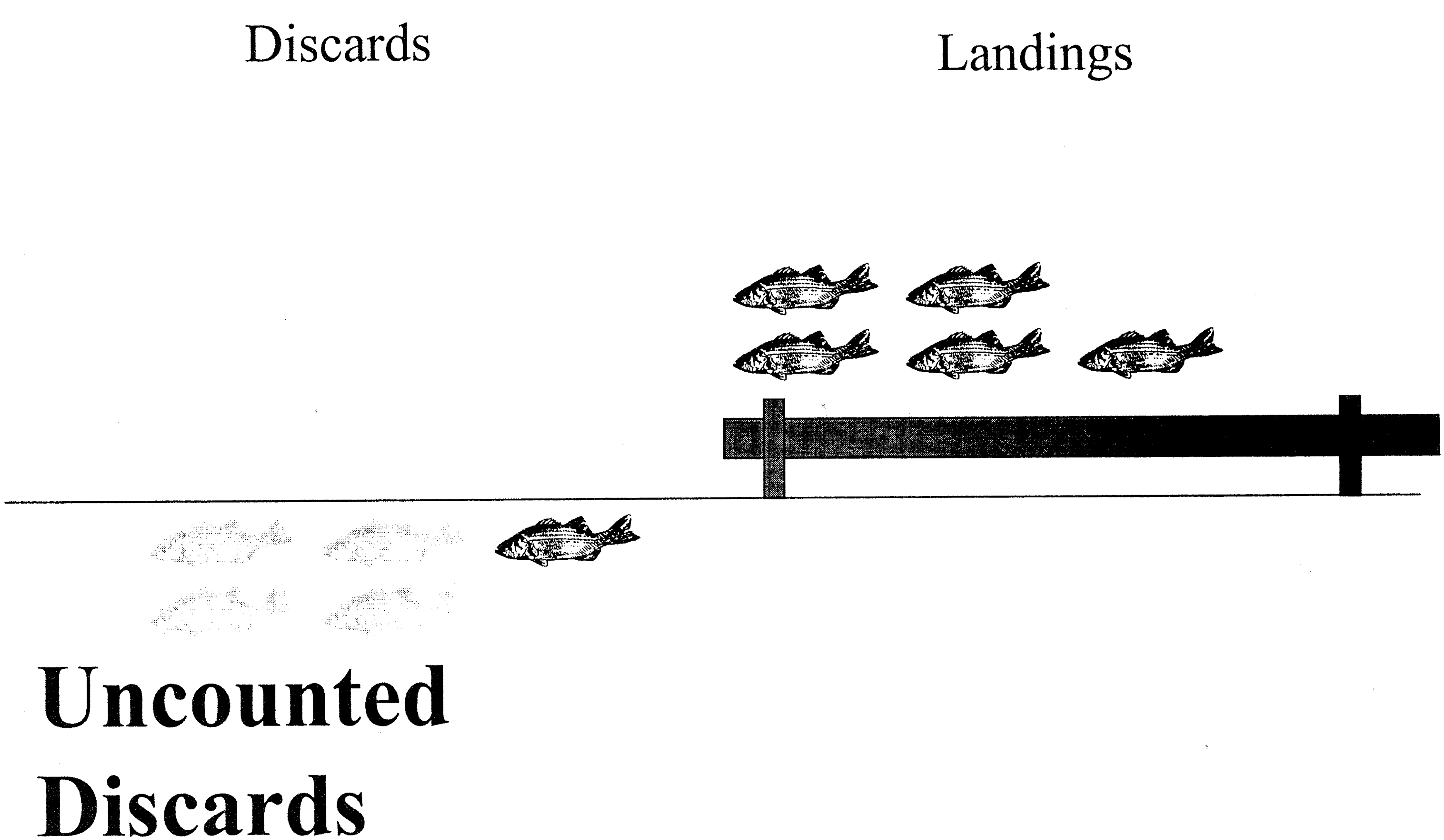
management.

PFMC
09/11/01

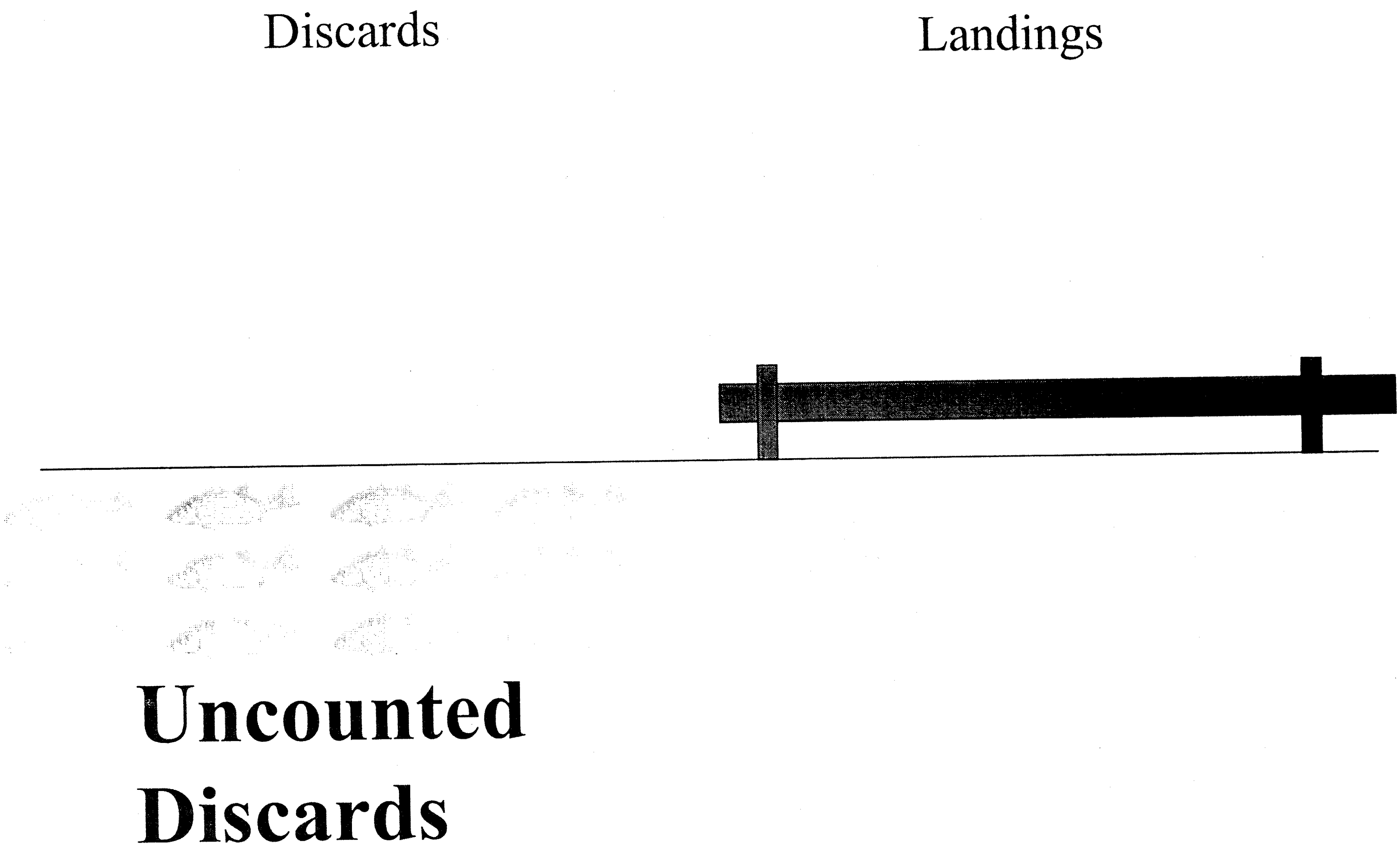
16% discard



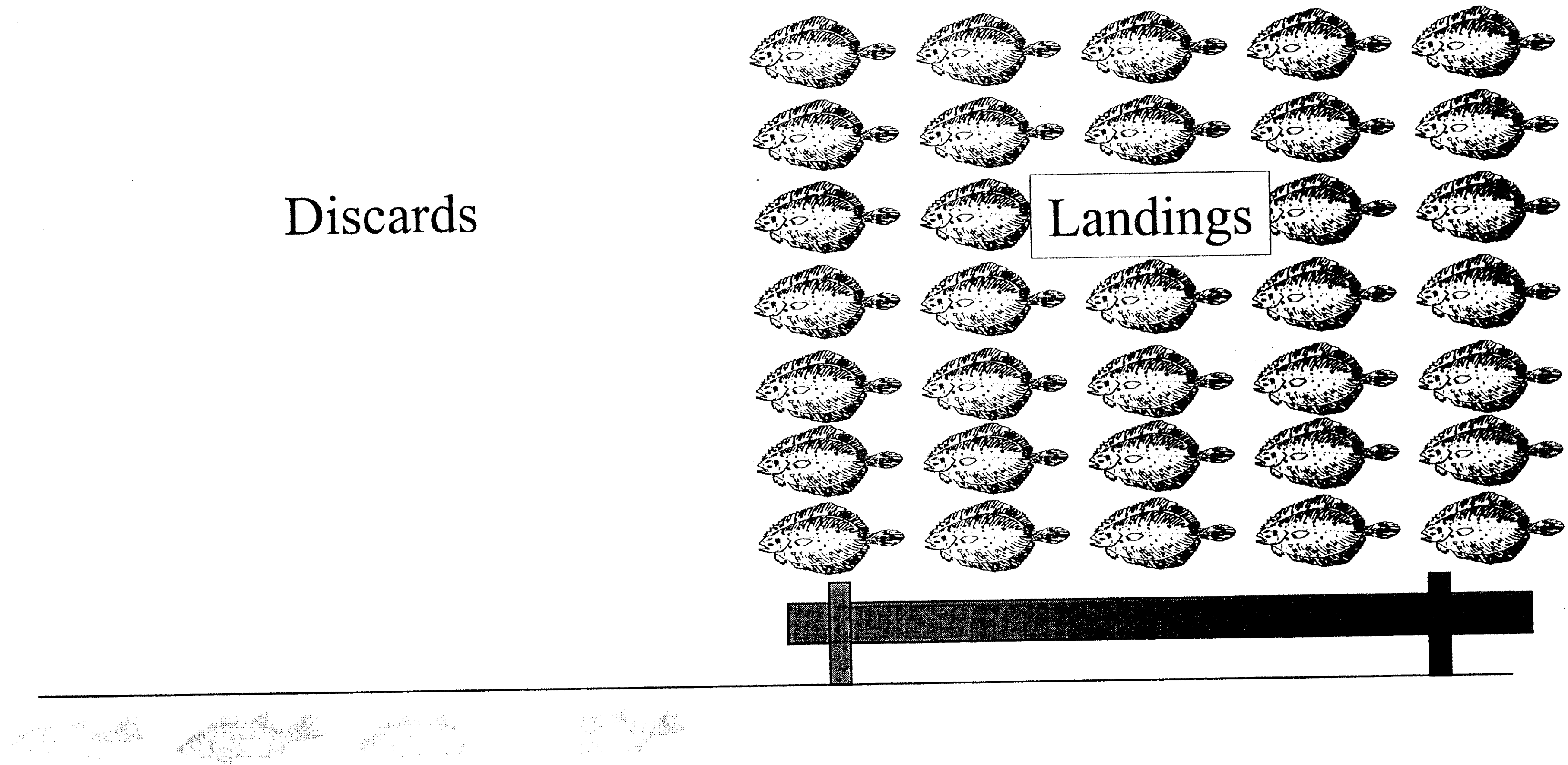
50% discard



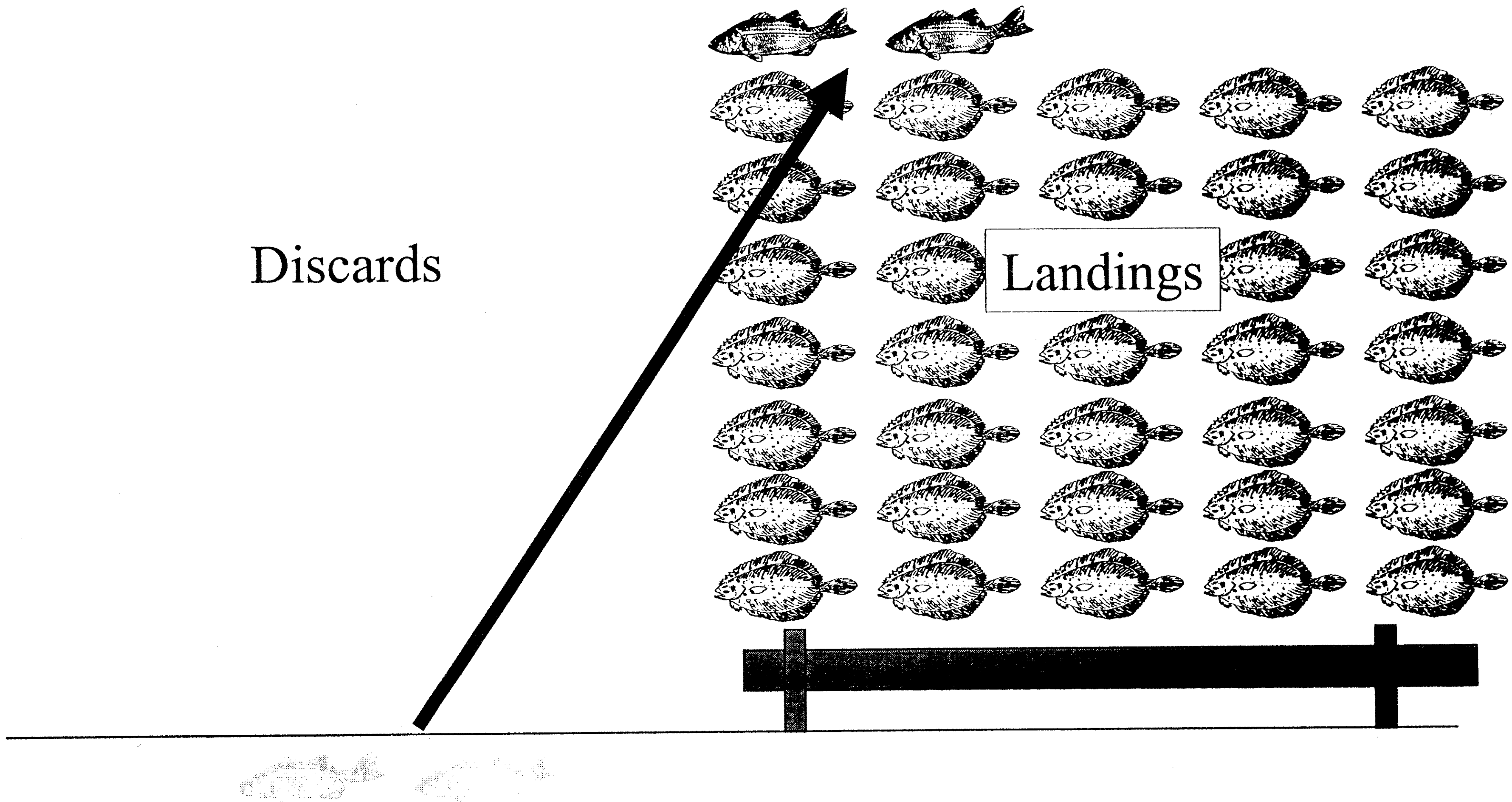
100% discard



100% discard (of rockfish)



Uncounted Discards



Bycatch counting

mortality of depleted species
based on landings of abundant species

Data sources:

- Estimates by GMT & GAP
- Observer program
- Logbooks
- Full retention
- NMFS surveys
- EFPs

REVENUE IMPACT OF SABLEFISH MANAGEMENT OPTIONS

1. Data on 2000 non-whiting groundfish purchases and sales obtained from 4 WCSPA member companies with facilities in CA, OR, and WA

2. WCSPA groundfish landings = 50% of total groundfish landings by weight (per PacFIN data)

3. WCSPA sablefish landings = 59% of total sablefish landings by weight

4. Extrapolating, gross ex-processor value of non-whiting groundfish in 2000 = **$106,486,514**

5. Ex-processor value of sablefish in 2000 = **$27,622,452**

6. GMT proposed landed catch amounts for 2002:

    High = 43% reduction from 2000 sablefish landings = **($11,877,654)**

    Ramp Down = 49% reduction from 2000 = **($13,535,001)**

    Low = 59% reduction from 2000 = **($16,297,246)**

7. Loss as percentage of total 2000 gross ex-processor value:

    High = **11%**

    Ramp Down = **12.7%**

    Low = **15.3%**

8. As comparison point, Senate Appropriations Committee mark for West Coast Groundfish Research in FY 2002 = **$5,010,000**

DRAFT SUMMARY MINUTES
A Subcommittee of the Ad Hoc Groundfish Strategic Plan Implementation Oversight Committee

Pacific Fishery Management Council
Teleconference to discuss
Limited Entry in Pacific Coast Open Access Groundfish Fisheries
July 31, 2001

Members in Attendance:

Mr. Bill Robinson, National Marine Fisheries Service
Mr. Phil Anderson, Washington Department of Fish and Wildlife
Dr. Hans Radtke, Pacific Fishery Management Council
Mr. Burnell Bohn, Oregon Department of Fish and Wildlife
Mr. LB Boydstun, California Department of Fish and Game

Others in Attendance:

Ms. Eileen Cooney, National Oceanographic and Atmospheric Administration - General Counsel
Ms. Yvonne deReynier, National Marine Fisheries Service
Ms. Laura Dietch
Ms. Judie Graham, Washington Trollers Association
Mr. Steve Bodnar, Coos Bay Trawlers Association
Mr. Gerald Gunnery
Ms. Tracy Bishop, California Department of Fish and Game
Mr. Dave Thomas, California Department of Fish and Game
Dr. Jim Hastie, National Marine Fisheries Service
Mr. Jim Golden, Oregon Department of Fish and Wildlife
Mr. Rod Moore, West Coast Seafood Processors Association
Dr. Donald McIsaac, Executive Director, Pacific Fishery Management Council
Mr. John DeVore, Council staff officer, Pacific Fishery Management Council

1. Call to Order and Consensus on agenda items. The conference call was initiated at 1408 hours. Dr. Donald McIsaac introduced everyone and called the conference call meeting to order. Dr. McIsaac went over the agenda. Mr. LB Boydstun added an agenda item regarding state-federal consistency. A public comment item was added as well. Mr. Boydstun chaired the conference call.

2. Where are we on this issue? Mr. LB Boydstun explained where the Council is on permitting in the open access (OA) fishery. Formal adoption of a plan for OA permitting is scheduled for next April or later depending on work load. This is the third meeting to develop this issue. Mr. John DeVore summarized the discussions that took place regarding this subject at the June council meeting. Allocation between directed and incidental groundfish fisheries and managing the workload in developing OA permitting were the main discussion points.

3. Historical analyses of OA fisheries. Dr. Jim Hastie summarized the analysis he did in preparation for the June council meeting (in June 2001 briefing book, Exhibit C.9, Attachment 2(a), “Analysis of Open Access Fishery”). He had provided tables depicting historical participation in various OA fisheries (i.e. no. vessels, landings, and other participation criteria). Also included participation indices in terms of volume and economic value of landings. He analyzed sets of hypothetical qualification criteria (94-99 window) for consideration. At June council meeting, Kenyon Hensel recommended other qualification criteria be analyzed. Dr. Hastie has solicited these again from Mr. Hensel. Dr. Hastie thinks there may be new priorities that need to be considered for allocating directed v. incidental groundfish fisheries.

Regarding Jim Seger's comments, any vessel that used these other trawl permits to target groundfish shouldn't be included in these analyses. Mr. LB Boydstun agreed and thought the criteria used to analyze OA vessels that target other groundfish species (i.e. rockfish, sablefish, etc.) should probably be specific to what OA fisheries (species) they target.

Dr. Hastie summarized his analysis of OA fisheries that target groundfish. Some vessels have mixed landings of various groundfish species and some participate in both limited entry (LE) and OA fisheries. There are a series of figures (in June 2001 briefing book, Exhibit C.9, Attachment 2(a), "Analysis of Open Access Fishery") referring to sorted distributions of sablefish revenues and the value of rockfish revenues associated with those. Many had significant rockfish revenues. There are also figures with tonnage distributions depicting the same data. The 95th percentile of sablefish revenues shows 20% of rockfish revenues. 90th percentile shows 10% of all rockfish revenues.

Mr. Boydstun mentioned there are numerous ways to determine qualifications for OA permitting. Consensus from April meeting.

Laura Dietch asked about Table 11, bottom column- are these summaries for the delivery period? Dr. Hastie replied yes.

Further developing history of OA sectors (OA fisheries that catch groundfish incidentally). Describe the OA sectors (directed and incidental). Dr. Hastie wondered what timeframe Mr. LB Boydstun was thinking of to pull this analysis together? Mr. Boydstun thought it would be good to do this by next April. Dr. Hastie thought it would be hard to do this fall, although there might be time after the November council meeting. Mr. LB Boydstun thought tabling landings by OA sector would be useful. Maybe stratify by state and year (noting that there is significant geographic variation by fishery and with time). He thought we needed this historical perspective to determine impacts of permitting. Dr. Hastie thought it would not be difficult to pull this data. For targeting, he used a criteria that >50% of landings had to be groundfish. He could adjust criteria for data extraction to get incidental fisheries. Could be a problem with other OA fisheries such as shrimp trawl. Dr. Hastie noted that there was a difference between sorting OA fisheries and OA vessels- 2 different datasets. He said that it was almost impossible for some of the OA fisheries to determine whether they were using OA gears (i.e. CA halibut fishery historically). Mr. Phil Anderson asked about the 3b agenda item (i.e. shrimp and trawl fisheries in Oregon)? He asked whether Jim Golden could help with this? Mr. Jim Golden replied that he could help. Dr. Hastie volunteered that it would be easier for one person to do the analysis. There are different approaches for extracting data. Mr. LB Boydstun thought different folks could analyze different sectors and bring their findings back to the group. Mr. Burnie Bohn said perhaps individuals could put the datasets together and bring in for analysis. Mr. Boydstun agreed that he thought this was good way to go. He wanted to have a discussion in the final OA document of dependence of different OA sectors on groundfish. Mr. Anderson asked whether different state individuals should pull the data together and bring forward for analysis. Mr. Boydstun asked about data quality over time. Dr. Hastie said that some fisheries historically have better data resolution than others. Mr. Boydstun asked how far should we try to go to analyze and compare these data? Dr. Hastie replied that all we need is historical data profiles rather than trying to specify gear types used in the 1980s. Mr. Boydstun suggested we put this on the back burner until after the November council meeting. He said we should get together after November to put this together. Dr. Hastie thought people could, in the meanwhile, determine how they want to see these data portrayed. It would help expedite the analysis.

4. Development of "B" permits. Mr. John DeVore summarized Mr. Jim Seger's suggestions (from a July 25, 2001 email message) for renaming permits and/or endorsements from "B" and "C" permits to "O" (other gear) and "I" (incidental) permits to avoid confusion with the LE endorsements that are part of the groundfish FMP. He also suggested that this permitting be accomplished within the LE endorsement system in place and that LE vessels would need to purchase the "O" endorsement to participate in the OA fishery. Alternatives to this would be prohibiting LE vessels from using OA gears and the status quo option of allowing LE vessels to use OA gears.

This affects fishers that target such species as crab, shrimp, and salmon and use OA gears such as longlines. The group generally acknowledged that there are a myriad of options for achieving the goals of limiting entry in OA fisheries. We need to define our goal of what we are trying to do. Mr. Phil Anderson thought we should ground our discussions to the Strategic Plan objectives. Bill Robinson thought we should limit our discussions to OA fisheries that target groundfish directly. Ms. Eileen Cooney agreed that the other OA fisheries are limited in other ways. Mr. Bill Robinson thought if we could limit our discussion to groundfish target OA fisheries, then we wouldn't need to allocate between these fisheries. Any allocation or take in incidental fisheries does affect allocation in directed fisheries. Dr. Jim Hastie thought the analysis would be a lot more complicated if we didn't consider incidental fisheries. Mr. Phil Anderson said the Strategic Plan directs Council to do the opposite and that we need to limit incidental fisheries that land groundfish. Mr. LB Boydstun thought the more challenging question is how far to limit these OA fisheries. Mr. Jim Golden thought the species catch composition is different in incidental v. target fisheries. The historical data may help us decide the direction we need to go since different species groups are accessed differently with different OA fisheries,. Ms. Eileen Cooney wondered how different gear types used in OA fisheries would affect this balance. Ms. Cooney wanted to know if someone could develop an "O" permit analysis. The question remains whether allocation could be ignored between directed and incidental fisheries. Ms. Cooney and Mr. Boydstun stated that the goals and objectives, as well as the criteria of different permutations, need to be well articulated up front. Mr. LB Boydstun suggested we take this up again in November.

5. Allocation issues. Mr. LB Boydstun stated that allocations can proceed without permitting. Mr. Phil Anderson asked whether he was talking about allocation between directed and incidental sectors? He thought this was pertinent when put in the context of permitting and permit stacking. Mr. Bill Robinson thought there needs to be a segregation of directed and incidental fishers and an allocation made. It would also help reduce bycatch. Mr. Robinson thought one would need to allocate prior to permitting. Dr. Hastie had a hard time understanding how allocations could be made prior to limiting entry in the OA fisheries. Dr. Hans Radtke asked whether this was allocation of total catch including discard (all fishing mortality)? Ms. Eileen Cooney said full accounting of mortalities was necessary. Mr. LB Boydstun repeated that allocation could be a first or early step in the permitting process.

Ms. Laura Dietch asked whether allocation decisions would prematurely shut down incidental fisheries early (such as shrimp) to accommodate directed fisheries? Mr. Bill Robinson said it could happen-precedent in AK fisheries. Mr. LB Boydstun thought you could see vessel response to allocation decisions. Mr. Rod Moore asked Dr. Jim Hastie whether data was available to determine the average percent groundfish taken in incidental fisheries? Dr. Hastie said yes but it would depend on how an incidental fishery was defined. Mr. Moore thought one could take the average percent taken in incidental fisheries off the top when allocating groundfish to directed fisheries. Mr. Bill Robinson asked what purpose would be served to have an incidental permit if we don't allocate? Ms. Eileen Cooney thought it still is needed for accountability. Mr. LB Boydstun recalled that, at the last meeting, incidental permits were probably not needed. He stated that we don't want to close the door yet, but there doesn't seem to be a compelling reason for "I" permits. Mr. Phil Anderson is concerned for not having an "I" permit. He said there was a problem that most of these fisheries are state managed and the Council can't prohibit these fisheries.

6. State management actions.

WDFW: Mr. Phil Anderson gave the following review: The OA fisheries in West Coast nearshore areas are different from north to south. The bottom topography different in WA than CA. Nearshore fish are vulnerable to overharvest. Washington has concerns with black rockfish, canary rockfish, yellowtail rockfish, cabezon, etc. They started adopting more conservative groundfish management policies in 1991: closed 0-3 mi. for bottomfish troll gear and commercial jig gear. They reduced the rockfish bag limit in recreational fisheries from 15 to 12 rockfish. In December1999, WDFW prohibited any live fish fishery and reduced the recreational bag limit from 12 to 10 rockfish. The daily bag limit for canary rockfish, yelloweye rockfish, and lingcod was reduced to 1 fish.

ODFW: Mr. Burnie Bohn gave the following review: Lots of restrictive regulations within Council process (similar to WDFW actions although nearshore fisheries not as restrictive). Oregon recently mandated BRDs in their shrimp fishery (starting tomorrow August 1). The Oregon Fish and Wildlife Commission (OFWC) will soon be considering establishing a control date for limiting OA fisheries (want to be consistent with control dates established by the Council). Mr. Jim Golden talked about recent public meetings regarding restricting nearshore fisheries, allocation between sport and commercial fisheries, further restrictions for greenling and cabezon and possibly for black rockfish as well. These will go before the OFWC in August and maybe October. Mr. Bohn asked if WDFW had adopted a control date for OA fisheries? Mr. Phil Anderson replied no.

CDFG: Mr. LB Boydstun gave the following review: California has enacted a marine fishery act (Marine Life Management Act), that is patterned after the Magnuson Act, and that California plans to adopt a nearshore FMP pursuant to the state act. They are also looking to control their OA fisheries. Ms. Tracy Bishop specified that the CDFG is proposing to limit access for select nearshore species. These 9 species are the target for the premium live fish fishery. They are hoping to implement LE by April 2002. If nearshore fisheries are limited to line and trap gears, then they would need a provision for incidental catch gears. They are setting up a control date for sometime in 2001 for LE partyboat and nearshore groundfish fisheries for the entire nearshore complex (in addition to the live fish species). They are considering a plan where OYs are stratified geographically as well as an ITQ program for cabezon. Ms. Eileen Cooney asked whether they were trying to limit their regulations to within just 3 miles? Ms. Bishop said some of the longliners operate outside of 3 miles and they want to limit their access as well.

Ms. Eileen Cooney explained some of the jurisdictional problems with fish that migrate in and out of state and federal waters. Fish that are primarily in state waters are primarily under state jurisdiction. States have maximum jurisdiction within 0-3 miles unless this effects federal or other states' fisheries. Federal authority could then preempt state authority. States only have jurisdiction in federal waters over their state-registered vessels. Otherwise, states need to consider whether fisheries outside of 3 miles that are regulated by the state are managed consistent with a Magnuson-Stevens Act fish management plan or Council actions. Mr. Boydstun stated that the proposals are primarily to limit entry in state managed OA fisheries. Therefore, they plan to limit participation in the nearshore live fish fishery. He said that they need to engage the Council on the nearshore landing limit. Mr. Boydstun stated that CDFG is considering options inconsistent with past Council actions. He explained that management decisions are made in February for implementation in April. He would like to have a discussion of further stratifying OYs. Ms. Eileen Cooney asked whether they were going to engage the Council on stratifying OYs within federal waters off CA. Ms. Cooney wasn't sure whether CDFG could do this. Mr. Bill Robinson asked whether CDFG was going to ask the Council to redefine their OYs? Mr. LB Boydstun suggested that was one way they could go. It was acknowledged that CDFG plans had many complications that need to be taken up in November. Mr. Phil Anderson wanted to everyone to think of other potential issues that might frustrate management actions in bordering states.

Mr. Phil Anderson said there were potential monies available from NOAA for managing nearshore fisheries. Mr. Boydstun thought that money was a one-time appropriation for planning purposes. Mr. Anderson thought a unified West Coast voice could get the states some money.

6.5 Public comment: Ms. Laura Dietch asked several questions and made points regarding the OA problem statement from the June 2001 council meeting. Why are directed groundfish fishers participating in OA fisheries being accommodated if they didn't qualify for LE fisheries in the first place? Further allocation decreases landing limits resulting in greater discard. How are discards and poaching being enforced with the current management system? How do you reconcile creating new LE permits with the buy back program being considered in Congress? What is latent capacity and how is it created? She suggested we need to understand latent capacity before we try to reduce it. Alaska has non-transferable LE permits. Latent capacity is created when creating LE permits.

7. Managing workload. Dr. McIsaac explained the new emphasis for all Council decisions to be more fully NEPA-documented earlier in the process, which increases workload and allows less time for OA permitting initiatives. He expressed the need for about $400K to properly establish permitting in OA fisheries. He suggested that we discuss this at our next Council meeting.

Mr. Boydstun asked if Mr. DeVore could get minutes out tomorrow to Committee members. He affirmed that request.

Mr. Robinson asked Mr. Boydstun to get together with him and Ms. Cooney to discuss their proposed management actions for nearshore fisheries.

The conference call was adjourned at 1635 hours.

Rebuilding Analysis for Darkblotched Rockfish

Addendum #1

Prepared for August 2001 GMT meeting
Edited Aug 14, 2001

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The SSC's review of the initial rebuilding analysis for darkblotched rockfish prepared by Dr. Jean Rogers in June 2001 resulted in two recommendations: the rebuilding analysis should be based on an assessment update that included the 2000 survey data, and recruitments during the more recent era should be the basis for the rebuilding rate. This document provides an update to the rebuilding analysis using only results from the 2001 assessment update. 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. 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.

The updated assessment model has the same basic life history parameters as the original model. With these parameters, F50% is 0.0321; generation time is 33 years; and the unfished level of spawn output per recruit is 18.42.

The initial rebuilding analysis used recruitments from 1984-1994 for the forecast. Here with the addition of 2000 survey data it is reasonable to include recruitments through 1996 since these fish are well represented in the survey. Also, the early year break is moved from 1984 back to 1983 to more clearly 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 simply assumed levels. 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.

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 3 and Figures 4-5. Note that in Scenario A2 and B2, the possible fishing mortality rate during a nearly 50 year rebuilding period would exceed the F50% level. Scenario A1 with a 50% probability of rebuilding in the maximum allowable time frame would have short-term rebuilding OY slightly above the ABC. At a 60% probability of rebuilding, the Scenario A1 OY in 2002 would be 181 mt which is less than the F50% ABC of 187 mt. Restriction of the OY during rebuilding to the ABC level would reduce the short-term OY in scenario A2 to a level near that in scenario A1.

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 status quo and to the F50% ABC level, and is intermediate between scenarios A2 and B1. The 40:10 OY adjustment would reduce the 2002 OY substantially because the projected spawning biomass in 2002 is at 14% of the virgin level.

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.

A table of the rebuilding trajectory for scenario A1 is presented in Table 4 and the input parameter file is in the appendix.

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,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
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
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
0.0011,0.0023,0.0176,0.1077,0.323,0.573,0.7587,0.8681,0.9268,0.9578,0.9745,0.9838,0.9892,0.9925,0.9945,0.9959,0.9968,0.9974,0.9978,0.9981,0.9984,0.9986,0.9987,0.9988,0.9989,0.9989,0.999,0.999,0.9991,0.9991,0.9991,0.9992,0.9992,0.9992,0.9992,0.9992,0.9992,0.9992,0.9992,0.9993
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
0.0435,0.1173,0.227,0.3327,0.4232,0.5018,0.5743,0.6419,0.7021,0.754,0.7983,0.8358,0.8674,0.

8937,0.9155,0.9335,0.9483,0.9604,0.9703,0.9784,0.9851,0.9904,0.9948,0.9983,1.0012,1.0035,1.0054,1.0069,1.0081,1.0091,1.0099,1.0106,1.0111,1.0116,1.0119,1.0122,1.0124,1.0126,1.0128,1.0133
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
1950,1577,29044,1,0,0
1963,4143,28036,0,0,0
1964,10,27908,0,0,0
1965,10,27858,0,0,0
1966,10,27552,0,0,0
1967,3965,25090,0,0,0
1968,330,21287,0,0,0
1969,6646,19389,0,0,0
1970,45,19053,0,0,0
1971,10,18654,0,0,0
1972,2996,18125,0,0,0
1973,240,17634,0,0,0
1974,3514,17467,0,0,0
1975,1035,17329,0,0,0
1976,838,17489,0,0,0
1977,928,17503,0,0,0
1978,1226,17786,0,0,0
1979,2095,17998,0,0,0
1980,3678,17581,0,0,0
1981,3008,17549,0,0,0
1982,1731,17408,0,0,0
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
Defintion of recovery (1=now only;2=now or before)
2
Produce the risk-reward plots (1=Yes)
0

Rebuilding plan matrix for groundfish species declared overfished (parameters to be determined by the Council in bold italic).

Criteria	Canary	Cowcod	Bocaccio	POP
% Unfished Spawning Biomass	7%-20%	4%-11%	2.1% (Southern portion of stock)	13% (1998)
Years to Rebuild w/ No Fishing (F_0)	41	61	26	18
Max. Rebuilding Time (F_0 + 1 mean generation)	58	98	38	47
Council-Adopted Rebuilding Time	57 years	95 years	34 years	43 years
Probability of Rebuilding Within Designated Timeframe	52%	55%	67%	79%
Management Actions to Rebuild	Constant harvest (93 mt), 2001-02 Time/gear/bag limit restrictions	Constant harvest rate (F=0.01) Area closures Retention prohibited Sport gear restrictions	Constant harvest (100-103 mt), 2000-02 Constant harvest rate (E=0.03), 2003-33 Time/gear/bag limit restrictions Area closures (cowcod closures)	***Constant harvest (OY<500-550 mt)***
Year Rebuilding Management Measures First Implemented	2000	2000	2000	2000
Target Rebuilding Year	2056	2094	2033	2042
2001 OY	93 mt	4.8 mt	100 mt	303 mt
2002 OY	93 mt	4.8 mt	***100 mt***	***290-410 mt***
Stock Ass. Used in Rebuilding Plan	1999	1999	1999	1998
Most Recent Stock Assessment	1999	1999	1999	***2000***
Next Stock Assessment	2002	2004	2002	2003
Next Council Review	2003	2003	2003	2001

Criteria	Lingcod	Widow	Darkblotched
% Unfished Spawning Biomass	15% (1999)	***24.6%***	***14%***
Years to Rebuild w/ No Fishing (F_0)	10	***22***	***14***
Max. Rebuilding Time (F_0 + 1 mean generation)	10	***38***	***47***
Council-Adopted Rebuilding Time	10 years	***34-37 years***	***To be determined***
Probability of Rebuilding Within Designated Timeframe	60%	***60-80% (range adopted in June 2001)***	***To be determined***
Management Actions to Rebuild	Constant harvest rate ($F_{45\%}$) Time/gear/bag limit restrictions	***Constant harvest rate (F=0.023-0.027)***	***Constant harvest rate ($F_{50\%}$)***
Year Rebuilding Management Measures First Implemented	2000	***2002***	***2002***
Target Rebuilding Year	2009	***To be determined***	***To be determined***
2001 OY	611 mt	2300 mt	130 mt
2002 OY	***577 mt***	***726-856 mt***	***157-181 mt***
Stock Ass. Used in Rebuilding Plan	1999	***2000***	***2000***
Most Recent Stock Assessment	***2000***	***2000***	***2000***
Next Stock Assessment	2003	2003	2003
Next Council Review	2001	2001	2001

Situation Summary
September 2001

REBUILDING PLANS

Situation: This agenda item concerns rebuilding plans for seven groundfish stocks (Exhibit C.5, Attachment 1) that have been declared overfished by the National Marine Fisheries Service (NMFS) based on provisions in the Magnuson-Stevens Fishery Conservation and Management Act. Rebuilding plans for canary rockfish, cowcod, and bocaccio have been revised according to guidance provided at the last Council meeting and are being considered for final Council approval (Exhibit C.5, Attachment 2, Supplemental Attachments 3 and 4). Updated rebuilding analyses for Pacific ocean perch (POP) (Exhibit C.5, Attachment 5), coastwide lingcod (Exhibit C.5, Attachment 6), and darkblotched rockfish (Exhibit C.5, Attachment 8) have been prepared consistent with Council directives. Rebuilding plans for these three species are scheduled for final Council adoption this November. The Council is requested to adopt rebuilding targets, checkpoints, and strategies for these species to guide final drafting of rebuilding plans and for adoption of 2002 acceptable biological catches (ABCs), optimum yields (OYs), and management measures (Exhibits C.3 and C.7). Likewise, further specification and adoption of rebuilding targets, checkpoints, and strategies for widow rockfish (Exhibit C.5, Attachment 7) are required to complete a rebuilding plan and develop congruent 2002 ABCs, OYs, and management measures in November.

Rebuilding plans for canary rockfish, cowcod, and bocaccio were considered for final Council approval at the June 2001 Council meeting. The Council decided the plans insufficiently addressed measures to describe and protect important habitats and methods for evaluating and controlling fishing-related mortality; elements that were judged critical to a comprehensive rebuilding plan. Rebuilding plans for these species have been revised accordingly (Exhibit C.5, Attachment 2, Supplemental Attachments 3 and 4) with specific recommendations for identifying and protecting important habitat areas. The framework for describing these habitats and species distributions in Geographic Information Systems (GIS) databases has been defined. As key GIS databases become available, managers will have the means to consider area-specific management measures that could be useful for designing effective rebuilding strategies. Another important revision to these plans mandated by the Council is a detailed analysis of alternative strategies for evaluating and controlling fishing-related mortality. An analysis of the strengths and shortcomings of status quo and alternative strategies for controlling bycatch and other sources of mortality is provided. More importantly, strategies for improving assessment of bycatch and fishing mortality are outlined. This Council directive is a central tenet of these rebuilding plans and will continue to guide rebuilding of overfished species. These three plans are expected to provide a template for other rebuilding plans, which are in a formative stage of development.

POP have been overfished on the West Coast by foreign vessels since prior to the implementation of the Pacific Coast Groundfish Fishery Management Plan in 1982. A new rebuilding analysis, authored by Dr. Andre Punt and Mr. James Ianelli (Exhibit C.5, Attachment 5), provides the Council with updated technical input for estimating virgin biomass (B_0) and predicting future recruitment. In June, based on a recommendation by the Scientific and Statistical Committee (SSC), the Council requested, an updated POP rebuilding analysis using the new rebuilding model developed by Dr. Punt. This has been accomplished, and now the Council needs to provide guidance for rebuilding plan authors on key rebuilding targets, checkpoints, and strategies for POP. Council guidance will also be instrumental for determining the 2002 ABC and OY for POP. The POP rebuilding plan is scheduled for Council adoption in November.

The West Coast lingcod stock was declared overfished in 1999 based on a 1997 assessment of the northern portion of the stock. New assessments were completed in 1999 (southern portion of the stock) and 2000 (both southern and northern portions of the stock). The lingcod rebuilding plan, put before the Council in June, did not incorporate the new 2000 coastwide assessment. The SSC and Groundfish Management Team (GMT) recommended incorporation of the new assessment data into an updated rebuilding analysis prior to Council consideration of rebuilding plan approval. An updated lingcod rebuilding analysis, authored by Mr. Tom Jagielo and Dr. Jim Hastie, has been completed (Exhibit C.5, Attachment 6) and is now before the Council for approval. The Council is requested to provide guidance to rebuilding plan authors by adopting targets, checkpoints, and strategies for rebuilding West Coast lingcod. Final plan approval is also scheduled for November.

The widow rockfish resource was declared overfished earlier this year based on last year's stock assessment. The Council approved a revised rebuilding analysis for widow rockfish, authored by Drs. Alec MacCall and Andre Punt, at the June Council meeting. The Council also adopted a range of alternative constant rate rebuilding policies based on the revised analysis that correspond to a 60%-80% probability of attaining the target biomass within the specified rebuilding time frame. The 2002 OYs for widow rockfish that equate to this range are 726 mt-856 mt, which are down substantially from the 2001 OY of 2,300 mt. The complete widow rockfish rebuilding plan will follow the format presented in the canary rockfish, cowcod, and bocaccio rebuilding plans. Exhibit C.5, Attachment 7 is a draft of Section 2 (alternatives) that is analogous to that section in those rebuilding plans. The alternatives presented in Attachment 7 will be the basis for management policies established in the rebuilding plan. Specific management measures to implement the policies will be developed in the completed rebuilding plan. The Council is requested to specify a constant rate harvest policy within the adopted range that will guide development of the widow rockfish rebuilding plan and allow managers to design 2002 management measures for midwater trawl and other fisheries that catch widow rockfish (Exhibit C.5, Attachment 7).

Darkblotched rockfish, another species declared overfished earlier this year based on a 1999 assessment of the stock, has an updated rebuilding analysis which is available for Council consideration (Exhibit C.5, Attachment 8). A new assessment, completed in 2000, indicated stock biomass was considerably lower than was indicated in the 1999 assessment. The SSC and GMT advised the Council a new rebuilding analysis incorporating the 2000 assessment was needed. The new rebuilding analysis was completed this summer by Dr. Richard Methot (Exhibit C.5, Attachment 8) and is now before the Council for consideration. As for POP, coastwide lingcod, and widow rockfish, the Council is requested to adopt specific rebuilding targets, checkpoints, and strategies based on the new rebuilding analysis for darkblotched rockfish to guide rebuilding plan authors. The Council also needs to specify a 2002 ABC and OY for the species consistent with rebuilding objectives to help shape slope fisheries that catch darkblotched rockfish.

Council Action:

1. **Adopt final rebuilding plans for canary rockfish, cowcod, and bocaccio.**
2. Review a revised rebuilding analysis for Pacific ocean perch and adopt rebuilding **targets, checkpoints, and strategies.**
3. **Review an updated rebuilding analysis for lingcod and adopt rebuilding targets, checkpoints, and strategies.**
4. Review and adopt **targets, checkpoints, and strategies for rebuilding widow rockfish.**
5. **Review an updated rebuilding analysis for darkblotched rockfish and adopt rebuilding targets, checkpoints, and strategies.**

Reference Materials:

1. Rebuilding Plan Matrix for Groundfish Species Declared Overfished (Exhibit C.5, Attachment 1).
2. Revised canary rockfish rebuilding plan (Exhibit C.5, Attachment 2).
3. Revised cowcod rebuilding plan (Supplemental Exhibit C.5, Attachment 3).
4. Revised bocaccio rebuilding plan (Supplemental Exhibit C.5, Attachment 4).
5. Revised Rebuilding Analysis for Pacific Ocean Perch (Exhibit C.5, Attachment 5).
6. Updated Rebuilding Analysis for Lingcod (Exhibit C.5, Attachment 6).
7. Draft Widow Rockfish Rebuilding Plan Alternatives (Exhibit C.5, Attachment 7).
8. Rebuilding Analysis for Darkblotched Rockfish (Exhibit C.5, Attachment 8).

Groundfish Fishery Strategic Plan (GFSP) Consistency Analysis

Rebuilding overfished species, as mandated by the Magnuson-Stevens Fishery Conservation and Management Act, was a primary motive for developing and implementing the GFSP.

Many sections of the GFSP describe how rebuilding plans factor into short- and long-term Council priorities for conducting groundfish conservation and management. GFSP objectives such as developing sustainable and effective harvest policies (Sec. II.A.2), achieving fleet capacity reduction (Sec. II.A.3.(b)), allocating groundfish resources (Sec. II.A.4), developing an effective Observer Program (Sec. II.A.5), and development of marine reserves as a groundfish management tool (Sec. II.A.6) are grounded by the need to accomplish the goal of rebuilding overfished groundfish stocks.

PFMC
08/29/01

Exhibit C.5
Supplemental Attachment 4
September 2001

Pacific Fishery Management Council

Revised Rebuilding Plan
for
Southern West Coast Bocaccio, *Sebastes paucispinis*

Including Environmental Assessment
of the Anticipated Impacts of the Rebuilding Plan
for Southern West Coast Bocaccio

September, 2001

LIST OF PREPARERS

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

EXECUTIVE SUMMARY

Revised Rebuilding Plan for the Southern Bocaccio Resource

On March 3, 1999, the National Marine Fisheries Service (NMFS) concurred with the Council's conclusion that the west coast bocaccio (*Sebastes paucispinis*) resource off California is overfished. According to the groundfish fishery management plan (FMP), a stock is considered to be overfished when its abundance (or reproductive potential) declines below 25% of its unfished level. The stock assessment prepared in 1999 estimates current spawning output of the southern bocaccio stock to be 2.1% of its initial level, and 5.1% of the estimated MSY level (MacCall et al. 1999). In the figure below, the horizontal dotted line represents the MSY level.

There are two separate west coast bocaccio populations, divided in the vicinity of Cape Mendocino, California (Gunderson and Sample 1980, Ralston et al. 1996). The southern stock has suffered poor recruitment during the warm water conditions that have prevailed off southern California for the past several years. Recent assessments have focused on this stock and have determined that it is overfished according to the definition in the FMP. The status of the northern bocaccio population, which extends into British Columbia and Alaska, is unknown. The 1999 rebuilding model calculates the expected minimum time to rebuild the southern population is 20 to 76 years, depending in part on the size of the 1999 year class. Assuming a medium size 1999 year class, the rebuilding model calculates the minimum time to rebuild is 26 years. Therefor the maximum allowable rebuilding time is 26 years plus one mean generation length (12 years for bocaccio), for a total of 38 years.

At its November 1999 meeting, the Council followed the advice of its Scientific and Statistical Committee and recommended a conservative rebuilding plan, which assumes only a medium-sized 1999 year class. Under this rebuilding plan, the rebuilding period is 34 years, with a calculated 67% likelihood the stock will recover to MSY in that time. Consistent with the rebuilding plan, the 2000 ABC for the area south of Cape Mendocino was set at 164 mt, and OY at 100 mt. For 2001, ABC was reduced to 122 mt, with the total catch OY remaining at 100 mt. It is unlikely OY will rise much above 100 mt for several years.

The Council considered a variety of issues relating to the rebuilding program, and also alternatives and initial management measures to implement the program and begin the rebuilding process. The four basic areas of consideration were (1) Goals and Objectives of the Rebuilding Plan, (2) Target Biomass and Rebuilding Period, (3) Harvest Rate Policy, and (4) Bycatch Control Strategy.

This rebuilding program is intended to rebuild the stock while allowing minimal fishing impacts from recreational fisheries, commercial fisheries targeting non-groundfish species, and commercial fisheries targeting certain groundfish south of Cape Mendocino, California. The rate of rebuilding, and thus the time expected to rebuild the stock, is highly dependent on recruitment of juvenile bocaccio to the population and the degree to which fishing mortality can be reduced. The proposed harvest rate strategy sets a constant harvest amount initially, followed by a harvest rate for the duration of the rebuilding period (harvest rate Option 2). This strategy is expected to rebuild the stock, with a 67% probability, to the B_{MSY} level in 34 years. In addition, area closures implemented under the rebuilding plan for cowcod in the Conception management area will reduce bycatch of bocaccio within those areas.

1.0 PURPOSE AND NEED FOR ACTION

The groundfish fisheries in the Exclusive Economic Zone (EEZ) (3 to 200 nautical miles offshore) adjacent to Washington, Oregon, and California are managed under the Pacific Coast Groundfish Fishery Management Plan (FMP). The FMP was developed by the Pacific Fishery Management Council (Council) under the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act). The FMP was approved by the Secretary of Commerce (Secretary) and became effective in 1982. The Council has prepared fourteen amendments to the FMP, thirteen of which have been approved or partially approved.
Section 304 of the Magnuson-Stevens Act addresses rebuilding requirements for overfished fisheries. When the Secretary of Commerce determines a stock is overfished, rebuilding measures must be developed within one year. Rebuilding measures must be designed to end overfishing if it is occurring, rebuild the stock or stock complex to the MSY level within an appropriate time frame, prevent the maximum fishing mortality threshold from being reached (if stock is approaching from below), and prevent the minimum stock size threshold (if stock is approaching from above) being reached. Allowable rebuilding time frames and considerations for adopting management measures to achieve stock rebuilding are also specified in Section the Magnuson-Stevens Act and the FMP.

Three amendments, to the Pacific coast groundfish FMP were developed to address the Magnuson-Stevens Act requirements relating to rebuilding overfished stocks. Amendment 11 established criteria for determining when a stock is overfished, Amendment 12 provided for a process by which the Council will develop overfished rebuilding plans, and Amendment 13 increased flexibility in setting annual management measures to better implement overfished species rebuilding plans.

A stock is considered overfished when the best available science determines that female spawning biomass has declined to less than 25% of its virgin biomass. A stock is considered successfully rebuilt when subsequent assessment indicates the female spawning biomass has increased to at least 40% of its virgin biomass. The most recent assessment of the bocaccio stock was prepared in 1999. The assessment concluded that the bocaccio stock is at 2.1% to 4.1% of the unfished levels estimated from historical recruitments and is therefore below its overfished threshold. On March 3, 1999 the National Marine Fisheries Service (NMFS) notified the Council that the bocaccio stock south of Cape Mendocino ($40^{O}30'$ N. lat), California, was overfished according to the definitions in the FMP and the National Standard Guidelines for the Magnuson-Stevens Act. Consequently, in November 1999, the Council recommended management measures to reduce fishing on this stock in order to initiate rebuilding.

This rebuilding plan is intended to comply with the legal requirements relating to the rebuilding of overfished stocks (Appendix B: Magnuson-Stevens Fishery Conservation and Management Act and Groundfish Fish Management Plan Regulatory Language Pertinent to the Bocaccio Rebuilding Plan). A rebuilding plan is a guide for the Council and Secretary that provides goals, targets and a description of the potential or required management measures. Actions taken to amend the FMP or implement other regulations governing the groundfish fisheries must meet the requirements of Federal laws and regulations. As specific regulations and management measures are developed to implement this rebuilding plan, the Council and Secretary will ensure their consistency with the rebuilding plan, the FMP, and all relevant Federal laws and regulations.

1.1 National Standard Guidelines (50 CFR Subpart D)

Rebuilding plans and regulations to implement them must be consistent with the National Standards of the Magnuson-Stevens Act. In general, the National Standards of the Magnuson-Stevens Act specify the federal marine fisheries management guidelines to conserve fishery resources by preventing overfishing, minimizing bycatch and total mortality of bycatch, and by using the best available science to base conservation and management measures. The National Standards also mandate consideration of economic impacts and fair treatment of fishermen and fishing communities as well as human safety at sea when adopting conservation and management measures.

1.2 Technical Guidance on Rebuilding

The National Standard 1 guidelines indicate that once biomass falls below the minimum stock size threshold, then remedial action is required "to rebuild the stock or stock complex to the MSY level within an appropriate time frame." Guidance for determining the adequacy and efficacy of rebuilding plans was prepared by Restrepo et al. (1998). This guidance manual does not have the force of law, but instead provides technical details for stock assessment scientists.

1.3 FMP Stock Rebuilding Provisions

Section 5.0 of the FMP describes the annual specifications for stock rebuilding (Appendix B). The specifications and provisions include the required structure and content of rebuilding plans, how acceptable biological catch (ABC) and optimum yield (OY) are calculated and applied when adopting management measures designed to accomplish stock rebuilding, Council considerations when developing rebuilding plans, and the process for developing and approving rebuilding plans.

1.4 Definitions from Groundfish FMP

Amendment 11 brought definitions in the FMP into conformance with definitions in the Magnuson-Stevens Act and National Standard Guidelines. The following definitions in the FMP are used throughout this rebuilding plan:

Acceptable Biological Catch (ABC) is a biologically based estimate of the amount of fish that may be harvested from the fishery each year without jeopardizing the resource. It is a seasonally determined catch that may differ from MSY for biological reasons. It may be lower or higher than MSY in some years for species with fluctuating recruitment. The ABC may be modified to incorporate biological safety factors and risk assessment due to uncertainty. Lacking other biological justification, the ABC is defined as the MSY exploitation rate multiplied by the exploitable biomass for the relevant time period.

Maximum sustainable yield (MSY) is an estimate of the largest average annual catch or yield that can be taken over a significant period of time from each stock under prevailing ecological and environmental conditions. It may be presented as a range of values. One MSY may be specified for a group of species in a mixed-species fishery. Since MSY is a long-term average, it need not be specified annually, but may be reassessed periodically based on the best scientific information available.

MSY stock size means the largest long-term average size of the stock or stock complex, measured in terms of spawning biomass or other appropriate units, that would be achieved under an MSY control rule in which the fishing mortality rate is constant. The proxy typically used in this fishery management plan is 40% of the estimated unfished biomass, although other values based on the best scientific information are also authorized.

Optimum yield (OY) means the amount of fish which will provide the greatest overall benefit to the U.S., particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems, is prescribed as such on the basis of the maximum sustainable yield from the fishery as reduced by any relevant economic, social, or ecological factor; and in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the maximum sustainable yield in such fishery.

Overfished describes any stock or stock complex whose size is sufficiently small that a change in management practices is required to achieve an appropriate level and rate of rebuilding. The term generally describes any stock or stock complex determined to be below its overfished/rebuilding threshold. The default proxy is generally 25% of its estimated unfished biomass; however, other scientifically valid values are also authorized.

Overfishing means fishing at a rate or level that jeopardizes the capacity of a stock or stock complex to produce MSY on a continuing basis. More specifically, overfishing is defined as exceeding a maximum allowable fishing mortality rate. For any groundfish stock or stock complex, the maximum allowable mortality rate will be set at a level not to exceed the corresponding MSY rate (F_{msy}) or its proxy (e.g., $F_{50\%}$).

2.0 ALTERNATIVES, INCLUDING THE STATUS QUO AND PROPOSED ACTION

2.1 Goals and Objectives of the Southern Bocaccio Rebuilding Plan

Alternative 1. Status quo. Do not adopt a rebuilding plan for bocaccio.

Alternative 2 (**adopted**). Establish a rebuilding plan for bocaccio. The rebuilding plan will provide goals and objectives, strategies, targets, checkpoints and guidance for rebuilding the bocaccio stock south of Cape Mendocino to a healthy and productive level. The plan may include a harvest rate policy and bycatch control strategy.

The goals of the rebuilding plan for bocaccio south of Cape Mendocino are to (1) achieve the bocaccio population size and structure that will support the maximum sustainable yield within 34 years; (2) minimize, to the extent practicable, the social and economic impacts associated with rebuilding this stock; (3) fairly and equitably distribute both the conservation burdens (costs) and benefits among commercial, recreational and charter fishing sectors; and (4) protect the quantity and quality of habitat necessary to support the bocaccio stock at healthy levels in the future.

To achieve these rebuilding goals, the Council will (1) set bocaccio harvest levels that will achieve the established rebuilding schedule; (2) identify present and historical harvesters of the bocaccio stock; (3) develop harvest sharing plans for the rebuilding period and for when rebuilding is completed; (4) implement measures as necessary to allocate the bocaccio resource in accordance with harvest sharing plans; (5) monitor fishing mortality and the condition of the stock at least every two years to ensure the goals and objectives are being achieved; (6) identify any critical or important bocaccio habitat areas and implement measures to ensure their protection; and (7) promote public education regarding these goals, objectives and the measures intended to achieve them.

2.2 Target Biomass and Rebuilding Period Alternatives

Alternative 1. Status quo. Do not adopt a target biomass or a rebuilding period.

Alternative 2 (**adopted**). Establish the rebuilding target in terms of spawning units; the target (40% of the initial spawning potential) would be 5,035 units and the rebuilding period would be 34 years.

The rebuilding target is the spawning biomass level that produces maximum sustainable yield (MSY); the typical proxy value is 40% of the initial (unfished) biomass. Unfished biomass cannot be estimated reliably due to lack of curvature in the bocaccio stock and recruitment data. Projections based on historical recruitments estimate mean unfished spawning outputs as a range of 6,350 (based on all recruitments in the time series) to 12,587 units (based on ten early recruitments, which were higher). The rebuilding target is 40% of these values, 2,540 - 5,035. Alternative 2 is based on the assumption that future recruitment is better estimated by the early years in the time series, setting the rebuilding target at 5,035 spawning units.

The 1999 spawning output was estimated to be 259 units, which is 2.1% to 4.1% of the initial spawning output. The bocaccio biomass estimate is 1,271 mt in 1999. The rebuilding period is specified as 34 years.

Alternative 3. Establish the rebuilding target in terms of spawning units; the rebuilding target (40% of the initial spawning potential) would be 2,540 spawning units and the rebuilding period would be 38 years.

Projections based on historical recruitments estimate mean unfished spawning outputs as a range of 6,350 (based on all recruitments in the time series) to 12,587 units (based on ten early recruitments, which were higher). The rebuilding target is 40% of these values, 2,540-5,035. Alternative 3 is based on the assumption that future recruitment is better estimated by the long term average of recruitments, i.e., the entire time series. That rebuilding target is 2,540 spawning units. The 38 year rebuilding period is the maximum authorized by the National Standard Guidelines.

Alternative 4. Establish the rebuilding target in terms of spawning units; the target (40% of the initial spawning potential) would be 5,035 units and the rebuilding period would be 26 years, which is the minimum time it would take to rebuild the stock in the absence of all fishing.

2.3 Harvest Rate Policy Alternatives

In previous years, when directed fisheries for bocaccio were allowed, specified harvest levels (OYs) were set each year. Typically, harvest levels are set in accordance with the standard ABC/OY method in the FMP. That method applies the MSY harvest rate (or a proxy value, currently $F_{50\%}$) to the estimated biomass, and then makes an adjustment based on the ratio of current to historic abundance.

Alternative 1. Default method. Harvest levels would be based on the $F_{50\%}$ harvest rate (the current MSY proxy), as adjusted by the default OY control rule in the FMP. The default OY rule is commonly referred to as the "40-10" adjustment. OY would be zero until stock biomass is estimated to reach 10% of the initial biomass level. A small harvest could be allowed when the population exceeds the 10% threshold.

Alternative 2 (**adopted**). Set the annual total catch OY at 100 mt until 2002, and thereafter as a fixed fraction of the population for the duration of the rebuilding period. This would allow a very low level of harvest in the initial years and increased harvest as the population rebuilds.

Alternative 3. Modified default method. Harvest levels would be based on the $F_{73\%}$ harvest rate (the MSY proxy calculated in the 1999 stock assessment), as adjusted by the default OY control rule (40-10 adjustment). OY would be zero until the population size reaches 10% of the initial biomass level. A small harvest could be allowed when the population exceeds the 10% threshold.

Alternative 4. Prevent all harvest of bocaccio south of Cape Mendocino for the duration of the rebuilding period, leaving only natural mortality to determine stock size. This would require elimination of all fishing in bocaccio habitat in that area.

Alternative 5. Prohibit all fishing for bocaccio and all retention of any bocaccio caught incidentally to other fishing strategies. This could allow fishing in bocaccio habitat, but not intentional fishing for bocaccio. All retention of bocaccio south of Cape Mendocino would be prohibited.

2.4 Bycatch Control Strategies

The main sources of bycatch of bocaccio are believed to be fishing with hook-and-line gear (both commercial and recreational) and commercial groundfish trawl gear on the continental shelf. Bocaccio are also taken incidentally in non-groundfish fisheries, such as the California spot prawn fishery. Management of activities in state fisheries is limited under the groundfish FMP. The State of California recently adopted requirements for fish excluders and observers in the spot prawn fishery which are expected to reduce incidental catch of finfish.

Alternative 1. Status quo (**adopted**). Maintain the management regime adopted for 2000 and 2001. That management regime reflects substantial restrictions on commercial and recreational fisheries. These restrictions include reduced bottom trawl opportunity for shelf rockfish, prohibited bocaccio landings with large footrope trawl gear (rollers larger than 8 inches), reductions in OY for chilipepper rockfish (an associated species), closures in the commercial non-trawl gear and recreational fisheries, reductions in bag limits, hook limits, and a new bocaccio size limit for recreational fishers.

Alternative 2. In addition to the measures in Alternative 1, authorize establishment of area closures to eliminate or reduce groundfish fishing where bocaccio are likely to be encountered. Certain exemptions could be established for fishing operations that typically have little or no bycatch of bocaccio.

Alternative 3. No groundfish fishing for bocaccio south of Cape Mendocino would be allowed, but all bocaccio incidentally captured must be retained and landed for counting.

2.5 Alternatives Not Considered

The Magnuson-Stevens Act requires that overfished stocks be rebuilt within ten years, except in limited cases such as where the biology of the stock or other environmental conditions prevent it. The bocaccio stock assessment and rebuilding analysis indicate this stock cannot be rebuilt within 10 years due to its extremely low abundance and low stock productivity. The maximum rebuilding time authorized by the National Standard Guidelines would be 38 years. Any alternatives that would not allow the stock to rebuild within that time would be inconsistent with the Magnuson-Stevens Act and were not considered in the following analysis.

The Magnuson-Stevens Act also requires that conservation burdens and benefits be fairly distributed among participants. Alternatives that would have given exclusive harvest opportunity to either the recreational or commercial sector would be inconsistent with this requirement and were not considered.

Bocaccio are dependent on coastal and marine habitats for survival. Anthropogenic activities not related to fishing such as dredging, pollution, introduction of non-indigenous species, mineral harvesting, vessel activities, and shoreline alteration may also affect groundfish stocks (Wilbur and Pentony 1999). Measures to address such impacts are not considered in this analysis since they are beyond the jurisdiction of the Council and NMFS.

3.0 DESCRIPTION OF THE AFFECTED ENVIRONMENT

3.1 Biology and Status of the Bocaccio Stock

3.1.1 Distribution and Life History

Bocaccio are found in the Gulf of Alaska off Krozoff and Kodiak Islands, south as far as Sacramento Reef, Baja California. Bocaccio is classified as a middle shelf-mesobenthal species, inhabiting depths between 50 and 300 meters. Most common depths are 100 to 150 meters over the outer continental shelf. Sakuma and Ralston (1995) categorized bocaccio as both a nearshore and offshore species.

All life stages of bocaccio are found in euhaline (high salinity) waters, and may congregate in local areas of high salinity. Warm temperatures are preferred, at least by larvae; Sakuma and Ralston (1995) found highest larval densities in water 12°C or higher. Bocaccio reportedly occur in typical marine waters with salinity of 31 to 34 ppt, temperatures of 6 to 15.5°C, and dissolved oxygen concentrations of 1.0 to 7.0 ppm.

Male bocaccio mature at 3 to 7 years with 50% mature at 4 to 5 years. Females mature at 3 to 8 years with 50% mature at 4 to 6 years. A large female (77.5 cm) may give birth to 2.3 million young. Bocaccio are ovoviviparous, which means eggs develop within the female's body and hatch within or immediately after extrusion from the parent. Love et al. (1990) reported the spawning season to be protracted and lasting almost year-round. Eggs develop for 40-50 days in the ovary; mature eggs measure about 0.55 mm in diameter. The eggs hatch, and yolkless larvae are released about one week later at 4-6 mm. Parturition (birthing) occurs during January to April off British Columbia and Washington, November to March off northern and central California, and October to March off southern California. In California, bocaccio may become pregnant in October, give birth in November, and prepare immediately for a second brood to be born in March. Two or more broods may be born in a year in California.

Larvae remain pelagic for up to 150 days. Metamorphosis to a semi-demersal juvenile stage occurs near 30 mm total length, and small juveniles are also pelagic. Larvae and small juveniles are commonly found in the upper 100 m of the water column, often far from shore. They are most often found in shallow coastal waters over rocky bottoms associated with algae. Post-pelagic, newly settled larvae in central California are first observed associated with the giant kelp canopy, but are also seen throughout the water column. Large juveniles and adults are semi-demersal. Adults are commonly found in eelgrass beds, or congregated around floating kelp beds. Young and adult bocaccio also occur around artificial structures, such as piers and oil platforms. Although juveniles and adults are usually found around vertical relief, adult aggregations also occur over firm sand-mud bottoms. Juvenile bocaccio also have been reported in 8-20 m in Diablo Canyon.

3.1.2. Trophic Interactions

Larval bocaccio often eat diatoms, dinoflagellates, tintinnids, and cladocerans. Copepods and euphausiids of all life stages (adults, nauplii and egg masses) are common prey for juveniles. Adults eat small fishes associated with kelp beds, including other species of rockfishes, and occasionally small amounts of shellfish. Bocaccio probably locate prey by sight and feed mostly at night. Bocaccio are eaten by sharks, salmon, other rockfishes, lingcod, and albacore, as well as sea lions, porpoises, and whales. Bocaccio directly compete with chilipepper, widow, yellowtail, and shortbelly rockfishes for both food and habitat resources.

3.2 Important Life History Factors that Affect Rebuilding

Several life history factors will affect the rate of bocaccio rebuilding and the types of management measures that may be effective or necessary. First, and probably most important, is the inherent low productivity of the species. The recent stock assessment calculates the MSY harvest rate as $F_{73\%}$, substantially lower than the default value for *Sebastes* rockfish. Reproduction in many years is insufficient to maintain abundance levels even with zero fishing mortality.

Adult bocaccio are known to be transient near oil platforms around Santa Barbara, California; large aggregations may remain near a platform for months and then disappear suddenly. Large adults also disappear from traditional commercial fishing grounds during winter spawning and reappear in the spring. Bocaccio move into shallow waters during their first year of life, then move into deeper water with increased size and age. Juvenile bocaccio are present in nearshore areas and susceptible to recreational fishing from piers, boats and shore; they are typically not caught in the commercial fishery until a year or two later. Due to the widespread distribution of the species, keeping the catch rate down to sustainable levels will be difficult. Reducing the catch rate to the level required to rebuild the stock will be substantially more difficult.

3.3 Stock Assessment

Previous stock assessments (Bence and Hightower 1990, Bence and Rogers 1992, Ralston et al. 1996) have demonstrated that the bocaccio resource off California has been declining at least since 1969 (Figure 3-1), the earliest year for which abundances can be estimated reliably. The 1996 assessment was the basis for declaring the stock as overfished.

The bocaccio resource was last assessed in 1999 by U.S. scientists of the National Marine Fisheries Service (NMFS) (MacCall et al. 1999). The 1999 assessment used a length-based stock synthesis model. Data included catches from four fisheries segments (trawl, setnet, hook-and-line, and recreation), length compositions from five sources (all four fisheries and the NMFS triennial survey), three indices of abundance (trawl CPUE, recreational CPUE, and the triennial survey), and one index of recruitment (the NMFS juvenile rockfish survey). It provided a fairly robust indication that the long term population trend has been decreasing and indicated current biomass is highly uncertain. The model achieved a reasonably good fit to trawl fishery size composition, a poor fit to triennial survey abundance index, and a reasonably good fit to estimates of relative year class strength to recruitment index data. It concluded the 1999 spawning output is about 259 spawning units, which was 2.1% to 4.1% of the unfished levels estimated form historical recruitments. The last significant recruitment was 1988; the past 10 years have been remarkable for consistent recruitment failure, although there is evidence the 1999-2000 year class may be much stronger.
Results of genetic research conducted by Russ Vetter (NMFS- Southwest Fisheries Science Center, La Jolla, CA) demonstrate lack of genetic mixing between bocaccio off southern California and fish from Washington, but the fish from southern California and Monterey Bay do intermix genetically. The two separate west coast bocaccio populations are divided in the vicinity of Cape Mendocino, California. Information is lacking to determine genetic stock boundaries or possible areas of mixing. The southern stock has suffered poor recruitment during the warm water conditions that have prevailed off southern California for the past several years. Recent assessments have focused on this stock and have determined that it is overfished. The status of the northern bocaccio population, which extends into British Columbia and Alaska, is unknown.

3.4 Basis for Determination the Stock is Overfished

The FMP requires a reduction in the harvest rate for a stock that is below its MSY biomass level (B_{msy}). For this reason, B_{msy} is also referred to as the precautionary threshold. In cases where B_{msy} has not been calculated, the FMP specifies its proxy to be 40% of the estimated initial (or unfished) abundance (i.e. $B_{40\%}$). In some cases, spawning output may be used instead of biomass. The default overfished threshold is 25% of the estimated unfished biomass (or spawning output) level. Current spawning output is estimated to have fallen to between 2.1% and 4.1% of the unfished abundance, well below the overfished threshold.

3.5 Essential Fish Habitat (EFH)

The Magnuson-Stevens Act defines EFH as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” 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. The groundfish FMP groups the various EFH descriptions into units called “composite” EFHs. This approach focuses on ecological relationships among species and between the species and their habitat, reflecting an ecosystem approach in defining EFH. Seven major habitat types were adopted as the basis for such assemblages or "composites":

1. Estuarine - Those waters, substrates and associated biological communities within bays and estuaries of the EEZ, from mean higher high water level (MHHW, which is the high tide line) or extent of upriver saltwater intrusion to the respective outer boundaries for each bay or estuary as defined in 33 CFR 80.1 (Coast Guard lines of demarcation).

2. Rocky Shelf - Those waters, substrates, and associated biological communities living on or within ten meters (5.5 fathoms) overlying rocky areas, including reefs, pinnacles, boulders and cobble, along the continental shelf, excluding canyons, from the high tide line MHHW to the shelf break (~200 meters or 109 fathoms).

3. Nonrocky Shelf - Those waters, substrates, and associated biological communities living on or within ten meters (5.5 fathoms) overlying the substrates of the continental shelf, excluding the rocky shelf and canyon composites, from the high tide line MHHW to the shelf break (~200 meters or 109 fathoms).

4. Canyon - Those waters, substrates, and associated biological communities living within submarine canyons, including the walls, beds, seafloor, and any outcrops or landslide morphology, such as slump scarps and debris fields.

5. Continental Slope/Basin - Those waters, substrates, and biological communities living on or within 20 meters (11 fathoms) overlying the substrates of the continental slope and basin below the shelf break (~200 meters or 109 fathoms) and extending to the westward boundary of the EEZ.

6. Neritic Zone - Those waters and biological communities living in the water column more than ten meters (5.5 fathoms) above the continental shelf.

7. Oceanic Zone - Those waters and biological communities living in the water column more than 20 meters (11 fathoms) above the continental slope and abyssal plain, extending to the westward boundary of the EEZ.

Bocaccio composite EFH is classified as rocky shelf, non-rocky shelf, continental slope/basin for adult stage; rocky shelf, non-rocky shelf, canyon, continental slope/basin for large juvenile stage; estuarine, neritic for small juvenile stage and larval stage. There is inadequate information to define EFH for mating stage and parturition .

3.5.1 Important Habitat Areas

Important habitat areas are specific areas or habitat types within EFH that play an important role in the life cycle of a species. As discussed in section 3.1, The distribution of bocaccio ranges from Kodiak Island, Alaska to Sacramento Reef, Baja California. It is abundant off southern and central California and uncommon between Cape Mendocino and Cape Blanco, although a second population exists near the Oregon-Washington border and extends north to Cape Flattery. They are found at depths ranging from 50 to 300 m (Ralston et al. 1996) and are classified as a middle shelf-mesobenthal species.

Bocaccio frequent a exceptional variety of habitats including, kelp forests, rocky reefs, midwater, and open, low relief bottoms. Larvae and small juveniles are pelagic and are commonly found in the upper 100 m of the water column. In central California, post-pelagic larvae are associated with the giant kelp canopy and also seen throughout the water column. Moser et al. (2000) found relatively high average abundances of bocaccio larvae when surveying stations in the Point Conception and Channel Islands areas, as well as a station southwest of Santa Rosa, a station northeast of San Nicholas Island, and a station southwest of Point Conception.

Bocaccio have been categorized as both a nearshore and offshore species because they occupy different habitats depending on life stage. After spending their first year in shallow areas along the coast, bocaccio move into deeper habitats as they age. Large juvenile and adult bocaccio are semi-demersal, found in both rocky and non-rocky habitats, and have been known to occur around artificial structures. Love et al. (2000) found the highest density of adult bocaccio (10.5 fish/100 m^2) around an oil platform was greater than the highest density of bocaccio around a natural reef (4.4 fish/100 m^2).

While adult bocaccio are usually associated with rocky vertical relief, they are also found occurring over firm sand-mud bottom, in eelgrass beds, or congregated around floating kelp beds. In Soquel Canyon, California, adults were associated with mud-boulder, rock-mud, rock-ridge, and rock-boulder habitats (Yoklavich et al. 1999). Adult bocaccio have been known to aggregate and disperse quickly and may travel more than two km per day. Bocaccio movements may also have a seasonal component, as bocaccio disappear from traditional commercial fishing areas during winter spawning and return in the spring.

All life stages of bocaccio are found in euhaline waters and they may congregate in local areas of high salinity. Warm temperatures are preferred by larvae and high larval densities have been observed in waters of 12EC and higher. However, average larval abundance declined abruptly during the shift from the cool regime (1951 - 1976) to the warm regime (1977 - 1998) of the Pacific Decadal Oscillation (PDO) in the Southern California Bight region (Moser et al. 2000). Bocaccio reportedly occur in typical marine waters with salinities of 31 to 34 ppt, temperatures of 6-15.5 ^{O}C, and dissolved oxygen concentrations of 1.0-7.0 ppm (Casillas et al. 1998).

3.5.2 Habitat and Human Impacts

The level of human impact on bocaccio habitat has not been documented. Potential fishing-related impacts to the habitat could take the form of lost or discarded fishing gear (such as setnets), direct disturbance of the sea floor from contact by trawl nets, and direct disturbance of the sea floor from contact by longlines and fish traps.

While the effects of fishing on bocaccio habitat have not been directly investigated, there is some research exploring how gear affects habitat. Auster and Langton (1999) reviewed a wide range 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 (Friedlander et al. 1999, Freese 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 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 of a trawl gear. Epifaunal invertebrates and boulders are structural components of fish habitat. Casual observations during the Freese et al. (1999) study revealed that Sebastes species use cobble-boulder and epifaunal invertebrates for cover. When boulders are displaced they can still provide cover, but when piles of boulders are displaced, it reduces the number and complexity of crevices (Freese et al. 1999).

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

In addition to fishing activities, humans have many direct and indirect effects on fish habitat. While non-fishing human impacts have not been directly assessed on bocaccio habitat, a study of flatfish in Puget Sound, Washington indicated that anthropogenic stressors included chemical contaminant exposure and alteration of nearshore nursery habitats (Johnson et al. 1998). The New England Fishery Management

Council compiled a list of human-induced threats to fish habitat that may be used as a guide to factors affecting groundfish species off the west coast. Oil, heavy metals, acid, chlorine, radioactive waste, herbicides and pesticides, sediments, greenhouse gases, and ozone loss are thought to be chemical factors that affect fish habitat. Biological threats can include the introduction of non-indigenous species, stimulation of nuisance and toxic algae, and the spread of disease. Human activities that may physically threaten fish habitat are dredging and disposal, mineral harvesting, vessel activity, shoreline alteration, and debris (Wilbur and Pentony 1999).

3.6 The Human (Socioeconomic) Environment

Humans use fish in a variety of ways including as a food source, a resource base for businesses and jobs, recreation, and religious symbols. For some people, even the knowledge and certainty that a species or type of human community will continue to exist constitutes a valued part of their environment. Various types of values that humans place on fish and on human economic and social structures associated with fishing are affected by changes in fishing policy.

The impacts on the human environment may be assessed at a number of levels including:

1. Individuals that participate directly in fishing and fishery support activities.
2. Communities of association among fishery participants and related water front support activities (e.g., processors and gear manufacturers).
3. The geographic range of the social communities.
4. Individuals who value visiting the human communities or partake in non-consumptive observation of the natural environment.
5. Individuals outside the geographic area that have no direct interaction with the fish or communities but value the existence of the fish, the fishing community, or the ensemble of communities of association that make up the geographic area.
6. Individuals affected by the role of fish as an economic commodity (broad market level effects).

The primary form of information on the socioeconomic environment is harvest related statistics. There is little information available about the characteristics of the individual participants and their social relationships other than harvest. Information on the characteristics of the participants would allow a closer look at communities of association and how those communities fit within geographic communities. The following information on West Coast fisheries provides a simple look at the aggregated activities of individuals.

3.6.1 The Commercial Groundfish Fishery

3.6.1.1 Coast-wide Overview

The Pacific coast groundfish fishery is a year-round, multi-species fishery that takes place off the coasts of Washington, Oregon, and California. Most of the commercial groundfish harvest is taken by trawl, longline, and trap (or pot) vessels operating in the limited entry segment of the groundfish fishery. The limited entry program was established in 1994. All vessels that land groundfish without groundfish limited entry permits are classified as open access vessels. Several open access fisheries take groundfish incidentally or in small amounts; participants in those fisheries may use, with some restrictions, longline, vertical hook-and-line, troll, pot, setnet, trammel net, shrimp and prawn trawl, California halibut trawl, sea cucumber trawl, and other gears.

In most years during the past decade or so, on a coastwide basis, the groundfish fishery was the most valuable commercial fishery on the West Coast (based on exvessel value), occasionally rivaled by the Dungeness crab fishery. However, in recent years both landings (tonnage) and value of groundfish have declined substantially (Tables 3-1and 3-2, Figures 3-2 and 3-3). In 2000, total landings in the groundfish fishery (including whiting), are projected to be about 25% lower than 1994, on a coastwide basis, and 2001 landings are expected to be substantially lower than 2000. Over the 1994-2000 period, total rockfish landings declined 70%. The total landed value of the harvest declined even more sharply by 33% since 1994. On a proportional basis, the value and volume of landings in the south declined more than in the north, but in absolute terms the declines in the north have been substantially larger. Rockfish have been on a consistent downward trend in both volume and value since 1995 (Tables 3-1and 3-2, Figures 3-4 and 3-5). Commercial landings of bocaccio peaked in 1983 at 7,115 mt, followed by a steep decline to 4,535 mt in 1984 and just over 2,500 mt in 1985 (Figure 3-3). Landings remained between 2,100 mt and 2,700 mt through 1990. In 1991, landings dropped to less than 1,500 mt. After 1993, landings declined each year to a historical low of 218 mt in 1998.

In 1999, 1,485 vessels participated in the open access commercial groundfish fishery (Table 3-4). There has generally been a downward trend in the number of vessels participating in the open access fishery with a precipitous decline in 1998 after a slight increase in 1997 (Figure 3-6). Open access vessels depending on groundfish for more than 50% of their income were on a general declining trend while those less dependent on groundfish were increasing until 1998. The vast majority of open access vessels earn less than $5,000 of revenue from groundfish (Figure 3-7). The open access fishery tends to be more dependent on the rockfish component of the groundfish fishery than the limited entry fleet.

In 1999, 89% (438 vessels) of the vessels with limited entry permits participated in the groundfish fishery (Table 3-4). Each groundfish limited entry permit is endorsed for a particular gear type, and that gear endorsement cannot be changed, so the distribution of permits between gear types is fairly stable. Limited entry vessels tend to be substantially larger producers than open access vessels (Figures 3-8). Excluding the at-sea processing vessels, there were 490 vessels with Pacific coast groundfish limited entry permits, of which approximately 53% were trawl vessels, 40% were longline vessels, 6% were pot vessels, and 2% were vessels that have endorsements for more than one type of gear. The number of vessels actively participating in the commercial groundfish fishery has generally declined in recent years. The number of active vessels in the limited entry fishery from 1994-1999 declined 16%, compared to a 19% declined in the open access fleet (Figure 3-9).

Limited entry trawlers focus their efforts on many different species, with the largest landings by volume (other than Pacific whiting) from the following species: Dover sole, sablefish, thornyheads, widow rockfish, and yellowtail rockfish. There are 55+ rockfish species managed by the Pacific coast groundfish FMP and, taken as a whole historically, rockfish landings represented the highest volume of non-whiting landings in the Pacific coast commercial groundfish fishery. In addition to these mixed-species fisheries, there is a distinct mid-water trawl fishery that targets Pacific whiting. Pacific whiting landings are substantially higher in volume than any other Pacific coast groundfish species. In 1998, by weight, whiting accounted for approximately 85% of all commercial shore-based groundfish landings. Longline and pot vessels primarily target sablefish but some longline vessels also target on a mix of species in the rockfish complex.

The major goal of management of the groundfish fishery throughout the 1990s was to prevent overfishing while achieving the OYs and providing year-round fisheries for the major species or species groups. For 2000, growing awareness of reduced productivity of the groundfish resource made it apparent that the goal of a year-round fishery was no longer achievable for a number of species. A new management strategy, which diverts effort off the rocky sea floor of the continental shelf, was initiated in 2000 to rebuild overfished species, especially canary rockfish. The measures resulted in lower OYs, reduced seasons, trawl gear restrictions and more restrictive trip limits for shelf and nearshore species. This management program, with generally tighter restrictions, was extended through 2001.

Open Access - regional variations: In Puget Sound, along the Washington Coast, and areas south of Yachats, Oregon, active groundfish open access vessels (those with over $5,000 of landings) tend to be more dependent on groundfish than those along the central and northern Oregon coast (Table 3-5). Vessels operating out of Washington tend to be more dependent on sablefish and those operating along the southern Oregon coast and in California tend to rely more on rockfish. Open access vessels from Bodega Bay to Oxnard California tend to be particularly reliant on rockfish. In this area there was a general downward trend in the number of participants from 1994-1999. North of this area there was more fluctuation without any clear trends, though in 1998 and 1999 there were fewer participants in most areas except the southern Oregon coast. Participation in the open access fishery is more flexible than participation in the limited entry fishery; open access vessels are more likely to move between fisheries from year to year, or to try a new economic venture altogether. Thus, open access fleet size may be used as one (very rough) gauge of the overall economic viability of the fishery.

A groundfish setnet fishery operates in central and southern California, taking bocaccio and other rockfish. This gear is classified as open access by the FMP, but California regulations limit participation in this fishery. Over the past decade or so, this fishery has been substantially restricted, especially in shallow waters near shore. In recent years, growth of a fishery for live fish (primarily rockfish, a few other nearshore groundfish species, and some state-managed species) has provided an economic alternative to some fishers who used setnets in the past. Much of the live fish fishery is conducted as open access, especially in California.

Limited Entry Fixed Gear Vessels - regional variations: For limited entry fixed gear vessels, the geographic pattern of reliance on rockfish tends to be similar to the open access fishery with greater reliance on rockfish generally occurring in the area from Bodega Bay south (Table 3-6). Over recent years, the number of active vessels in this fleet has tended to be relatively stable along the central and southern Oregon coast. An increase has occurred along the northern Oregon coast. Along other areas of the coast there has been some fluctuation from 1994-1999 with the number of participating vessels first increasing then decreasing. There may be some relationship between this pattern and the imposition of the fixed gear sablefish endorsement program in 1997. The fixed gear sablefish endorsement program prevented the shift of additional fixed gear limited entry vessels into the lucrative sablefish fishery, based on landings history through 1994.

As in the open access fishery, many limited entry fixed gear (nontrawl) fishers participate in the live fish fishery. They may operate either with variations of traditional longline gear, vertical hook-and-line gear or other methods that take the target species with minimal injury. This fishery has become one of the more lucrative in California, especially for small vessels.

Limited Entry Trawl Vessels - regional variations: Trawl vessels fishing out of Puget Sound and along the Washington coast tend to have a level of dependence on groundfish comparable to limited entry fixed gear vessels fishing out of the same areas (Table 3-7). Along the northern and central Oregon coast and northern California coast, the trawl vessel level of dependence in most years is substantially greater than for fixed gear vessels. Along the southern Oregon and north-central California coast (Bodega Bay to Santa Cruz), the level of trawl vessel reliance on groundfish has varied from year to year compared to limited entry fixed gear vessels. Trawl vessel dependence on groundfish along the southern California coast (Santa Cruz to Oxnard) is generally less than for fixed gear vessels. With respect to rockfish, the pattern of trawl reliance is different than for fixed gear and open access vessels. In general, trawl vessels from Washington through the central Oregon coast and along the north Central California coast tend to rely more on rockfish, and trawl vessels fishing along other areas of the California coast tend to rely less on rockfish.

Tribal Fishers: No tribal groundfish fisheries operate within the area covered by this rebuilding plan.

3.6.1.2 The Commercial Fishery for Bocaccio

Bocaccio landings data from 1950 to 1998 are included in the 1999 bocaccio assessment. For the commercial fishery, from 1950 to 1980, trawl gear was the predominant harvest strategy for bocaccio, followed by hook-and-line gears (Figure 3-10). These were the only commercial gears used for bocaccio until 1980, when the setnet fishery took 206 mt. The setnet fishery expanded rapidly, surpassing hook-and-line landings in 1983 and nearly every year thereafter until 1995. Landings in the Monterey area exceeded those in the Conception area, except in 1992-1995 when landings were similar in both areas. Landings in the Monterey area declined steadily from about 3,000 mt in 1984 to about 50 mt in 1999. Landings in the Conception area were roughly steady at about 400 - 650 mt per year until 1995, when landings declined quickly. The decline in the two management areas was due to a combination of reduced stock size and restrictive management measures; in the most recent years, management was very restrictive.

3.6.2 Recreational Fisheries

3.6.2.1 Coast-wide Overview

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.

Recreational fishing in the open ocean has been on a downward trend for a number of years. Data for 1994-1997 is incomplete, thus the downward trend may be more than indicated by the available Marine Recreational Fisheries Statistical Survey (MRFSS) data (Figure 3-11). Part of this decline is likely the result of shorter salmon seasons and smaller bag (retention) limits. Some effort shift from salmon to groundfish likely occurred, but the primary effect was likely to slow the overall decline in recreational fishing.
The proportion of ocean angling trips in which rockfish were taken or targeted unsuccessfully increased in 1999 compared to 1998 (Figure 3-12). Rockfish is a target or incidental catch in a substantial portion of the West Coast ocean recreational fishery. On average (1994-1999), 43% of all recreational ocean angling trips are taken on private and rental vessels, 25% are taken on party and charter vessels and the remaining trips are taken from the beach, banks, or manmade objects such as piers.

More recreational trips are taken in southern California than in northern California, Oregon or Washington, (Table 3-8 and Figure 3-13). The proportion of trips taken on party/charter vessels in southern California is generally greater than all areas of the West Coast except Washington state. Data across years for 1994-1999 is available for southern California and show a steady decline in ocean recreational angling trips. Most of the reduction occurred for private vessels in southern California.

Recreational fishers in most regions tend to have household incomes of between $45,000 and $60,000. Yearly tax payments were greatest for individuals in southern California, compared to Washington and Oregon. Recreational fishing activities follow a similar seasonal pattern along the entire coast, although there are regional variations. Summer is the most important time for recreational ocean fishing, with the peak occurring in July and August. The fewest trips are taken during November and December.

3.6.2.2 Recreational Harvest of Bocaccio

Recreational effort was directed at bocaccio from both private fishing boats and commercial passenger fishing vessels (CPFVs). CPFVs include both charter boats (carrying a prearranged or closed group of anglers) and party boats (generally open to the general public, without prior reservation). The CPFV industry began in southern California around 1919, and by 1939 the fleet consisted of over 200 boats. CPFV operators targeted numerous species during the first half of the 20th century, such as tuna, giant sea bass, marlin, swordfish, mackerel, California halibut, kelp and sand bass, bonito, barracuda, and yellowtail. However, early reports do not list *Sebastes* (rockfish) as a CPFV target group during the first half century.

Following World War II, there was a notable expansion of the CPFV fleet, and by 1953 it totaled about 590 boats. By 1963, the statewide CPFV fleet had declined to 476 vessels, 450 of which operated out of central and southern California ports. The majority of the 1963 CPFV fleet (256 vessels) was based in the southern California bight. Species of preference for the southern California CPFV fleet did not include rockfish, although rockfish were listed as an important part of the catch. By 1974, attitudes of the typical CPFV fisher had changed, and there was increased effort directed towards rockfish. With the decline in availability of “traditional” sportfish in the 1960s-1970s, less lively “food” fish such as *Sebastes* were sought in order to maintain angler satisfaction. Late autumn through early spring is the time of year when southern California CPFVs normally target bottom fishes.

CPFVs in central California typically have capacities of 6 to 50 anglers, and in southern California they may range up to about 60 anglers. State law has required logbooks for every CPFV trip since 1935, but compliance is not complete. From 1981 to 1986 in central and northern California, CPFV logbook data was found to account for 38% to 62% of total effort, and 49% to 84% of total catch. Bocaccio were typically combined with all other *Sebastes* as part of the rockfish group.

In the late 1960s and 1970s, recreational landed catch of bocaccio increased substantially, and from 1973-1980 averaged 1,700 mt per year. Landings fell dramatically from 1982 (1,511 mt) to 1983 (593 mt) and remained below that level through 1999. During that period, most recreational management measures, including bag limits, were unchanged.

3.6.3 Groundfish Buyers

3.6.3.1 Coastwide Overview

Groundfish buyers include processing plants, buying stations and vessels that hold buyers licenses and sell directly to wholesale markets. There was a jump in the number of groundfish buyers in 1998-1999. This jump is associated primarily with buyers handling a small amount of groundfish (less than $5,000 in exvessel value) with a low level of dependence (the first column of Table 3-9). Recently, the number of large operations (those handling product valued at over $500,000 at the ex-vessel level) declined from the 125-134 range observed from 1994-1997 to 80-107 for 1998-1999. Declines occurred both for those buyers more dependent on groundfish (over 50% of their purchases are groundfish in terms of exvessel value) and those that are less dependent on groundfish. From 1994-1999, groundfish comprised between 71% and 75% of the purchases of large buyers with over 50% of their purchases from groundfish. However, the rockfish component of these purchases dropped substantially beginning in 1997.

The total numbers of buyers active in the central and southern regions of California increased from 1998 to 1999 (Table 3-10). Most of the volatility in numbers of buyers occurs in the smaller size classes, those purchasing less than $10,000 exvessel value groundfish in a year (note: smaller groundfish buyers may include large seafood buyers that buy only small quantities of groundfish). The number of larger buyers (over $500,000 in exvessel purchases) in north-central California and south-Central California (Santa Cruz to Oxnard) declined from the range observed from 1994-1997.

For buyers in Puget Sound, a greater percentage of purchases are groundfish than for buyers along the Washington coast. Buyers along the Oregon coast tend to be relatively consistent with one another in terms of the percentage of their purchases of groundfish. Groundfish comprise a greater proportion of the purchases of Oregon buyers than for buyers along the Washington coast but a lesser proportion than buyers in Puget Sound. Groundfish purchases comprise a greater portion of the catch for buyers in north and north-central California. Along the south-central and southern California coast, groundfish as a proportion of purchases tends to be more comparable to the Oregon coast.

The rockfish component of the groundfish purchases tends to increase as one moves from north to south with exceptions at the extreme ends of this range. In south-central and southern California, the rockfish component of groundfish purchases tends to be somewhat lower than to the north.

Bocaccio has often been considered a less desirable species by groundfish processors due to the abundance of parasitic nematode worms, which create an unappetizing appearance to many consumers. This problem is especially acute in larger, older bocaccio.

3.6.4 Communities

Fishing communities, as defined in the Magnuson-Stevens Act, include not only the people who actually catch the fish, but also those who share a common dependency on directly related fisheries-dependent services and industries. In commercial fishing, this may include boatyards, fish handlers and processors, and ice suppliers. In recreational fishing, this may include tackle shops, small marinas, lodging facilities that cater to out-of-town anglers, and tourism bureaus that advertise charter fishing opportunities. Another component of fishing communities is the people employed in fishery management and enforcement.

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 and habitat types, seasonal patterns, and target species. While each community is unique, there are many similarities. For example, all face danger, safety issues, dwindling resources, and a multitude of state and federal regulations.

Individuals make up unique communities with differing cultural heritages and economic characteristics. Examples include a Vietnamese fishing community of San Francisco Bay, and an Italian fishing community of southern California. Also included in these considerations are the Native American communities with an interest in the groundfish fisheries (however, there are no tribal communities in the area of concern). 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.

Demographic information on geographic communities at the county level has been compiled for a general baseline description of West Coast fishing communities. This information may be downloaded from the Council web site (www.pcouncil.org).

3.6.5 Historical Management of Bocaccio

The Council was given management responsibilities for west coast groundfish , including bocaccio, when the FMP became effective in September 1982. Full time groundfish management by the Council began in 1983. Prior to that, groundfish management, including that for bocaccio, was the responsibility of the individual states. State management was generally limited to area closures and minimum mesh sizes.

Some measures are set in the FMP, and some are frameworked in the FMP and established through federal regulatory or notice procedures. Framework provisions allow for management measures to be adjusted as necessary, in some cases very quickly. The primary management measures for controlling groundfish catches under the FMP are the annual harvest levels, which include acceptable biological catch (ABC) and optimum yield (OY) specifications. Some of the more important management measures for commercial fisheries include definitions of legal trawl gear, including the minimum mesh size specification, and trip limits, which are limits on the amounts of fish that may be taken and retained, landed and sold in a specified time period and/or area. These are typically adjusted through the year as necessary in response to fleet participation and landings rates. For the recreational fishery, the primary management measures have been bag limits and seasons.

The original FMP established the initial ABC values for bocaccio in the Monterey and Conception areas based solely on historical landings during selected periods (6,100 mt for the two areas combined). The stock was managed as part of the generic *Sebastes* (rockfish) complex without its own harvest guideline. In response to concerns about bocaccio stock conditions, an assessment was conducted in 1990, and the results were the basis for reduction of the ABC to 800 mt in 1991. This ABC applied to the combined Monterey, Conception and Eureka areas. The Council, after hearing public testimony, established a harvest guideline of 1,100 mt for the same areas. The same ABC and harvest guideline were in effect through 1992. In 1992, the Council received a new assessment for bocaccio and recommended the 1993 ABC be increased to 1,540 mt. The Council endorsed the results and set the harvest guideline at that level also. The new assessment accommodated some expected discard in the trawl and set net fisheries that often fished up to the trip limits. By 1994, the Council had determined that few trips were being impacted by trip limits and the reduction to account for discard was unnecessary. Therefore, the 1,540 mt ABC and harvest guideline were adjusted to 1,700 mt for 1995. This was extended through 1996. In 1996, another stock assessment was prepared using new age and growth information, a midwater trawl index of recruitment from 1984-1996, and egg and larval survey data. The 1996 stock assessment concluded "it is unlikely that the current stock size is greater than 15-20% of the 1970 level," and the authors recommended that "harvests be held at minimal levels until there is some evidence of a strong year-class having developed and signs of stock rebuilding become evident." The Council reduced the 1997 ABC to 265 mt (based on $F_{35\%}$) and to 230 mt (based on $F_{40\%}$) in 1998.

Prior to 1991, there were no management measures specifically for bocaccio; instead, the species was merely included in the *Sebastes* complex trip limits. In 1991, bocaccio was still included in the *Sebastes* complex trip limits, but landings south of Coos Bay, Oregon were limited to 5,000 pounds per trip. In 1992, this was changed to 10,000 lb per two weeks, and in 1994 to 30,000 lb/month. This trip limit remained in effect for the limited entry sector until January 1997, when it was reduced to 12,000 lb/2 months south of Cape Mendocino, and further reduced to 10,000 lb/2 months in May 1997. The 1996 open access trip limit was reduced to 300 lb/trip for vessels using hook-and-line, not to exceed 2,000 lb/month; open access vessels using setnets were allowed 4,000 lb/month. Annual landings in 1997 exceeded the 265 mt harvest guideline, reaching 427 mt, and the limited entry trip limit was reduced to 2,000 lb/2 months in January 1998. Open access hook-and-line vessels were limited to 250 lb of bocaccio per trip, not to exceed 1,000 lb/month; setnet vessels were allowed 2,000 lb/month. In addition, recreational fishers in California were limited to three bocaccio per day. On May 1, 1998, the open access per trip limit was increased to 500 lb in an effort to reduce discard. In January 1999, the limited entry trip limit was reduced to 750 lb/month; open access fishers were restricted to 500 lb/month (hook-and-line) and 1,000 lb/month for setnets. On May 1, the limited entry trip limit was reduced to 1,000 lb/2 months. In 2000, differential trip limits were established for large and small footrope trawl gear and the *Sebastes* complex was divided into nearshore, shelf and slope rockfish components. Bocaccio, which is a shelf rockfish, was reduced to 300 lb/month from January through April, 500 lb/month May through October, and 300 lb/month November through December. Open access fishers were limited to 200 lb/month. For the recreational fishery in California, two-month closures were established, applying to all rockfish. In 2001, the monthly bocaccio limit for limited entry vessels was 300 lb/month, and 200 lb/month for open access vessels. The open access fishery was closed for two months, concurrent with closure of the recreational fishery in California.

4.0 ELEMENTS OF THE REBUILDING PLAN

NMFS concurred with the Council's finding and in March 1999 advised the Council it had designated the southern bocaccio stock as overfished. That designation requires the Council to prepare a rebuilding plan within one year. A rebuilding plan consists of (1) a rebuilding analysis that estimates the potential rate of rebuilding the stock, including a technical analysis of stock productivity, estimate of B_{msy}, forecasts of future population growth and estimation of the time for the stock to rebuild under various assumptions; (2) the management plan to achieve the population size and harvest levels indicated in the rebuilding analysis, including goals and objectives and how progress will be monitored; and (3) the management measures necessary to maintain catch at or below the designated levels.

4.1 Rebuilding Analysis

An initial rebuilding analysis for bocaccio was prepared in 1999 by Dr. Alec MacCall (Appendix 1). The rebuilding analysis provides calculations of rebuilding time, target biomass, and projected abundance for the southern bocaccio stock. Options for harvest levels over the first three years are included in the analysis. The following sections are based on that analysis.

4.1.1 Time to Rebuild in the Absence of Fishing

Stock rebuilding for this species is highly dependent on reproductive success (referred to as "recruitment"). Since 1977, average annual recruitment has been substantially below that for the period 1968-1977. If the 1999 year class is similar to the 1984 year class (which was the largest since 1977), the expected median time to rebuild would be 20 years if all fishing mortality were eliminated (see Table 1, Appendix 1). If the 1999 year class most resembles the 1988 year class, the minimum time to rebuild would be about 26 years in the absence of fishing. Several years of high recruitment would result in more rapid rebuilding, and rebuilding would be delayed if average future recruitment is similar to the past 10 years. The Council considered these factors and adopted the medium recruitment scenario (the 1999 year class is similar to the 1988 year class) which deduces a minimum period of 26 years to rebuild southern West Coast bocaccio in the absence of fishing.

4.1.2 Rebuilding Target Biomass

The first step in designing a rebuilding program is establishment of an appropriate target to designate when the stock will be considered rebuilt. This target should allow determination of when rebuilding is complete and the stock has returned to, or is maintaining, a healthy condition. If adequate information were available, this would typically be a stock size or biomass that is calculated to produce MSY. The FMP establishes the default proxy for MSY as 40% of the estimated initial biomass. In the case of bocaccio (and perhaps other groundfish stocks), biomass alone may not provide the best indication of stock health. For example, if all the fish are young, the spawning output may be substantially less than optimum because older, larger individuals produce many more offspring per spawning event. Therefore, the bocaccio rebuilding plan is based on spawning output; the initial goal is 40% of the stock's estimated initial spawning potential. This target is used to guide the rebuilding process and to establish management measures. The target is a level of stock productivity (spawning output units) at which harvesting of the resources can be sustained on a continual basis at the level necessary to support MSY. Achievement of this stock condition would signal recovery of the stock to a healthy condition. Projections based on historical recruitments give mean unfished spawning outputs from 6,350 (based on all years of recruitments) to 12,587 (based on recruitments observed in 10 early years). This rebuilding plan sets the target for bocaccio at 40% of the upper value, 5,000 spawning units.

4.1.3 Maximum Allowable Time to Rebuild

The rebuilding model calculates the expected minimum time to rebuild is 20 to 76 years, depending in part on the size of the 1999 year class. Assuming the 1999 year class is of "medium size", the rebuilding model calculates the minimum time to rebuild is 26 years. According to the National Standard Guidelines, the allowable rebuilding time is the minimum time (26 years) plus one mean generation length (12 years for bocaccio), for a maximum of 38 years.

In developing this rebuilding plan, the Council asked for advice from its scientific advisors regarding the level of recent recruitment and reasonable expectations of future recruitment. At the November 1999 meeting, the Scientific and Statistical Committee recommended a conservative rebuilding plan, which assumes only a medium-sized 1999 year class. Under this assumption, bocaccio would be expected to rebuild in 34 years (67% of the simulations rebuilt within that time).

4.1.4 Target Rebuilding Time Period

In accordance with the rebuilding analysis, the Council set the 2000 ABC at 164 mt and OY at 100 mt. The 2001 ABC and OY were the same as 2000. According to this plan, the OYs for 2002 and 2003 will be 102 mt and 103 mt, after which OY will be based on a F rate index policy of 0.03.

A major factor affecting rebuilding time is fishing mortality rate. It may be extremely difficult to maintain low fishing mortality rates during rebuilding because young bocaccio will be mixed with other species and likely to be encountered by sport and commercial fishers targeting those co-occurring stocks.

In its deliberations, the Council paid particular attention to the last two pages of Appendix 1. Table 2 of that appendix summarizes the performance of alternative rebuilding policies in which the catch is held constant for the first three years (2000-2002), and reverts to a constant harvest rate in the fourth year. The Council based its recommended 2000 OY on the medium 1999 year class and the F index rate of 0.03. That approach sets OY at 100 mt each year; however, fishing effort must be reduced progressively to maintain the specified constant catch. This is due to the increase in available biomass as the strong 1999 year class grows older.

The Council adopted a time period of 34 years to rebuild the southern bocaccio stock. The rebuilding analysis (Appendix A) indicated, under the aforementioned recruitment assumptions, estimates of current biomass, and the rebuilding management strategy adopted by the Council, there would be a 67% probability of successfully rebuilding bocaccio within this designated period. The 34 year rebuilding time period is less than the maximum allowable rebuilding time period of 38 years. The more conservative rebuilding time period and associated management measures adopted by the Council insures a higher probability of achieving the target biomass for bocaccio within the allowable rebuilding timeframe.

4.1.5 Cause of the Overfishing Condition

The fundamental cause of the currently overfished condition of the southern bocaccio stock was a lack of understanding of the inherent low productivity of the stock. Default fishing mortality rates used to manage West Coast commercial and recreational fisheries that harvested the southern bocaccio stock were too high given the slow growth, variable recruitment, and other population dynamics parameters that lead to low potential stock productivity. While the evolving understanding of low productivity of bocaccio and other Pacific Coast rockfish stocks has led to increasingly conservative management measures for groundfish fisheries that directly or incidentally harvest these stocks, the stock's biomass has been depleted to its currently overfished condition by excessive past harvests.

4.2 Management Under the Rebuilding Plan

A rebuilding plan is an agreed upon set of decisions and management measures which are intended to meet the identified goals. The goals of the southern West Coast bocaccio rebuilding program are to: (1) achieve the population size and structure that will support the maximum sustainable yield within 34 years; (2) establish a long term management program that has a high probability that total annual fishing mortality of southern West Coast bocaccio will not exceed the specified amounts; (3) foster public education programs about the need to rebuild the southern West Coast bocaccio population, and how individuals can help; and (4) protect the quantity and quality of habitat necessary to support the stock at healthy levels in the future. The rebuilding plan envisions an OY of 100-103 mt for the 2000-2002 period and an annual 3% exploitation rate thereafter.

To achieve these rebuilding goals, the Council established the following objectives: (1) set harvest levels that will achieve the established rebuilding schedule; (2) establish measures such as gear restrictions, bag limits, and commercial landing limits that will reduce southern West Coast bocaccio bycatch in fisheries; (3) monitor the condition of the stock at least every two years to ensure the goals and objectives are being achieved; (4) identify any important habitat areas and implement measures to ensure their protection; and (5) promote public education regarding these goals, objectives and the measures intended to achieve them.

Chapter 5 of the FMP addresses preparation and implementation of rebuilding plans and management measures. Specifically, the FMP states that the Council will develop a rebuilding plan and submit its recommendations to NMFS in the same manner as the annual management process. Once approved, a rebuilding plan will remain in effect for the specified duration or until a revision of the plan is approved by the Secretary. The Council intends to implement management measures for rebuilding plans through the annual specifications process or federal rulemaking procedures, as is done with other management measures.

To monitor the effectiveness of a rebuilding plan, managers need rigorous information to assess population size and structure, total fishing mortality, and important habitat. The following section describes the management measures that will be taken to implement and monitor the effectiveness of the southern West Coast bocaccio rebuilding goals over time.

4.2.1 Stock Assessment and Monitoring Rebuilding Progress

The Magnuson-Stevens Act requires NMFS to review the effectiveness of each rebuilding plan and whether it has achieved the intended results (such as specified catch levels and biomass trajectories) at least every two years. The Council anticipates these reviews will result in additional information that will be used to revise and/or update the rebuilding plan. The best available science for monitoring and evaluating the effects of the recovery strategy will be used.

Stocks under rebuilding must be monitored closely so adjustments can be made if the rebuilding milestones are not being met for any reason. Groundfish trawl surveys conducted by the NMFS are the primary source of information on long-term trends in abundance of bocaccio as well as several other species found on the continental shelf. Since 1997, Northwest Fisheries Science Center (NWFSC) scientists have worked to provide better data for stock assessments and to improve the scientific assumptions on which those assessments are based. In addition, new statistical methods have been applied to address the uncertainty in fishery logbook data which is used in assessments.

Standard NMFS bottom trawl surveys have been a major data source for southern West Coast bocaccio stock assessments and will be important sources of information to track rebuilding. In the future, these surveys will be especially important because gear restrictions and trip limits severely limit the information on stock abundance that can be obtained from commercial fishery data. Improvements in survey coverage will be important to better track stock abundance. Historical bottom trawl surveys have not been able to sample on very rocky habitats, so they may give an incomplete picture regarding the status of bocaccio which are common in such habitats. New technologies such as remotely operated vehicles and submersibles are making it possible to conduct quantitative visual surveys in these untrawlable habitats. Recent work by NMFS and collaborators on the Heceta Bank off Oregon demonstrates the high potential for this methodology. Future analyses will be able to blend these trawl and non-trawl data to provide a more complete, habitat-based assessment of canary rockfish.

Efforts continue to be taken to better understand catchability and to examine gears that may be more suitable for assessments in rocky habitats. The Alaska Fisheries Science Center and Washington Department of Fish and Wildlife recently conducted a pilot study to determine if submersible survey methods could be used to assess trawl survey catchability and provide a meaningful comparison of fish densities between trawlable and untrawlable habitats. Such efforts hold promise of improving on traditional groundfish survey techniques, and NMFS is committed to fund such research for the purpose of refining and validating assumptions used in stock assessment models.

The NWFSC also continues work on the development of a commercial fishing logbook which is intended to increase the amount and uses of fishery dependent data, aid in data verification, and improve access to data.

4.2.2 Maintaining Fishing Mortality Within Rebuilding Parameters

The Council intends to implement specific management measures for rebuilding plans through the annual specifications process or federal rulemaking procedures. As with other groundfish species, bocaccio total fishing mortality (retained + discard) will be managed using the best available information and managed so total mortality does not exceed the OY.

4.2.2.1 Harvest Rates

The preliminary harvest strategy for bocaccio is to set OY near 100 mt each year through 2002, and thereafter apply an F rate index policy of 0.03 for the duration of the rebuilding period. This strategy is one of several the Council considered and is an attempt to balance the need to reduce harvest to the extent practicable and the needs of fishers and fishing communities. Given the current low abundance, any reasonable constant exploitation rate policy would result in an OY of only a few tens of metric tons during the first few years of the rebuilding program. Setting OY near 100 mt during the first years results in a slight delay, but part of the delay is offset by the low exploitation rate over a long time period.

The Council believes it could be extremely difficult to reduce the current harvest rate and maintain it at the low level required to rebuild this stock. In the short term, reducing total catch (including bycatch) to 100 mt will be difficult. This problem will become more acute as stock abundance increases; the effort index must decline from 0.49 in 2000 to 0.34 in 2001, 0.21 in 2002, and 0.14 in 2003. The Council considered area closures for managing this stock but determined most of the stock is mobile rather than sedentary, and therefore would not be greatly benefitted by area closures. However, the area closures for cowcod will contribute to the success of this rebuilding plan. In the longer term, as the stock recovers and biomass increases, the annual OY will increase in direct proportion to the biomass.

4.2.2.2 Harvest Sharing Plans and Allocations

The Council has not developed any harvest sharing plans for bocaccio at this time. Allocations may become necessary in order to prevent one sector from taking the entire OY or a disproportionate share of the harvest.

4.2.2.3 Modification of Open Access and Limited Entry Allocation Shares

Amendment 12 to the FMP authorizes the Council and NMFS to temporarily suspend or modify allocations of overfished species and associated species in order to facilitate the rebuilding process and to fairly distribute the conservation burdens. However, at this time, the Council has not considered whether modification of open access and limited entry shares of bocaccio will be necessary or appropriate.

4.2.2.4 Bycatch Reduction Measures

Amendment 13 to the FMP, which NMFS approved on December 21, 2000, addressed the bycatch requirements of the Magnuson-Stevens Act through evaluation of standardized reporting methodologies and bycatch reduction measures. The amendment and its associated environmental assessment included a thorough review of historical bycatch reduction efforts which will not be repeated here.

The main sources of bycatch of bocaccio are believed to be fishing with hook-and-line gear (both commercial and recreational) and commercial groundfish trawl gear on the continental shelf. Bocaccio are also taken incidentally in non-groundfish fisheries, such as the California spot prawn fishery. Management of activities in state fisheries is limited under the groundfish FMP. However, in response to Council concerns for bocaccio and other overfished groundfish stocks, the State of California recently adopted requirements for fish excluders and observers in the spot prawn fishery which are expected to reduce incidental catch of finfish.

Several measures adopted by the Council, NMFS, and the state of California are expected to reduce bycatch of this stock. For the recreational fishery, the Council specified that California anglers may not use more than two hooks in times and areas when the recreational season for rockfish is open. Previously there were no federal restrictions on the number of hooks a sport fisher in California could use, although State regulations limited anglers to not more than three hooks per rod. The use of multiple hooks frequently results in more than one fish being caught at a time, especially when anglers encounter dense schools of feeding rockfish. If bocaccio were encountered, an angler could easily exceed his two fish daily limit. Accidental catch of most rockfish results in high mortality due to decompression and temperature shock. The reduction in the number of hooks is intended to reduce the likelihood that an angler would accidentally catch more than the specified bag limit of bocaccio or other depleted rockfish.

Bycatch of bocaccio will also be reduced by seasonal area closures adopted by the state of California. Rockfish, including bocaccio, are not allowed to be taken in recreational fisheries from March through June in the area south of Cape Mendocino (40° 10' N. Lat.) to Point Conception. Likewise, a seasonal closure of recreational fisheries for rockfish exists for the area south of Point Conception to the U.S./Mexico international border during January, February, November, and December. The southern area seasonal restriction is put in place by regulatory action if needed to meet Council-adopted management goals for rockfish and lingcod.

The Council discussed the possibility of using smaller area closures to help rebuild the bocaccio stock but has not developed any recommendations at this time. As bocaccio occupy such a wide variety of habitats throughout their life stages, it would be difficult to protect habitat areas specific to bocaccio. It is thought that bocaccio will benefit from the areas closed in conjunction with the cowcod rebuilding plan.

The Council has also recommended several measures to reduce bycatch in commercial groundfish fisheries. Reduction in commercial trip limits of groundfish species that are not overfished, but in close association with overfished species such as bocaccio, is a common management measure recommended by the Council to reduce bycatch of overfished species. Most notably, the Council has significantly reduced OYs and trip limits for sympatric chilipepper rockfish to reduce the bycatch and fishing mortality rate of southern West Coast bocaccio.

The Council recommended commercial gear restrictions for managing fisheries in 2000 and 2001. Several measures were implemented by emergency regulation for the 2000 fisheries and Amendment 13 authorized implementation of gear restrictions through the annual specification procedures for 2001. For the commercial trawl fishery, the Council specified that several groundfish species found primarily on the continental shelf may not be landed by any vessel using trawls with footropes larger than eight inches in diameter. Also, the lower sections of the net may not have any material added to protect it from damage or snagging by rocks or other components of the ocean floor. These provisions are believed to have effectively eliminated trawling in rocky areas inhabited by bocaccio.

The Council has also recommended gear restrictions for non-groundfish fisheries that incidentally harvest groundfish. The California spot prawn trawl fishery has been shown to have a relatively high incidental bycatch of bocaccio. Consistent with the Council recommendation to reduce this bycatch, the State of California recently adopted requirements for fish excluders and observers in the spot prawn fishery which are expected to reduce incidental catch of bocaccio.

The Council has approved several exempted fishing permits (EFP) to test gear and fishing techniques designed to reduce southern West Coast bocaccio bycatch while allowing access to other species. Recent EFPs approved for California groundfish fisheries include an open access trawl EFP designed to target chilipepper rockfish while minimizing bycatch of bocaccio and other overfished species. Additionally, an EFP designed to test the ability of vertical hook and line gear to target healthy groundfish species such as yellowtail rockfish while minimizing bycatch of bocaccio and other overfished species was approved by the Council in 2001. Both EFPs required the presence of trained on-board observers to verify test results and the ability of fishers to selectively target healthy species. Incentives for these EFPs include higher landing limits for target species while strictly regulating bycatch. There is great potential for EFPs to shape fishing strategies and techniques to reduce bycatch of bocaccio and other overfished groundfish species.

As abundance increases over time, recreational and commercial fishers will be more and more likely to encounter these fish. The rebuilding plan envisions a constant harvest rate, including bycatch, each year until the stock is fully recovered. Thus, as stock abundance increases, the catch allowance will also increase.

4.2.2.5 Time/Area Management

4.2.2.6 Monitoring Fishing Mortality and Discard Assumptions

Monitoring of fishing mortality is critical to the success of rebuilding the southern West Coast bocaccio stock, yet continues to be problematic. Sources of fishing-related mortality of groundfish in general and bocaccio specifically are landed catch, which is well accounted with commercial fish receiving tickets and recreational fishery sampling programs, and discarded bycatch, which is not well accounted. Reliable information on discarded catch in the present fishery is needed to assess and account for total fishing mortality (retained +discarded catch). If discard estimates are too low, then harvest allocations may be set too high, and the long-term health of the stock may be jeopardized.

Over time, the Council introduced trip limits for a greater number of species taken in the domestic fisheries. Effort increased in the domestic fishery, and trip limits became more restrictive to control harvest rates. The Council realized that managing a variety of species under trip limits could lead to increased rates of discards for some species. Bycatch and discards can result from a regime of multiple trip limits because a fisher might target an assemblage of species, and then find that in order to catch the full limit on one species, he has to exceed the limit on another species, discarding the excess. To address this issue, the Council shifted away from per trip limits, converting most to monthly cumulative limits by the 1994 season. Cumulative limits were preferable to per trip limits because a fisher could accumulate species at different rates over different trips, without having to discard fish each trip because of exceeding per trip limits. In an effort to further reduce the likelihood that fishermen would have to discard overages of particular species within a multi-species fishery, the Council began extending the cumulative limit period length to two months for most major species throughout most of the 1997 season.

In addition to these efforts to modify the trip limit regime to reduce discards, the Council used several regulatory measures to reduce incidental catch of juvenile fish that would be discarded as unmarketable. In the early 1990s, the Council experimented with different combinations of gear regulations, first requiring larger trawl mesh sizes in net codends, and then moving to requirements for larger mesh sizes throughout trawl nets. By 1995, bottom trawl nets were required to have a minimum of 4.5 inch mesh, double-walled (lined) codends were prohibited, and the use of chafing gear was restricted (60 FR 13377, March 13, 1995, codified at 50 CFR 660.322.). All of these measures were intended to give smaller-size fish the opportunity to escape from the trawl net, reducing the likelihood that those fish would be caught and then discarded.

Additional gear restrictions were also introduced during the 2000 fishery. Previously, fishers had been allowed to use footropes equipped with large rollers--often truck tires--to target shelf rockfish species residing in high-relief habitat. Beginning in 2000, trawl landings of shelf rockfish were prohibited if large footrope trawls (gear with footropes or rollers greater than 8 inches in diameter) were onboard the vessel; small amounts of shelf rockfish bycatch were allowed to be landed if footropes less than 8 inches in diameter were onboard; and, higher limits were provided for targeting healthy shelf rockfish stocks when only midwater nets were onboard. Although the effect of these gear requirements on bycatch of depleted rockfish species has yet to be validated through observation, a review of tow locations from 1999 and 2000 trawl logbooks does suggest that many areas where shelf rockfish, such as bocaccio, were previously caught are no longer being trawled (Hannah and Freeman 2000).

Cumulative limits for minor shelf rockfish were set at minimal levels for all gear groups, in order to reduce incidental catch of canary rockfish, bocaccio, and lingcod. During 2000, these restrictions resulted in less than 10% of the commercial OYs for minor shelf rockfish being landed, in both the southern and northern areas. The fishery is projected to utilize a similar percentage in 2001, and an even lower percentage in 2002, in order to protect yelloweye rockfish. Constraining ratios were used in 1999 in establishing cumulative limits for the healthy chilipepper rockfish stock in an effort to protect bocaccio. As a result, less than 800 mt of the 3,700 mt chilipepper commercial OY was landed. Beginning in 2000, the Council also reduced the chilipepper OY from 3,700 mt to 2,000 mt; however, the restrictive limits approved by the Council allowed landings of just 400 mt.

Logbook data have been used by the Council's Groundfish Management Team (GMT) in estimating coincident catch rates of depleted rockfish species that may occur during the prosecution of small-footrope fisheries for species such as flatfish. However, interpretation of these data is complicated by the absence of recorded discards, as well as changes in gear usage, unreliable recording of the gear type used prior to 2000, and substantial changes in retention limits, and thus targeting opportunities, for many species. Although considerable inference and filtering of these data, and input from fishers, is required to develop coincident catch rates that reflect the current fishery, these rates are grounded in the best available information regarding fishing practices. They have been used to develop trip limit recommendations for target species, through assessment of the expected, associated catches of depleted species, and comparison of those amounts with limit opportunities for the depleted species. As a result, shelf flatfish fisheries which previously had no management limits, now have overall flatfish limits, in conjunction with lower sub-limits on species which have exhibited higher historic coincident catch of depleted rockfish species. These types of analyses, as well as the knowledge of fishers, have also been used to craft seasonal variations in limit opportunities, in an effort to harvest healthy stocks when they can be most cleanly targeted. An example of this would be the structure of Dover sole limits. Dover sole reside primarily in deeper slope areas throughout the winter, and are distributed through the continental shelf during the summer. This migrational pattern factored into the scheduling of larger trip limits for Dover sole at the beginning of the year than during the summer, in order to reduce impacts on depleted shelf rockfish such as bocaccio.

Prior to the 2001 fishing season, the domestic commercial groundfish fishery off the West Coast had not been subject to routine at-sea monitoring by scientific observers. However, two studies, which included fishing vessels carrying observers on a voluntary basis, have provided information on catch rates and discards under the prevailing trip limits. The first study included observations during the 1985-87 seasons (Pikitch et al. 1988). Observations for the second study (Enhanced Data Collection Project, EDCP) occurred about ten years later, beginning in late 1995 and continuing through 1998.

In the Pikitch report, widow rockfish is the only rockfish species for which discard rates are discussed. Ratios of estimated total catch-to-landings are reported for 1985,1986, and 1987 as being 1.19, 1.13, and 1.15, respectively, representing an average of 1.157 across these three years. Since 1991, this 16% rate has been employed by the Council as an estimate for discarded widow rockfish, as well as an increasing number of other *Sebastes* species. Over time, as the number of rockfish species with assessments has increased, the Council has removed additional species from the generic *Sebastes* complex and assigned individual OYs incorporating this discard rate. For bocaccio, the 16% rate was used in 1993 and 1994, but discontinued from 1995-1999 based on GMT analysis that bocaccio trip limits were not being achieved. Beginning in 2000, the 16% discard assumption was re-instituted, in conjunction with imposition of lower trip limits needed to rebuild bocaccio.

In recent years, excess fleet capacity and declining trends for many groundfish stocks have forced the Council to lower cumulative limits substantially, in order to preserve year-round supplies of groundfish to harvesters and processors while constraining catches to allowable levels. This pattern of trip limit reductions has led some to question the current appropriateness of the 16% discard estimate, which was derived from a period in which limits were far higher. In 2001, the GMT re-evaluated the appropriateness of the current 16% discard assumption for *Sebastes* species in general, and depleted species in particular, as it relates to observations described in the Pikitch study. Several key issues were considered including: gear usage on observed trips vs. that in the current fishery, alternative shelf target opportunities available during low-limit periods, and changes in relative biomass of species over time.

The restriction on trawl gear foot rope diameter has eliminated most of the gear that accounted for shelf rockfish bycatch in the Pikitch study. Within the Pikitch study, the nearshore-mixed strategy, targeting primarily flatfish with smaller footrope gear, represents the best analogy to the current shelf fishery. Estimates of canary rockfish discard from those gear types ranged from 1% to 4%. These results suggest that, even during a period when trip limits would have allowed the retention of large amounts of rockfish, fishermen targeting flatfish with small footrope gear had minimal encounters with rockfish species, including bocaccio.

Not only was much of the gear used during the Pikitch study more suitable for on-bottom targeting of most rockfish than that with which shelf rockfish can be landed today, the opportunities that existed for targeting other rockfish species when widow limits were low are not comparable to the present trip limit regime. When the limit for a single component species of an assemblage is lowered, relative to the remainder of the assemblage, it is reasonable to conclude that discard of the single species will tend to increase. However, when all limits within the assemblage are reduced in concert, it is considerably more difficult to infer that, for any of the species individually, the mere presence of a lower limit will result in a higher discard rate.

A third consideration involves changes in relative biomasses since the Pikitch study. Flatfish now represent the bulk of on-bottom trawling effort on the shelf. And flatfish abundance is currently believed to have been relatively stable, and perhaps even increased, since the mid-1980s. On the other hand, recent assessments suggest that the current exploitable biomass of canary rockfish is less than one-third of what it was during the mid-1980s. Other rockfish species currently viewed as "overfished" have experienced similar, if not greater, declines over this period. In addition to changes in gear restrictions and targeting opportunities, such changes in relative abundance suggest that rockfish encounter rates in other target, small-footrope fisheries on the shelf should be lower now than during the Pikitch study period.

The later EDCP study was also focused on the fishery off Oregon, with some observations off northern California and Washington. Data from this study were analyzed during 1999 and 2000, and a preliminary report of findings presented to the Council in September of 2000. Because the major focus of vessels participating in the voluntary study was Dover sole, shortspine and longspine thornyhead, and sablefish (DTS) species, the first analytical efforts focused on these four species. The analysis went beyond a simple calculation of discard rates on observed trips, to the development of models that projected discard amounts for all trawl trips in which DTS species were landed, based upon DTS volume and the amount of individual limits that remained at the time of each trip. The projected fleet discards were then combined with documented landings to estimate overall trawl discard rates for the four species. The Council promptly incorporated these new assumed discard rates in their recommendations for landed-catch OYs for the 2001 season. Further examination of the EDCP data with regard to rockfish bycatch and discard in shelf flatfish fisheries is anticipated, though has not yet been initiated. However, across all observed tows, discard rates were calculated for a number of species. Among these, the observed discard rate for widow rockfish was 1%, for canary 12%, for yellowtail 20%, for lingcod 10%, and for shortspine 20%.

4.2.2.7 Mortality in the Commercial Fishery

With the exception of the mid-water trawl fishery for Pacific whiting, most commercial groundfish vessels sort their catch at sea and discard rockfish catch that is in excess of cumulative trip limits, unmarketable, or in excess of annual allocations. Landed or retained catch is monitored by the individual state run fish ticket programs in Washington, Oregon, and California. Because a portion of the catch is discarded at sea, there is no opportunity for NMFS or the states to monitor total catch (retained plus discarded catch) at onshore processing facilities. To monitor harvest allocations, assumed discard rates are used for many species taken in the commercial fisheries, including bocaccio. Further discussion on current discard rates and the discards assumptions can be found in section 4.2.2.6 above. For some portions of the commercial fishery, total catch data is collected through at-sea observer sampling programs or exempted fishing permits which require participants to retain all incidental catch.

Since 1991, observers have been placed on a voluntary basis aboard offshore catcher/processors and processing vessels in the Pacific whiting fishery. The whiting observers have gathered data that has been used to estimate total catch of or target and incidentally caught species, including bocaccio. NMFS is currently seeking approval of a rule that would require mandatory observer coverage on all at-sea processing vessels in the Pacific whiting fishery.

Since 1992, vessels in the shore-based Pacific whiting fishery have been issued exempted fishing permits (EFPs) which allows sorting to be delayed until the vessel offloads its catch at a shore-based processing facility. This has been a voluntary full retention program which allows state biologists to collect total catch data from target and incidentally taken catch from fish that would have otherwise been discarded at sea, including bocaccio.

To address data deficiencies in total catch data, the Council and NMFS has moved forward on the development of a coastwide observer program for all limited entry and open access groundfish vessels that deliver catch to shore-based processors. Regulations to support the program became effective on May 24, 2001. The NWFSC deployed the first observers in August 2001. Although limited in number, the observers will gather data that will be used to estimate fleet-wide total catch, bycatch and discard associated with different fisheries, and fish stocks. During 2001, approximately 20-25 observers will be deployed with 75% of the coverage occurring in the limited entry trawl fishery. The remaining 25% of the coverage will be used to collect data in other fisheries. Catch and discard data from this program could be available as soon as 2002 to validate the discard assumptions used in the rebuilding plan for portions of the trawl fleet.

The Council is considering mandatory retention of all shelf and slope rockfish, which may prove effective in accounting for the total fishing-related mortality of bocaccio with adequate verification, such as video systems for monitoring full retention or observer data to compare to vessel-collected data. Accountability of rockfish catch in excess of prescribed landing limits would enable accurate estimation of total mortality. NMFS has issued exempted fishing permits to the State of California intended to refine incidental catch rates for bocaccio in the southern open access fisheries by fishing location, and collect information to assess the feasibility of full retention requirements. The NWFSC intends to begin testing alternative monitoring systems in 2001, including video recordings, as an alternative to the human observer.

4.2.2.8 Mortality in the Recreational Fishery

Recreational catch data will continue to be obtained from recreational fishery sampling programs and commercial passenger fishing vessel (CPFV) logbook data.

4.2.2.9 Habitat Identification and Protection

As stated in section 3.5.1, bocaccio frequent a wide variety of habitats including kelp forests, sand-mud bottoms, eel grass beds, and rocky reefs. They are found in different habitat types depending on life stage and move from shallow, nearshore areas to deeper waters offshore as they age. Because bocaccio occupy such a range of habitat types and can travel relatively great distances (greater than two km per day) (Casillas et al. 1998), it is difficult to implement management measures to protect habitats used during all life stages.

In 2000, the primary strategy the Council chose to rebuild overfished species was to divert trawl effort off the sea floor of the continental shelf, where bocaccio occur. Historically, bottom trawl gear with large footropes (greater than 8 inches in diameter) and roller gear or other devices such as chains or skid plates designed to bounce over rock piles was used to fish for shelf rockfish. Such gear allowed vessels greater access to areas where several of the overfished species congregate, including bocaccio. Since January 2000, landing bocaccio taken with large footrope trawl gear has not been permitted; only small footrope or mid-water gear may be used land bocaccio. The use of chafing gear on the body of small footrope trawl gear is prohibited. Chafing gear is used to protect the net from snagging on rock piles or the sea floor. Prohibiting the use of chafing gear makes the net more vulnerable to tears, and so encourages fishers to operate in less damaging areas or off the sea floor. Vessels using large footrope gear are prohibited from landing nearshore shelf and most flatfish species. Although vessels are not prohibited from using large footropes in nearshore and continental shelf areas, they are not allowed to retain and sell most of the fish they could catch there, which is expected to be a significant disincentive to operate in those areas. The use of mid-water trawl gear, which is effective in harvesting species above the ocean floor, is encouraged for the harvest of species that are found in the same areas as bocaccio.

To protect the habitat of cowcod and other bottom-dwelling groundfish species, the Council also recommended two Cowcod Conservation Areas (CCAs). The CCAs are expected to reduce the amount of fishing effort in areas that have traditionally produced large catches of both cowcod and bocaccio. These areas are located in the southern California Bight and cover about 43,000 square miles. Fishing for groundfish is prohibited within these closed areas, with the exception that minor nearshore rockfish, cabezon, and greenling may be taken from depths less than 20 fathoms. By reducing fishing activity in these areas, any associated impacts from fishing gear on habitat are expected to be reduced.

There is increasing scientific interest in the areas of identification and protection of fish habitat. Numerous research programs and analyses are currently being funded by NMFS and the states to identify habitat and map species distribution by various stages of life history. This information will be used to identify which habitat is susceptible to degradation, and determine how fishing practices can be modified to minimize risk to habitats. A wide variety of existing data, including data from geological surveys, commercial fishing logbooks and fish receiving tickets are being used to identify distribution and habitat.

The designation of Habitat Areas of Particular Concern (HAPC) may provide some additional protection for bocaccio habitat. An HAPC is a specific area within designated EFH that is intended to focus conservation priorities on an area that plays a particularly important role in the life cycle of federally managed fish species. The Council is currently working with NMFS as part of the Groundfish Fishery Management Plan Environmental Impact Statement (EIS) to develop a framework for identifying, evaluating, and designating HAPC. The identification of important habitat areas (Section 3.5.1) may provide valuable input into the development of specific HAPC.

The Council's Groundfish Fishery Strategic Plan (PFMC 2000) identifies marine reserves as a potential tool for contributing to groundfish conservation efforts. Parrish et al. (2001) indicated that marine reserves also have potential for contributing to the rebuilding of overfished stocks such as bocaccio. Modeling scenarios indicate that the primary mechanism would be from catch reduction, but that increased production from larger, more fecund individuals associated with protected habitat would also be likely.

4.2.3 Interaction with Other Overfished Species and Conservation Measures

The geographic and habitat distribution of southern West Coast bocaccio overlaps those of lingcod, cowcod rockfish, and canary rockfish, all of which also inhabit the continental shelf and have been declared overfished. Commercial lingcod catches are generally highest in the depth range of 70-150 m, which is within the primary range of bocaccio. Bocaccio is classified as a middle shelf-mesobenthal species, inhabiting depths between 50 and 300 meters. Most common depths are 100 to 150 meters over the outer continental shelf. The southern bocaccio stock extends from Mexico north to about Cape Mendocino, California, and thus overlaps the southern portion of the canary rockfish range. Management measures to reduce the take of lingcod and canary rockfish, especially measures that reduce fishing in rocky areas of the continental shelf, are also likely to benefit bocaccio. As stated in Section 4.2.2.9, the CCAs that were designed to protect cowcod rockfish will likely benefit bocaccio as well.

The Council may take into account measures designed to recover one species when making recommendations for another. Taken to their logical conclusion, such strategies are the basis for ecosystem management. However, if such overlapping measures are modified or discontinued for one species or habitat type, reassessment and modification of rebuilding strategies for the other species that were benefitting from those measures will be necessary.

4.2.4 How Management Measures Will be Implemented

Chapter 5 of the FMP addresses preparation and implementation of rebuilding plans and management measures. Specifically, the FMP says 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. The Council anticipates management measures for rebuilding plans will be implemented in the same manner as other management measures, either through the annual specifications process or federal rulemaking procedures.

4.3 Implementation of the Management Measures in 2000 and 2001 to Initiate Rebuilding

The Council adopted a total catch OY of 100 mt for 2000 and 2001 for bocaccio in the area south of Cape Mendocino. Other measures to better ensure accomplishment of the bocaccio rebuilding goals were also implemented with the annual harvest specifications for groundfish. The Council prepared an analysis (EA/RIR) to accompany those recommendations.

Future reassessments will demonstrate whether management measures have accomplished intended objectives. However, it is likely that many years will need to pass before it is possible to detect a statistically significant change in abundance for an unproductive species such as bocaccio.

5.0 ANALYSIS OF IMPACTS

5.1 Goals and Objectives of the Rebuilding Plan

Under the status quo, no rebuilding plan would be adopted for bocaccio. This alternative is not viable because it does not meet the requirements of federal law. Although the bocaccio stock might rebuild under this alternative, there would be no clear and cohesive plan to accomplish rebuilding. Management measures would be developed in an ad hoc manner.

The only viable decision for the Council is to establish a bocaccio rebuilding plan. Under Alternative 2, the Council rebuilding plan would include goals and objectives based on those listed in Section 5.3.6.1 of the FMP. Specifically, the goals of the bocaccio rebuilding program are to (1) achieve the population size and structure that will support the maximum sustainable yield in 34 years; (2) minimize, to the extent practicable, the social and economic impacts associated with rebuilding; (3) fairly and equitably distribute both the conservation burdens (costs) and benefits among commercial, recreational and charter fishing sectors; and (4) protect the quantity and quality of habitat necessary to support the stock at healthy levels in the future.

To achieve these rebuilding goals, the Council will (1) set harvest levels that will achieve the established rebuilding schedule; (2) identify present and historical harvesters of the stock; (3) develop harvest sharing plans for the rebuilding period and for when rebuilding is completed; (4) implement any measures necessary to allocate the resource in accordance with harvest sharing plans; (5) monitor fishing mortality and the condition of the stock at least every two years to ensure the goals and objectives are being achieved; (6) identify any critical or important habitat areas and implement measures to ensure their protection; and (7) promote public education regarding these goals, objectives and the measures intended to achieve them.

5.2 Target Biomass and Rebuilding Period

Alternative 1 would not establish a target population size and rebuilding period and was rejected because it does not comply with basic requirements of rebuilding plans. Alternatives 2, 3 and 4 would each establish a rebuilding target in terms of spawning units (40% of the initial spawning potential). The rebuilding target is the spawning biomass level that produces maximum sustainable yield (MSY), and 40% is the typical proxy value. Unfished biomass cannot be estimated reliably due to lack of curvature in the bocaccio stock and recruitment data. Projections based on historical recruitments estimate mean unfished spawning outputs as a range of 6,350 (based on all recruitments in the time series) to 12,587 units (based on ten early recruitments, which were higher). The rebuilding target is 40% of these values, 2,540 - 5,035. Alternative 2 is based on the assumption that future recruitment is better estimated by the early years in the time series, setting the rebuilding target at 5,035 spawning units, the upper end, and the rebuilding period at 34 years. Under Alternative 3, the rebuilding target would be 2,540 spawning units (the lower end) and the rebuilding period would be 38 years. Alternative 3 is based on the assumption that future recruitment is better estimated by the long term average of recruitments, i.e., the entire time series. Alternative 4 sets the rebuilding period at 26 years, the minimum length of time to rebuild in the absence of all fishing mortality.

The Magnuson-Stevens Act requires the time period for rebuilding the fishery shall:

> (i) be as short as possible, taking into account the status and biology of any overfished stocks of fish, the needs of fishing communities ... and the interaction of the overfished stock of fish within the marine ecosystem; and (ii) not exceed 10 years, except in cases where the biology of the stock of fish, other environmental conditions ... dictate otherwise;

According to the rebuilding analysis, the median time for the bocaccio population to rebuild with zero fishing is 26 years. The long period is due to the extremely depressed condition of the stock and the expected low level of recruitment in the future.

The Council rejected Alternative 4 based on consideration of the needs of fishing communities. To implement a zero-impact program for bocaccio, the Council would need to prohibit all on-bottom groundfish fishing (both commercial and recreational) and some off-bottom fishing in a large region of southern and central California. In addition, non-groundfish fisheries that take bocaccio incidentally (i.e., bycatch fisheries) would also need to be further curtailed. This would require either preemption of state management authority or development of an FMP for other fish species that inhabit the outer continental shelf. Communities whose economic base includes recreational and/or commercial fishing would be severely impacted, and the supply of fresh local fish in the region would be substantially reduced. Instead, the Council chose to lengthen the recommended rebuilding period by adding one mean generation time. This will allow minimal commercial and recreational fishing mortality.

It is impossible to accurately predict future recruitment, and the best that scientists can do is make a best guess based on what has occurred in the past. Bocaccio recruitment has been inconsistent, ranging from low levels that barely maintain the population, up to higher levels that could support more rapid rebuilding. For most of the years covered by the assessment, recruitment was low.

5.3 Harvest Rate Policy

In previous years, substantial directed fisheries for bocaccio were allowed. During that period, bocaccio was included in the generic rockfish group, although it had its own ABC and, after 1990, a harvest guideline or OY. ABC and OY were typically set in accordance with the standard ABC/OY method in the FMP, with the MSY harvest rate (or a proxy value, currently $F_{50\%}$) applied to the estimated biomass, and then an adjustment made based on the ratio of current to historic abundance. The recent stock assessment estimates the appropriate MSY harvest rate would be $F_{73\%}$, due to the low productivity in recent years.

Alternative 1 would set bocaccio harvest levels in the default manner, that is, based on the $F_{50\%}$ (or $F_{73\%}$) harvest rate as adjusted by the default OY control rule. Because current abundance is estimated to be less than 10% of the unfished level, the default OY would be zero. No fishing mortality would be allowed until the biomass increased to more than 10% of the unfished level. At that point, harvest rates would increase slowly, at some point in the distant future exceeding the rate set by Alternative 2. Alternative 2 (adopted by the Council) sets a fixed annual harvest of about through 2003, and thereafter a constant rate (.003) applied to the estimated current abundance. This allows for a minimal level of fishing mortality in the early years of the program that would not be possible under either the status quo approach or a constant harvest level approach. Alternative 2 would set the annual harvest as a fixed fraction of the population after the first 3 years for the duration of the rebuilding period. This approach would allow increased harvest as the population rebuilds, it will be difficult to keep fishing mortality down to the necessary levels. Alternative 4 (no fishing mortality allowed) is the same as Alternative 1 in the short term but would eliminate all harvest for the duration of the rebuilding period (26 years). Alternative 5 would prohibit all fishing for bocaccio and retention of bocaccio caught incidentally. Unless combined with specific bycatch reduction measures, this alternative would not necessarily reduce fishing mortality as necessary or achieve the rebuilding objectives.

Alternative 1 was rejected because it sets OY at zero when the population is below 10% of initial biomass. Thus, in the short term, all fishing would be prohibited, including all incidental harvest. The Council could not accept this due to the severe impacts on California fishing communities that would suffer not only the loss of bocaccio and other groundfish landings, but also the loss of some non-groundfish landings . An additional impediment is that the Council lacks management authority to regulate many non-groundfish fisheries that take incidental amounts of bocaccio. Alternative 4, which suffers the same problems, would result in the shortest rebuilding period (26 years). It is unclear whether Alternative 1 would achieve rebuilding within the established period; in the early years, rebuilding would proceed as quickly as under Alternative 4, but as stock abundance approaches the target amount, the harvest rate would approach the MSY harvest rate. That rate, which is expected to achieve the target on average in the long term, is not based on any schedule.

Alternative 2 (a fixed harvest rate of about 3%) allows a very small take of bocaccio in the short term and an increasing amount as the stock recovers to the target level. However, the amount available for harvest in the early years would require substantial restriction of commercial and recreational fisheries. By allowing a slightly larger harvest during the early years, the rebuilding period is lengthened but the impacts on fishing communities are mitigated. This harvest rate would be expected to achieve the rebuilding timetable.

Without other measures to prevent incidental catch, Alternative 5 would result in zero reported or landed catch but an unknown amount of total catch, all of which would be bycatch. There is no assurance this alternative would achieve the rebuilding period requirement.

5.4 Bycatch Controls Strategies

The main sources of bycatch of bocaccio are believed to be trawl gear (commercial) and hook-and-line gear (both commercial and recreational) on the continental shelf. Alternative 1, which is the status quo (**adopted** by the Council), maintains the management regime adopted for 2000 and 2001. That management regime reflects substantial restrictions on commercial and recreational fisheries, including bag limit reductions for recreational fishers in waters off southern and central California and hook limits. Alternative 2 would include the management measures of Alternative 1 but would also authorize establishment of area closures to eliminate or reduce groundfish fishing where bocaccio are likely to be encountered. Certain exemptions could be established for fishing operations that typically have little or no bycatch of bocaccio. Alternative 3 would allow no fishing for bocaccio south of Cape Mendocino, but would require that all bocaccio captured must be retained and landed for counting.

Under Alternative 1 (status quo), the 2001 management regime would be maintained indefinitely, but specific provisions may be modified as necessary as new information becomes available. The current management regime reflects substantial fishing restrictions implemented for commercial and recreational fisheries in 2000 and 2001. These include bag limit reductions for recreational fishers in California waters south of Cape Mendocino and a limit of three hooks per rod. Commercial trawl and hook-and-line vessels would continue to be managed under trip limits that allow retention of small amounts of unavoidable incidental catch.

Under Alternative 2, specific time/area closures would be investigated to help ensure fishing mortality rates would be reduced and maintained adequately. Alternative 3 would prohibit targeting on bocaccio but would require that all incidentally caught bocaccio be retained and turned over to fishery officials for enumeration and/or research purposes. To be useful in determining an accurate assessment of fishing mortality, such a retention program would need to be coupled with an onboard observer program.

6.0 CONSISTENCY WITH THE FMP AND OTHER APPLICABLE LAWS

6.1 Consistency with the FMP

The Pacific Coast Groundfish FMP states that

> "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. A new rebuilding plan or revision to an existing plan proposed by the Council will generally 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."

All management actions recommended by the Council are evaluated for consistency with the goals, objectives and procedures of the FMP.

Goals and Objectives of the FMP

The Council is committed to developing long-range plans for managing the Pacific Coast groundfish fisheries that prevent overfishing and loss of habitat, yet provide the maximum net value of the resource, and achieve maximum biological yield. The Council has prepared this rebuilding plan, consistent with the requirements and standards of the FMP. The status quo alternative (no rebuilding plan) is inconsistent with the resource conservation and utilization goals and standards of the FMP, as well as the requirement to prepare rebuilding plans for overfished groundfish stocks.

> Goal 1- Conservation: Prevent overfishing by managing for appropriate harvest levels, and prevent any net loss of the habitat of living marine resources.
>
> > Objective 2. Adopt harvest specifications and management measures consistent with resource stewardship responsibilities for each groundfish species or species group.

The target biomass and rebuilding period Alternatives 2, 3, and 4 are consistent with this objective. Alternatives 2 and 3 would both establish rebuilding programs of 34-38 years by adding one mean generation time to the estimated minimum rebuilding time. Alternative 4 would be the shortest possible time, requiring more stringent bycatch controls. Alternative 1 would establish an ad-hoc approach that lacks the certainty of the other alternatives.

Harvest rate policy Alternatives 1, 2, 3 and 4 would establish harvest specifications consistent with the Council's resource responsibilities. Alternative 1 follows the default OY methodology in the FMP, and would result in zero harvest for several years until the population reaches 10% of the initial biomass. Alternative 2 would set the annual total catch OY at 100 mt until 2002, and thereafter as a fixed fraction of the population for the duration of the rebuilding period. Under Alternative 3, harvest levels would be based on the $F_{73\%}$ harvest rate (the MSY proxy calculated in the 1999 stock assessment), as adjusted by the default OY control rule (40-10 adjustment). OY would be zero until the population size reaches 10% of the initial biomass level. Alternative 4 would prevent all harvest of bocaccio south of Cape Mendocino for the duration of the rebuilding period, leaving only natural mortality to determine stock size. This would require elimination of all fishing in bocaccio habitat in that area. Alternative 4 is the most restrictive option and would result in the fastest rebuilding of the bocaccio stock. In the short term, Alternatives 1 and 3 would have similar impacts because each would eliminate all bocaccio fishing mortality. Alternative 2 allows a small harvest in the first few years and gradual increase thereafter.

Alternative 5 would prohibit all fishing for bocaccio and all retention of any bocaccio caught incidentally to other fishing strategies. Unless other measures were also used, this could allow substantial bocaccio fishing mortality, all of which would be bycatch. There is no certainty the rebuilding goals would be achieved; it is unlikely fishing mortality would be reduced enough to rebuild the stock in the specified time.

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.

Alternative 1 under "Goals and Objectives of the Rebuilding Plan" (status quo) would not be consistent with this FMP objective. The preferred alternative (Alternative 2) is consistent with 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.

Deleterious impacts of fishing gear on the EFH of Pacific coast groundfish have not been documented. However, Bycatch Control Strategy Alternative 2 authorizes and envisions closures in bocaccio habitat areas. By eliminating fishing in such areas, impacts from fishing gear (if any) would also be eliminated.

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.

Bycatch Control Strategy Alternative 2 authorizes and envisions closures in bocaccio habitat areas. By eliminating fishing in such areas, bycatch of bocaccio would also be eliminated. However, it is unclear whether bycatch outside closed areas would be affected.

Social Factors.

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.

Goals and Objectives Alternative 2 (the preferred alternative) and Harvest Policy Alternative 2 (preferred) consider the tradeoffs between short term impact on fishing communities, recreational fishers and commercial fishers, and impacts on the bocaccio resource. By setting OY near 100 mt during the first years (Harvest Policy Alternative 2), a minimal level of fishing impact will be allowed. Under the default OY control rule in the FMP (Harvest Policy Alternative 1, Alternative 3, and Alternative 4), the annual harvest of bocaccio would be set at zero because the stock is below 10% of its unfished level. Under that policy, all fishing mortality on the portion of the bocaccio stock would be eliminated. After a number of years, harvest levels would gradually increase as the stock recovers under Alternatives 1 and 3.

6.2 Likely Impacts on Other Management Measures and Other Fisheries

Measures to reduce the harvest of bocaccio, especially north of Point Conception, may also tend to reduce impacts on lingcod and canary rockfish, both of which are also overfished. However, the interactions between these fisheries are not clear.

6.3 Economic Impacts, Particularly on the Cost to the Fishing Industry

The economic impacts and costs to the industry have been addressed in sections 3.6 and 5.

6.4 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Act provides parameters and guidance for federal fisheries management, requiring that the Councils and NMFS adhere to a broad array of policy ideals. Overarching principles for fisheries management are found in the Act's National Standards. In crafting rebuilding plans for overfished stocks and fisheries management regimes to implement those plans, the Councils and NMFS must balance their recommendations to meet these different national standards.

The Council’s recommendations were driven by Section 304 (e) of the Act, which requires that Councils rebuild species that have been designated as overfished.

“Goals and Objectives of the Rebuilding Plan” Alternative 1 and “Target Biomass and Rebuilding Period” Alternative 1 do not meet this mandate.

Management to protect the southern bocaccio resource illustrates some of the conflicts that arise from trying to meet several different National Standards in one regulatory package. The following National Standards were of particular concern to the Council as it worked on the rebuilding plan and initial implementing management measures:

National Standard 1 requires 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.” Harvest Rate Alternative 5 would not prevent overfishing, but only prohibit retention, the primary reason for its rejection. Alternatives 1, 2, 3 and 4 would prevent overfishing, but Alternative 2 is the most balanced alternative for achieving the optimum yield from healthy stocks while still protecting bocaccio.

The Council’s primary goal in crafting specifications and management measures for bocaccio in 2001 was to protect this overfished species. In particular, the Council believed it necessary to reduce the harvest rate of bocaccio to the extent practicable. Protecting bocaccio from incidental capture is particularly challenging, as this species is caught incidentally in several southern California fisheries. The Council determined that prohibiting groundfish fishing in bocaccio habitat areas could be the most effective way to reduce bycatch and total fishing mortality on the stock (Bycatch Strategy Alternative 2) but the social and economic price was too high.

National Standard 2 requires the use of the best available scientific information. In every case, the Council adheres to this standard. However, too often the best available scientific information is inadequate for informed decision making. Therefore, the Council generally follows a risk-averse path. The Council heard considerable public testimony that bocaccio abundance has increased dramatically and that current population estimates are inaccurate. However, the Council chose to support the conclusions of the stock assessment and rebuilding analysis.

National Standard 8 provides protection to fishing communities: "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."

Alternatives 2 and 3 regarding rebuilding time periods would extend the period to provide a degree of relief to fishing communities. Alternative 4, along with harvest rate policy Alternatives 1 and 3 would require major reductions in commercial and recreational fishing opportunities for at least a few years. These alternatives were rejected due to their impacts on west coast fishing communities and associated industries.

Implementing rebuilding measures for West Coast groundfish has impacted the socioeconomic structure of fishing communities. In January 2000, the Secretary of Commerce declared West Coast groundfish fisheries to be a “federal fishery failure.” There are two components that need protection in a federal fishery failure, the depleted fish stocks and the fishing communities that have traditionally depended on those stocks. For fishing communities to survive and thrive, West Coast groundfish stocks must be healthy. Where fish stocks are not healthy, the Council must consider even more carefully the economic burdens created by its policies. The 2001 annual specifications and management measures, which are consistent with this proposed bocaccio rebuilding plan, are intended to provide as much access to healthy groundfish and non-groundfish stocks as possible while protecting overfished stocks. Management measures have been recommended to soften the burden of rebuilding on southern California fishing communities.

National Standard 9 requires that conservation and management measures minimize bycatch and minimize the mortality of bycatch. Bycatch Alternative 2 would be the most effective in minimizing bycatch by eliminating or greatly reducing all fishing in areas where bocaccio are present. However, specific areas for bocaccio have not been identified. The Council endorsed Alternative 1, which includes hook limits for recreational fishers, which should reduce the likelihood of bycatch in the recreational fishery, and lower commercial trip limits for species associated with bocaccio. For example, the OY and trip limits for chilipepper rockfish are constrained due to potential bocaccio bycatch. Thus, bycatch is expected to be substantially lower than under Alternative 3, which merely prevents fishing for bocaccio, or a *laissez faire* approach that would not constrain fishing.

Essential Fish Habitat (EFH)

The Magnuson-Stevens Act defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." EFH for WOC groundfish is further defined in Amendment 11 to the Pacific Coast FMP as "the entire EEZ and marine coastal waters inshore of the EEZ." NMFS guidelines (62 FR 66553, December 19, 1997) state that "adverse effects from fishing may include physical, chemical, or biological alterations of the substrate, and loss of, or injury to, benthic organisms, prey species and their habitat, and other components of the ecosystem..." The area closures established under the cowcod rebuilding plan should result in reduced impacts on the physical bocaccio habitat environment, particularly the rocky shelf strata. None of the alternatives address bocaccio EFH directly, but no adverse impacts on EFH are expected from any of the alternatives.

6.5 Paperwork Reduction Act

None of the alternatives require collection-of-information subject to the PRA.

6.6 Endangered Species Act

NMFS issued Biological Opinions under the ESA on August 10, 1990, November 26, 1991, August 28, 1992, September 27, 1993, May 14, 1996, and December 15, 1999 pertaining to the effects of the groundfish fishery on chinook salmon (Puget Sound, Snake River spring/summer, Snake River fall, upper Columbia River spring, lower Columbia River, upper Willamette River, Sacramento River winter, Central Valley, California coastal), coho salmon (Central California coastal, southern Oregon/northern California coastal, Oregon coastal), chum salmon (Hood Canal, Columbia River), sockeye salmon (Snake River, Ozette Lake), steelhead (upper, middle and lower Columbia River, Snake River Basin, upper Willamette River, central California coast, California Central Valley, south-central California, southern California), and cutthroat trout (Umpqua River, southwest Washington/Columbia River). The biological opinions have concluded that implementation of the FMP for the Pacific Coast groundfish fishery is not expected to jeopardize the continued existence of any endangered or threatened species under the jurisdiction of NMFS, or result in the destruction or adverse modification of critical habitat. NMFS has re-initiated consultation on the Pacific whiting fishery associated with the Biological Opinion issued on December 15, 1999. During the 2000 whiting season, the whiting fisheries exceeded the chinook bycatch amount specified in the Biological Opinion's incidental take statement's incidental take estimates, 11,000 fish, by approximately 500 fish. The re-initiation will focus primarily on additional actions that the whiting fisheries would take to reduce chinook interception, such as time/area management. NMFS expects that the re-initiated Biological Opinion will be complete in 2001. During the re-initiation, fishing under the FMP is within the scope of the December 15, 1999 Biological Opinion, so long as the annual incidental take of chinook stays under the 11,000 fish bycatch limit. The biological opinions have concluded that implementation of the FMP for the Pacific Coast groundfish fishery is not expected to jeopardize the continued existence of any endangered or threatened species under the jurisdiction of NMFS, or result in the destruction or adverse modification of critical habitat. This action is within the scope of these consultations.

6.7 Marine Mammal Protection Act

Under the MMPA, marine mammals whose abundance falls below the optimum sustainable population level (usually regarded as 60% of carrying capacity or maximum population size) can be listed as "depleted". Populations listed as threatened or endangered under the ESA are automatically depleted under the terms of the MMPA. Currently the Stellar sea lion population in the west coast is listed as threatened under the ESA and the fur seal population is listed as depleted under the MMPA. Incidental takes of these species in the Pacific coast fisheries are well under the annual PBR. None of the proposed management alternatives are likely to affect the incidental mortality levels of species protected under the MMPA.

The west coast groundfish fisheries are considered category III fisheries where the annual mortality and serious injury of a stock by the fishery is less than or equal to 1 percent of the PBR level. Under all the alternatives, it is likely that information regarding the incidental take of marine mammals in the groundfish fishery will continue to be limited.

6.8 Coastal Zone Management Act

Section 307(c)(1) of the Federal Coastal Zone Management Act (CZMA) of 1972 requires all federal activities which directly affect the coastal zone be consistent with approved state coastal zone management programs to the maximum extent practicable. Under the CZMA, each state develops its own coastal zone management program which is then submitted for federal approval. This has resulted in programs which vary widely from one state to the next. Because the proposed action is to prevent overfishing and achieve the OY for the available groundfish resource, the Council believes that it is consistent with each state's coastal management program.

6.9 Executive Orders 12866 and 13132

None of the recommended changes to annual specifications and management measures for 2001 would be a significant action according to E.O. 12866. This action will not have a cumulative effect on the economy of $100 million or more nor will it result in a major increase in costs to consumers, industries, government agencies, or geographical regions. No significant adverse impacts are anticipated on competition, employment, investments, productivity, innovation, or competitiveness of U.S.-based enterprises.

None of the alternative actions would have federalism implications subject to E.O. 13132.

Table 6. Summary of Potential Impacts from Alternative Actions

	Goals and Objectives Alternatives	Target Biomass and Rebuilding Period Alternatives	Harvest Rate Policy Alternatives	Bycatch Control Strategy Alternatives
	Substantial Impacts Expected?	Substantial Impacts Expected?	Substantial Impacts Expected?	Substantial Impacts Expected?
Coastal Zone	No	No	No	No
Public Health and Safety	No	No	No	No
Unique Geographical Characteristics	No	No	No	No
Historical/Cultural Impacts	No	No	No	No
Endangered/Threatened Species	No	No	No	No
Uncertainty or Unique/Unknown Risks	No	No	No	No
Existing Habitat Protection Laws	No	No	No	No

Essential Fish Habitat	**No**	**No**	**No**	**No**
Marine Mammals	**No**	**No**	**No**	**No**
Seabirds	**No**	**No**	**No**	**No**

7.0 CONCLUSIONS OR FINDINGS OF NO SIGNIFICANT IMPACT

This action would establish a rebuilding plan for bocaccio in accordance with the Pacific Coast Groundfish Fishery Management Plan. The bocaccio rebuilding plan will provide guidance in the development and implementation of management measures until the bocaccio stock has fully recovered or until this rebuilding plan is amended in accordance with the FMP. To implement the rebuilding plan, annual fishery specifications and the management measures designed to rebuild this overfished stock will be established. Harvest levels of bocaccio will be achieved through constraining the direct and incidental mortality associated with fishing, while achieving as much of the OYs as practicable for healthier groundfish stocks managed under the FMP. Under Magnuson-Stevens Act requirements for protecting overfished species, managing to keep directed and incidental catch of overfished species at levels that will allow those species to rebuild their populations has become the Council's first priority for setting annual specifications and management measures for all West Coast groundfish. For 2001, restrictive commercial gear and trip limits are designed to prevent commercial catch from exceeding the established limit. Management measures for the recreational fishery, which consist of time/area closures, a limit on the number of hooks per angler, and a reduced bag limit, are intended to result in the necessary recreational catch reductions.

Based on the biological, physical and socioeconomic impacts of the alternatives that have been assessed in this document, it has been determined that implementation of the proposed rebuilding plan would not significantly affect the quality of the human environment. Therefore, the preparation of an environmental impact statement for the proposed action is not required by Section 102 (2) (C) of the National Environmental Policy Act or its implementing regulations.

Assistant Administrator for Fisheries, NOAA   Date

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Table 3-1. Real ex-vessel revenue (thousands of 2000 dollars) from groundfish for 1994-1999 and projected revenue for 2000, by species group and management area.

								Percentage Change From		
Area / Species	1994	1995	1996	1997	1998	1999	2000	94-00	97-00	99-00
Coastwide										
Sablefish	15,319	25,510	27,579	29,195	11,732	17,405	11,597	-24%	-60%	-33%
Pacific whiting	20,507	19,311	17,373	27,944	18,744	18,976	19,027	-7%	-32%	0%
Lingcod	1,934	1,618	1,714	1,740	591	639	325	-83%	-81%	-49%
Dover sole	6,767	8,255	8,855	6,857	6,236	6,759	6,491	-4%	-5%	-4%
Other flatfish	6,835	7,678	7,238	7,595	6,182	6,662	7,278	6%	-4%	9%
Longspine Thornyhead	7,895	12,656	8,963	6,658	3,336	3,127	3,396	-57%	-49%	9%
Shortspine Thornyhead	5,670	5,107	4,087	2,970	2,277	1,944	1,653	-71%	-44%	-15%
Thornyheads (Mixed)	755	495	378	357	169	112	134	-82%	-63%	19%
Total thornyheads	14,320	18,258	13,429	9,985	5,782	5,183	5,183	-64%	-48%	-0%
Nearshore rockfish	1,879	2,059	1,928	1,875	1,862	1,830	1,586	-16%	-15%	-13%
Shelf rockfish	16,128	15,855	14,516	12,186	10,207	7,966	6,002	-63%	-51%	-25%
Slope rockfish	3,469	3,403	3,146	2,661	3,432	1,126	738	-79%	-72%	-34%
Unsp. rockfish	1,197	1,064	1,260	917	1,396	1,271	267	-78%	-71%	-79%
Total rockfish	36,993	40,639	34,278	27,625	22,679	17,376	13,777	-63%	-50%	-21%
Other groundfish	1,895	1,732	1,950	2,019	2,253	1,943	2,063	9%	2%	6%
Total groundfish	90,250	104,743	98,987	102,976	68,417	69,760	60,558	-33%	-41%	-13%
Total excluding whiting	69,743	85,432	81,613	75,032	49,673	50,784	41,531	-40%	-45%	-18%
Monterey and Conception INPFC areas										
Sablefish	1,993	4,960	6,294	5,916	1,978	2,572	1,767	-11%	-70%	-31%
Pacific whiting	4	4	6	2	2	0	1	-76%	-43%	184%
Lingcod	541	474	468	470	197	192	65	-88%	-86%	-66%
Dover sole	2,186	3,293	3,206	2,497	1,390	1,590	1,264	-42%	-49%	-21%
Other flatfish	1,991	2,269	2,330	2,338	1,545	1,585	1,162	-42%	-50%	-27%
Longspine Thornyhead	1,473	3,284	2,174	1,819	1,034	1,099	1,139	-23%	-37%	4%
Shortspine Thornyhead	1,417	1,782	1,604	1,065	736	803	625	-56%	-41%	-22%
Thornyheads (Mixed)	276	484	375	327	168	89	66	-76%	-80%	-25%
Total thornyheads	3,167	5,551	4,153	3,211	1,938	1,991	1,830	-42%	-43%	-8%
Nearshore rockfish	1,473	1,619	1,529	1,346	1,476	1,316	904	-39%	-33%	-31%
Shelf rockfish	5,282	5,408	4,629	4,812	3,510	1,873	823	-84%	-83%	-56%
Slope rockfish	1,291	1,427	1,418	1,286	1,952	225	173	-87%	-87%	-23%
Unsp. rockfish	250	127	424	194	311	588	194	-23%	-0%	-67%
Total rockfish	11,464	14,131	12,154	10,850	9,188	5,994	3,924	-66%	-64%	-35%
Other groundfish	489	923	1,299	1,158	1,480	1,299	1,416	189%	22%	9%
Total groundfish	18,667	26,054	25,756	23,230	15,780	13,232	9,598	-49%	-59%	-27%
Total excluding whiting	18,663	26,050	25,751	23,229	15,778	13,231	9,597	-49%	-59%	-27%
Vancouver-Columbia-Eureka INPFC areas										
Sablefish	13,327	20,550	21,285	23,279	9,754	14,833	9,830	-26%	-58%	-34%
Pacific whiting	20,503	19,307	17,368	27,942	18,742	18,976	19,026	-7%	-32%	0%
Lingcod	1,393	1,144	1,246	1,271	394	447	260	-81%	-80%	-42%
Dover sole	4,582	4,962	5,649	4,360	4,846	5,169	5,228	14%	20%	1%
Other flatfish	4,843	5,409	4,908	5,257	4,637	5,078	6,116	26%	16%	20%
Longspine Thornyhead	6,421	9,372	6,790	4,840	2,303	2,028	2,257	-65%	-53%	11%
Shortspine Thornyhead	4,253	3,325	2,484	1,905	1,540	1,140	1,028	-76%	-46%	-10%
Thornyheads (Mixed)	479	11	3	30	1	23	67	-86%	125%	187%
Total thornyheads	11,153	12,708	9,276	6,774	3,844	3,192	3,352	-70%	-51%	5%
Nearshore rockfish	406	440	398	529	386	514	536	32%	1%	4%
Shelf rockfish	10,846	10,447	9,886	7,374	6,697	6,092	5,053	-53%	-31%	-17%
Slope rockfish	2,177	1,976	1,727	1,375	1,480	901	548	-75%	-60%	-39%
Unsp. rockfish	947	937	836	723	1,084	682	73	-92%	-90%	-89%
Total rockfish	25,530	26,508	22,124	16,775	13,491	11,382	9,563	-63%	-43%	-16%
Other groundfish	1,406	809	651	861	774	644	948	-33%	10%	47%
Total groundfish	71,583	78,689	73,231	79,745	52,638	56,528	50,970	-29%	-36%	-10%
Total excluding whiting	51,080	59,382	55,863	51,803	33,895	37,552	31,944	-37%	-38%	-15%

Table 3-2. Groundfish landings (mts) for 1994-1999 and projected landings for 2000, by species group and management area.

Area/Species	1994	1995	1996	1997	1998	1999	2000	Percentage Change From 94-00	97-00	99-00
Coastwide										
Sablefish	7,579	7,905	8,317	7,942	4,372	6,645	4,300	-43%	-46%	-35%
Pacific whiting	248,815	174,771	191,355	230,468	231,358	223,926	200,935	-19%	-13%	-10%
Lingcod	1,904	1,467	1,557	1,568	349	357	130	-93%	-92%	-64%
Dover sole	9,359	10,565	12,187	10,117	8,004	9,137	8,500	-9%	-16%	-7%
Other flatfish	8,186	7,672	7,173	8,103	7,457	9,710	6,500	-21%	-20%	-33%
Longspine Thornyhead	4,385	5,411	4,596	3,935	2,249	1,791	1,700	-61%	-57%	-5%
Shortspine Thornyhead	3,282	1,946	1,798	1,453	1,213	808	650	-80%	-55%	-20%
Thornyheads (Mixed)	382	197	138	109	49	46	50	-87%	-54%	9%
Total thornyheads	8,049	7,554	6,533	5,498	3,511	2,645	2,400	-70%	-56%	-9%
Nearshore rockfish	734	690	616	693	608	438	260	-65%	-62%	-41%
Shelf rockfish	17,699	16,771	16,461	13,436	10,339	8,195	5,880	-67%	-56%	-28%
Slope rockfish	4,033	3,600	3,628	3,408	4,160	1,375	730	-82%	-79%	-47%
Unsp. rockfish	1,063	918	962	746	1,144	806	80	-93%	-89%	-90%
Total rockfish	31,578	29,533	28,200	23,780	19,762	13,458	9,350	-70%	-61%	-31%
Other groundfish	3,297	1,972	2,449	2,185	1,915	1,489	1,800	-45%	-18%	21%
Total groundfish	310,717	233,885	251,236	284,162	273,218	264,724	231,515	-25%	-19%	-13%
Total excluding whiting	61,902	59,114	59,882	53,695	41,860	40,797	30,580	-51%	-43%	-25%
Monterey and Conception INPFC Areas										
Sablefish	1,224	1,820	2,160	1,822	833	1,151	689	-44%	-62%	-40%
Pacific whiting	3	1	71	1	2	0	5	38%	431%	881%
Lingcod	462	376	355	372	98	84	19	-96%	-95%	-77%
Dover sole	3,094	4,351	4,564	3,844	1,844	2,184	1,789	-42%	-53%	-18%
Other flatfish	1,674	1,874	1,906	2,006	1,366	1,490	902	-46%	-55%	-39%
Longspine Thornyhead	813	1,350	1,081	1,041	616	564	498	-39%	-52%	-12%
Shortspine Thornyhead	823	665	701	487	350	266	198	-76%	-59%	-25%
Thornyheads (Mixed)	110	191	137	93	48	35	21	-81%	-78%	-40%
Total thornyheads	1,746	2,206	1,920	1,622	1,014	865	718	-59%	-56%	-17%
Nearshore rockfish	400	383	331	322	299	199	90	-77%	-72%	-55%
Shelf rockfish	4,157	4,499	3,826	4,233	2,804	1,505	580	-86%	-86%	-61%
Slope rockfish	1,197	1,273	1,435	1,499	2,378	283	130	-89%	-91%	-54%
Unsp. rockfish	155	63	187	98	151	224	40	-74%	-59%	-82%
Total rockfish	7,655	8,425	7,699	7,773	6,646	3,076	1,558	-80%	-80%	-49%
Other groundfish	372	492	1,195	718	651	453	390	5%	-46%	-14%
Total groundfish	14,484	17,339	17,950	16,536	11,439	8,439	5,352	-63%	-68%	-37%
Total excluding whiting	14,481	17,338	17,879	16,535	11,438	8,438	5,347	-63%	-68%	-37%
Vancouver-Columbia-Eureka INPFC Areas										
Sablefish	6,355	6,085	6,157	6,120	3,539	5,494	3,611	-43%	-41%	-34%
Pacific whiting	248,812	174,769	191,284	230,467	231,356	223,926	200,933	-19%	-13%	-10%
Lingcod	1,442	1,091	1,202	1,196	251	273	111	-92%	-91%	-59%
Dover sole	6,265	6,214	7,622	6,273	6,160	6,952	6,711	7%	7%	-3%
Other flatfish	6,512	5,798	5,267	6,097	6,092	8,220	5,598	-14%	-8%	-32%
Longspine Thornyhead	3,572	4,061	3,515	2,894	1,633	1,228	1,202	-66%	-58%	-2%
Shortspine Thornyhead	2,459	1,282	1,097	966	863	541	451	-82%	-53%	-17%
Thornyheads (Mixed)	272	6	1	15	1	11	29	-89%	87%	159%
Total thornyheads	6,303	5,348	4,613	3,876	2,497	1,780	1,682	-73%	-57%	-5%
Nearshore rockfish	335	306	285	371	309	239	170	-49%	-54%	-29%
Shelf rockfish	13,542	12,272	12,635	9,203	7,535	6,690	5,300	-61%	-42%	-21%
Slope rockfish	2,836	2,326	2,193	1,909	1,782	1,092	600	-79%	-69%	-45%
Unsp. rockfish	908	855	775	649	993	582	40	-96%	-94%	-93%
Total rockfish	23,923	21,108	20,501	16,007	13,116	10,383	7,792	-67%	-51%	-25%
Other groundfish	2,924	1,480	1,253	1,467	1,264	1,037	1,410	-52%	-4%	36%
Total groundfish	296,233	216,546	233,286	267,626	261,778	256,285	226,166	-24%	-15%	-12%
Total excluding whiting	47,421	41,776	42,002	37,160	30,422	32,359	25,233	-47%	-32%	-22%

Table 3-3. Real ex-vessel revenue (thousands of 2000 dollars) from groundfish for 1994-1999 and projected revenue for 2000, by species group and management area.

Area / Species	1994	1995	1996	1997	1998	1999	2000	Percentage Change From 94-00	97-00	99-00
Coastwide										
Sablefish	15,319	25,510	27,579	29,195	11,732	17,405	11,597	-24%	-60%	-33%
Pacific whiting	20,507	19,311	17,373	27,944	18,744	18,976	19,027	-7%	-32%	0%
Lingcod	1,934	1,618	1,714	1,740	591	639	325	-83%	-81%	-49%
Dover sole	6,767	8,255	8,855	6,857	6,236	6,759	6,491	-4%	-5%	-4%
Other flatfish	6,835	7,678	7,238	7,595	6,182	6,662	7,278	6%	-4%	9%
Longspine Thornyhead	7,895	12,656	8,963	6,658	3,336	3,127	3,396	-57%	-49%	9%
Shortspine Thornyhead	5,670	5,107	4,087	2,970	2,277	1,944	1,653	-71%	-44%	-15%
Thornyheads (Mixed)	755	495	378	357	169	112	134	-82%	-63%	19%
Total thornyheads	14,320	18,258	13,429	9,985	5,782	5,183	5,183	-64%	-48%	-0%
Nearshore rockfish	1,879	2,059	1,928	1,875	1,862	1,830	1,586	-16%	-15%	-13%
Shelf rockfish	16,128	15,855	14,516	12,186	10,207	7,966	6,002	-63%	-51%	-25%
Slope rockfish	3,469	3,403	3,146	2,661	3,432	1,126	738	-79%	-72%	-34%
Unsp. rockfish	1,197	1,064	1,260	917	1,396	1,271	267	-78%	-71%	-79%
Total rockfish	36,993	40,639	34,278	27,625	22,679	17,376	13,777	-63%	-50%	-21%
Other groundfish	1,895	1,732	1,950	2,019	2,253	1,943	2,063	9%	2%	6%
Total groundfish	90,250	104,743	98,987	102,976	68,417	69,760	60,558	-33%	-41%	-13%
Total excluding whiting	69,743	85,432	81,613	75,032	49,673	50,784	41,531	-40%	-45%	-18%
Monterey and Conception INPFC areas										
Sablefish	1,993	4,960	6,294	5,916	1,978	2,572	1,767	-11%	-70%	-31%
Pacific whiting	4	4	6	2	2	0	1	-76%	-43%	184%
Lingcod	541	474	468	470	197	192	65	-88%	-86%	-66%
Dover sole	2,186	3,293	3,206	2,497	1,390	1,590	1,264	-42%	-49%	-21%
Other flatfish	1,991	2,269	2,330	2,338	1,545	1,585	1,162	-42%	-50%	-27%
Longspine Thornyhead	1,473	3,284	2,174	1,819	1,034	1,099	1,139	-23%	-37%	4%
Shortspine Thornyhead	1,417	1,782	1,604	1,065	736	803	625	-56%	-41%	-22%
Thornyheads (Mixed)	276	484	375	327	168	89	66	-76%	-80%	-25%
Total thornyheads	3,167	5,551	4,153	3,211	1,938	1,991	1,830	-42%	-43%	-8%
Nearshore rockfish	1,473	1,619	1,529	1,346	1,476	1,316	904	-39%	-33%	-31%
Shelf rockfish	5,282	5,408	4,629	4,812	3,510	1,873	823	-84%	-83%	-56%
Slope rockfish	1,291	1,427	1,418	1,286	1,952	225	173	-87%	-87%	-23%
Unsp. rockfish	250	127	424	194	311	588	194	-23%	-0%	-67%
Total rockfish	11,464	14,131	12,154	10,850	9,188	5,994	3,924	-66%	-64%	-35%
Other groundfish	489	923	1,299	1,158	1,480	1,299	1,416	189%	22%	9%
Total groundfish	18,667	26,054	25,756	23,230	15,780	13,232	9,598	-49%	-59%	-27%
Total excluding whiting	18,663	26,050	25,751	23,229	15,778	13,231	9,597	-49%	-59%	-27%
Vancouver-Columbia-Eureka INPFC areas										
Sablefish	13,327	20,550	21,285	23,279	9,754	14,833	9,830	-26%	-58%	-34%
Pacific whiting	20,503	19,307	17,368	27,942	18,742	18,976	19,026	-7%	-32%	0%
Lingcod	1,393	1,144	1,246	1,271	394	447	260	-81%	-80%	-42%
Dover sole	4,582	4,962	5,649	4,360	4,846	5,169	5,228	14%	20%	1%
Other flatfish	4,843	5,409	4,908	5,257	4,637	5,078	6,116	26%	16%	20%
Longspine Thornyhead	6,421	9,372	6,790	4,840	2,303	2,028	2,257	-65%	-53%	11%
Shortspine Thornyhead	4,253	3,325	2,484	1,905	1,540	1,140	1,028	-76%	-46%	-10%
Thornyheads (Mixed)	479	11	3	30	1	23	67	-86%	125%	187%
Total thornyheads	11,153	12,708	9,276	6,774	3,844	3,192	3,352	-70%	-51%	5%
Nearshore rockfish	406	440	398	529	386	514	536	32%	1%	4%
Shelf rockfish	10,846	10,447	9,886	7,374	6,697	6,092	5,053	-53%	-31%	-17%
Slope rockfish	2,177	1,976	1,727	1,375	1,480	901	548	-75%	-60%	-39%
Unsp. rockfish	947	937	836	723	1,084	682	73	-92%	-90%	-89%
Total rockfish	25,530	26,508	22,124	16,775	13,491	11,382	9,563	-63%	-43%	-16%
Other groundfish	1,406	809	651	861	774	644	948	-33%	10%	47%
Total groundfish	71,583	78,689	73,231	79,745	52,638	56,528	50,970	-29%	-36%	-10%
Total excluding whiting	51,080	59,382	55,863	51,803	33,895	37,552	31,944	-37%	-38%	-15%

Table 3-4. Real ex-vessel revenues (millions of 1999 dollars) for vessels with some groundfish, and percentage of total revenue derived from groundfish and rockfish, by year and fleet, 1994-99.

	Vessels with < 50% of revenue from groundfish						Vessels with > 50% of revenue from groundfish						All vessels					
		Revenue ($ mil.) from			% of rev. from			Revenue ($ mil.) from			% of rev. from			Revenue ($ mil.) from			% of rev. from	
	# of ves	All species	Grnd-fish	Rock-fish	Grnd-fish	Rock-fish	# of ves	All species	Grnd-fish	Rock-fish	Grnd-fish	Rock-fish	# of ves	All species	Grnd-fish	Rock-fish	Grnd-fish	Rock-fish
1994																		
Limited entry																		
0-$5,000	81	6.8	0.10	0.04	6%	1%	14	0.0	0.03	0.02	93%	61%	95	6.8	0.13	0.06	19%	10%
$5,000-100,000	104	15.7	3.62	0.93	27%	7%	126	6.8	5.61	1.92	87%	32%	230	22.5	9.22	2.86	60%	20%
> $100,000	17	7.0	2.68	0.74	39%	10%	178	58.8	52.52	26.26	91%	44%	195	65.8	55.20	27.00	86%	41%
Total	202	29.5	6.39	1.71	19%	5%	318	65.7	58.16	28.21	90%	40%	520	95.1	64.55	29.92	62%	26%
Open access																		
0-$5,000	967	33.3	0.57	0.36	7%	5%	556	0.7	0.64	0.51	93%	75%	1,523	34.0	1.21	0.87	39%	30%
$5,000-100,000	101	11.7	1.20	0.96	21%	18%	209	4.7	4.30	3.44	93%	74%	310	16.4	5.50	4.40	70%	56%
> $100,000	1	0.4	0.22	0.00	49%	0%	7	1.9	1.45	1.02	83%	66%	8	2.3	1.66	1.02	79%	58%
Total	1,069	45.4	1.99	1.32	9%	6%	772	7.3	6.39	4.97	93%	74%	1,841	52.7	8.37	6.29	44%	35%
1995																		
Limited entry																		
0-$5,000	28	2.2	0.03	0.01	5%	1%	10	0.0	0.03	0.02	93%	57%	38	2.2	0.06	0.03	28%	16%
$5,000-100,000	82	12.1	2.87	0.50	27%	5%	128	7.4	6.09	1.40	87%	20%	210	19.5	8.95	1.89	64%	14%
> $100,000	19	8.5	3.47	0.88	40%	10%	210	74.5	67.16	31.25	91%	40%	229	83.1	70.63	32.13	87%	37%
Total	129	22.8	6.37	1.38	24%	5%	348	81.9	73.27	32.67	89%	33%	477	104.7	79.64	34.05	72%	25%
Open access																		
0-$5,000	967	36.7	0.63	0.37	5%	4%	471	0.6	0.51	0.38	95%	72%	1,438	37.3	1.14	0.75	35%	26%
$5,000-100,000	121	15.3	1.56	0.90	19%	10%	237	6.2	5.58	3.67	92%	62%	358	21.4	7.15	4.58	67%	44%
> $100,000							4	1.5	1.41	0.69	93%	51%	4	1.5	1.41	0.69	93%	51%
Total	1,088	52.0	2.19	1.28	7%	4%	712	8.3	7.50	4.74	94%	68%	1,800	60.3	9.69	6.01	41%	30%
1996																		
Limited entry																		
0-$5,000	23	2.2	0.03	0.01	5%	1%	6	0.0	0.01	0.00	90%	45%	29	2.2	0.05	0.01	23%	10%
$5,000-100,000	104	17.4	3.88	0.83	26%	6%	146	9.0	7.40	1.58	88%	18%	250	26.4	11.28	2.41	62%	13%
> $100,000	19	10.3	3.57	0.70	36%	8%	204	67.5	59.33	25.78	89%	36%	223	77.8	62.91	26.48	85%	34%
Total	146	29.9	7.48	1.54	24%	6%	356	76.5	66.75	27.36	89%	29%	502	106.4	74.23	28.90	70%	22%
Open access																		
0-$5,000	974	39.0	0.62	0.35	6%	4%	440	0.6	0.57	0.37	95%	65%	1,414	39.6	1.19	0.71	34%	23%
$5,000-100,000	132	17.1	1.58	0.83	18%	9%	250	5.8	5.27	3.11	93%	51%	382	22.9	6.85	3.95	67%	36%
> $100,000	1	0.2	0.10	0.10	46%	45%	1	0.2	0.21	0.03	100%	14%	2	0.4	0.31	0.13	73%	30%

Table 3-4. Real ex-vessel revenues (millions of 1999 dollars) for vessels with some groundfish, and percentage of total revenue derived from groundfish and rockfish, by year and fleet, 1994-99.

	Vessels with < 50% of revenue from groundfish						Vessels with > 50% of revenue from groundfish						All vessels					
		Revenue ($ mil.) from			% of rev. from			Revenue ($ mil.) from			% of rev. from			Revenue ($ mil.) from			% of rev. from	
	# of ves	All species	Grnd-fish	Rock-fish	Grnd-fish	Rock-fish	# of ves	All species	Grnd-fish	Rock-fish	Grnd-fish	Rock-fish	# of ves	All species	Grnd-fish	Rock-fish	Grnd-fish	Rock-fish
Total	1,107	56.2	2.30	1.28	8%	5%	691	6.6	6.05	3.51	94%	60%	1,798	62.9	8.35	4.79	41%	26%
1997																		
Limited entry																		
0-$5,000	18	0.8	0.03	0.01	9%	5%	12	0.0	0.02	0.01	88%	28%	30	0.8	0.05	0.02	41%	14%
$5,000-100,000	64	10.3	2.75	0.32	30%	5%	136	10.0	8.23	1.10	88%	14%	200	20.2	10.98	1.42	69%	11%
> $100,000	27	9.7	3.72	1.22	41%	11%	224	63.8	55.52	19.75	88%	29%	251	73.5	59.24	20.97	83%	27%
Total	109	20.7	6.50	1.55	29%	6%	372	73.8	63.77	20.86	88%	24%	481	94.5	70.27	22.41	75%	20%
Open access																		
0-$5,000	1,015	44.3	0.73	0.39	6%	4%	442	0.6	0.58	0.35	94%	60%	1,457	45.0	1.32	0.74	33%	21%
$5,000-100,000	125	9.4	1.43	0.72	24%	12%	245	5.3	4.69	2.84	91%	50%	370	14.6	6.12	3.56	68%	37%
> $100,000							4	1.0	0.74	0.24	84%	28%	4	1.0	0.74	0.24	84%	28%
Total	1,140	53.7	2.16	1.11	8%	5%	691	6.9	6.02	3.42	93%	56%	1,831	60.6	8.18	4.54	40%	24%
1998																		
Limited entry																		
0-$5,000	30	1.7	0.06	0.02	8%	4%	8	0.0	0.02	0.00	86%	11%	38	1.8	0.07	0.03	24%	5%
$5,000-100,000	89	12.2	3.22	0.73	29%	7%	143	7.4	6.22	2.12	89%	28%	232	19.5	9.44	2.84	66%	20%
> $100,000	10	3.3	1.24	0.56	40%	17%	162	39.7	35.36	14.71	90%	37%	172	43.0	36.60	15.27	87%	36%
Total	129	17.2	4.52	1.31	25%	7%	313	47.1	41.60	16.83	90%	32%	442	64.3	46.11	18.14	71%	25%
Open access																		
0-$5,000	868	29.6	0.58	0.33	6%	4%	378	0.6	0.51	0.32	93%	62%	1,246	30.2	1.09	0.65	32%	22%
$5,000-100,000	81	6.5	0.82	0.55	20%	13%	190	4.5	4.03	2.74	91%	57%	271	11.1	4.85	3.29	70%	44%
> $100,000							1	0.1	0.12	0.07	100%	55%	1	0.1	0.12	0.07	100%	55%
Total	949	36.1	1.40	0.88	7%	5%	569	5.2	4.67	3.13	93%	61%	1,518	41.4	6.06	4.01	39%	26%
1999																		
Limited entry																		
0-$5,000	30	2.0	0.05	0.02	7%	4%	6	0.0	0.02	0.01	89%	36%	36	2.1	0.06	0.03	21%	9%
$5,000-100,000	94	16.4	4.12	0.75	28%	5%	128	7.7	6.67	1.77	91%	24%	222	24.1	10.78	2.52	64%	16%
> $100,000	22	9.3	3.33	0.73	37%	8%	158	40.6	34.81	10.71	88%	27%	180	49.9	38.13	11.44	81%	25%
Total	146	27.8	7.49	1.50	25%	5%	292	48.3	41.49	12.49	89%	26%	438	76.1	48.98	13.98	68%	19%
Open access																		
0-$5,000	807	33.9	0.57	0.29	5%	3%	389	0.5	0.49	0.33	94%	62%	1,196	34.4	1.05	0.61	34%	22%
$5,000-100,000	90	11.3	1.00	0.41	20%	9%	196	3.7	3.30	1.90	91%	53%	286	15.0	4.30	2.32	68%	39%

Table 3-4. Real ex-vessel revenues (millions of 1999 dollars) for vessels with some groundfish, and percentage of total revenue derived from groundfish and rockfish, by year and fleet, 1994-99.

	Vessels with < 50% of revenue from groundfish						Vessels with > 50% of revenue from groundfish						All vessels					
		Revenue ($ mil.) from			% of rev. from			Revenue ($ mil.) from			% of rev. from			Revenue ($ mil.) from			% of rev. from	
	# of ves	All species	Grnd-fish	Rock-fish	Grnd-fish	Rock-fish	# of ves	All species	Grnd-fish	Rock-fish	Grnd-fish	Rock-fish	# of ves	All species	Grnd-fish	Rock-fish	Grnd-fish	Rock-fish
> $100,000							3	0.4	0.38	0.07	90%	19%	3	0.4	0.38	0.07	90%	19%
Total	897	45.2	1.57	0.70	7%	4%	588	4.7	4.16	2.30	93%	58%	1,485	49.9	5.73	3.00	41%	26%

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Table 3-5. Real ex-vessel revenue (thousands of 1999 dollars) for open-access vessels that earned more than $5,000 in coastwide fishery revenue, and average vessel percentages of total income from selected groundfish categories, by port-groups, 1994-2000.

		Ex-vessel revenue ($1,000s) from:								Average % of revenue from:		
	# of ves	All species total	All species avg.	Groundfish total	Groundfish avg.	Sablefish total	Sablefish avg.	Rockfish total	Rockfish avg.	Ground-fish	Sable-fish	Rock-fish
WA: Puget Sound												
1994	21	310	14.8	224	10.7	87	4.1	50	2.4	79%	28%	28%
1995	15	213	14.2	137	9.1	70	4.7	52	3.5	70%	28%	27%
1996	21	194	9.2	184	8.8	114	5.4	41	2.0	95%	51%	21%
1997	28	391	14.0	359	12.8	279	10.0	19	0.7	71%	40%	11%
1998	7	75	10.7	46	6.6	40	5.8	6	0.8	70%	54%	16%
1999	21	226	10.8	38	1.8	25	1.2	11	0.5	22%	15%	6%
WA: Coastal ports												
1994	75	6,233	83.1	413	5.5	51	0.7	269	3.6	22%	3%	14%

Table 3-5. Real ex-vessel revenue (thousands of 1999 dollars) for open-access vessels that earned more than $5,000 in coastwide fishery revenue, and average vessel percentages of total income from selected groundfish categories, by port-groups, 1994-2000.

	# of ves	All species total	All species avg.	Groundfish total	Groundfish avg.	Sablefish total	Sablefish avg.	Rockfish total	Rockfish avg.	Average % of revenue from: Ground-fish	Sable-fish	Rock-fish
1995	72	7,778	108.0	456	6.3	150	2.1	210	2.9	20%	10%	8%
1996	58	6,419	110.7	715	12.3	243	4.2	226	3.9	34%	21%	7%
1997	66	3,899	59.1	325	4.9	191	2.9	110	1.7	30%	21%	7%
1998	43	2,889	67.2	203	4.7	70	1.6	122	2.8	21%	8%	12%
1999	46	4,075	88.6	126	2.7	91	2.0	22	0.5	13%	12%	1%
OR: North of Nehalem												
1994	51	3,216	63.1	444	8.7	53	1.0	303	5.9	15%	1%	9%
1995	59	4,816	81.6	888	15.0	404	6.9	174	2.9	9%	3%	3%
1996	62	4,037	65.1	237	3.8	66	1.1	134	2.2	8%	2%	5%
1997	50	3,635	72.7	109	2.2	39	0.8	50	1.0	8%	3%	4%
1998	48	2,286	47.6	109	2.3	25	0.5	65	1.4	9%	3%	5%
1999	43	3,782	87.9	168	3.9	48	1.1	41	0.9	11%	5%	3%
OR: Nehalem-Yachats												
1994	100	4,754	47.5	175	1.7	8	0.1	131	1.3	10%	1%	6%
1995	140	6,012	42.9	181	1.3	20	0.1	122	0.9	8%	0%	5%
1996	147	6,888	46.9	259	1.8	41	0.3	172	1.2	6%	1%	4%
1997	164	6,494	39.6	275	1.7	46	0.3	155	0.9	7%	1%	4%
1998	136	4,548	33.4	199	1.5	13	0.1	160	1.2	7%	0%	6%
1999	103	5,559	54.0	261	2.5	130	1.3	90	0.9	8%	1%	6%
OR: South of Yachats												
1994	132	7,386	56.0	1,647	12.5	377	2.9	906	6.9	24%	2%	14%
1995	138	6,222	45.1	1,330	9.6	233	1.7	819	5.9	17%	4%	10%
1996	157	6,518	41.5	566	3.6	103	0.7	380	2.4	17%	3%	11%
1997	154	5,727	37.2	1,200	7.8	257	1.7	699	4.5	25%	6%	15%
1998	131	3,372	25.7	562	4.3	35	0.3	443	3.4	23%	2%	16%
1999	164	4,870	29.7	616	3.8	63	0.4	415	2.5	18%	1%	12%
CA: North of Bodega Bay												
1994	152	7,773	51.1	621	4.1	143	0.9	422	2.8	20%	2%	15%
1995	140	6,474	46.2	1,221	8.7	766	5.5	365	2.6	34%	16%	14%
1996	187	9,383	50.2	1,165	6.2	668	3.6	376	2.0	30%	15%	10%
1997	212	9,529	44.9	1,462	6.9	637	3.0	598	2.8	38%	16%	15%
1998	140	4,537	32.4	754	5.4	115	0.8	428	3.1	35%	7%	17%
1999	138	5,992	43.4	981	7.1	204	1.5	358	2.6	40%	8%	15%
CA: Bodega Bay-Santa Cruz												
1994	321	6,958	21.7	1,846	5.8	29	0.1	1,570	4.9	28%	1%	24%
1995	335	8,745	26.1	2,238	6.7	415	1.2	1,557	4.6	30%	5%	21%
1996	290	7,812	26.9	1,960	6.8	669	2.3	1,04	3.6	33%	11%	18%

Table 3-5. Real ex-vessel revenue (thousands of 1999 dollars) for open-access vessels that earned more than $5,000 in coastwide fishery revenue, and average vessel percentages of total income from selected groundfish categories, by port-groups, 1994-2000.

	# of ves	All species total	All species avg.	Groundfish total	Groundfish avg.	Sablefish total	Sablefish avg.	Rockfish total	Rockfish avg.	Ground-fish	Sable-fish	Rock-fish
		Ex-vessel revenue ($1,000s) from:								Average % of revenue from:		
								5				
1997	288	9,343	32.4	1,933	6.7	322	1.1	1,199	4.2	30%	6%	18%
1998	242	6,385	26.4	1,769	7.3	97	0.4	1,340	5.5	36%	3%	25%
1999	244	5,304	21.7	989	4.1	180	0.7	640	2.6	29%	4%	19%
CA: Santa Cruz-Oxnard												
1994	229	8,707	38.0	2,156	9.4	11	0.0	1,799	7.9	45%	1%	37%
1995	286	12,088	42.3	2,948	10.3	56	0.2	2,124	7.4	41%	1%	29%
1996	261	10,845	41.6	2,584	9.9	22	0.1	1,732	6.6	46%	1%	29%
1997	242	10,772	44.5	1,786	7.4	2	0.0	1,117	4.6	40%	0%	24%
1998	209	9,336	44.7	1,740	8.3	4	0.0	977	4.7	36%	1%	20%
1999	194	10,395	53.6	1,765	9.1	12	0.1	899	4.6	38%	1%	22%
CA: South of Oxnard												
1994	183	4,842	26.5	1,012	5.5	75	0.4	853	4.7	35%	2%	29%
1995	156	5,409	34.7	884	5.7	96	0.6	698	4.5	26%	3%	21%
1996	138	5,754	41.7	669	4.9	53	0.4	524	3.8	22%	2%	18%
1997	149	6,505	43.7	444	3.0	6	0.0	339	2.3	20%	1%	15%
1998	108	4,425	41.0	456	4.2	0	0.0	380	3.5	20%	0%	16%
1999	107	4,719	44.1	395	3.7	64	0.6	244	2.3	17%	3%	11%

Note: vessels may be included in more than one port group. Revenue shares are calculated for each vessel for landings made only within a port group.

Table 3-6. Real ex-vessel revenue (thousands of 1999 dollars) earned by vessels with limited-entry fixed-gear permits within specified
groups of ports, and average vessel percentages of total income from selected groundfish categories, 1994-2000.

	# of	Ex-vessel revenue ($1,000s) from								Average % of revenue from:		
		All species		Groundfish		Sablefish		Rockfish		Ground-	Sable-	Rock-
	ves	total	avg.	total	avg.	total	avg.	total	avg.	fish	fish	fish
WA: Puget Sound												
1994	40	1,293	32.3	1,138	28.4	934	23.4	144	3.6	74%	60%	10%
1995	52	1,969	37.9	1,963	37.7	1,732	33.3	227	4.4	99%	82%	17%
1996	53	1,952	36.8	1,930	36.4	1,724	32.5	199	3.7	99%	85%	13%
1997	50	2,185	43.7	2,166	43.3	2,127	42.5	38	0.8	97%	89%	8%
1998	42	1,018	24.2	1,013	24.1	966	23.0	44	1.0	95%	91%	4%
1999	44	1,688	38.4	1,672	38.0	1,554	35.3	92	2.1	95%	85%	9%
WA: Coastal ports												
1994	31	1,560	50.3	874	28.2	566	18.3	306	9.9	73%	52%	21%
1995	33	2,192	66.4	1,441	43.7	1,220	37.0	220	6.7	82%	72%	10%
1996	43	2,340	54.4	1,311	30.5	1,147	26.7	163	3.8	78%	69%	9%
1997	37	2,731	73.8	2,093	56.6	1,863	50.4	225	6.1	80%	73%	7%
1998	30	1,101	36.7	752	25.1	514	17.1	236	7.9	75%	54%	21%
1999	29	1,722	59.4	829	28.6	633	21.8	194	6.7	71%	55%	14%
OR: North of Nehalem												
1994	12	1,805	150.4	1,447	120.6	1,409	117.5	36	3.0	86%	73%	14%
1995	13	2,269	174.5	1,029	79.1	799	61.5	229	17.6	69%	53%	17%
1996	17	4,648	273.4	1,083	63.7	952	56.0	129	7.6	43%	36%	7%
1997	21	2,817	134.2	1,092	52.0	1,027	48.9	64	3.1	51%	48%	3%
1998	19	1,549	81.5	674	35.5	560	29.5	113	5.9	61%	51%	10%
1999	20	4,171	208.6	1,248	62.4	1,181	59.1	65	3.3	49%	43%	5%
OR: Nehalem-Yachats												
1994	21	2,223	105.9	926	44.1	865	41.2	54	2.6	44%	36%	7%
1995	23	3,480	151.3	1,383	60.1	1,335	58.0	41	1.8	43%	37%	6%
1996	24	3,907	162.8	1,880	78.3	1,801	75.0	70	2.9	52%	48%	4%
1997	23	3,186	138.5	1,818	79.1	1,715	74.6	98	4.3	62%	59%	3%
1998	22	2,057	93.5	866	39.4	804	36.5	61	2.8	55%	52%	3%
1999	22	3,439	156.3	1,408	64.0	1,336	60.7	67	3.1	46%	44%	2%
OR: South of Yachats												
1994	37	3,603	97.4	2,206	59.6	2,068	55.9	125	3.4	69%	49%	20%
1995	33	3,327	100.8	1,977	59.9	1,842	55.8	124	3.8	66%	54%	12%
1996	37	4,089	110.5	2,051	55.4	1,881	50.8	157	4.2	61%	55%	6%
1997	34	3,760	110.6	2,496	73.4	2,260	66.5	190	5.6	73%	63%	7%
1998	30	2,298	76.6	886	29.5	534	17.8	298	9.9	44%	25%	14%
1999	37	4,621	124.9	1,744	47.1	1,367	36.9	316	8.5	45%	32%	11%
CA: North of Bodega Bay												
1994	19	2,086	109.8	969	51.0	772	40.6	175	9.2	46%	30%	13%
1995	33	2,636	79.9	1,367	41.4	1,027	31.1	296	9.0	63%	49%	13%
1996	35	2,978	85.1	1,303	37.2	887	25.3	363	10.4	54%	37%	16%
1997	36	4,133	114.8	2,128	59.1	1,767	49.1	317	8.8	59%	51%	7%
1998	29	1,566	54.0	523	18.0	360	12.4	141	4.9	46%	30%	13%
1999	25	2,022	80.9	644	25.8	532	21.3	79	3.2	42%	31%	8%
CA: Bodega Bay-Santa Cruz												
1994	30	1,287	42.9	696	23.2	326	10.9	347	11.6	52%	22%	27%
1995	37	2,657	71.8	1,427	38.6	1,079	29.2	311	8.4	57%	40%	15%
1996	46	3,622	78.7	2,809	61.1	2,063	44.9	531	11.6	73%	57%	14%
1997	44	3,252	73.9	2,469	56.1	1,879	42.7	471	10.7	73%	52%	18%
1998	37	1,444	39.0	956	25.8	418	11.3	401	10.8	77%	38%	31%
1999	31	1,748	56.4	1,274	41.1	604	19.5	565	18.2	73%	40%	29%
CA: Santa Cruz-Oxnard												
1994	13	486	37.4	182	14.0	2	0.1	136	10.5	78%	1%	75%
1995	20	583	29.1	119	5.9	26	1.3	80	4.0	55%	4%	48%
1996	14	787	56.2	390	27.9	55	4.0	323	23.1	63%	7%	54%
1997	19	1,073	56.5	646	34.0	186	9.8	443	23.3	80%	20%	56%
1998	14	709	50.6	326	23.3	55	3.9	264	18.8	63%	12%	51%
1999	18	466	25.9	121	6.7	27	1.5	90	5.0	64%	15%	47%
CA: South of Oxnard												
1994	12	507	42.3	384	32.0	184	15.3	193	16.1	74%	29%	42%
1995	11	445	40.5	358	32.5	143	13.0	210	19.1	91%	27%	62%
1996	17	619	36.4	520	30.6	220	12.9	298	17.5	81%	31%	49%
1997	17	517	30.4	465	27.4	217	12.8	245	14.4	85%	36%	49%
1998	19	868	45.7	682	35.9	267	14.0	412	21.7	63%	21%	41%

1999	14	625	44.7	548	39.1	264	18.8	277	19.8	73%	29%	43%

Note: vessels may be included in more than one port group. Revenue shares are calculated for each vessel for landings made only within a port group.

Table 3-7. Real ex-vessel revenue (thousands of 1999 dollars) earned by vessels with limited-entry trawl permits within specified groups of ports, and average vessel percentages of total income from selected groundfish categories, 1994-2000.

		Ex-vessel revenue ($1,000s) From								Average % of revenue from:		
	# of	All species		Groundfish		DTS species*		Rockfish*		Ground-	Sable-	Rock-
	ves	total	avg.	total	avg.	total	avg.	total	avg.	fish	species*	fish*
WA: Puget Sound												
1994	28	3,228	115.3	3,185	113.7	641	22.9	1,275	45.5	95%	12%	37%
1995	23	2,728	118.6	2,612	113.6	865	37.6	979	42.6	95%	29%	30%
1996	22	2,860	130.0	2,763	125.6	947	43.1	1,041	47.3	95%	21%	39%
1997	20	3,093	154.7	3,026	151.3	950	47.5	795	39.7	95%	22%	28%
1998	17	2,715	159.7	2,624	154.3	639	37.6	698	41.0	92%	20%	25%
1999	17	3,112	183.1	2,955	173.8	808	47.5	715	42.1	97%	28%	24%
WA: Coastal ports												
1994	48	4,567	95.1	3,848	80.2	1,525	31.8	1,223	25.5	74%	23%	27%
1995	35	6,214	177.5	5,841	166.9	2,355	67.3	1,891	54.0	84%	32%	29%
1996	34	5,103	150.1	4,449	130.9	1,889	55.6	1,199	35.3	84%	35%	24%
1997	25	3,795	151.8	3,481	139.2	1,285	51.4	776	31.0	88%	38%	17%
1998	21	2,566	122.2	2,278	108.5	573	27.3	671	32.0	81%	23%	23%
1999	20	2,716	135.8	2,175	108.8	594	29.7	472	23.6	83%	29%	19%
OR: North of Nehalem												
1994	56	12,480	222.9	11,531	205.9	5,188	92.6	3,449	61.6	89%	34%	26%
1995	56	15,016	268.1	13,363	238.6	5,828	104.1	3,280	58.6	83%	33%	20%
1996	52	14,970	287.9	12,404	238.5	5,794	111.4	3,161	60.8	84%	38%	20%
1997	59	12,859	218.0	11,571	196.1	4,579	77.6	2,243	38.0	88%	35%	14%
1998	54	9,034	167.3	8,372	155.0	2,870	53.1	2,637	48.8	83%	26%	25%
1999	59	11,935	202.3	10,094	171.1	3,539	60.0	2,201	37.3	78%	28%	17%
OR: Nehalem-Yachats												
1994	50	10,838	216.8	9,637	192.7	2,559	51.2	3,254	65.1	85%	23%	31%
1995	48	11,471	239.0	10,140	211.3	2,409	50.2	2,393	49.8	82%	29%	25%
1996	48	9,835	204.9	8,500	177.1	2,931	61.1	2,690	56.0	83%	30%	24%
1997	40	9,140	228.5	8,547	213.7	2,518	62.9	1,778	44.4	92%	32%	22%
1998	46	6,154	133.8	5,466	118.8	1,441	31.3	1,391	30.2	78%	26%	25%
1999	48	7,868	163.9	6,427	133.9	1,887	39.3	1,568	32.7	71%	24%	23%
OR: South of Yachats												
1994	61	10,786	176.8	7,232	118.6	4,619	75.7	1,249	20.5	58%	33%	8%
1995	56	13,107	234.1	10,066	179.8	7,072	126.3	1,503	26.8	66%	44%	11%
1996	57	12,815	224.8	8,674	152.2	6,058	106.3	1,276	22.4	57%	41%	6%
1997	52	11,345	218.2	7,834	150.6	4,888	94.0	1,433	27.5	61%	39%	9%
1998	51	7,865	154.2	6,079	119.2	3,564	69.9	1,274	25.0	64%	40%	12%
1999	56	10,298	183.9	5,978	106.8	3,618	64.6	943	16.8	56%	32%	8%
CA: North of Bodega Bay												
1994	75	16,401	218.7	10,549	140.7	7,060	94.1	1,682	22.4	58%	39%	8%
1995	75	17,370	231.6	14,561	194.2	10,356	138.1	2,188	29.2	74%	52%	9%
1996	80	17,902	223.8	12,765	159.6	9,179	114.7	1,696	21.2	65%	46%	7%
1997	84	18,074	215.2	11,976	142.6	7,712	91.8	1,828	21.8	60%	38%	7%
1998	77	12,355	160.5	8,594	111.6	5,187	67.4	1,840	23.9	69%	41%	12%
1999	78	11,714	150.2	7,800	100.0	5,320	68.2	1,027	13.2	65%	43%	8%
CA: Bodega Bay-Santa Cruz												
1994	43	5,172	120.3	4,285	99.7	1,773	41.2	1,186	27.6	78%	36%	20%

Table 3-7. Real ex-vessel revenue (thousands of 1999 dollars) earned by vessels with limited-entry trawl permits within specified groups of ports, and average vessel percentages of total income from selected groundfish categories, 1994-2000.

		Ex-vessel revenue ($1,000s) From								Average % of revenue from:		
	# of	All species		Groundfish		DTS species*		Rockfish*		Ground-	Sable-	Rock-
	ves	total	avg.	total	avg.	total	avg.	total	avg.	fish	species*	fish*
1995	52	8,603	165.4	7,698	148.0	3,963	76.2	2,111	40.6	84%	49%	20%
1996	55	8,859	161.1	7,845	142.6	3,568	64.9	2,436	44.3	83%	47%	19%
1997	53	7,677	144.9	5,971	112.7	2,550	48.1	1,953	36.8	69%	33%	20%
1998	44	5,507	125.2	4,051	92.1	1,356	30.8	1,603	36.4	66%	25%	27%
1999	50	4,663	93.3	3,507	70.1	1,558	31.2	776	15.5	70%	37%	14%
CA: Santa Cruz-Oxnard												
1994	29	3,421	118.0	2,686	92.6	1,642	56.6	678	23.4	65%	46%	10%
1995	22	4,078	185.4	3,230	146.8	2,525	114.8	478	21.7	66%	53%	8%
1996	22	3,722	169.2	2,916	132.6	2,336	106.2	352	16.0	70%	58%	8%
1997	18	3,259	181.1	2,523	140.1	1,918	106.6	396	22.0	64%	49%	9%
1998	21	2,842	135.3	1,869	89.0	1,140	54.3	604	28.8	61%	38%	18%
1999	17	1,669	98.2	918	54.0	750	44.1	104	6.1	58%	49%	6%
CA: South of Oxnard												
1994	4											
1996	1											
1998	2											

Note: vessels may be included in more than one port group. Revenue shares are calculated for each vessel for landings made only within a port group.
* DTS species are sablefish, Dover sole, and longspine and shortspine thornyhead rockfish.
The "rockfish" category includes all rockfish except thornyheads.

Table 3-8. Number of ocean area recreational trips by region and for rockfish and lingcod trips.

Region/Year	Total Recreational Trips	Rockfish Trips All	Rockfish Trips No Catch	Rockfish Trips Percent No Catch	Lingcod Trips All	Lingcod Trips No Catch	Lingcod Trips Percent No Catch
Washington							
1994	60	NA	NA		NA	NA	
1995	100	NA	NA		NA	NA	
1996	154	12	6	0.52	4	0	0.13
1997	107	NA	NA		NA	NA	
1998	246	86	36	0.42	17	9	0.53
1999	186	51	9	0.18	21	5	0.26
Oregon							
1994	179	231	38	0.16	76	19	0.25
1995	196	216	41	0.19	52	24	0.45
1996	146	206	44	0.21	57	24	0.42
1997	206	288	61	0.21	68	29	0.43
1998	307	409	92	0.22	87	48	0.56
1999	279	337	60	0.18	65	35	0.54
California - northern							
1994	1,538	1,055	358	0.34	167	98	0.59
1995	1,413	959	315	0.33	186	112	0.60
1996	992	852	256	0.30	145	74	0.51
1997	1,226	1,374	448	0.33	185	115	0.63
1998	1,187	881	243	0.28	142	82	0.58
1999	959	1,012	256	0.25	139	67	0.48
California - southern							
1994	4,076	918	341	0.37	26	17	0.66
1995	3,550	599	204	0.34	20	12	0.61
1996	2,819	949	260	0.27	33	25	0.76
1997	2,680	308	84	0.27	10	6	0.64
1998	2,531	495	146	0.29	15	10	0.70
1999	1,989	853	238	0.28	40	32	0.80
Total							
1994	5,853	2,204	736	0.33	269	134	0.50
1995	5,260	1,774	559	0.32	475	189	0.40
1996	4,111	2,018	566	0.28	239	123	0.51
1997	4,219	1,970	592	0.30	263	151	0.57
1998	4,271	1,871	517	0.28	261	150	0.57
1999	3,413	2,253	563	0.25	266	140	0.53

Table 3-9. Purchase information for processing plants (coastwide) stratified by groundfish purchases and implied groundfish and rockfish dependence, 1994-1999.

Groundfish Purchases for Plant	Plants with < 50% purchases of groundfish						Plants with > 50% purchases groundfish						All plants					
		Purchases ($ mil.) from			% Purchases of			Purchases ($ mil.) of			% Purchases of			Purchases ($ mil.) from			% of rev. from	
	# of plants	All species	Grnd-fish	Rock-fish	Grnd-fish	Rock-fish	# of plants	All species	Grnd-fish	Rock-fish	Grnd-fish	Rock-fish	# of plants	All species	Grnd-fish	Rock-fish	Grnd-fish	Rock-fish
1994																		
0-$10,000	667	1.6	0.04	0.02	3%	2%	198	0.4	0.36	0.29	94%	73%	865	2.0	0.40	0.31	24%	18%
$10,000-100,000	319	11.5	0.50	0.37	4%	3%	79	2.8	2.48	1.66	88%	63%	398	14.4	2.98	2.02	21%	15%
$100,000-500,000	122	28.7	1.89	1.26	6%	4%	22	5.0	4.17	1.86	84%	41%	144	33.6	6.06	3.12	18%	10%
> $500,000	99	167.6	23.62	11.58	11%	6%	26	57.6	39.86	19.17	72%	35%	125	225.2	63.49	30.75	23%	12%
Total	1,207	209.3	26.05	13.23	4%	3%	325	65.8	46.88	22.98	90%	65%	1,532	275.1	72.93	36.21	22%	16%
1995																		
0-$10,000	543	1.4	0.04	0.02	2%	1%	128	0.3	0.24	0.18	93%	66%	671	1.7	0.28	0.20	20%	14%
$10,000-100,000	290	11.2	0.51	0.38	4%	3%	65	2.1	1.91	1.33	89%	65%	355	13.4	2.42	1.70	20%	14%
$100,000-500,000	108	24.7	1.59	1.03	6%	4%	19	5.5	4.52	1.77	82%	35%	127	30.2	6.11	2.79	18%	9%
> $500,000	103	183.7	26.98	11.47	10%	4%	31	77.1	53.54	23.89	73%	31%	134	260.8	80.52	35.36	25%	11%
Total	1,044	221.1	29.12	12.89	4%	2%	243	85.0	60.22	27.17	88%	59%	1,287	306.1	89.33	40.06	20%	13%
1996																		
0-$10,000	534	1.5	0.03	0.02	2%	1%	110	0.3	0.24	0.16	91%	60%	644	1.7	0.27	0.18	17%	11%
$10,000-100,000	265	9.5	0.55	0.36	5%	3%	63	2.1	1.90	1.22	89%	58%	328	11.7	2.45	1.58	21%	14%
$100,000-500,000	121	30.5	1.38	0.83	5%	3%	25	6.0	4.75	1.84	82%	32%	146	36.5	6.13	2.67	18%	8%
> $500,000	97	203.6	26.58	10.22	10%	4%	32	72.9	47.15	19.02	71%	28%	129	276.4	73.73	29.24	25%	10%
Total	1,017	245.0	28.53	11.43	4%	2%	230	81.3	54.04	22.25	87%	52%	1,247	326.3	82.58	33.68	19%	11%
1997																		
0-$10,000	538	1.5	0.06	0.04	3%	2%	135	0.3	0.23	0.18	91%	65%	673	1.8	0.29	0.22	21%	15%
$10,000-100,000	270	9.2	0.57	0.38	5%	3%	61	2.2	1.89	1.19	89%	60%	331	11.4	2.46	1.56	20%	14%
$100,000-500,000	104	25.7	1.40	0.81	6%	3%	29	6.6	5.21	1.95	82%	31%	133	32.3	6.61	2.76	22%	9%
> $500,000	103	180.0	26.69	9.17	11%	4%	30	58.1	42.40	13.24	75%	22%	133	238.1	69.09	22.41	25%	8%
Total	1,015	216.4	28.72	10.39	5%	3%	255	67.2	49.73	16.56	87%	55%	1,270	283.7	78.45	26.95	21%	13%
1998																		
0-$10,000	665	1.9	0.05	0.03	2%	1%	125	0.3	0.30	0.23	94%	73%	790	2.3	0.35	0.26	16%	13%
$10,000-100,000	311	11.1	0.53	0.35	4%	3%	70	2.2	1.80	1.20	85%	60%	381	13.3	2.33	1.55	19%	13%
$100,000-500,000	119	28.9	1.33	0.82	5%	3%	31	8.0	6.56	2.83	81%	36%	150	36.9	7.89	3.65	21%	10%
> $500,000	58	94.7	13.05	5.64	13%	6%	22	41.9	28.56	11.05	72%	28%	80	136.6	41.61	16.69	29%	12%
Total	1,153	136.6	14.96	6.84	3%	2%	248	52.4	37.22	15.31	88%	61%	1,401	189.0	52.18	22.15	18%	13%
1999																		
0-$10,000	682	1.8	0.05	0.04	3%	2%	129	0.3	0.29	0.21	91%	65%	811	2.1	0.34	0.25	17%	12%
$10,000-100,000	282	10.0	0.50	0.27	4%	2%	41	1.5	1.27	0.77	85%	61%	323	11.5	1.77	1.03	14%	10%
$100,000-500,000	126	29.1	1.34	0.77	5%	3%	23	5.5	4.47	1.48	83%	29%	149	34.6	5.81	2.24	17%	7%
> $500,000	87	159.4	19.71	6.25	8%	3%	20	41.6	27.07	7.21	74%	18%	107	201.0	46.78	13.46	21%	6%
Total	1,177	200.3	21.60	7.32	4%	2%	213	48.9	33.11	9.66	88%	56%	1,390	249.2	54.71	16.98	17%	10%

Table 3-10. Purchase information for processing plants (by port group) stratified by groundfish purchases and implied groundfish and rockfish dependence, 1994-1999.

Groundfish Purchases for Plant	# of Plants	Purchases ($ million) of			% Purchases of	
		All species	Groundfish	Rockfish	Groundfish	Rockfish
Puget Sound						

Table 3-10. Purchase information for processing plants (by port group) stratified by groundfish purchases and implied groundfish and rockfish dependence, 1994-1999.

	Groundfish Purchases for Plant	# of Plants	Purchases ($ million) of All species	Groundfish	Rockfish	% Purchases of Groundfish	Rockfish
1994	0-$10,000	24	0.0	0.01	0.01	50%	28%
	$10,000-100,000	16	0.6	0.30	0.05	30%	5%
	$100,000-500,000	5	1.4	1.11	0.18	76%	20%
	> $500,000	3	4.7	3.33	1.46	57%	26%
	Total	48	6.7	4.75	1.70	46%	19%
1995	0-$10,000	27	0.1	0.01	0.00	26%	11%
	$10,000-100,000	8	0.4	0.03	0.01	6%	2%
	$100,000-500,000	8	2.2	1.37	0.28	50%	16%
	> $500,000	5	5.4	3.33	1.28	51%	15%
	Total	48	8.1	4.74	1.57	29%	11%
1996	0-$10,000	24	0.1	0.00	0.00	25%	15%
	$10,000-100,000	8	0.3	0.12	0.09	31%	18%
	$100,000-500,000	8	2.1	0.82	0.03	42%	1%
	> $500,000	4	4.3	3.96	1.39	95%	27%
	Total	44	6.7	4.90	1.51	35%	14%
1997	0-$10,000	21	0.1	0.01	0.00	29%	13%
	$10,000-100,000	12	0.5	0.22	0.02	36%	9%
	$100,000-500,000	8	1.6	0.72	0.04	45%	3%
	> $500,000	4	4.8	4.63	1.00	98%	16%
	Total	45	6.9	5.58	1.06	40%	10%
1998	0-$10,000	18	0.1	0.01	0.00	15%	1%
	$10,000-100,000	21	0.7	0.10	0.00	10%	0%
	$100,000-500,000	12	2.4	1.31	0.15	45%	5%
	> $500,000	2	2.4	2.28	0.69	94%	28%
	Total	53	5.5	3.70	0.84	23%	3%
1999	0-$10,000	13	0.0	0.00	0.00	8%	0%
	$10,000-100,000	18	0.8	0.21	0.00	17%	0%
	$100,000-500,000	9	2.6	0.69	0.10	20%	3%
	> $500,000	5	4.6	3.78	0.77	74%	12%
	Total	45	8.0	4.68	0.87	21%	2%
WA Coast							
1994	0-$10,000	32	0.1	0.00	0.00	5%	3%
	$10,000-100,000	23	0.9	0.12	0.03	11%	3%
	$100,000-500,000	9	2.1	0.01	0.01	1%	1%
	> $500,000	12	35.0	5.73	2.75	10%	6%
	Total	76	38.1	5.86	2.80	7%	3%
1995	0-$10,000	34	0.1	0.00	0.00	4%	2%
	$10,000-100,000	20	0.7	0.01	0.00	4%	1%
	$100,000-500,000	7	1.7	0.29	0.00	15%	0%
	> $500,000	16	44.3	7.48	3.38	7%	3%
	Total	77	46.8	7.77	3.39	6%	2%
1996	0-$10,000	29	0.1	0.00	0.00	14%	4%
	$10,000-100,000	16	0.5	0.03	0.00	10%	1%
	$100,000-500,000	10	2.4	0.25	0.00	19%	0%
	> $500,000	14	45.9	6.48	2.26	10%	3%
	Total	69	48.9	6.75	2.27	13%	3%
1997	0-$10,000	21	0.1	0.01	0.01	19%	12%
	$10,000-100,000	14	0.5	0.02	0.01	3%	1%
	$100,000-500,000	8	2.3	0.25	0.02	16%	1%
	> $500,000	11	28.0	5.64	1.44	14%	3%
	Total	54	30.8	5.91	1.48	13%	6%
1998	0-$10,000	37	0.1	0.00	0.00	0%	0%
	$10,000-100,000	15	0.7	0.01	0.00	2%	1%
	$100,000-500,000	8	2.2	0.21	0.07	7%	3%
	> $500,000	8	21.8	3.01	1.09	8%	3%
	Total	68	24.8	3.23	1.17	2%	1%
1999	0-$10,000	27	0.1	0.00	0.00	0%	0%
	$10,000-100,000	13	0.3	0.01	0.00	4%	0%
	$100,000-500,000	9	2.3	0.00	0.00	0%	0%
	> $500,000	11	28.0	3.14	0.76	7%	2%
	Total	60	30.7	3.15	0.77	2%	0%
OR: N. of Nehalem							

Table 3-10. Purchase information for processing plants (by port group) stratified by groundfish purchases and implied groundfish and rockfish dependence, 1994-1999.

	Groundfish Purchases for Plant	# of Plants	Purchases ($ million) of All species	Groundfish	Rockfish	% Purchases of Groundfish	Rockfish
1994	0-$10,000	18	0.0	0.01	0.00	6%	1%
	$10,000-100,000	12	0.5	0.08	0.03	18%	4%
	$100,000-500,000	2	0.3	0.01	0.00	3%	1%
	> $500,000	9	20.6	13.42	6.49	58%	28%
	Total	41	21.4	13.52	6.51	20%	8%
1995	0-$10,000	14	0.0	0.00	0.00	0%	0%
	$10,000-100,000	11	0.4	0.03	0.00	9%	0%
	$100,000-500,000	2	0.3	0.01	0.00	3%	1%
	> $500,000	10	28.7	15.25	6.42	42%	16%
	Total	37	29.5	15.28	6.43	14%	4%
1996	0-$10,000	11	0.0	0.00	0.00	8%	3%
	$10,000-100,000	9	0.3	0.03	0.00	12%	1%
	$100,000-500,000	2	0.5	0.01	0.01	4%	2%
	> $500,000	10	29.8	13.96	5.54	40%	15%
	Total	32	30.7	14.00	5.55	19%	6%
1997	0-$10,000	18	0.0	0.00	0.00	12%	7%
	$10,000-100,000	7	0.2	0.03	0.00	12%	1%
	$100,000-500,000	3	0.5	0.06	0.02	19%	6%
	> $500,000	8	23.6	12.52	3.73	50%	10%
	Total	36	24.3	12.61	3.76	21%	7%
1998	0-$10,000	27	0.1	0.01	0.01	3%	3%
	$10,000-100,000	12	0.3	0.02	0.00	6%	1%
	$100,000-500,000	5	0.9	0.18	0.03	15%	3%
	> $500,000	6	17.8	8.86	3.53	44%	15%
	Total	50	19.1	9.07	3.57	10%	4%
1999	0-$10,000	28	0.1	0.01	0.00	4%	3%
	$10,000-100,000	8	0.2	0.00	0.00	0%	0%
	$100,000-500,000	Confidential					
	> $500,000	8	24.2	11.12	2.90	40%	7%
	Total	44	24.4	11.13	2.90	10%	3%
OR: Nehalem-Yachats							
1994	0-$10,000	50	0.1	0.01	0.00	10%	4%
	$10,000-100,000	21	0.6	0.06	0.03	12%	6%
	$100,000-500,000	2	0.4	0.34	0.02	55%	6%
	> $500,000	6	19.8	10.30	4.71	52%	22%
	Total	79	20.9	10.71	4.76	15%	6%
1995	0-$10,000	44	0.1	0.00	0.00	7%	3%
	$10,000-100,000	21	0.7	0.08	0.06	11%	7%
	$100,000-500,000	4	1.1	0.41	0.27	26%	17%
	> $500,000	7	22.9	11.14	3.16	62%	18%
	Total	76	24.9	11.63	3.49	14%	6%
1996	0-$10,000	53	0.2	0.00	0.00	7%	3%
	$10,000-100,000	18	0.5	0.06	0.04	14%	8%
	$100,000-500,000	5	1.4	0.54	0.19	35%	12%
	> $500,000	6	23.8	9.76	3.62	50%	16%
	Total	82	25.8	10.37	3.85	14%	5%
1997	0-$10,000	41	0.1	0.01	0.01	6%	5%
	$10,000-100,000	29	0.7	0.11	0.08	12%	6%
	$100,000-500,000	3	0.6	0.39	0.01	42%	2%
	> $500,000	5	20.4	10.00	2.61	53%	12%
	Total	78	21.8	10.51	2.71	13%	6%
1998	0-$10,000	63	0.2	0.01	0.00	7%	4%
	$10,000-100,000	26	0.7	0.06	0.05	5%	4%
	$100,000-500,000	3	0.6	0.28	0.03	37%	4%
	> $500,000	5	13.2	6.16	1.87	46%	12%
	Total	97	14.7	6.50	1.95	9%	4%
1999	0-$10,000	47	0.2	0.01	0.00	7%	4%
	$10,000-100,000	22	0.7	0.07	0.05	7%	5%
	$100,000-500,000	3	0.8	0.45	0.02	35%	2%
	> $500,000	5	18.3	7.49	2.02	41%	8%
	Total	77	19.9	8.01	2.09	10%	4%

OR: S. of Yachats

Table 3-10. Purchase information for processing plants (by port group) stratified by groundfish purchases and implied groundfish and rockfish dependence, 1994-1999.

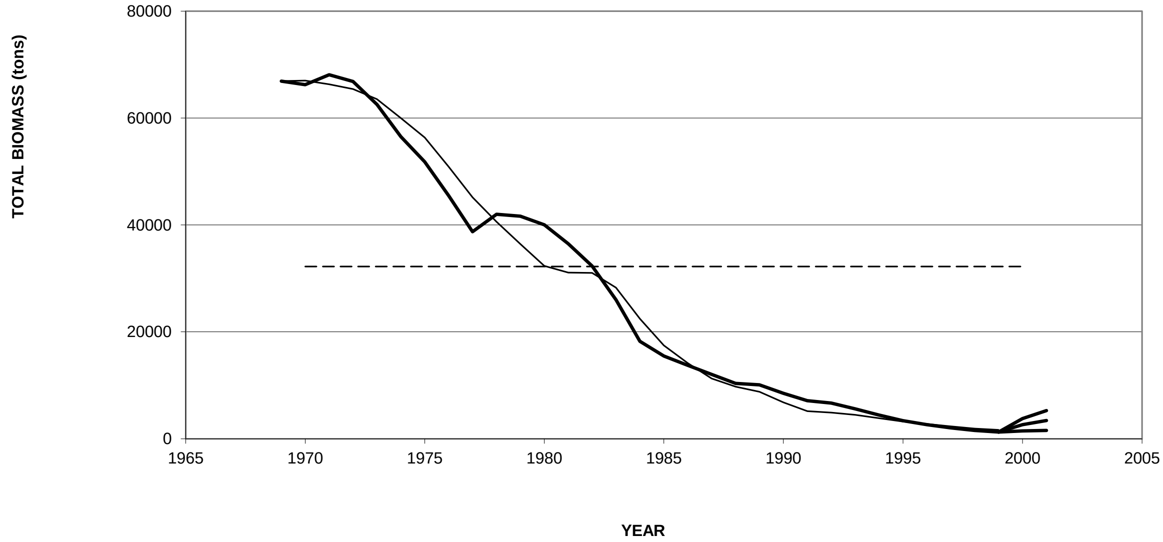
	Groundfish Purchases for Plant	# of Plants	Purchases ($ million) of All species	Groundfish	Rockfish	% Purchases of Groundfish	Rockfish
1994	0-$10,000	56	0.1	0.02	0.01	6%	6%
	$10,000-100,000	16	0.6	0.03	0.01	5%	3%
	$100,000-500,000	6	1.9	0.54	0.17	34%	11%
	> $500,000	10	23.8	10.77	4.73	47%	21%
	Total	88	26.5	11.35	4.93	13%	7%
1995	0-$10,000	52	0.1	0.01	0.01	11%	9%
	$10,000-100,000	12	0.4	0.06	0.05	14%	10%
	$100,000-500,000	6	1.2	0.39	0.18	24%	12%
	> $500,000	11	24.7	12.96	6.01	44%	18%
	Total	81	26.4	13.42	6.25	17%	11%
1996	0-$10,000	54	0.2	0.01	0.01	10%	6%
	$10,000-100,000	16	0.5	0.08	0.05	12%	9%
	$100,000-500,000	4	1.3	0.36	0.18	20%	10%
	> $500,000	10	26.6	10.87	4.20	40%	14%
	Total	84	28.5	11.32	4.43	14%	8%
1997	0-$10,000	51	0.1	0.01	0.01	11%	9%
	$10,000-100,000	14	0.4	0.09	0.06	11%	7%
	$100,000-500,000	3	1.0	0.22	0.14	22%	14%
	> $500,000	10	21.9	11.27	3.96	53%	17%
	Total	78	23.4	11.58	4.17	17%	10%
1998	0-$10,000	67	0.2	0.01	0.01	4%	3%
	$10,000-100,000	17	0.5	0.11	0.06	19%	10%
	$100,000-500,000	5	1.5	0.57	0.30	37%	25%
	> $500,000	7	13.8	6.89	2.74	47%	21%
	Total	96	16.0	7.58	3.10	12%	7%
1999	0-$10,000	61	0.2	0.01	0.01	3%	2%
	$10,000-100,000	18	0.6	0.12	0.06	12%	6%
	$100,000-500,000	7	1.7	0.69	0.38	38%	22%
	> $500,000	9	20.0	7.57	2.11	40%	10%
	Total	95	22.4	8.39	2.56	11%	5%
CA: N. of Bodega Bay							
1994	0-$10,000	109	0.2	0.06	0.05	32%	27%
	$10,000-100,000	24	0.8	0.07	0.05	11%	9%
	$100,000-500,000	14	3.9	0.53	0.38	12%	8%
	> $500,000	20	38.7	11.99	6.20	27%	13%
	Total	167	43.6	12.65	6.67	26%	21%
1995	0-$10,000	50	0.1	0.04	0.02	41%	21%
	$10,000-100,000	19	0.7	0.19	0.09	36%	19%
	$100,000-500,000	16	4.4	0.98	0.46	21%	10%
	> $500,000	15	31.3	16.02	7.46	37%	17%
	Total	100	36.5	17.23	8.03	36%	18%
1996	0-$10,000	73	0.2	0.04	0.02	26%	12%
	$10,000-100,000	35	1.4	0.40	0.17	26%	12%
	$100,000-500,000	15	3.7	0.42	0.22	9%	4%
	> $500,000	19	36.0	14.41	5.91	33%	13%
	Total	142	41.3	15.26	6.32	25%	11%
1997	0-$10,000	81	0.2	0.06	0.05	38%	25%
	$10,000-100,000	27	0.9	0.28	0.14	34%	20%
	$100,000-500,000	14	2.9	0.96	0.40	39%	17%
	> $500,000	20	36.8	14.38	5.18	39%	15%
	Total	142	40.7	15.68	5.77	37%	22%
1998	0-$10,000	68	0.2	0.05	0.03	24%	17%
	$10,000-100,000	28	1.0	0.24	0.15	28%	18%
	$100,000-500,000	15	4.5	1.15	0.58	25%	13%
	> $500,000	17	21.9	8.53	3.60	35%	15%
	Total	128	27.7	9.97	4.35	27%	17%
1999	0-$10,000	99	0.2	0.06	0.03	23%	8%
	$10,000-100,000	24	0.7	0.14	0.10	15%	10%
	$100,000-500,000	19	4.5	0.71	0.26	18%	6%
	> $500,000	15	23.9	8.61	2.80	30%	10%
	Total	157	29.4	9.52	3.19	22%	8%
CA: Bodega Bay - Santa Cruz							

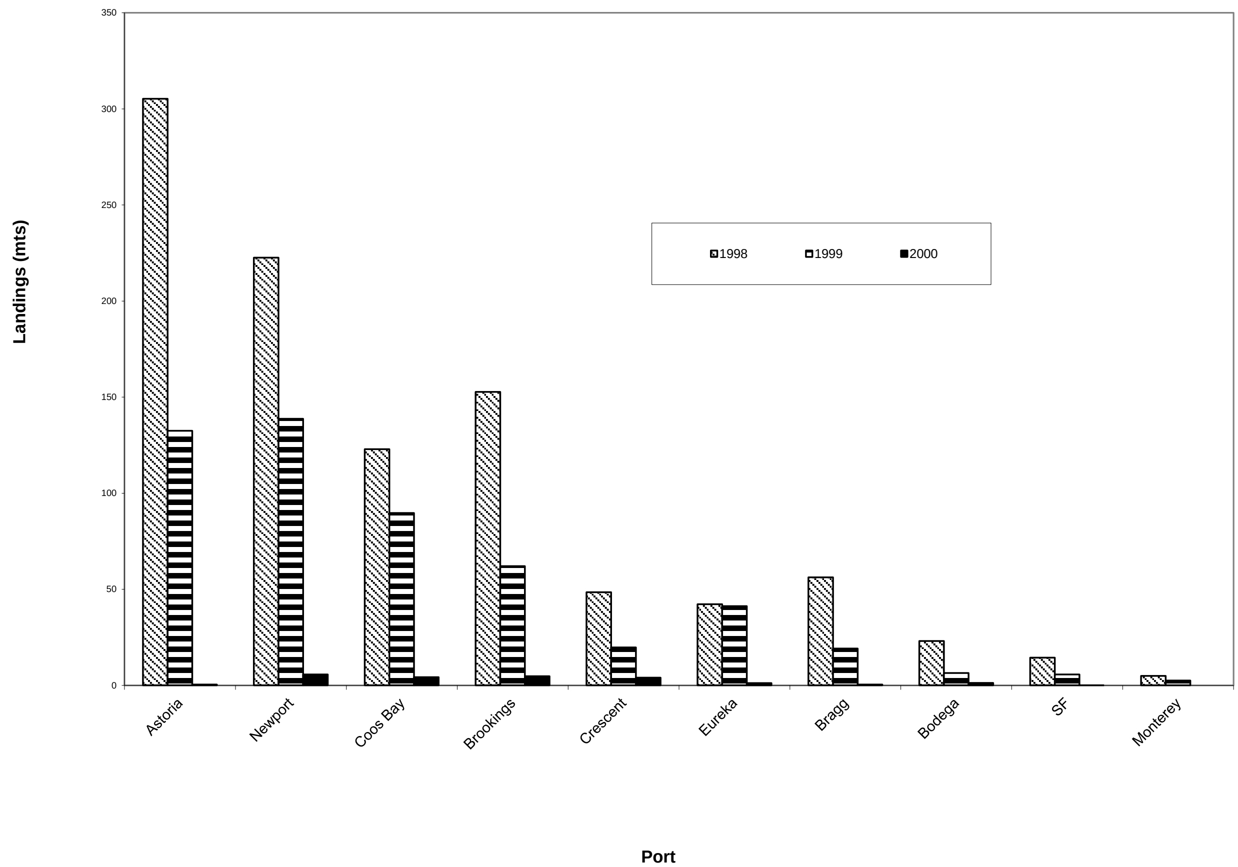
Table 3-10. Purchase information for processing plants (by port group) stratified by groundfish purchases and implied groundfish and rockfish dependence, 1994-1999.

	Groundfish Purchases for Plant	# of Plants	Purchases ($ million) of All species	Groundfish	Rockfish	% Purchases of Groundfish	Rockfish
1994	0-$10,000	245	0.5	0.13	0.10	24%	18%
	$10,000-100,000	102	3.8	1.15	0.90	32%	26%
	$100,000-500,000	36	7.8	1.52	0.89	21%	12%
	> $500,000	19	22.6	4.38	2.19	23%	12%
	Total	402	34.7	7.18	4.08	26%	19%
1995	0-$10,000	195	0.5	0.12	0.09	26%	18%
	$10,000-100,000	99	3.5	0.90	0.69	27%	21%
	$100,000-500,000	31	7.1	1.27	0.59	19%	10%
	> $500,000	25	34.7	9.21	4.48	26%	13%
	Total	350	45.7	11.50	5.84	26%	18%
1996	0-$10,000	178	0.4	0.11	0.07	22%	15%
	$10,000-100,000	93	3.0	0.63	0.44	24%	17%
	$100,000-500,000	38	9.4	1.94	0.77	24%	11%
	> $500,000	25	34.7	9.94	4.11	29%	12%
	Total	334	47.5	12.62	5.39	23%	15%
1997	0-$10,000	199	0.5	0.10	0.08	23%	17%
	$10,000-100,000	87	3.0	0.72	0.55	26%	19%
	$100,000-500,000	37	9.6	2.43	1.06	24%	11%
	> $500,000	32	42.1	7.26	2.99	18%	7%
	Total	355	55.2	10.50	4.68	23%	16%
1998	0-$10,000	259	0.7	0.13	0.10	22%	18%
	$10,000-100,000	100	3.3	0.87	0.64	26%	20%
	$100,000-500,000	36	9.3	2.08	1.20	21%	12%
	> $500,000	15	11.8	3.82	2.05	31%	16%
	Total	410	25.0	6.90	3.99	23%	18%
1999	0-$10,000	241	0.6	0.13	0.09	21%	16%
	$10,000-100,000	93	3.5	0.72	0.48	21%	15%
	$100,000-500,000	33	7.8	1.55	0.52	20%	6%
	> $500,000	15	13.5	3.50	1.48	24%	12%
	Total	382	25.4	5.89	2.57	21%	15%
CA: Santa Cruz-Oxnard							
1994	0-$10,000	160	0.4	0.09	0.07	33%	26%
	$10,000-100,000	87	3.3	0.68	0.57	21%	18%
	$100,000-500,000	43	9.9	1.52	1.15	14%	11%
	> $500,000	28	33.5	3.12	1.85	10%	6%
	Total	318	47.1	5.41	3.63	25%	20%
1995	0-$10,000	138	0.3	0.04	0.03	19%	16%
	$10,000-100,000	74	2.9	0.48	0.40	19%	15%
	$100,000-500,000	29	6.4	1.19	0.86	15%	10%
	> $500,000	28	40.0	4.75	2.81	12%	7%
	Total	269	49.7	6.46	4.11	18%	14%
1996	0-$10,000	118	0.4	0.05	0.05	19%	16%
	$10,000-100,000	53	2.0	0.53	0.44	26%	20%
	$100,000-500,000	40	9.8	1.50	1.12	16%	12%
	> $500,000	23	36.8	4.05	1.91	13%	6%
	Total	234	49.0	6.13	3.51	19%	15%
1997	0-$10,000	122	0.3	0.05	0.04	23%	17%
	$10,000-100,000	60	2.2	0.52	0.44	22%	19%
	$100,000-500,000	35	8.9	1.38	0.92	18%	12%
	> $500,000	25	26.6	3.19	1.32	10%	4%
	Total	242	38.0	5.13	2.71	20%	15%
1998	0-$10,000	135	0.4	0.08	0.07	19%	16%
	$10,000-100,000	81	3.2	0.56	0.39	22%	17%
	$100,000-500,000	36	8.5	1.44	0.86	17%	11%
	> $500,000	10	9.0	1.97	1.04	17%	9%
	Total	262	21.1	4.06	2.36	20%	15%
1999	0-$10,000	154	0.4	0.10	0.09	25%	21%
	$10,000-100,000	60	2.3	0.30	0.21	16%	13%
	$100,000-500,000	39	8.7	1.03	0.60	12%	7%
	> $500,000	20	33.4	1.53	0.58	3%	1%
	Total	273	44.8	2.95	1.48	19%	16%
CA: S. of Oxnard							

Table 3-10. Purchase information for processing plants (by port group) stratified by groundfish purchases and implied groundfish and rockfish dependence, 1994-1999.

	Groundfish Purchases for Plant	# of Plants	Purchases ($ million) of All species	Purchases ($ million) of Groundfish	Purchases ($ million) of Rockfish	% Purchases of Groundfish	% Purchases of Rockfish
1994	0-$10,000	171	0.4	0.08	0.07	21%	17%
	$10,000-100,000	97	3.5	0.50	0.35	16%	12%
	$100,000-500,000	27	5.9	0.49	0.33	12%	8%
	> $500,000	18	26.4	0.44	0.39	4%	3%
	Total	313	36.1	1.51	1.14	18%	14%
1995	0-$10,000	117	0.3	0.05	0.05	15%	12%
	$10,000-100,000	91	3.6	0.64	0.41	18%	12%
	$100,000-500,000	24	5.7	0.21	0.15	5%	4%
	> $500,000	17	28.9	0.39	0.36	3%	3%
	Total	249	38.6	1.31	0.97	14%	11%
1996	0-$10,000	104	0.3	0.04	0.04	11%	8%
	$10,000-100,000	80	3.2	0.58	0.36	17%	12%
	$100,000-500,000	24	5.9	0.29	0.17	8%	4%
	> $500,000	18	38.5	0.31	0.29	2%	2%
	Total	226	47.9	1.23	0.85	12%	9%
1997	0-$10,000	119	0.3	0.03	0.02	13%	10%
	$10,000-100,000	81	2.9	0.49	0.27	16%	10%
	$100,000-500,000	22	5.0	0.22	0.15	7%	5%
	> $500,000	18	34.2	0.21	0.18	2%	1%
	Total	240	42.4	0.95	0.62	13%	9%
1998	0-$10,000	116	0.3	0.05	0.04	17%	14%
	$10,000-100,000	81	3.0	0.38	0.27	16%	12%
	$100,000-500,000	30	7.0	0.67	0.44	12%	9%
	> $500,000	10	24.8	0.09	0.08	1%	1%
	Total	237	35.2	1.19	0.84	15%	12%
1999	0-$10,000	141	0.3	0.04	0.03	12%	9%
	$10,000-100,000	67	2.4	0.21	0.13	10%	7%
	$100,000-500,000	30	6.3	0.69	0.36	16%	8%
	> $500,000	19	35.2	0.05	0.05	0%	0%
	Total	257	44.2	0.99	0.56	11%	7%


TOTAL BIOMASS (tons)
80000
60000
40000
20000
0
1965
1970
1975
1980
1985
1990
1995
2000
2005
YEAR


Landings (mts)
350
300
250
200
150
100
50
0
1998
1999
2000
Astoria
Newport
Coos Bay
Brookings
Crescent
Eureka
Bragg
Bodega
SF
Monterey
Port

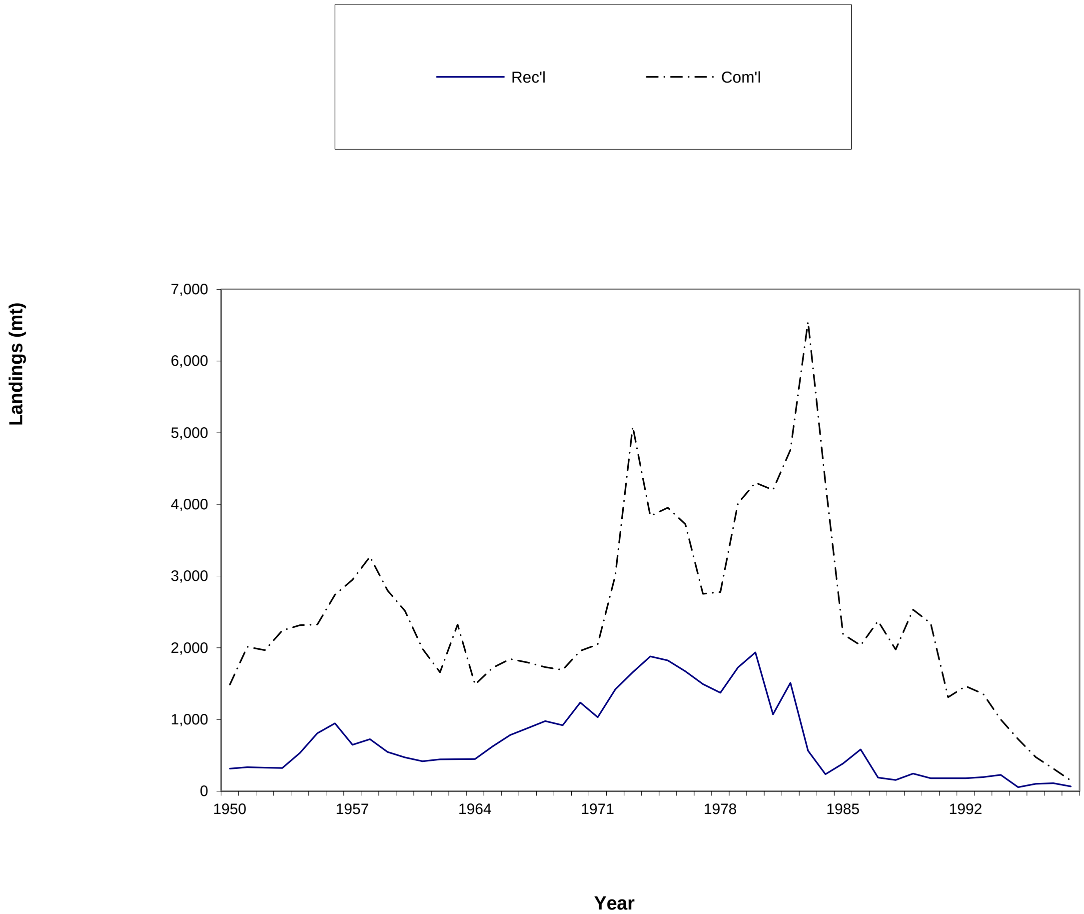

Rec'l
Com'l
Landings (mt)
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
1950
1957
1964
1971
1978
1985
1992
Year

Figure 3-4. Landings trends in West Coast groundfish, 1994-2000.

Figure 3-5. Real ex-vessel revenue trends in West Coast groundfish, 1994-2000.

Figure 3-6. Number of groundfish open access vessels by level of dependence on groundfish, 1994-1999.

Figure 3-7. Number of open access vessels by level of groundfish revenue.

Figure 3-8. Number of limited entry vessels by level of groundfish revenue.

Figure 3-9. Number of groundfish limited entry vessels by level of dependence on groundfish, 1994-1999.

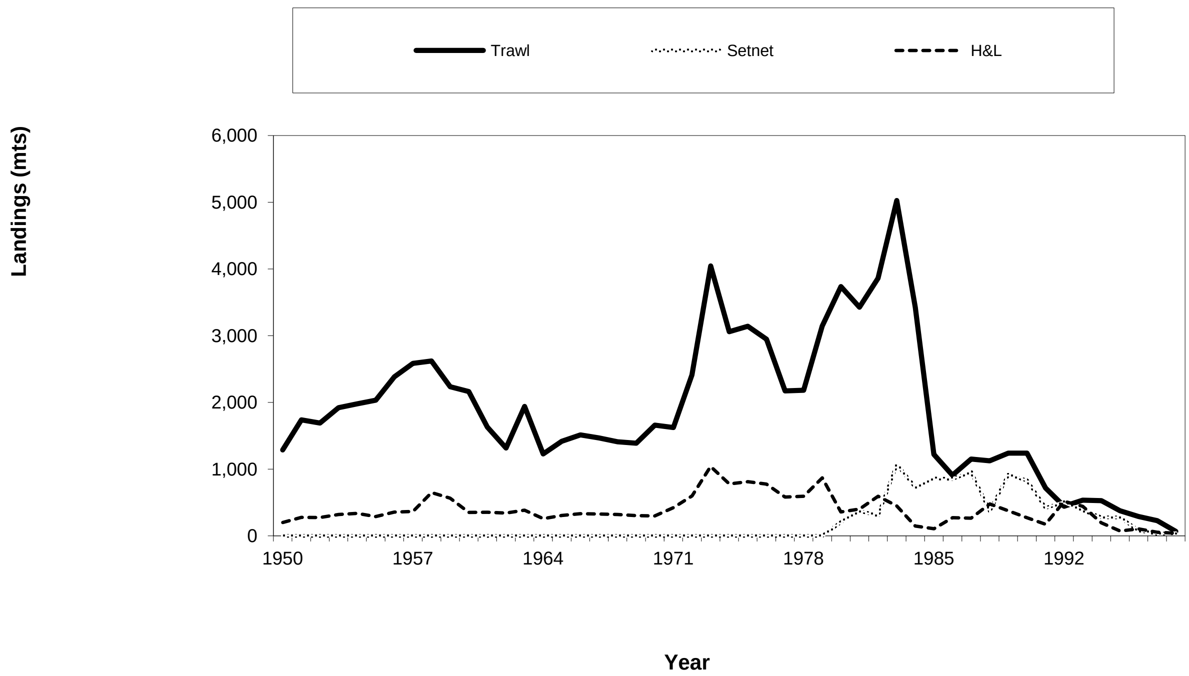


Figure 3-10. Commercial bocaccio landings by gear type, 1950-1998.

Figure 3-11. Number of recreational trips (MRFSS data from RecFIN).

Figure 3-12. Proportion of ocean angling trips in which rockfish were taken or targeted, 1998-1999.

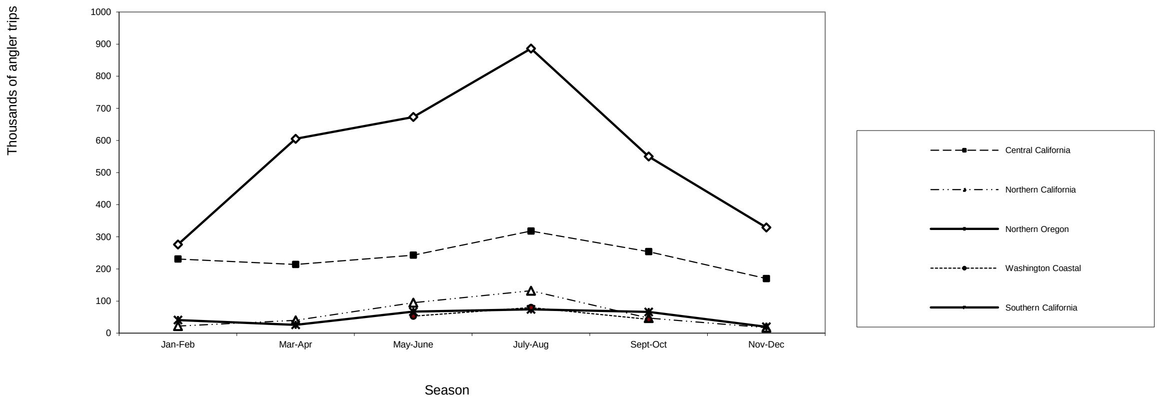


Figure 3-13. Seasonality of ocean angler trips (in 1000s) by region.

APPENDIX A

Bocaccio Rebuilding – September 1999

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Introduction

In 1998, the PFMC adopted Amendment 11 of the Groundfish Management Plan, which established a minimum stock size threshold of 25% of unfished biomass. Based on existing abundance estimates (Ralston et al. 1996), bocaccio was formally declared to be overfished, thereby requiring development of a rebuilding plan for consideration by the Council in the fall of 1999. This timing was complicated by the stock assessment schedule, which called for a new bocaccio stock assessment to be prepared in the summer of 1999.

Development of alternative management options for bocaccio rebuilding began before the new assessment was available, and required interim use of the results of the 1996 stock assessment. MacCall (1999) developed a simple production model to project bocaccio rebuilding trajectories. Assuming the 1999 stock to be at 50% of the 1996 abundance, that preliminary model indicated that the total catch (plus discards) would have to be reduced to about 100 tons.

The new stock assessment (MacCall et al. 1999) established that the stock off California is genetically distinct from bocaccio found to the north, and that the groundfish management line at Cape Mendocino may be considered as the northern boundary of the stock for management purposes. The new assessment found that under continuing recruitment failure, the index of bocaccio spawning output had fallen from Ralston et al's estimate of 568 units in 1996 to 259 units in 1999. Estimated total biomass fell from 3,857 mt in 1996 to 1,271 mt in 1999. A portion of this change was due to a change in estimation methodology. The decline shown by the 1999 assessment was more severe than the 50% decline assumed in MacCall's (1999) preliminary rebuilding analysis.

Management Reference Points

Bmsy: The rebuilding target is the spawning abundance level that produces MSY. This cannot be determined directly, but experience in other fisheries has shown that B_{msy} is often near 40% of the initial unfished spawning abundance (B_0). This is the rebuilding target endorsed by the SSC's Rebuilding Workshop (Conser 1999). B_0 can be estimated by simulating an unfished resource with recruitment levels sampled from an appropriate historical time period. The STAR Panel proposed that the entire history of recruitment be used, but the Rebuilding Workshop favored using an early period when biomasses were large (in this case, the 1970 to 1979 year classes. The two approaches generate simulated distributions of initial abundance that can be compared with the 1969 abundance estimated in the stock assessment (Figure 1). A biomass as large as that in 1969 would be unlikely given the frequency distribution based on samples taken from the entire series of recruitments, but would be commonplace based on use of recruitments sampled from the early period. Estimated unfished abundance is a linear function of recruitments, so the mean recruitment from 1970 to 1979 (9.7896 million fish) can be expanded by the SPR ratio at F=0 (1.286 units of spawning output per recruit) to give estimated B_0= 12,587 units of spawning output. The corresponding estimate of B_{msy} is 40% of this amount, or 5035 units of spawning output. For comparison, the estimated 1999 spawning output of 259 is 5.1% of the rebuilding target, and is only 2.1% of B_0.

Mean generation time: If the stock cannot be rebuilt in ten years, then the maximum time allowed for rebuilding is the length of time required to rebuild at F=0 plus one generation time. Mean generation time can be estimated from the net maternity function (product of survivorship and fecundity at age, Figure 2), and for bocaccio is estimated to be 12.06 years, which is rounded to an integer value of 12 years.

Simulation Model

The simulation model tracks abundances at age, with an accumulator at age 21+. Values of weights at age, selectivity and fecundity are taken from Appendix 1 of MacCall et al. (1999). Population simulations begin with the 1999 age composition, and the age 1 recruitment strength in year 2000 is set according to one of three scenarios described below (see "Initial Conditions"). Subsequent recruitments are generated by a random draw of one of the historical values of R/S, which is multiplied by current spawning output (S) to obtain the following year's recruitment. For each recreated sequence of R/S values, three sets of simulations are run corresponding to the three recruitment scenarios. In each case, the time (number of years) to reach the rebuilding target at F=0 (T_{min}) is first determined. Then the value of fishing mortality rate is determined that allows the stock to achieve the rebuilding abundance in the maximum allowable length of time (T_{max}=T_{min}+12). The model simulated a maximum of 300 years. One hundred of these simulations (i.e., with one hundred different sequences of reproductive successes) were run in order to obtain percentage probabilities of successful rebuilding within the required time frame.

Initial conditions: Initial age structure used in the simulations is taken from the most recent stock assessment (MacCall et al. 1999). However, that assessment does not include an estimate of the strength of the 1999 year class, which appears to be larger than any seen in recent years according to anecdotal reports. The strong 1999 year class is likely to be a demographically important component of the population, and should not be ignored in rebuilding projections.

Three possible strengths of the 1999 year class are considered (Figure 3): It could be equivalent to the 1991 year class ("low"), the 1988 year class ("medium"), or the 1984 year class ("high"). Even the "low" value of the 1999 year class would require that reproductive success, in recruits per spawning output, was equal to that in 1988, the highest ever observed. The alternative reproductive successes associated with the "medium" and "high" values would be far higher than any value observed previously (Figure 4).

The rebuilding projection is driven by resampling of historical values of reproductive success (Figure 4) without adjustment for population size effects (the slope of the relationship between log spawning success and spawning output is not significantly different from 0). Values of R/S for years prior to 1977 (the first year of length composition information) are presumably imprecise, and were not used. Each of the three alternative 1999 recruitment models includes the corresponding 1999 value of R/S in the values to be resampled. The medium and high recruitment cases generate very high 1999 values of R/S, which contributes to a corresponding large increase in model resource productivity for those cases.

1999 year class: Because the three different 1999 recruitment cases result in very different management recommendations, some attempt to quantify the 1999 year class strength is desirable. Fish impingement data from electric power generating stations in southern California (K. Herbinson, Southern California Edison, pers. comm) provide information that helps resolve this problem. Two power plants at San Onofre provide records from 1984 to March, 1999. A plot of the number of days on which impinged bocaccio were observed shows a general relationship to the historical recruitment strengths from the stock assessment. The 1991, 1988 and 1984 counts are generally higher than the counts from years known to have weaker recruitment. The 1999 data cover only the first three months of the year, but the number of positive station-days already exceeds previously observed values. A strict quantitative interpretation is probably not warranted. The relationship between the 1984 and 1988 points is counter to the corresponding estimated year class strengths, and argues that the relationship is not precise. However, a reasonable qualitative conclusion would be that the 1999 year class is probably at the strong end of the three alternative scenarios in the rebuilding plan.

Projections

Table 1 presents the probabilities of rebuilding under alternative fishing rates. Catch levels given in the table are associated with the respective fishing rate and assumed strength of the 1999 year class. The medium and high 1999 recruitment scenarios anticipate an additional recreational catch of 1999 year class bocaccio in year 2000. One-year-old fish are not normally available to commercial fisheries, so an alternative calculation of catch of age 2+ fish is presented as the amount that can be allocated among fishery segments in year 2000. Rebuilding policies are based on a constant harvest rate, given the selectivity curve, and are most easily summarized by the catches in 2000, 2001 and 2002 (Table 1). Probability of successful rebuilding is related directly to year 2000 catch in Figure 6.

Acknowledgment: Kevin Herbinson (Southern California Edison) provided useful data on bocaccio impingement at the San Onofre power plants, allowing improved estimates of the strength of the 1999 year class.

Table 1. Probabilities of bocaccio rebuilding, assuming three alternative 1999 year class strengths. Catch is projected for three years; PERCENT SUCCESS is percentage of simulations achieving rebuilding schedule; MEDIAN TIME is median time (years) to reach rebuilding target. Bold entries indicate that more than one half the simulations achieved rebuilding requirements.

LOW 1999 YEAR CLASS

CATCH:	AGE 2+	AGE 1+			PERCENT	MEDIAN
F\YEAR	2000	2000	2001	2002	SUCCESS	TIME
0.00	**0**	**0**	**0**	**0**	**100**	**76**
0.01	**8**	**9**	**9**	**11**	**73**	**87**
0.02	16	17	17	21	37	104
0.03	23	25	26	31	11	136
0.04	31	33	34	40	1	162
0.05	38	41	42	50	0	245
0.06	45	48	49	59	0	300
0.07	52	55	57	67	0	300
0.08	59	63	64	76	0	300
0.09	65	70	71	84	0	300

MEDIUM 1999 YEAR CLASS

CATCH:	AGE 2+	AGE 1+			PERCENT	MEDIAN
F\YEAR	2000	2000	2001	2002	SUCCESS	TIME
0.00	**0**	**0**	**0**	**0**	**100**	**26**
0.01	**8**	**10**	**15**	**25**	**94**	**27**
0.02	**16**	**20**	**29**	**49**	**84**	**30**
0.03	**23**	**30**	**43**	**73**	**75**	**33**
0.04	**31**	**39**	**58**	**96**	**57**	**37**
0.05	38	48	71	120	46	42
0.06	45	58	85	142	37	49
0.07	52	67	99	164	31	58
0.08	59	76	112	186	19	68
0.09	65	84	125	208	11	90

HIGH 1999 YEAR CLASS

CATCH:	AGE 2+	AGE 1+			PERCENT	MEDIAN
F\YEAR	2000	2000	2001	2002	SUCCESS	TIME
0.00	**0**	**0**	**0**	**0**	**100**	**20**
0.01	**8**	**12**	**20**	**38**	**98**	**20**
0.02	**16**	**23**	**41**	**76**	**95**	**21**
0.03	**23**	**34**	**61**	**114**	**94**	**22**
0.04	**31**	**45**	**81**	**151**	**84**	**22**
0.05	**38**	**56**	**101**	**188**	**81**	**23**
0.06	**45**	**67**	**120**	**224**	**76**	**24**
0.07	**52**	**78**	**140**	**259**	**64**	**27**
0.08	**59**	**88**	**159**	**294**	**54**	**30**
0.09	65	98	179	329	44	36

INITIAL	F RATE	CATCHES (age 1+)				EFFORT INDEX (1998 = 1.0)				MEDIAN	MEDIAN	PERCENT
CATCH	INDEX	C2000	C2001	C2002	C2003	F2000	F2001	F2002	F2003	YEARS	DELAY	SUCCESS
assume med1999												
n/a	0.03	30	44	75	110	0.14	0.14	0.14	0.14	33	4	70%
80	0.03	80	81	82	106	0.39	0.27	0.16	0.14	34	5	68%
100	0.03	100	101	102	104	0.49	0.34	0.21	0.14	34	6	67%
120	0.03	120	121	123	102	0.59	0.41	0.25	0.14	37	7	65%
140	0.03	140	142	144	100	0.70	0.48	0.30	0.14	37	7	62%
assume hi1999												
forced	0.03	30	44	75	181	0.12	0.10	0.09	0.14	21	1	89%
80	0.03	80	81	82	177	0.34	0.19	0.10	0.14	22	1	88%
100	0.03	100	101	102	174	0.42	0.24	0.13	0.14	22	1	87%
120	0.03	120	121	123	172	0.51	0.29	0.16	0.14	23	1	87%
140	0.03	140	142	143	169	0.59	0.34	0.18	0.14	23	1	87%
assume med1999												
n/a	0.04	39	58	99	145	0.19	0.19	0.19	0.19	37	9	57%
80	0.04	80	81	82	142	0.40	0.27	0.16	0.19	37	9	56%
100	0.04	100	101	102	139	0.50	0.34	0.21	0.19	37	10	55%
120	0.04	120	121	123	136	0.60	0.42	0.25	0.19	37	11	53%
140	0.04	140	142	144	133	0.71	0.49	0.30	0.19	40	12	51%
assume hi1999												
forced	0.04	39	58	99	240	0.17	0.14	0.12	0.19	22	1	84%
80	0.04	80	81	82	237	0.34	0.19	0.10	0.19	22	1	84%
100	0.04	100	101	102	233	0.43	0.24	0.13	0.19	22	1	84%
120	0.04	120	121	123	230	0.52	0.29	0.16	0.19	22	1	84%
140	0.04	140	142	143	226	0.60	0.34	0.19	0.19	22	1	84%

APPENDIX B: Magnuson-Stevens Fishery Conservation and Management Act and Groundfish Fish Management Plan Regulatory Language Pertinent to the Bocaccio Rebuilding Plan

Stock rebuilding is required by the Magnuson Stevens Act, Section 304. The applicable section of the Act is provided below.

(e) REBUILDING OVERFISHED FISHERIES.--

(1) The Secretary shall report annually to the Congress and the Councils on the status of fisheries within each Council's geographical area of authority and identify those fisheries that are overfished or are approaching a condition of being overfished. For those fisheries managed under a fishery management plan or international agreement, the status shall be determined using the criteria for overfishing specified in such plan or agreement. A fishery shall be classified as approaching a condition of being overfished if, based on trends in fishing effort, fishery resource size, and other appropriate factors, the Secretary estimates that the fishery will become overfished within two years.

(2) If the Secretary determines at any time that a fishery is overfished, the Secretary shall immediately notify the appropriate Council and request that action be taken to end overfishing in the fishery and to implement conservation and management measures to rebuild affected stocks of fish. The Secretary shall publish each notice under this paragraph in the Federal Register.

(3) Within one year of an identification under paragraph (1) or notification under paragraphs (2) or (7), the appropriate Council (or the Secretary, for fisheries under section 302(a)(3)) shall prepare a fishery management plan, plan amendment, or proposed regulations for the fishery to which the identification or notice applies--

(A) to end overfishing in the fishery and to rebuild affected stocks of fish; or

(B) to prevent overfishing from occurring in the fishery whenever such fishery is identified as approaching an overfished condition.

(4) For a fishery that is overfished, any fishery management plan, amendment, or proposed regulations prepared pursuant to paragraph (3) or paragraph (5) for such fishery shall–

(A) specify a time period for ending overfishing and rebuilding the fishery that shall--

(i) be as short as possible, taking into account the status and biology of any overfished stocks of fish, the needs of fishing communities, recommendations by international organizations in which the United States participates, and the interaction of the overfished stock of fish within the marine ecosystem; and

(ii) 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;

(B) allocate both overfishing restrictions and recovery benefits fairly and equitably among sectors of the fishery; and

(C) for fisheries managed under an international agreement, reflect traditional participation in the fishery, relative to other nations, by fishermen of the United States.

(5) If, within the one-year period beginning on the date of identification or notification that a fishery is overfished, the Council does not submit to the Secretary a fishery management plan, plan amendment, or proposed regulations required by paragraph (3)(A), the Secretary shall prepare a fishery management plan or plan amendment and any accompanying regulations to stop overfishing and rebuild affected stocks of fish within 9 months under subsection (c).

(6) During the development of a fishery management plan, a plan amendment, or proposed regulations required by this subsection, the Council may request the Secretary to implement interim measures to reduce overfishing under section 305(c) until such measures can be replaced by such plan, amendment, or regulations. Such measures, if otherwise in compliance with the provisions of this Act, may be implemented even though they are not sufficient by themselves to stop overfishing of a fishery.

(7) The Secretary shall review any fishery management plan, plan amendment, or regulations required by this subsection at routine intervals that may not exceed two years. If the Secretary finds as a result of the review that such plan, amendment, or regulations have not resulted in adequate progress toward ending overfishing and rebuilding affected fish stocks, the Secretary shall--

(A) in the case of a fishery to which section 302(a)(3) applies, immediately make revisions necessary to achieve adequate progress; or

(B) for all other fisheries, immediately notify the appropriate Council. Such notification shall recommend further conservation and management measures which the Council should consider under paragraph (3) to achieve adequate progress.

Rebuilding plans and regulations to implement them must be consistent with the National Standards of the Magnuson-Stevens Act. Below in this section is an excerpt from the Final Rule on National Standard Guidelines, published in the Federal Register on May 1, 1998 (63 FR 24212).

Sec. 600.310 National Standard 1--Optimum Yield.

(e) Ending overfishing and rebuilding overfished stocks– (1) Definition. A threshold, either maximum fishing mortality or minimum stock size, is being "approached" whenever it is projected that the threshold will be breached within 2 years, based on trends in fishing effort, fishery resource size, and other appropriate factors.
(2) Notification. The Secretary will immediately notify a Council and request that remedial action be taken whenever the Secretary determines that:

(i) Overfishing is occurring;
(ii) A stock or stock complex is overfished;
(iii) The rate or level of fishing mortality for a stock or stock complex is approaching the maximum fishing mortality threshold;
(iv) A stock or stock complex is approaching its minimum stock size threshold; or
(v) Existing remedial action taken for the purpose of ending previously identified overfishing or rebuilding a previously identified overfished stock or stock complex has not resulted in adequate progress.

(3) Council action. Within 1 year of such time as the Secretary may identify that overfishing is occurring, that a stock or stock complex is overfished, or that a threshold is being approached, or such time as a Council may be notified of the same under paragraph (e)(2) of this section, the Council must take remedial action by preparing an FMP, FMP amendment, or proposed regulations. This remedial action must be designed to accomplish all of the following purposes that apply:

(i) If overfishing is occurring, the purpose of the action is to end overfishing.
(ii) If the stock or stock complex is overfished, the purpose of the action is to rebuild the stock or stock complex to the MSY level within an appropriate time frame.
(iii) If the rate or level of fishing mortality is approaching the maximum fishing mortality threshold (from below), the purpose of the action is to prevent this threshold from being reached.
(iv) If the stock or stock complex is approaching the minimum stock size threshold (from above), the purpose of the action is to prevent this threshold from being reached.

(4) Constraints on Council action.

(i) In cases where overfishing is occurring, Council action must be sufficient to end overfishing.
(ii) In cases where a stock or stock complex is overfished, Council action must specify 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.

(A) A number of factors enter into the specification of 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; and
(5) Management measures under an international agreement in which the United States participates.

(B) 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 10 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 10 years, unless management measures under an international agreement in which the United States participates dictate otherwise.

(3) If the lower limit is 10 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 12 years in the absence of any fishing mortality, and has a mean generation time of 8 years. The rebuilding period, in this case, could be as long as 20 years.

(C) A rebuilding program undertaken after May 1, 1998 commences as soon as the first measures to rebuild the stock or stock complex are implemented.

(D) In the case of rebuilding plans that were already in place as of May 1, 1998, such rebuilding plans must be reviewed to determine whether they are in compliance with all requirements of the Magnuson- Stevens Act, as amended by the Sustainable Fisheries Act.

(5) Interim measures. The Secretary, on his/her own initiative or in response to a Council request, may implement interim measures to reduce overfishing under section 305(c) of the Magnuson-Stevens Act, until such measures can be replaced by an FMP, FMP amendment, or regulations taking remedial action.

(i) These measures may remain in effect for no more than 180 days, but may be extended for an additional 180 days if the public has had an opportunity to comment on the measures and, in the case of Council-recommended measures, the Council is actively preparing an FMP, FMP amendment, or proposed regulations to address overfishing on a permanent basis. Such measures, if otherwise in compliance with the provisions of the Magnuson-Stevens Act, may be implemented even though they are not sufficient by themselves to stop overfishing of a fishery.
(ii) If interim measures are made effective without prior notice and opportunity for comment, they should be reserved for exceptional situations, because they affect fishermen without providing the usual procedural safeguards. A Council recommendation for interim measures without notice-and-comment rulemaking will be considered favorably if the short-term benefits of the measures in reducing overfishing outweigh the value of advance notice, public comment, and deliberative consideration of the impacts on participants in the fishery.

Section 5.0 of the FMP describes the annual specification process 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.

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 harvest guidelines (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 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 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.

An excerpt from Section 5.3.2 of the FMP describes the process for determining OY each year and references rebuilding in several provisions.

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 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 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 the current biomass estimate is less than the precautionary threshold, the harvest rate will be reduced according to the harvest control rule specified in Section 5.3.5 in order to accelerate a return of abundance to optimal levels. If the abundance falls below the overfished/rebuilding threshold, 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: Other social, economic, or ecological considerations, including reduction for anticipated bycatch, 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 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.

(iii) Any new rebuilding program will commence as soon as the first measures to rebuild the stock or stock complex are implemented.

(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, harvest guidelines, and/or OYs, as appropriate.

Section 5.3.6 of the FMP provides the following procedures, guidance and requirements relating to stock rebuilding.

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. 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.

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. As with all Council activities, public participation is critical to the development, implementation and success of management programs.

5.3.6.1 Goals and Objectives of Rebuilding Plans

The 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.

5.6.3.2 Contents of Rebuilding Plans

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) 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; (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.

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.

In general, the Council will also consider the following questions 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?

5.6.3.3 Process for Development and Approval of Rebuilding Plans

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 it 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 the 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.

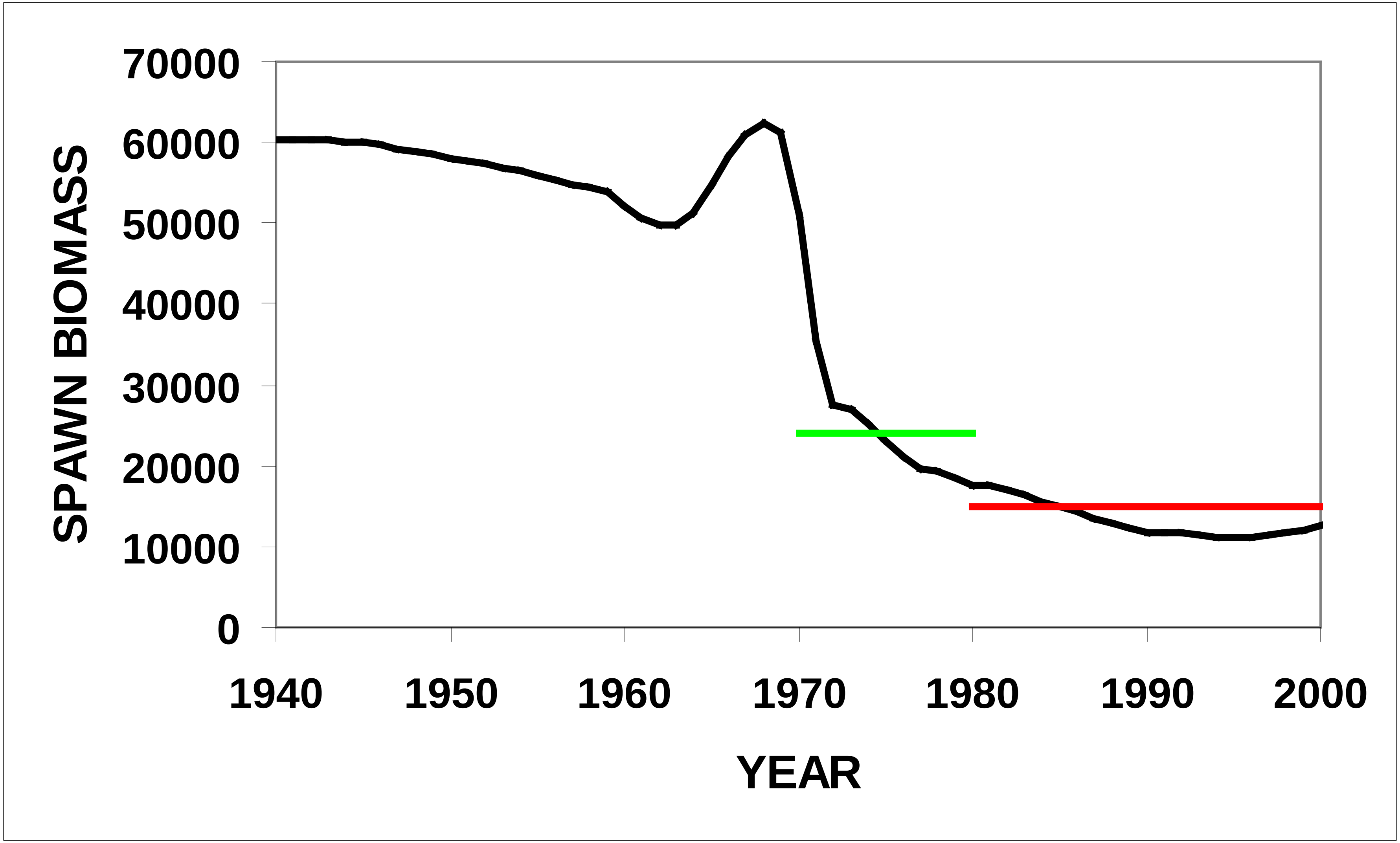
NMFS will review the Council's recommendations and supporting information upon receipt and may approve, disapprove, or partially approve each rebuilding plan. The Council will be notified in writing of the NMFS decision. If NMFS does not concur with the Council's recommendation, reasons for the disapproval 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.

Pacific Ocean Perch Rebuilding Analysis

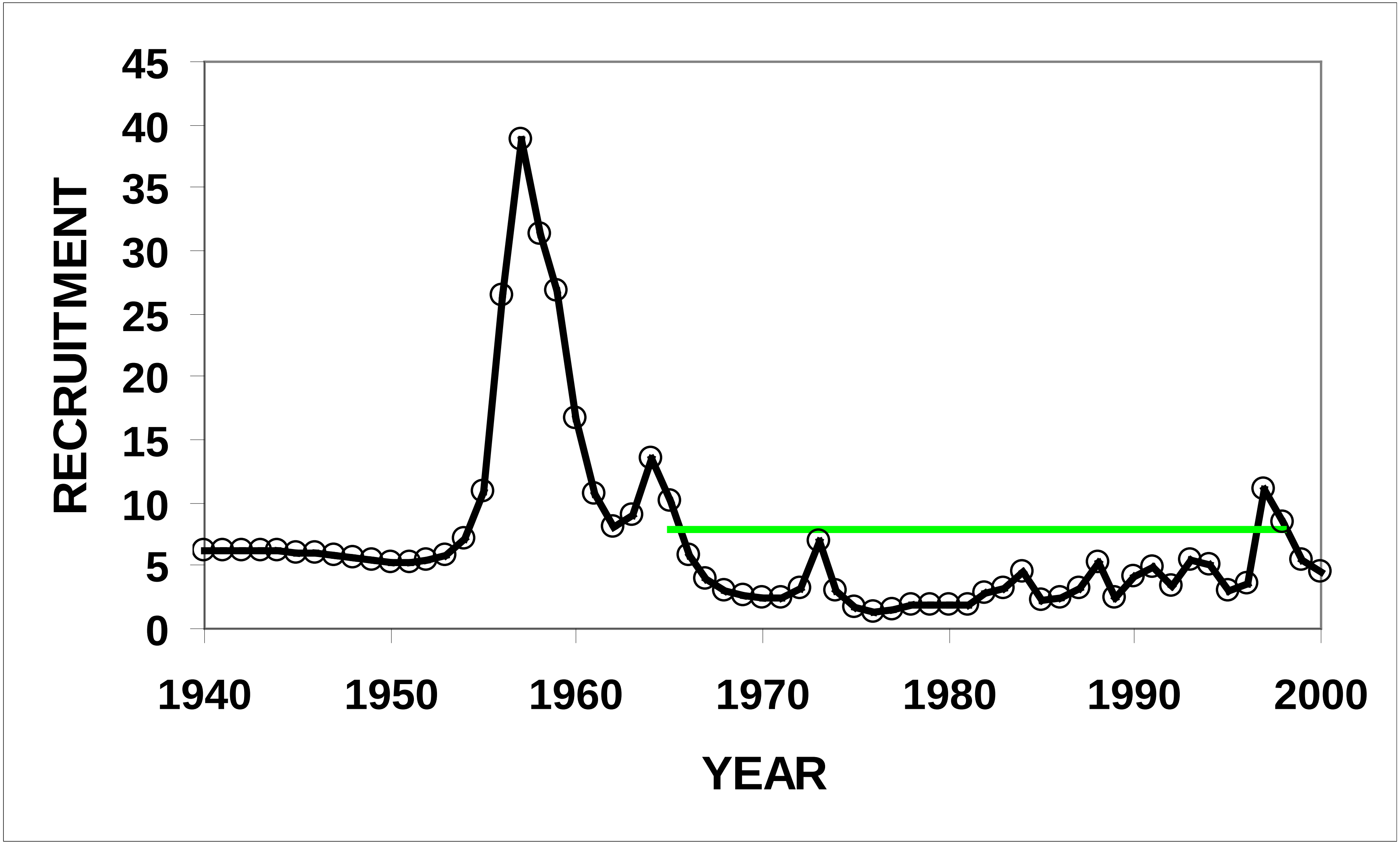
by Andre Punt and James Ianelli

Presented by Richard Methot

Sept. 12, 2001

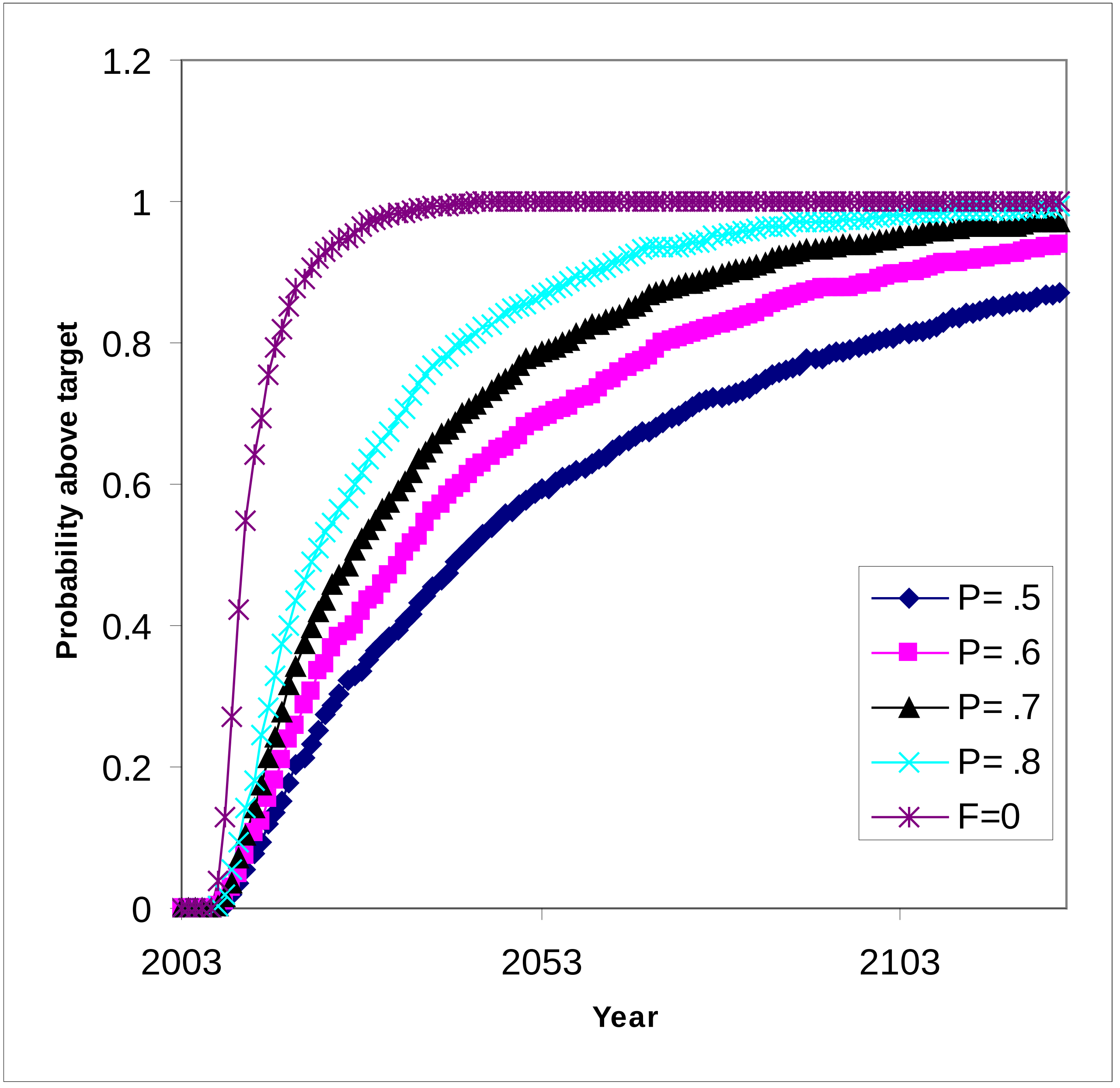


SPAWN BIOMASS
70000
60000
50000
40000
30000
20000
10000
0
1940
1950
1960
1970
1980
1990
2000
YEAR

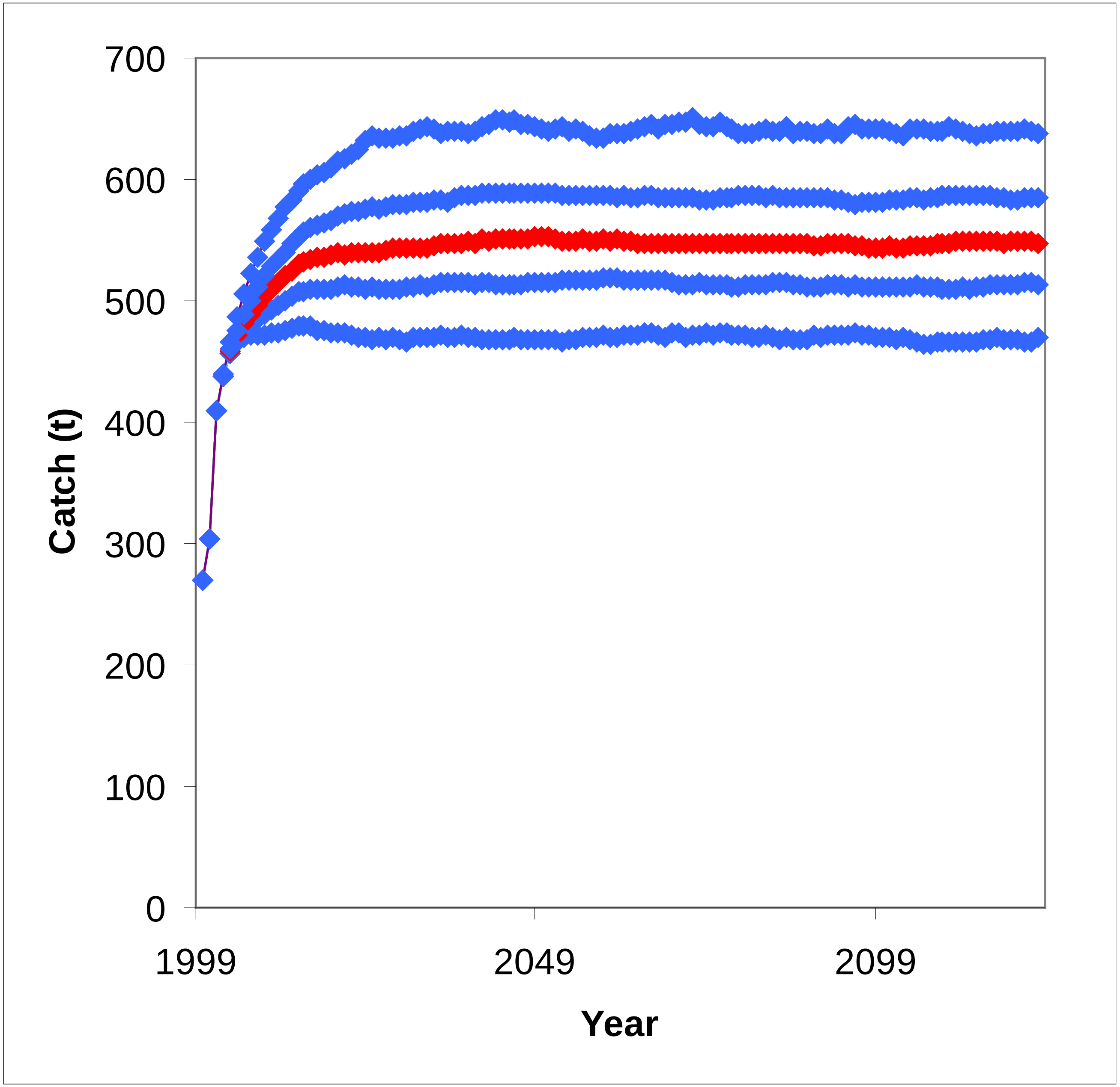

45
40
35
30
25
20
15
10
5
0
RECRUITMENT
1940
1950
1960
1970
1980
1990
2000
YEAR

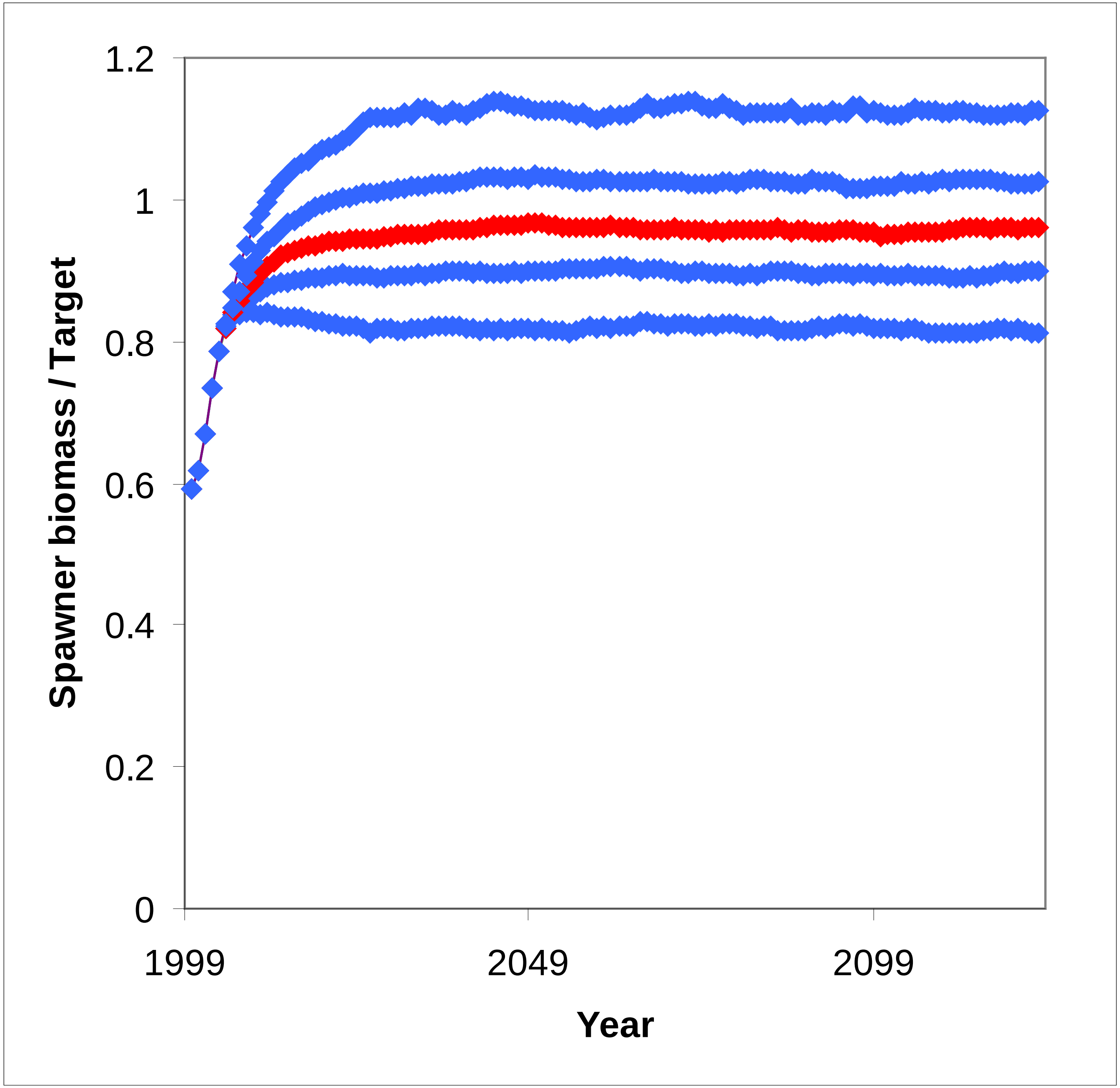
Time Frame

- Begin in 2000
- 50% Rebuild with F=0 by 2012
- Mean Generation Time = 30 years
- Maximum Year for Rebuilding = 2042



1.2
1
0.8
0.6
0.4
0.2
0
Probability above target
2003
2053
2103
Year
P= .5
P= .6
P= .7
P= .8
F=0


700
600
500
400
300
200
100
0
Catch (t)
1999
2049
2099
Year



1.2
1
0.8
0.6
0.4
0.2
0
Spawner biomass / Target
1999
2049
2099
Year

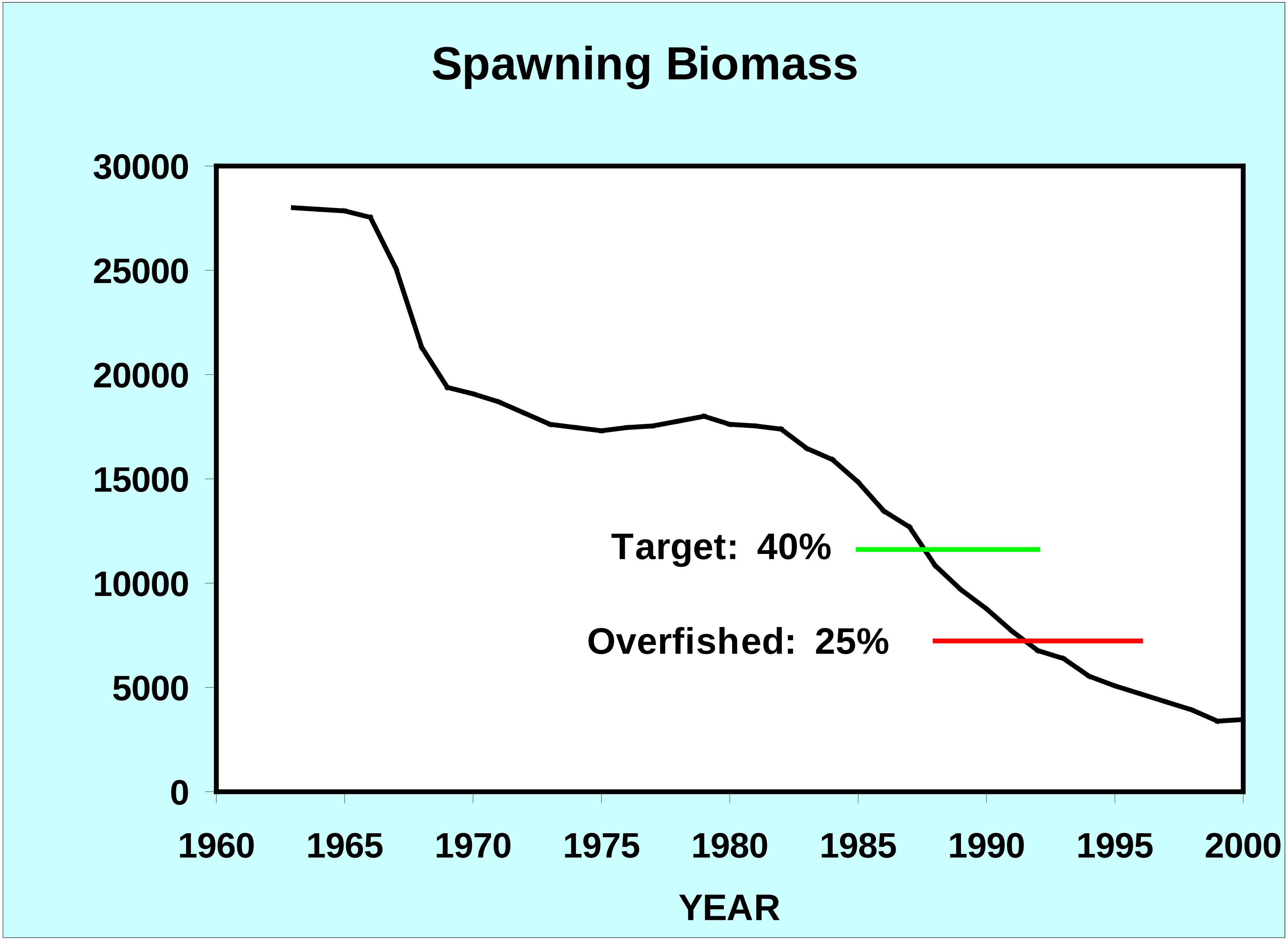
	Scenario	Baseline	Spawn/ Recr	Trim Series
	Virgin Years	Init	Init	Init
	Virgin Recr.	7822	7822	7822
	Virgin Spawn	60212	60212	60212
	Target (40%) Spawn	24085	24085	24085
	Spawn 1998/Virgin	0.217	0.217	0.217
	Resample from:	65-98	S/R	66-96
	Rebuild year with F=0	2012	2010	2016
	Max allowed rebuild year	2042	2040	2046
	F	0.0109	0.0311	0.0038
0.5	median rebuild year	2042	2040	2046
	OY in 2002	465	1313	163
	F	0.0096	0.0287	0.0031
0.6	median rebuild year	2034	2033	2037
	OY in 2002	410	1215	133
	F	0.0082	0.0266	0.0023
0.7	median rebuild year	2027	2028	2028
	OY in 2002	353	1126	101
	F	0.0068	0.0233	0.0014
0.8	median rebuild year	2022	2023	2021
	OY in 2002	291	991	59

Darkblotched Rockfish Rebuilding Analysis

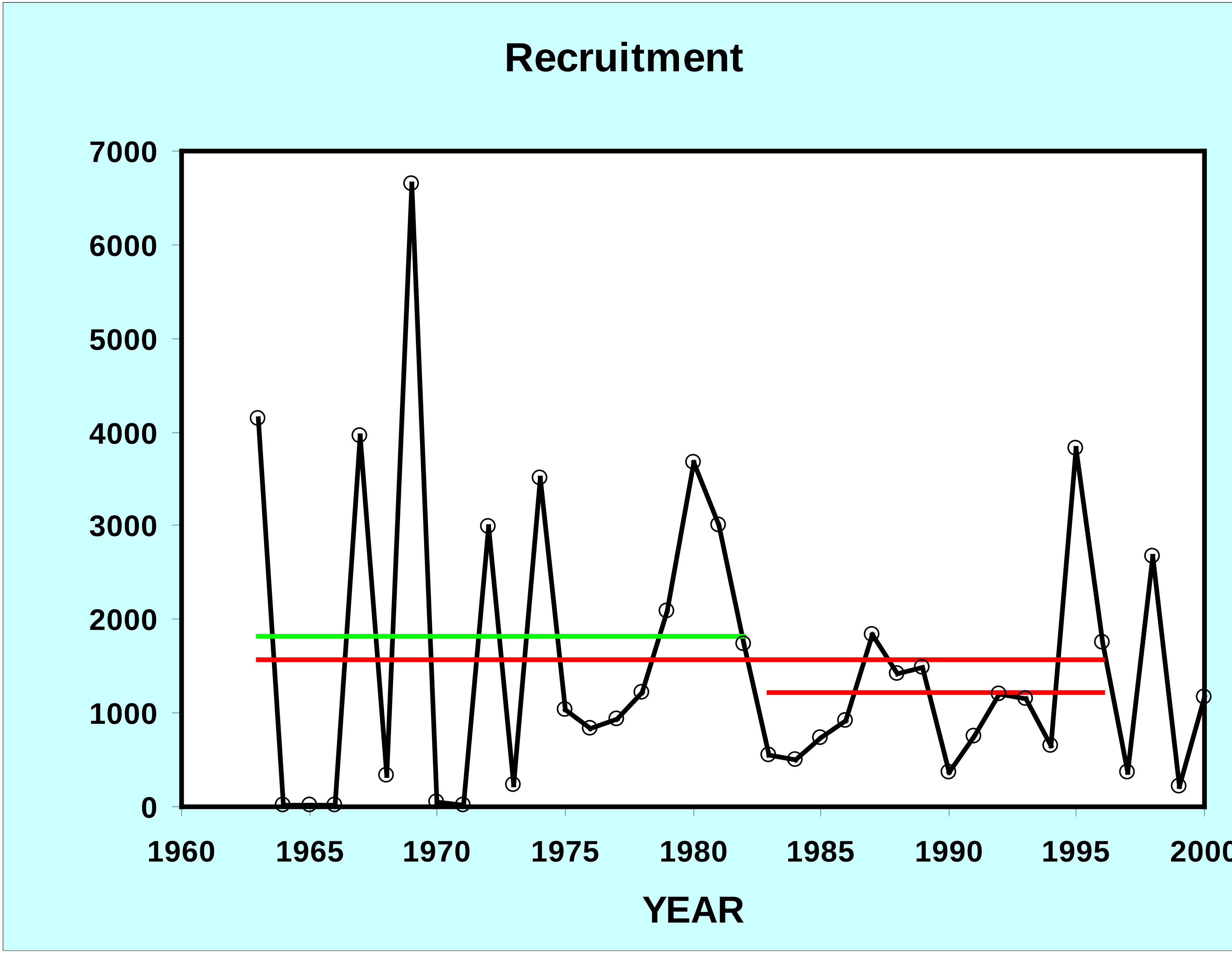
Richard Methot

NOAA Fisheries – NWFSC

Sept. 12, 2001



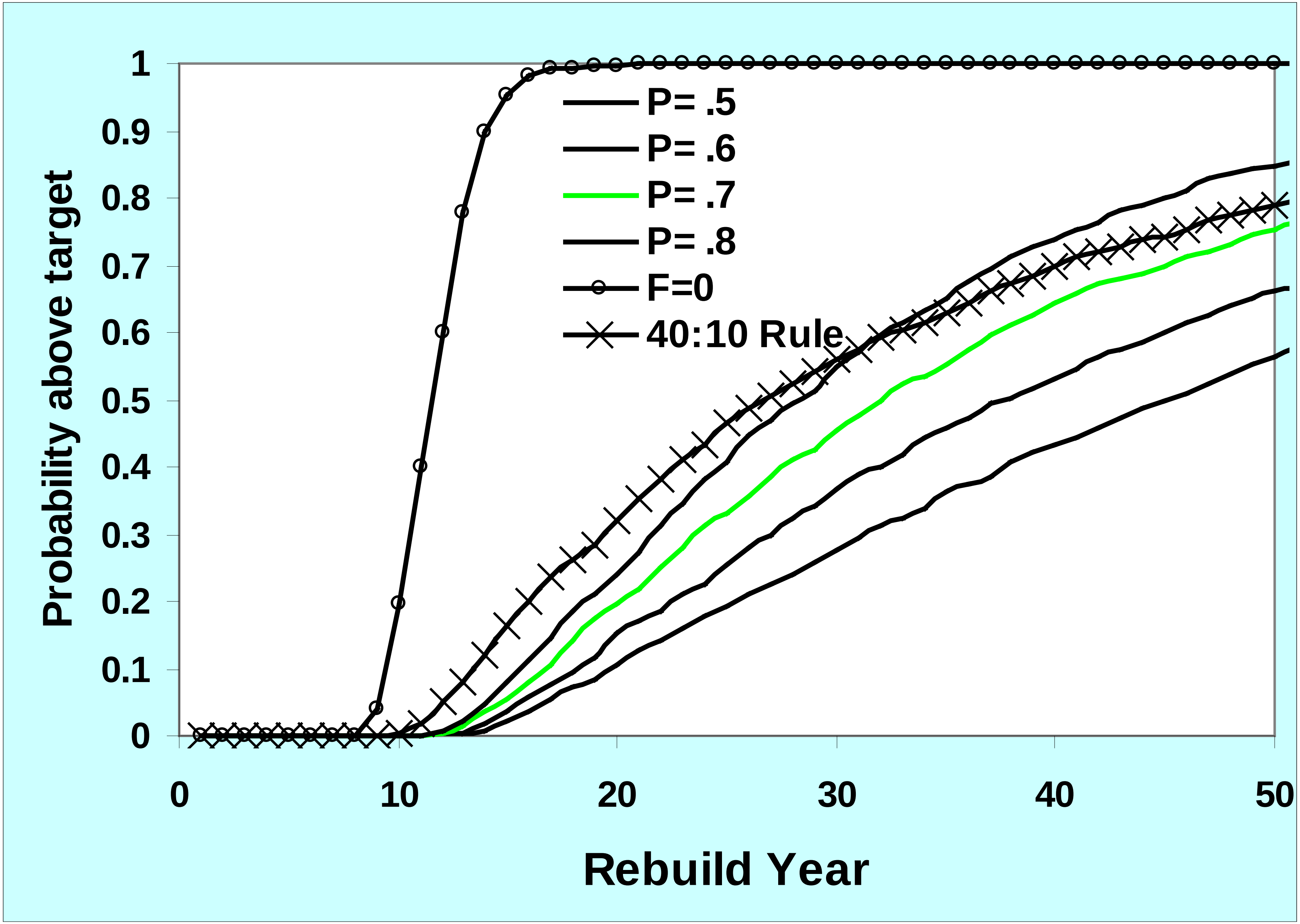
Spawning Biomass
30000
25000
20000
15000
10000
5000
0
Target: 40%
Overfished: 25%
1960
1965
1970
1975
1980
1985
1990
1995
2000
YEAR



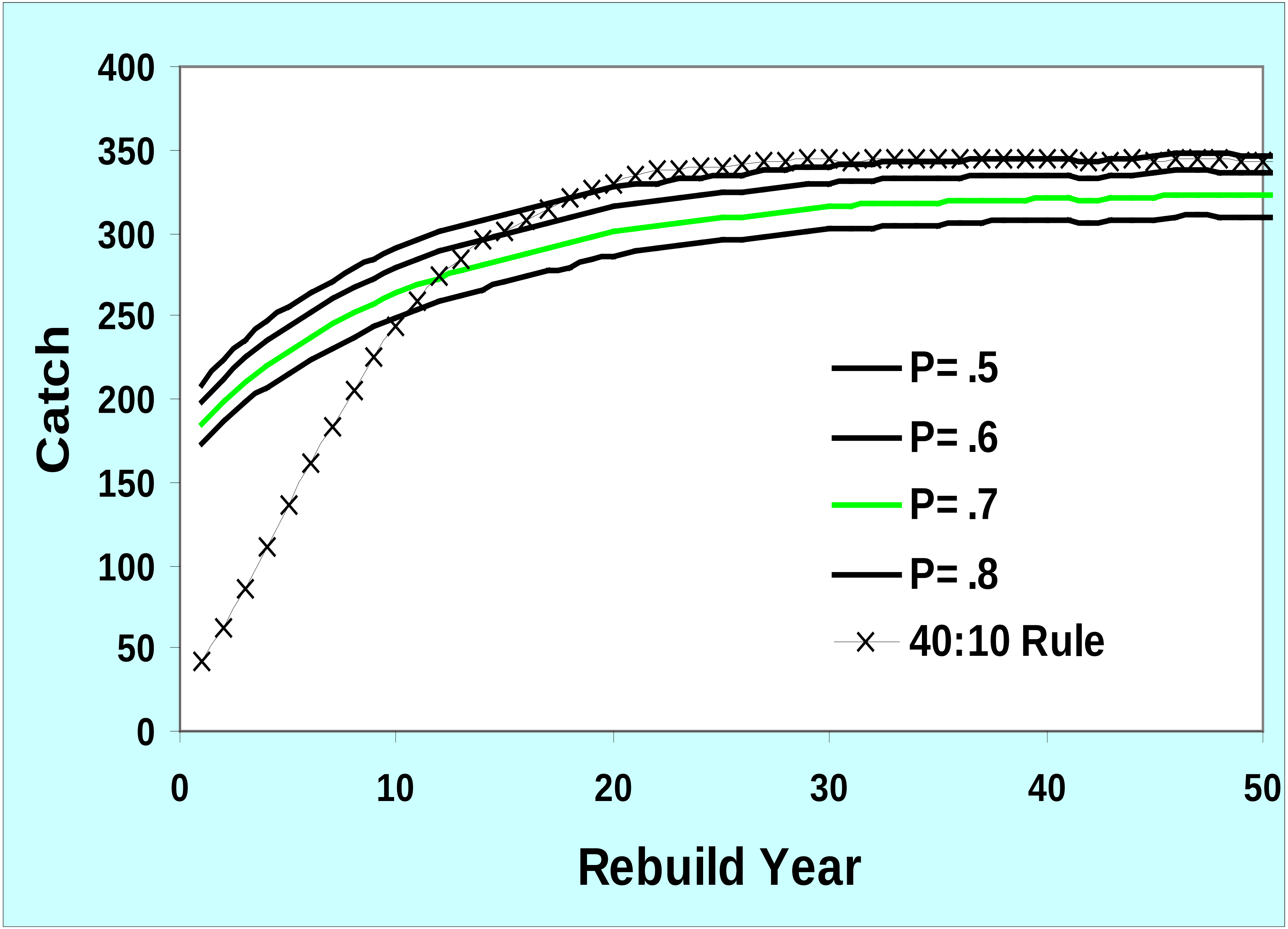
Recruitment
7000
6000
5000
4000
3000
2000
1000
0
1960
1965
1970
1975
1980
1985
1990
1995
2000
YEAR

Time Frame

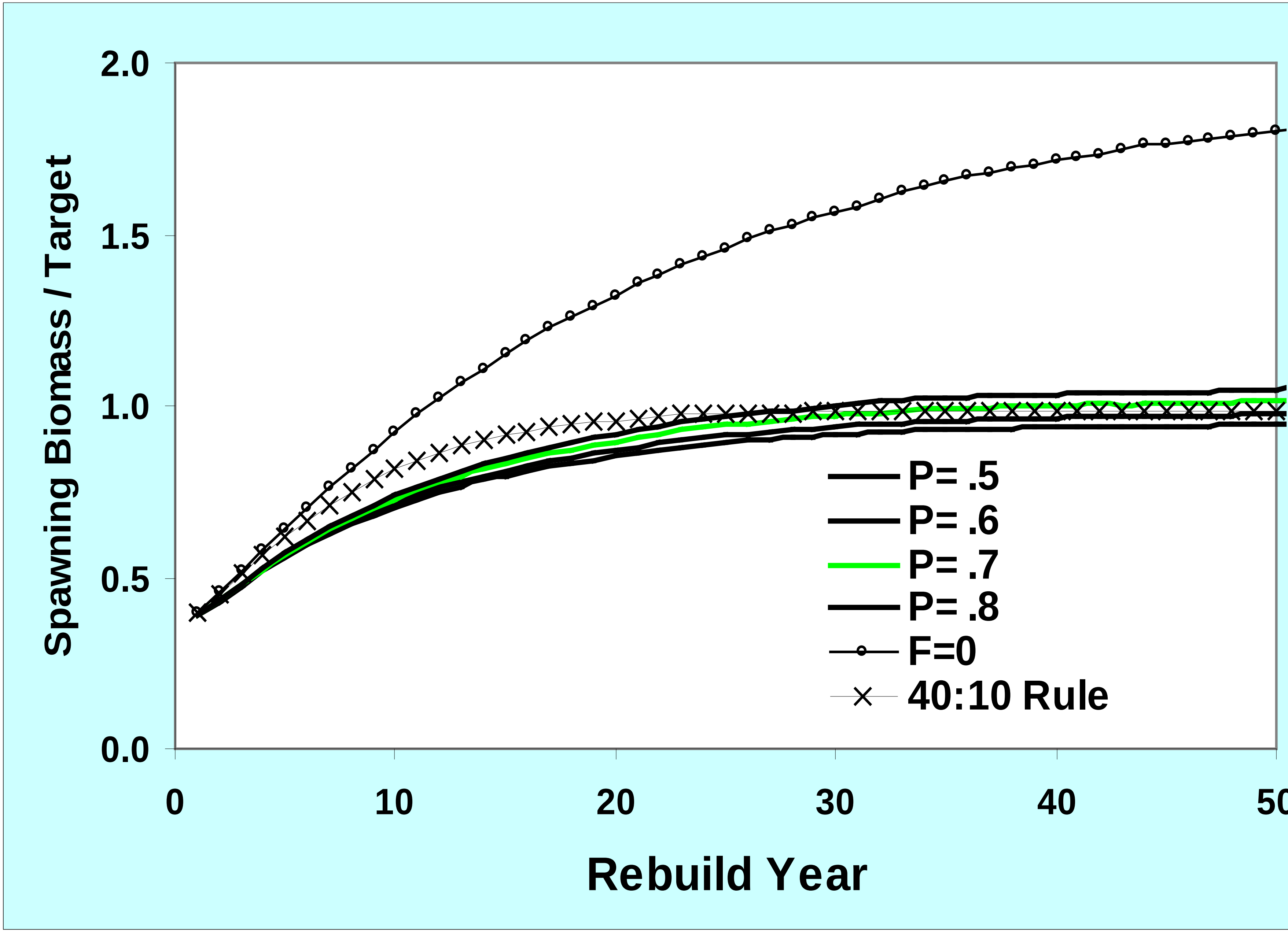
- Begin in 2002
- 50% Rebuild with F=0 by 2014
- Mean Generation Time = 33 years
- Maximum Year for Rebuilding = 2047



Probability above target
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
10
20
30
40
50
Rebuild Year
P= .5
P= .6
P= .7
P= .8
F=0
40:10 Rule



Catch
400
350
300
250
200
150
100
50
0
0
10
20
30
40
50
Rebuild Year
P= .5
P= .6
P= .7
P= .8
40:10 Rule



Spawning Biomass / Target
2.0
1.5
1.0
0.5
0.0
0
10
20
30
40
50
Rebuild Year
P= .5
P= .6
P= .7
P= .8
F=0
40:10 Rule

	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
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
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
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
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

Exhibit C.5.b
Supplemental GAP Report
September 2001

GROUNDFISH ADVISORY SUBPANEL STATEMENT ON REBUILDING PLANS

The Groundfish Advisory Subpanel (GAP) met jointly with the Scientific and Statistical Committee (SSC) to review rebuilding plans for several groundfish species. The GAP appreciates the SSC accommodating the joint meeting.

The GAP has three general concerns about the rebuilding plans that have been presented, and believes the canary rockfish plan in particular should be appropriately modified, as it will serve as the template for other rebuilding plans.

First, since rebuilding plans will be subject to environmental analysis, there is a need for complete social and economic data to be included, especially regarding the economic impact of plan alternatives on coastal communities. The canary plan, along with the others, is seriously lacking in this regard. Both the Magnuson- Stevens Fishery Conservation and Management Act and the National Environmental Policy Act call for full analysis of the effect of federal actions on the human environment. This includes economic impacts. It would be ironic if the Council corrected legal deficiencies regarding environmental information, but left itself open to legal challenge on lack of economic information.

Second, rebuilding plans must be flexible enough to accommodate new information, good or bad. We should not lock ourselves into a rebuilding strategy which may be based on incomplete information and find that our rebuilding program doesn't work or works better than we thought.

Third, the GAP continues to be concerned as to how rebuilding will be monitored and how rebuilding plans can be designed to respond to the results of that monitoring. There appears to be no clear strategy for monitoring the progress of rebuilding.

PFMC
09/12/01

Situation Summary
September 2001

EXEMPTED FISHING PERMIT APPLICATIONS

Situation: Three exempted fishing permits (EFPs) were approved at the June 2001 Council meeting with the understanding that progress updates would be provided at this September Council meeting. The goal of the first EFP, sponsored by Washington Department of Fish and Wildlife, is to measure bycatch rates of canary and other rockfish associated with targeted arrowtooth flounder fishing through an at-sea observer program. The second EFP, sponsored by the California Department of Fish and Game (CDFG), seeks to test the ability of trawls to selectively harvest chillipepper rockfish while minimizing the incidental catch of bocaccio rockfish in California waters. The primary purpose of the third EFP, sponsored by CDFG, Pacific Marine Conservation Council, and Mr. Kenyon Hensel, is to quantify the capacity for vertical hook-and-line gear to selectively catch yellowtail rockfish while minimizing the incidental catch of canary rockfish. Sponsors of these approved EFPs will report on their progress in implementing their respective EFP fisheries.

Additional EFP applications may be considered at this time if any are submitted for Council consideration.

Council Task:

1. Consider recommendations on existing EFPs.
2. Consider newly submitted EFP applications (if any).

Reference Materials: None.

Groundfish Fishery Strategic Plan (GFSP) Consistency Analysis

The GFSP supports bycatch reduction efforts and development of selective fishing techniques. The three approved EFPs are designed to gather information on methods to selectively harvest abundant species and determine bycatch rates of canary rockfish, bocaccio rockfish, and other groundfish species of concern.

PFMC
08/15/01

GROUNDFISH ADVISORY SUBPANEL STATEMENT ON EXEMPTED FISHING PERMITS

The Groundfish Advisory Subpanel (GAP) received reports from the Washington Department of Fish and Wildlife and the California Department of Fish and Game regarding progress made on exempted fishing permit fisheries.

While Washington has progressed further in its program using observers to record discards in specific trawl fisheries, both states have made substantial efforts to get their programs up and running. Given the need for more precise and accurate data, especially involving harvesting one species while avoiding another, the GAP is pleased with the progress made and encourages other entities to adopt similar experimental programs.

PFMC
09/12/01

PROPOSED MANAGEMENT MEASURES FOR 2002

Situation: Management measures adopted during the Council process are designed to implement new and existing rebuilding programs, achieve bycatch reduction mandates, keep total catch within the proposed harvest levels, and achieve optimum benefits to the various user groups and fishing communities. In the last two years the Council has implemented a substantial restructuring of the groundfish fishery that includes gear restrictions, seasons, and dramatically lower harvest levels consistent with previously-approved rebuilding programs for overfished species. In January 2001, widow and darkblotched rockfish were declared overfished by the National Marine Fisheries Service (NMFS). It is likely that NMFS will declare yelloweye rockfish overfished early next year based on the 2001 assessment of that species. In response, the Groundfish Management Team (GMT) recommends reduced optimum yields (OYs) for lingcod, Pacific ocean perch, yelloweye rockfish, and rockfish in the "other" and "minor *Sebastes*" complexes in 2002. Groundfish fisheries operating on the slope and targeting the Dover sole/thornyhead/trawl-caught sablefish complex are expected to be similarly constrained to protect declined darkblotched rockfish and to avoid future declines of sablefish. Two new assessments of the West Coast sablefish stock north of Pt. Conception indicate the need to consider reduced harvest of sablefish to avoid this stock being declared overfished in the near future. There are other new stock assessments and updated rebuilding analyses that may compel the Council to consider adjusting further harvest level and other management measure adjustments for 2002.

In order to alert the public of possible changes, the Council should develop specific management options at this meeting to help focus public attention on the extent of changes that may be necessary. A major goal would be to selectively harvest more abundant groundfish species without impacting overfished and depleted stocks. Both open access and limited entry management proposals will need to be considered for the commercial sector, as well as adjustments to existing recreational fisheries.

The Ad Hoc Allocation Committee Report (Exhibit C.7, Supplemental Attachment 1) is expected to propose a range of management approaches for 2002. The GMT and Groundfish Advisory Subpanel (GAP) will begin meeting on Monday, September 10 to consider these proposals. Both advisory entities will likely have additional suggestions for Council consideration.

There are two pieces of public correspondence regarding management measures designed to reduce fishing mortality on depleted rockfish (Exhibit C.7.d, Public Comment 1). The first, from Mr. Bill Perkinson of Los Osos, California, encourages the Council to lift the sport rockfish "closure" in Morro Bay. The second, an email transmission received at the Council office from Mr. Steve Edwards, laments the effect of rockfish-directed management measures on the fishing communities in Ventura County, California. A third comment letter from the West Coast Seafood Processors Association (Exhibit C.7.d, Public Comment 2) displays the change in Council-adopted, allowable harvest levels of the major groundfish species from 1996-2000.

Council Action: Adopt proposed 2002 management measures for public review (final action in November).

Reference Materials:

1. Exhibit C.7, Supplemental Attachment 1, Ad Hoc Allocation Committee Report.
2. Exhibit C.7.d, Public Comment 1.
3. Exhibit C.7.d, Public Comment 2.

Groundfish Fishery Strategic Plan (GFSP) Consistency Analysis

The GFSP supports making the necessary allocation decisions so that fishery participants can plan on a specific share of future OYs (Sec. II.A.1(3)) and establishing an allowable level of catch that prevents overfishing while achieving optimum yield based on best available science (Sec. II.A.2). The GFSP envisions choices made by the Council on 2002 management measures at this stage in the process would be consistent with these criteria.

The GFSP also supports establishing and maintaining a management process that is transparent, participatory, understandable, accessible, consistent, effective, and adaptable (Sec. II.C). The Council process of adopting specific proposed management measures at this September meeting would be consistent with these GFSP principles.

PFMC
08/29/01

GROUNDFISH ADVISORY SUBPANEL STATEMENT ON PROPOSED 2002 MANAGEMENT MEASURES FOR 2002

Due to the lack of time available to deal with this complex issue, the Groundfish Advisory Subpanel (GAP) was unable to have a group discussion on management proposals. Thus, the proposals that are included here consist of the submissions made by gear group / fishery subcommittees. Further, the GAP recognizes that - in order to meet the need for a range of proposals - these proposals in some cases represent the high and low ends of ranges, thereby providing the public an opportunity to comment so that the Council can refine their action at the next meeting.

LIMITED ENTRY TRAWL

Attached are proposed trip limits representing a range between the Council's preferred optimum yield (OY) numbers and the Council's high OY numbers.

LIMITED ENTRY FIXED GEAR

There was lack of consensus among members representing this gear group on what actions to take involving non-trawl sablefish. Listed below are options that have been put forth by GAP members representing the limited entry fixed gear fishery:

1. Maintain the current sablefish season (April to October)
2. Maintain the current sablefish season but require full retention during July, August, and September
3. Close the sablefish season in July and August
4. Close the sablefish season in July, August, and September

For species other than sablefish south of Mendocino, open and closed periods and areas would parallel recreational

OPEN ACCESS, NORTH OF MENDOCINO

Nearshore rockfish Option 1 (preferred):

1,000 lbs/month January 1 - April 30
2,000 lbs/month May 1 - September 30
1,000 lbs/month October 1 - December 31

Nearshore rockfish Option 2:

Season open May 1 - September 30, allowable catch of 2,500 - 3,500 lbs/month

Lingcod - 350 lbs/month May 1 - September 30
Shelf rockfish (plus yellowtail plus widow) - 100 lbs/month, no retention of canary, yelloweye
Slope rockfish - 500 lbs/ 2 months

The special fishery for Pacific City, OR would continue under appropriate catch limits

OPEN ACCESS SOUTH OF MENDOCINO AND SOUTH OF PT. CONCEPTION

Open and closed periods and areas would parallel recreational

WASHINGTON RECREATIONAL

The GAP endorses the range of options proposed by the WA Department of Fisheries and Wildlife

CALIFORNIA RECREATIONAL

The GAP endorses the range of options provided by the California Department of Fish and Game

Incidental catch rates for species in unconstrained tows for target species (>40% of total groundfish).
Used for bycatch assumptions for proposed 2001 trip limit changes
Data from 1999 Oregon/Washington trawl logbooks

	4th Quarter						
	Bycatch % of:						
Target species	Slope Rk	SSPN	CNRY	POP	Sable	LSPN	DOVR
Petrale sole [slope=MRCK in Q 1&4 only]	0.726%	0.523%	0.013%	5.165%	4.922%	0.514%	0.844%
English sole	0.259%	0.005%	0.036%	0.002%	0.410%	0.005%	0.883%
Other Flatfish in shelf depths >50 and <200 Fth	0.016%	0.002%	0.012%	0.000%	0.012%	0.000%	0.522%
Other Flatfish in near-shore depths <50 Fth	0.000%	0.098%	0.021%	0.000%	0.293%	0.000%	3.166%
Widow - Midwater	0.000%	0.000%	0.000%	0.021%	0.000%	0.000%	0.022%
Longspine NoC all Depths	0.077%	15.134%	0.103%	0.207%	36.210%		12.612%
Sablefish NoC all Depths	1.297%	13.767%	0.621%	1.499%		15.278%	45.244%
Dover sole all Depths	0.534%	2.347%	0.155%	0.611%	17.201%	2.857%	
Dover sole <200 ftms	0.935%	1.950%	0.454%	1.600%	13.192%	0.943%	
Arrowtooth flounder - All Depths	3.665%	1.989%	0.967%	6.075%	9.307%	0.345%	29.844%
Arrowtooth flounder <150 Fth	16.523%	3.500%	1.029%	7.148%	12.279%	0.179%	36.245%
Arrowtooth flounder >150 Fth	5.824%	1.099%	0.162%	5.443%	7.557%	0.443%	26.073%
POP [35% of MRCK assumed slope]	0.190%	0.513%	0.000%		7.464%	0.000%	0.544%
Yellowtail - Midwater	0.000%	0.000%	7.378%	0.477%	0.000%	0.000%	0.000%

STRATEGIC PLAN IMPLEMENTATION OVERSIGHT COMMITTEE REPORT
ON
PROPOSED MANAGEMENT MEASURES FOR 2002

At the Ad Hoc Groundfish Strategic Plan Implementation Oversight Committee (SPOC) August 30 conference call, Mr. Phil Anderson reviewed the Ad Hoc Allocation Committee meeting summary, focusing on their recommendations for 2002. Mr. Anderson highlighted that new assessment information prompted the Groundfish Management Team to recommend lower 2002 optimum yields (OYs) for several species; sablefish, Dover sole, widow rockfish, darkblotched rockfish, and yelloweye rockfish. These lower OYs will be very constraining to management of the groundfish fishery in 2002.

After review of the recommendations of the Ad Hoc Allocation Committee, the SPOC concluded the recommendations are consistent with the Strategic Plan.

PFMC
09/11/01

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
PROPOSED RECREATIONAL GROUNDFISH SEASON OPTIONS FOR 2002

The Washington Department of Fish and Wildlife (WDFW) is proposing the following recreational groundfish season options to be considered for public review:

Option 1a
A recreational rockfish bag limit of 10 rockfish, of which no more than one canary rockfish and one yelloweye rockfish can be retained; open year-round.

Option 1b
A recreational rockfish bag limit of 10 rockfish, of which no more than one rockfish can be canary or yelloweye; open year-round.

Option 2
Combine Option 1a or 1b with prohibiting the retention of yelloweye rockfish if Pacific halibut have been retained on the same fishing trip.

Under both options, WDFW would monitor its fishery and track its catch. If the Washington recreational yelloweye rockfish harvest guideline is projected to be exceeded, WDFW will take action to prohibit recreational groundfish fishing outside 25 fathoms.

STATUS OF FISHERIES AND 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.

The Council considers GMT and GAP recommendations, along with public testimony, before making recommendations to the National Marine Fisheries Service (NMFS) for inseason adjustments. At the June 2001 meeting, several adjustments were recommended and NMFS implemented the changes effective July 1 (Exhibit C.8, Attachment 1). The Council's task at this meeting is to review the available information and projections and recommend further adjustments as appropriate.

The next cumulative landing period begins October 1 and reductions to landing limits would take effect at that time. Some increases to cumulative vessel landing limits may be appropriate and these might be implemented prior to October 1 in order to provide more opportunity for fishers to take the increased limits. Vessels will have to wait until the regulations change before they have access to the larger limits.

Council Task:

1. Adopt inseason adjustments as necessary.

Reference Materials:

1. NMFS Public Notice: Changes to Groundfish Landings Limits off Washington, Oregon, and California, Effective July 1, 2001 (Exhibit C.8, Attachment 1).

Groundfish Fishery Strategic Plan (GFSP) Consistency Analysis

The GFSP supports establishing an allowable level of catch that prevents overfishing while achieving optimum yield based on best available science (Sec. II.A.2). The GFSP also supports establishing and maintaining a management process that is transparent, participatory, understandable, accessible, consistent, effective, and adaptable (Sec. II.C). The Council process of adopting inseason adjustments to landing limits is consistent with these GFSP principles.

PFMC
08/21/01

Exhibit C.8.b
Supplemental EC Report
September 2001

ENFORCEMENT CONSULTANTS REPORT ON STATUS OF FISHERIES AND INSEASON ADJUSTMENTS

The Enforcement Consultants (EC) have reviewed the Groundfish Advisory Subpanel (GAP) and California Department of Fish and Game (CDFG) options and have the following comments:

California Recreational Fishery (less than 20 fathoms)

The EC would ask language be included stating any vessel in possession of nearshore rockfish may not fish for any other species outside the 20 fathom curve (i.e., California halibut or other state-managed species).

California has already addressed fishing on offshore islands and returning to the main land by a permit process.

This language has been discussed with the GAP, and they concur.

PFMC
09/13/01

GROUNDFISH ADVISORY SUBPANEL STATEMENT ON STATUS OF FISHERIES AND INSEASON ADJUSTMENTS

The Groundfish Advisory Subpanel (GAP) held several joint meetings with the Groundfish Management Team (GMT) to discuss inseason adjustments. The GAP has the following comments, based on the inseason recommendation chart presented to the Council by the GMT.

Limited Entry Midwater Trawl

Under current regulations, the midwater trawl fishery for widow rockfish is scheduled to re-open October 1st with a 10,000 pound cumulative limit, changing to a 10,000 pound, 2-month limit for November and December. The yellowtail midwater trawl fishery is scheduled to re-open on October 1st with a 15,000 pound cumulative limit, changing to a 20,000 pound, 2-month limit for November and December.

The GAP supports continuing the openings as scheduled, but strongly urges NMFS concentrate observer coverage on midwater vessels in order to monitor interactions between widow and yellowtail. This will provide important data for designing the 2002 fishery.

California Recreational Fishery

The GAP supports a change in the nearshore (less than 20 fathoms) recreational bag limit which would allow retention of 2 lingcod over 26" and 2 shelf or slope rockfish other than bocaccio, canary, yelloweye, or cowcod. Any vessel in possession of near shore rockfish may not fish for any other species outside the 20 fathom curve. California has already addressed the issue of fishing on offshore islands and returning to the mainland through a permit process.

Whiting Reallocation

NMFS has proposed to re-allocate a portion of the tribal whiting set-aside to the non-tribal fishery. The Council has raised questions about the effect of the reallocation on canary bycatch.

Based on figures supplied by NMFS, it appears the effect on canary bycatch will be minimal. The at-sea whiting fishery has taken fewer canary than projected. Set-asides of canary for research have used less than anticipated. Recreational catches of canary are still being analyzed. In combination, this should provide enough canary to cover any slight increase in canary bycatch. The GAP believes the reallocation should be made as originally planned.

Sablefish Issue

The GMT has identified three options regarding sablefish harvest for the remainder of the year. The GAP has no consensus on this issue and presents no opinion. Individual GAP members will provide comments through public testimony. GAP members expressed concern about the lack of prior notice, opportunity for comment, and analysis of the two options that differ from status quo.

Northern Near Shore Fishery

The GMT presented two options for the northern near shore rockfish fishery. The GAP expressed a preferences for the option allowing continued harvest of northern near shore rockfish (2,000 pounds per month) with an incidental allowance for lingcod and shelf rockfish other than yelloweye.

PFMC
09/13/01

Pacific Fisheries Management Council

September 13, 2001

Wednesday we heard the processor's representative to the GAP say that closing the blackcod trawl fishery will result in the fish plants shutting down until crab season. This will result in elimination of the market for most boats from October through early December.

I would like to request that an economic analysis be conducted prior to the council taking this drastic action. I would like to know the effect on the port communities and the plant workers of a 30 to 60 day plant closure.

Thank You

Terry Thompson
5123 NW Agate Way
Newport, OR 97365

AMENDMENT 15 TO THE GROUNDFISH FISHERY MANAGEMENT PLAN - AMERICAN FISHERIES ACT

Situation: The American Fisheries Act (AFA) of 1998 provides the Council the opportunity to recommend management measures to protect West Coast fisheries from harm caused by the AFA. The AFA provides vessels in the Bering Sea pollock fishery greater flexibility in when and how they participate in that fishery. The concern is that AFA vessels will use benefits gained from the AFA to move into West Coast groundfish fisheries, increase effort, and cause harm to current participants.

In response to these concerns, the Council developed a suite of management alternatives to provide various levels of protection for the West Coast groundfish fishery. These alternatives are being developed into an amendment to the groundfish fishery management plan (Amendment 15). At the June Council meeting, staff presented a preliminary analysis of the proposed management measures. The Council also received information from the Groundfish Advisory Subpanel (GAP) and public about the proposed measures. Two additional management options were recommended by the GAP (Exhibit C.9, Attachment 3).

The Council directed staff to include GAP Option 1 in Amendment 15, and complete the analytical portions of Amendment 15 in time for Council review in September 2001. In addition, the Council requested an analysis comparing the proportion of groundfish harvested by AFA vessels before and after implementation of the AFA.

At this meeting, the Council will review an analysis of the proposed management alternatives, and, possibly, select preferred alternatives. The Council will also review an analysis comparing pre and post AFA harvest. Based on this latter analysis, the Council could request GAP Option 2 be incorporated into Amendment 15.

Preliminary action on Amendment 15 could occur at this meeting (if GAP Option 2 is not added), with the Council directing staff to finalize and distribute Amendment 15 for public review. Depending on workload priorities, final action could occur in March or April 2002. If GAP Option 2 is added, analyses for Amendment 15 will require additional work, thus, preliminary action would likely occur in March 2002, with final action possibly in April 2002.

Two attachments are provided to aid Council deliberation. Attachment 1 (Excerpts from Amendment 15 – Environmental Assessment [EA]/Regulatory Impact Review [RIR]) discusses the rationale for developing protective management measures (Section 1) and details the management alternatives developed by the Council (Section 2). Draft language for amending the groundfish fishery management plan (FMP) is also included in this attachment. This draft language highlights the specific provisions in the FMP that could be affected by the proposed measures. A “technical amendment” is also included to alter the FMP section pertaining to the Limited Entry Permit Issuance Review Board. The amendment would move these provisions from the FMP to the Council Operating Procedures. If this change is adopted, appeals of a NMFS decision to issue or not issue an AFA permit would not be dealt with through the Council process. This is similar to what is done for sablefish endorsements and tier assignments.

Attachment 2 (Analysis of Management Alternatives) is a comparative analysis of the proposed management alternatives. It provides the basis for Council selection of preferred alternatives. This document also includes analysis of participation prior to and following implementation of the AFA.

Council Task: **Provide guidance on staff recommendations.**

Reference Materials:

1. Exhibit C.9, Attachment 1, Excerpts from Amendment 15 – EA/RIR.
2. Exhibit C.9, Attachment 2, Analysis of Management Alternatives.
3. Exhibit C.9, Attachment 3, June 2001 GAP Report.

4. Exhibit C.9.b, Supplemental GAP Report.

<u>Groundfish Fishery Strategic Plan (GFSP) Consistency Analysis</u>

The direct benefits of these management measures relate to preventing harm to West Coast groundfish fishery participants. However, protective management measures could provide indirect benefits consistent with the GFSP. AFA management measures restricting participation of AFA vessels could facilitate attainment of GFSP capacity reduction goals, and possibly reduce latent capacity. These measures might also facilitate allocation decisions by reducing the number of participants competing for limited resources.

PFMC
08/23/01

GROUNDFISH ADVISORY SUBPANEL REPORT ON AMENDMENT 15 TO THE GROUNDFISH FISHERY MANAGEMENT PLAN - AMERICAN FISHERIES ACT

The Groundfish Advisory Subpanel (GAP) reviewed options for a fishery management plan (FMP) amendment to address impacts of the American Fisheries Act (AFA). A majority of the GAP supported the following as preferred alternatives for public review. Our comments are based on the issues and analysis laid out in Exhibit C.9, Attachment 2. The majority GAP opinion reflects a presentation made by whiting fishermen and offshore processors.

Issue 1 - Qualification and Subdivision

Question 1: Should AFA catcher vessel participation be limited?

The majority of the GAP prefers Option 1.a, limit vessels by sector (at-sea, shore-side, non-whiting).

Question 2: Should qualification require that a permit be held on a specific date?

The GAP supports Option 1.a, no date requirement.

Question 3: What landing requirement should be used?

The qualifying landings must have occurred during the period of January 1, 1994 to September 16, 1999.

In regard to landing requirements, the GAP believes that one additional piece of analysis needs to be done in order to determine whether a 50 ton or a 500 ton requirement is most appropriate. The GAP requests that a simple analysis be done for vessels that qualify for non-whiting groundfish using the 50 ton criterion. The analysis should list: the length of the vessels qualified; the years that those vessels delivered non-whiting groundfish; the number of trips by each vessel per year during the qualifying period; and the poundage of non-whiting groundfish delivered per vessel per year. This will help determine if the 50 ton limit is sufficient to provide the protections required under the American Fisheries Act.

Issue 2 - Catcher Vessel Restrictions

The majority of the GAP supports Option 2.a, which requires issuance of a medallion. Vessels qualifying by virtue of having met landing requirements would be issued a medallion which restricts the vessel to participation in the sectors for which the vessel qualifies. Medallions would be transferable under the same conditions and restrictions as apply to limited entry permits. However, medallions would be transferable only as a whole. In other words, a vessel qualifying for more than one sector cannot subdivide its medallion among those sectors.

Issue 3: Catcher - Processors

The GAP supports Option 3.a

Issue 4: Motherships

The GAP supports option 4.a

Issue 5: Duration

The GAP supports Option 5.b

Issue 6: Appeals and Technical Amendment

The GAP supports Option 6.b and the technical amendments regarding permit review proposed by Council staff.

PFMC
09/13/01

1. The owner of the vessel has had many years of history fishing ground fish off of the coast. And met the requirements for a ground fish permit with shoreside landings and offshore whiting landings.

2. This is not an AFA issue to us.

   a. We have pursued a shoreside whiting market for many years.
   b. Market availability came from new processing capabilities.
   c. We have not been fishing during most of the June through August period for many years.

3. We have been advised that the Magnuson Act states that recent participation must be considered if no action has been taken. Also there is president set in quite a few cases on this subject already.

Supplemental C. 9

Dave Jencks, Brent Payne **DRAFT**

Joint Industry AFA Proposal

Objective: To prevent a net increase in capacity of the AFA fleet that would reduce opportunity for non-AFA boats.

MTC UCB Proposal: Implement a system of qualifying criteria for CVs in the three sectors:

- traditional groundfish
- mothership whiting
- shoreside whiting

Qualification period: would be based on deliveries between 1994 and the Council's September 16, 1999 control date.

Landing requirements: apply to AFA CVs by sector as follows:

- Traditional groundfish:
50 tons of groundfish or 10 deliveries of groundfish (non-whiting)

- Mothership whiting:
50 tons of whiting

- Shoreside whiting:
50 tons of whiting

Implementation: would be accomplished by issuing "medallions" to vessels that had met qualifying landing criteria (specific to the sector in which the vessel qualified). In order for an AFA CV to participate in a fishery it must have on board both a valid LE and a valid "medallion" tied to the vessel length.

Transferability: AFA vessels may lease either LE permits or "medallions" based on the rules that apply under the current LE program. Vessel "medallions" are issued as a single inserverable package for vessels qualifying in multiple sectors.

Notes on Joint Proposal

Objective: *To prevent a net increase in capacity of the AFA fleet that would reduce opportunity for non-AFA boats.*

Note - The Sideboard actions should not be a tool to protect AFA boats from AFA boats. Nor should it be a tool to selectively implement capacity reduction.

Note – Attachment 2 of Exhibit C-9 "Analysis of Management Alternatives" shows 112 CVs qualify for AFA, though less than 35 have participated in any West Coast groundfish fishery.

MTC UCB Proposal: *Implement a system of qualifying criteria for CVs in the three sectors:*

- *traditional groundfish*
- *mothership whiting*
- *shoreside whiting*

Note – The intent of the proposal is to stabilize capacity in each sector of the groundfish fishery by AFA participants at the levels equal to or less than capacity at the time of the control date announced by the Council in September of 1999.

Qualification period: *would be based on deliveries between 1994 and the Council's September 16, 1999 control date.*

Note – Everyone was put on notice of this proposal by the Council's issuance of a control date. Vessels that were implementing plans made prior to the AFA (aquiring permits, installing RSW) to fish in the shoreside whiting sector are covered by the "prove-up" window provided by the control date.

Note – Using the 1994-1997 window is inappropriate since the AFA was not passed until October of 1998.

Landing requirements: *apply to AFA CVs by sector as follows:*

- Traditional groundfish:
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Note – The tables, A-1, 2, & 3 of the appendix to the analysis indicate the numbers of qualifying vessels for each sector.
CV Mothership sector whiting – 31 vessels tons *(31 vessels at 1000 tons)*
CV Shoreside sector whiting - 20 vessels *(18 vessels at 500 tons)*
Traditional groundfish – 14 vessels at 50 tons, 18 with 10 deliveries *(9 vessels at 100 tons, 15 vessels with 20 deliveries)*

Note - These criteria appear fairly liberal. However, there is very little marginal benefit to selecting a different (higher) level. It should also be remembered that these are not cumulative harvests over the qualifying period, these are the harvests in any one year. Theses levels avoid the need to address individual "hardship" cases.

Note – The numbers of qualifying vessels should be measured against the potential pool of new entrants. Out of the 112 AFA CVs, this proposal exludes 81 AFA vessels from mothership whiting, 92 AFA vessels from shoreside whiting, and 98 vessels from traditional groundfish.

Implementation: *would be accomplished by issuing "medallions" to vessels that had met qualifying landing criteria (specific to the sector in which the vessel qualified). In order for an AFA CV to participate in a fishery it must have on board both a valid LE and a valid "medallion" tied to the vessel length.*

Note – The proposal is more restrictive than the staff analysis interpretation of the medallion system. It treats medallions as tied to the vessel length in the same way the LE's are tied to vessel length. This means that a "medallion" earned by a 75' vessel that packs 175,000 lbs of whiting can't be used on a 150' vessels that packs a 1,000,000 lbs.

Transferability: *AFA vessels may lease either LE permits or "medallions" based on the rules that apply under the current LE program. Vessel "medallions" are issued as a single inserverable package for vessels qualifying in multiple sectors.*

Note – The transferability provision includes an important restriction that "medallions" are issued in an inservable package. This means a vessel that qualifies in two or more sectors can not continue fishing in one sector while leasing its medallion for a different sector to another AFA vessel.

Other Comments on AFA

The analysis shows average whiting catch increasing by AFA vessels, while decreasing by non-AFA vessels. What the analysis fails to explore is why this occurred.

The analysis does show that the number of motherships has dropped from 11 in 1994 to 8 in 1996, and to 6 in 1999. Markets are like musical chairs – if the number of markets are reduced some catcher vessels lose their markets and with it their catch of whiting. The average catch of the remaining vessels goes up. Because AFA vessels are generally higher horsepower, they have tended to retain their markets while non-AFA vessels (as well as lower horsepower AFA vessels) have lost their mothership markets.

Because the mothership whiting season does not overlap in time with the Pollock season, this cannot be described as an impact of the AFA, at least insofar as the AFA allows CVs increased flexibility as to when they harvest Pollock.

Most of the motherships that no longer are in the fishery were CP vessels that went to Russia and were prevented from returning by the AFA. This was the greatest impact of the AFA on non-AFA CVs even though it was an indirect impact.

It would be unfortunate if the "sideboard" were used as a pretext to impose limited entry for processors in the mothership market. Doing so would "protect" AFA motherships from other AFA mothership, while institutionalizing the loss of markets for non-AFA CVs.

Chris Peterson C.9.
Suppl. Public Comment AFA
Speaker notes
September 2001

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The analysis does show that the number of motherships has dropped from 11 in 1994 to 8 in 1996, and to 6 in 1999. Markets are like musical chairs – if the number of markets are reduced some catcher vessels lose their markets and with it their catch of whiting. The average catch of the remaining vessels goes up. Because AFA vessels are generally higher horsepower, they have tended to retain their markets while non-AFA vessels (as well as lower horsepower AFA vessels) have lost their mothership markets.

Because the mothership whiting season does not overlap in time with the Pollock season, this cannot be described as an impact of the AFA, at least insofar as the AFA allows CVs increased flexibility as to when they harvest Pollock.

Most of the motherships that no longer are in the fishery were CP vessels that went to Russia and were prevented from returning by the AFA. This was the greatest impact of the AFA on non-AFA CVs even though it was an indirect impact.

It would be unfortunate if the "sideboard" were used as a pretext to impose limited entry for processors in the mothership market. Doing so would "protect" AFA motherships from other AFA mothership, while institutionalizing the loss of markets for non-AFA CVs.

GROUNDFISH FISHERY MANAGEMENT PLAN ENVIRONMENTAL IMPACT STATEMENT

Situation: The National Marine Fisheries Service (NMFS) is preparing an environmental impact statement (EIS) on federal management of the Pacific Coast groundfish fishery. This is a comprehensive EIS that will review the current status of the federal groundfish management program, condition of the groundfish resource, and the socioeconomic conditions of the fishery. The EIS will discuss a range of future policy alternatives and implementation options, including provisions in the Council's Groundfish Fishery Strategic Plan (GFSP). The document will include analysis of the potential effects on the human environment, such as essential fish habitat, target and non-target fish species, and socioeconomic conditions.

Mr. Jim Glock, the NMFS Groundfish EIS project manager, will discuss the relationship of the EIS process to the existing Groundfish FMP and summarize progress to date in EIS development. The update will inform the Council of the result of the public scoping process and other planning decisions made relative to structure, content, and schedule of the EIS.

Note that under agenda item I.2, the Council will appoint membership to an EIS oversight committee to coordinate Council input over the course of the EIS development process.

Council Task:

1. Provide guidance as appropriate on the EIS process.

Reference Materials:

1. *Scoping Summary Report, Pacific Coast Groundfish Fishery Supplemental Environmental Impact Statement, National Marine Fisheries Service Northwest Region,* (Exhibit C.10, Attachment 1).

Groundfish Fishery Strategic Plan (GFSP) Consistency Analysis

The GFSP broadly supports effective public involvement during and beyond the transition to sustainable groundfish fishery management. The GFSP also specifically seeks to update the goals and objectives in the current groundfish FMP to incorporate GFSP visions and goals (Sec. II.C.(d)3). The EIS will provide a public forum vehicle for assessing and incorporating GFSP visions and goals into the Groundfish FMP.

PFMC
08/27/01

Exhibit C.10.a
Supplemental GAP Report
September 2001

GROUNDFISH ADVISORY SUBPANEL STATEMENT ON GROUNDFISH FISHERY MANAGEMENT PLAN ENVIRONMENTAL IMPACT STATEMENT

The Groundfish Advisory Subpanel (GAP) received a report from Mr. Jim Glock regarding the progress made on developing an environmental impact statement (EIS) for the Pacific groundfish fishery.

While Mr. Glock should be commended for the amount of work he has done, at some point the Council will need to provide a coordinating body to help develop preferred alternatives and complete the EIS process. The GAP recommends the Council appoint an ad hoc committee to assist in this regard and requests that one or more members of the GAP be assigned to help assist in the effort.

PFMC
09/12/01

Donna Darm, Acting Regional Administrator
National Marine Fisheries Service
7600 Sand Point Way NE Bin C 15700
Seattle, Washington 98115

June 26, 2001

Re: Groundfish EIS

I write as Oregon Chair of the Recreational Fishing Alliance, as a representative of Oregonians for Fish and Fishing, many of whose members are recreational marine groundfishermen, and as a recently appointed non-charter recreational member of the PFMC Groundfish Advisory Subpanel, for the purpose of commenting on the general direction of drafting a new environmental impact statement for the Pacific coast groundfish fisheries.

After a survey of the basic legislation, and the NOAA NEPA directive, I find that most of my comments relate more directly to implementation of the Magnuson-Stevens Fishery Conservation and Management Act as amended, rather than with the required EIS. It appears that any fair analysis of NMFS' regulatory actions with regard to the groundfishery in the past 10 years would conclude that the agency has allowed commercial fishermen to strip-mine the ocean to the detriment, nay, almost the extirpation, of a number of groundfish species. This certainly is an environmental disaster that must be the setting for a change of course. It has had immense deleterious effects on the commercial groundfishery. It is also a disaster for recreational fishermen and the many businesses associated with coastal sportfishing. However, NEPA does not seem to be concerned with impact on segments of society, and while it cites impact on "the human environment," it seems to be very weak in requiring analysis of impacts of agency actions on cultural or economic interests of non-Indians.

The main connection that I can see is that NOAA regulations require that decisions taken pursuant to an EIS must be in compliance with all laws. In my view, the agency, and its Pacific Fisheries Management Council, has for years ignored the protections afforded recreational fishing, both charter and non-charter, in the Magnuson-Stevens law in favor of a deeply solicitous responsiveness to commercial fishing and seafood processors favoring maximum extraction and profit. This has led to unsustainable harvest, which certainly is contrary to the law. Therefore, it could be said that compliance with the Magnuson-Stevens law has not been achieved, or even approached with regard to the groundfishery. In addition, allowing the commercial industry to wipe out the fish of the recreational sector, necessitating draconian cut-backs in recreational fishing, is hardly an equitable allocation of the resource as required by Magnuson-Stevens. In fact, it can't be interpreted as other than an additional violation of the intent of the law.

The PFMC has for years used charterboat operators as surrogates for "recreational fishermen," when it is clear that unlike non-charter recreational fishermen, they have a financial interest in continued high extraction. Charterboat operators, furthermore, tie up at the same docks that commercial fishermen do, and have a built-in need not to cause any notice on the docks. And finally, it just seems unconscionable that a very small handful of commercial charter operators are treated as though they represent the thousands upon thousands of non-charter recreational fishermen along the coast and inland. For public input, reliance has been upon meetings of a weeks' duration, that almost no person with a job to maintain could possibly attend, or poorly advertised and attended meetings such as the scoping meetings for this EIS effort. When the telephone surveys, personal interviews, and questionnaires of modern sociology are so available to modern management, it is unacceptable that neither NMFS nor the PFMC have availed themselves of readily used methods for obtaining input from the affected public, and have chosen instead to proceed, essentially, as though only commercial fishing, foodfish processing, charterboat operations, and tribal interests, were affected by each agency's decisions. When questioned on this issue, agency personnel invariably state that recreational fishermen have never shown any interest. What appears to be a failure of methodology and a denial of reality is calmly dumped on the injured parties. So thousands upon thousands of recreational fishermen have had, for examples, their canary rockfish, cowcod, and lingcod fishing wiped out, mostly by the trawl fleet, while the regulatory agencies turned their backs. Had the public been given adequate representation as required under the law, a higher level of abundance would have been understood as desirable for sportfishing, and would have also been attractively protective of the resources.

Optimum yields have been set without regard to recreational opportunity, counter to the requirements of the law, and optimum yields have not had the reductions of maximum sustainable yield which realistic consideration of relevant economic and social factors would have indicated. In fact, economic impact data used in PFMC fish management plans seems to largely ignore studies of sportfishing impact (not just charterboat days) on coastal communities. The economic impact data on commercial fishing is detailed and extensive. By comparison the businesses which provide the equipment and support services to sportfishing and the economic needs of those businesses seem to be largely ignored.   There is no attempt to estimate the income to coastal communities that might have derived from sportfishing that never takes place because the fish aren't there and/or fishing has been severely restricted. There is no estimation of the effect a vibrant sportfishing opportunity might have had.

The states and the coastal communities need the kind of economic data (and regulatory action) that would help them extract maximum economic value from their now depleted groundfish resources.   This most probably implies allocating greater numbers of fish to low impact high value sportfishing rather than to high impact commercial gears. It certainly indicates that thoughtful consideration should be given to ways of slowing down commercial extraction and favoring less efficient extraction over more efficient extraction in allocations. (This would involve measures other than merely reducing the number of trawl vessels.) The states and the coastal communities need help in evaluating various ways to particularize restrictions on recreational take so as to maximize value to coastal communities and their businesses, while protecting areas easily accessible to charter and small boat fishermen. They need help in solving the puzzles of overlapping jurisdictions that this kind of management requires.

Finally, we would encourage you to recognize that unless adequate resources are devoted to regulating the fisheries, it is unlikely that sustainability will be achieved. We would encourage NMFS to analyze methods for making the groundfish fishery self-supporting. We can't see that the citizens of this country should be expected to pay taxes to have their oceans harvested. If the boats of the commercial industry cannot sustain the cost of paying for the observers necessary to protect the fishery, we should just leave the fish alone. When citizens finally learned that they were paying tax money to have their forests clear cut, the beginning of the end finally arrived. Why should citizens pay tax money to support other extractive activities? Such activities should be required to pay for themselves, or they are workfare. A plan for gradual transition to full observer coverage and full self-support should be part of the economic analysis.

Also in regard to having adequate resources for achieving sustainability, if enforcement dollars are not available, then the precautionary approach would indicate that NMFS should not allow harvest until adequate enforcement is provided for. NMFS' studies in California found that a large proportion of live-fish landings were not accounted for through the fish ticket system. Should the agency then allow the live-fish fishery to continue unabated, or should there be a time-out while control over the fishery is established? Ordered to provide for a sustainable fishery, it appears that only the second course is legally available to NMFS.

In sum, for a document to provide background and analysis for choosing groundfish management options, the fishing needs of thousands of ordinary Americans and the economic needs of coastal communities need to be recognized and protected much better than they have been in the past, and the provisions of the law which were put there by Congress to protect recreational fishing should be better implemented.

Sincerely yours,

Janice Green
P.O. Box 71
Umpqua, Oregon 97486

FULL RETENTION MEASURES

Situation: In April, the Groundfish Management Team (GMT) presented a discussion paper to the Council and suggested development of a program to retain all shelf and slope rockfish. The GMT is concerned discard of canary rockfish and other overfished stocks may make it impossible to tell if rebuilding harvest levels are being achieved. After hearing the GMT statement, the Council directed the GMT to pursue development of management measure options for mandatory retention for at least some element of the commercial fishery. The Council gave further direction on this issue in June when it formed the Ad Hoc Full Retention Committee with representation from the GMT, Groundfish Advisory Subpanel, and Enforcement Consultants. The committee was tasked to develop a consensus recommendation on full retention measures to bring to the Council. A meeting of the Ad Hoc Full Retention Committee was held on August 6, 2001 at the Council office in Portland. The summary minutes of that meeting are available for Council review (Exhibit C.11, Attachment 1). Mr. Brian Culver will present the committee's findings and conclusions.

Council Task: Provide guidance for developing full retention measures.

Reference Materials:

1. Exhibit C.11, Attachment 1, Summary Minutes of the August 6, 2001 Ad Hoc Full Retention Committee meeting.

Groundfish Fishery Strategic Plan (GFSP) Consistency Analysis

The GFSP calls for bycatch reduction and enumeration, individual and sector accountability for bycatch and other impacts, and, whenever possible, establishment of incentives for fishers to operate in ways that are consistent with management goals and objectives. The GFSP envisions adoption of regulations that are more easily enforced and data collection for accurate assessment of the effects of management on groundfish stocks and fishery participants. The GFSP anticipates a full retention strategy may be considered when an effective observer program has been established.

PFMC
08/27/01

2002 STOCK ASSESSMENT SCHEDULE

Situation: At the June Council meeting, the following species were proposed to be assessed next year: bocaccio, cabezon, and whiting. An alternative task to the bocaccio assessment was continued development of methods for assessing data poor species. The species-to-be-assessed list was shorter than usual in order to evaluate historical fishery and trawl survey data in 2002, which may have significant impacts on survey results. The Scientific and Statistical Committee and many Council members suggested that a canary rockfish assessment be conducted in 2002 rather than 2003. This recommendation was contingent on timely age data from the 2001 trawl survey.

Since the June meeting, the National Marine Fisheries Service (NMFS) proposes to conduct the canary rockfish stock assessment in 2002 and add this stock to the list. The black rockfish assessment that was conducted this year was retracted by the assessment authors after discovering inaccurate input data. Discussions are underway to potentially reassess black rockfish next year. Ms. Cyreis Schmitt, NMFS Stock Assessment Coordinator, will update the Council on stock assessment plans for 2002 and discuss issues pertinent to the stock assessment schedule. At this meeting, the Council should provide any additional guidance on the schedule and priorities for assessing groundfish stocks in 2002.

Council Task: Discussion and guidance for 2002 stock assessments.

Reference Materials: None.

Groundfish Fishery Strategic Plan (GFSP) Consistency Analysis

This agenda item is consistent with GFSP goals for science, data collection, monitoring, and analysis (Sec. II.B).

PFMC
08/27/01

GROUNDFISH STRATEGIC PLAN IMPLEMENTATION

Situation: The Council will receive a progress report from the Ad Hoc Groundfish Strategic Plan Implementation Oversight Committee (SPOC) about implementation of several Groundfish Fishery Strategic Plan (GFSP) initiatives: capacity reduction, marine reserves, and allocation. The SPOC held a conference call on August 31, 2001 (after the briefing book deadline). A supplemental report will be provided at the Council meeting (Exhibit C.4.b).

After hearing from the SPOC and groundfish advisory bodies, the Council will provide guidance to the SPOC regarding the next steps in implementing GFSP measures.

Council Action: Consider SPOC recommendations.

Reference Materials:

1. Exhibit C.4.b, Supplemental SPOC Report.
2. Exhibit C.4.c, Open Access Permit Scoping Minutes.

GFSP Consistency Analysis

This agenda item is consistent with the implementation process detailed in the Groundfish Strategic Plan. Issues covered under this item conform to the implementation priorities adopted by the Council in April 2001.

PFMC
08/27/01

Exhibit C.9
Attachment 3
September 2001

GROUNDFISH ADVISORY SUBPANEL COMMENTS ON AMERICAN FISHERIES ACT MANAGEMENT MEASURES

The Groundfish Advisory Subpanel (GAP) spent a considerable amount of time reviewing the draft documents on American Fisheries Act (AFA) issues that were provided by Council staff. The GAP appreciates staff and Council efforts in this regard.

During the course of GAP discussion, at least two additional options were put forth the GAP believes merit public review. Since these options were developed at the GAP meeting, and therefore, had not been analyzed by Council staff; the GAP was uncomfortable in simply putting them forward and asking the Council send them out for final comment pending final action in September.

Therefore, the GAP - somewhat reluctantly - asks the Council delay action on this agenda item until September, so Council staff (subject to workload requirements) can provide some analysis on the two additional options.

Attached to this statement are the two options as they were put forward by members of the GAP. The GAP as a whole expresses no preference for either of these options or the existing options at this time.

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GAP AFA OPTION 1

An AFA vessel which had a groundfish permit as of October 1, 1998, and which delivered at least 500 tons of groundfish in any year during the period January 1, 1994 to October 1, 1998, would be allowed unrestricted participation in the Pacific groundfish fishery.

An AFA vessel which does not meet the above criteria may not participate in the Pacific groundfish fishery.

A permit attached to an AFA vessel not qualifying for participation may be sold or leased to another vessel which is qualified to participate in the fishery, subject to the limitations on permit transfers that apply to groundfish permits

The “replacement clause” language in Amendment 6 to the Groundfish fishery management plan, dealing with vessels lost due to sinking or other causes, would apply as appropriate.

GAP AFA OPTION 2

A window period of September 1, 1995 to September 16, 1999 would be established. Groundfish landings (by species) made by AFA vessels during this period would be calculated and an average established by vessel by species. This average would be converted to a percentage of all groundfish landings (by species).

AFA vessels would not be permitted to land groundfish in an amount greater than their average for each species. No other restrictions would be imposed on that vessel’s permit.

PFMC
06/14/01