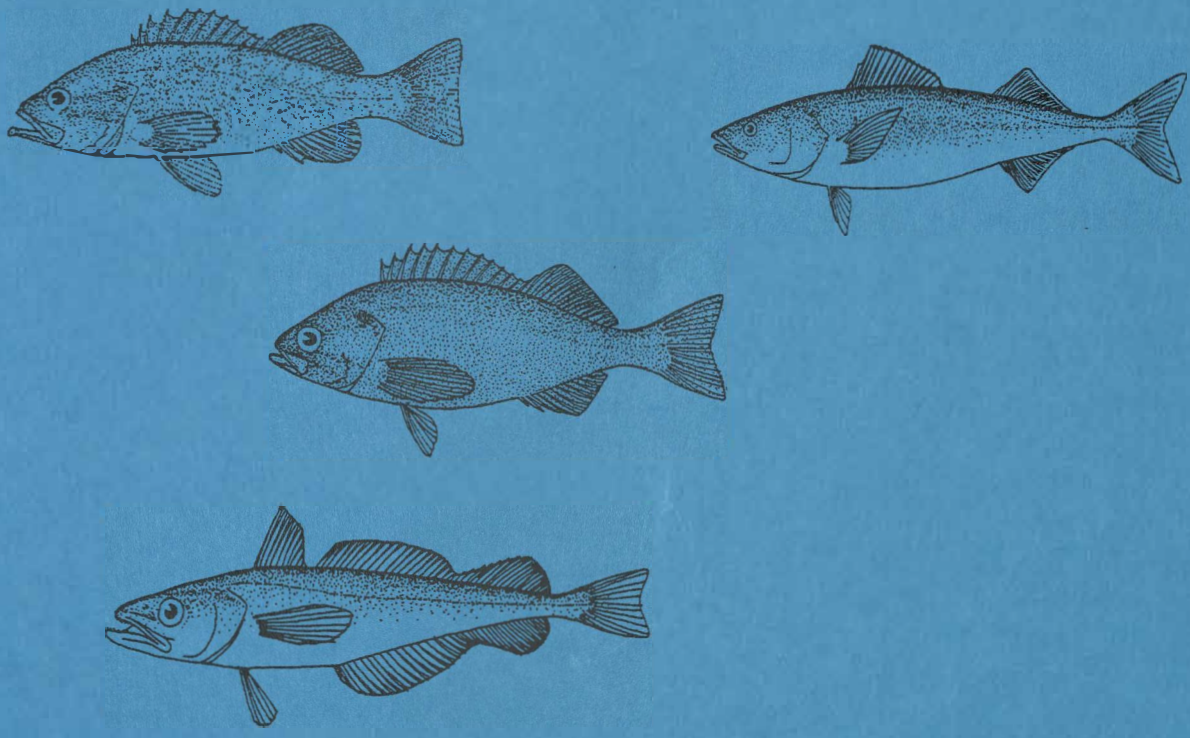
Status of the Pacific Coast Groundfish Fishery through 1999 and Recommended Acceptable Biological Catches For 2000

Stock Assessment and Fishery Evaluation



Pacific Fishery Management Council
2130 SW Fifth Avenue, Suite 224
Portland, OR 97201

October 1999

ACKNOWLEDGEMENTS

This is the sixteenth in a series of documents which review past years' fishery performance and Council management actions, in addition to assessing the status of a number of groundfish stocks off Washington, Oregon, and California.

Several of the appendices to this document were prepared by scientists other than Groundfish Management Team members. The Groundfish Management Team and Council are deeply indebted to these individuals and gratefully acknowledge the excellent cooperation and diligent efforts that resulted in these documents.

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PACIFIC FISHERY MANAGEMENT COUNCIL

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CHAIRMAN
Jim Lone

EXECUTIVE DIRECTOR
Lawrence D. Six

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October 20, 1999

Dear Reviewer:

At its November 1-5, 1999 meeting, the Pacific Fishery Management Council (Council) will establish year 2000 catch limits for groundfish species managed under the Pacific coast groundfish fishery management plan (FMP). The Council's Groundfish Management Team has prepared this document – Status of the Pacific Coast Groundfish Fishery Through 1999 and Recommended Acceptable Biological Catches for 2000: Stock Assessment and Fishery Evaluation (SAFE document) for the Council to use in establishing harvest limits. This document discusses major reductions that have been proposed for several species in 2000.

The enclosed document provides historical catch, economic, and management information, as well as the Groundfish Management Team's recommended acceptable biological catches (ABCs) and harvest guidelines for the year 2000. Individual stock assessments for several of the species discussed in this document are available from the Council office. Those assessments include: black rockfish, bocaccio, canary rockfish, cowcod rockfish, lingcod, petrale sole, and Pacific whiting.

The FMP authorizes the Council to propose target harvest levels (either harvest guidelines or quotas) for any groundfish species or species complex in need of individual management attention and to establish allocations for limited entry and open access fisheries. The FMP also authorizes the Council to establish management measures to ensure harvest targets are achieved. For example, to participate in a limited entry fishery, vessels using trawl, longline, or fishpot gear must possess a limited entry permit. Vessels without limited entry permits may participate in the open access fishery using any legal groundfish gear (except groundfish trawl gear), but are subject to specified catch limits. Specific management proposals and allocations between these two fisheries for 2000 are not addressed in this document. However, current and previous management measures are included and discussed.

This document is intended to provide a general understanding of Pacific coast groundfish fishery management, including the process for determining recommended ABCs and harvest guidelines. At its November meeting, the Council will accept public comment on these recommendations before taking final action to set ABCs and harvest guidelines for 2000. Copies of stock assessment documents are available on request from the Council office, 2130 SW Fifth Avenue, Suite 224, Portland, Oregon 97201; telephone (503) 326-6352.

Sincerely,

Lawrence D. Six
Executive Director

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The following Stock Assessments are available in the APPENDIX to the SAFE Document:

Status of the Black Rockfish Resource in 1999
Farron R. Wallace, Washington Department of Fish and Wildlife
Annette Hoffmann, Washington Department of Fish and Wildlife
Jack V. Tagart, Washington Department of Fish and Wildlife

Status of Bocaccio off California in 1999 and Outlook for the Next Millennium
Alec D. MacCall, National Marine Fisheries Service
Stephen Ralston, National Marine Fisheries Service
Don Pearson, National Marine Fisheries Service
Erik Williams, National Marine Fisheries Service

Stock Assessment of the Canary Rockfish Resource in the Waters off Southern Oregon and California in 1999
Erik Williams, National Marine Fisheries Service
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David Woodbury, National Marine Fisheries Service
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Status of the Canary Rockfish Resource off Oregon and Washington in 1999
STAT Team Members, National Marine Fisheries Service

Stock Assessment of Cowcod
John L. Butler, National Marine Fisheries Service
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J. Thomas Barnes, California Department of Fish and Game
H. Geoffrey Moser, National Marine Fisheries Service
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Yong Woo Lee, Oregon State University, Newport

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Martin W. Dorn, National Marine Fisheries Service
Mark W. Saunders, Department of Fisheries and Oceans - Canada
Christopher D. Wilson, National Marine Fisheries Service
Michael A. Guttormsen, National Marine Fisheries Service
Kenneth Cooke, Department of Fisheries and Oceans - Canada
Robert Kieser, Department of Fisheries and Oceans - Canada
Mark E. Wilkins, National Marine Fisheries Service

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LIST OF ACRONYMS

ABC	acceptable biological catch
CAGEAN	catch at age analysis
Council	Pacific Fishery Management Council
CPUE	catch per unit effort
DTS	Dover sole/thornyhead/trawl-caught sablefish complex
EEZ	exclusive economic zone
EFP	exempted fishing permit
F	fishing mortality rate
FMP	fishery management plan
GDP	gross domestic product
GMT	Groundfish Management Team
GNP	gross national product
GSG	Groundfish Select Group
INPFC	International North Pacific Fishery Commission
IQ	individual quota
M	natural mortality
Magnuson-Stevens Act	Magnuson-Stevens Fishery Conservation and Management Act
MFCMA	Magnuson Fishery Conservation and Management Act
MSY	maximum sustainable yield
mt	metric ton
NMFS	National Marine Fisheries Service
ODFW	Oregon Department of Fish and Wildlife
OY	optimum yield
PacFIN	Pacific Coast Fisheries Information Network
PSMFC	Pacific States Marine Fisheries Commission
Secretary	U.S. Secretary of Commerce
SSC	Scientific and Statistical Committee
WDFW	Washington Department of Fish and Wildlife
WOC	Washington, Oregon, and California

INTRODUCTION

This is the sixteenth annual status of the Pacific coast groundfish fishery document prepared for the Pacific Fishery Management Council. The purpose of this report is to briefly summarize the development of the fishery management plan (FMP) and to describe the history of the fishery and its management since the enactment of the Magnuson-Stevens Fishery Conservation and Management Act.

Included in this report are a description of landings, fishing patterns, estimates of the status of stocks (including appended status of stocks analyses for major species), and acceptable biological catches (ABC) for 1997-1999, as well as those proposed for 2000. Historical ABC information is included for 1983 through 1998 in tables 31 through 52. Brief discussions of the history of foreign and joint venture fishing, as well as the Americanization of the Pacific whiting fishery are also included.

RECENT HISTORY OF MANAGEMENT, 1998-1999

1998 Fishery

The acceptable biological catches (ABCs) and optimum yields/harvest guidelines (OY/HG) for 1998 were approved by the Council at the November 1997 meeting held in Portland, Oregon. For 1998, the Council again set harvest guidelines for Pacific whiting, lingcod, sablefish, jack mackerel, Pacific ocean perch, shortbelly rockfish, widow rockfish, *Sebastes* complex (northern and southern areas), bocaccio, yellowtail rockfish (northern and southern areas), Dover sole (coastwide and the Columbia area), canary rockfish, shortspine thornyhead, and longspine thornyhead.

Limited entry and open access allocation percentages were identical to 1998 (Table 36). Harvest guidelines were generally set for landed catch, less than the respective ABCs in many cases to take into account anticipated discard resulting from trip limit management. Species for which the landed catch harvest guideline was below the ABC include Dover sole, lingcod, *Sebastes* complex, widow, yellowtail, and canary rockfish, sablefish, shortspine thornyhead, and longspine thornyhead.

For the limited entry fishery, the Council continued the policy of two-month cumulative vessel limits for all species managed with "trip limits," with the target harvest level per month being 50% of the two-month limit. However, limited entry vessels could land as much as 60% of the two-month limit during either of the two months, as long as the total for the two months did not exceed the specified limit. (Open access vessels were limited to 50% per month). The Council believed the combination of two-month limits and the 60:40 opportunity would both reduce discards and reduce the number of times vessels might be cited for inadvertently exceeding the specified limits. As in 1997, the specified two-month periods were January through February, March through April, May through June, July through August, September through October, and November through December.

In 1998, the GMT began a system for tracking the open access fishery, allowing inseason management changes. Landings in January and February in all fisheries were significantly lower than expected due to severe weather conditions coastwide. As a result, limits for limited entry widow, Sebastes, DTS complex, fixed gear sablefish and open access bocaccio and fixed gear sablefish were increased effective May 1. Open access landings generally proceeded more quickly than expected, leading to restrictions in July, closure of the open access lingcod fishery coastwide on August 1, prohibition of all *Sebastes* landings north of Cape Blanco, Oregon on October 1, and prohibition of canary and widow rockfish landings coastwide on October 1.

Another factor affecting portions of the groundfish fleet in 1998 was a sharp decline in availability of pink shrimp. PacFIN estimated of 1998 pink shrimp landings to be around 4,338 mt, compared to 17,472 mt in 1997 and 13,822 mt in 1996.

Sebastes Complex Harvest guidelines for the *Sebastes* complex were established for the Vancouver/Columbia area and the Eureka/Monterey/Conception area; harvest guidelines for the northern area increased from 6,656 mt to 7,057 mt. The southern area harvest guideline decreased from 9,284 mt in 1997 to 8,439 mt due to reductions in yellowtail in the Eureka area, and reductions in bocaccio and chilipepper based on the $F_{40\%}$ harvest rate. The harvest guidelines for the *Sebastes* complex were calculated as the sums of either the ABC or recent catch, whichever was less, for each species, combined with the recent catch amounts of the other rockfish species. The yellowtail rockfish assessment in 1997 provided an ABC of 4,657 mt for the Vancouver-Columbia-Eureka areas, including Canada, compared to a 1997 US ABC of 1,773 mt. The U.S. portion was estimated to be 3,539 mt, 76% of the U.S.-Canada ABC, based on the survey biomass estimate for the portion of the assessment area in U.S. waters, The 1998 ABC of 3,118 mt represented a precautionary reduction of 10%. The chilipepper rockfish ABC was reduced to the $F_{40\%}$ level, from 4,000 mt to 3,400 mt. For bocaccio, the harvest guideline for the Monterey and

Conception areas combined was reduced from the 1997 level of 387 mt to 230 mt, which was the ABC calculated at $F_{40\%}$. The canary rockfish ABC remained the same as in 1997 at 1,045 mt. The landed catch harvest guideline of 878 mt reflects a 16% discard adjustment.

Beginning January 1, the limited entry fishery for the *Sebastes* complex was managed under a two-month cumulative trip limit of 40,000 pounds north of Cape Mendocino and 150,000 pounds south of Cape Mendocino. Within these two-month cumulative limits for the *Sebastes* complex, no more than 11,000 pounds could be yellowtail rockfish north of Cape Mendocino, no more than 2,000 pounds could be bocaccio south of Cape Mendocino, and no more than 15,000 pounds could be canary rockfish coastwide. On May 1, the two-month cumulative trip limit for yellowtail rockfish was increased to 13,000 pounds because landings had been slowed by unusually severe weather during the first quarter of 1998, and increasing the cumulative limit was expected to allow achievement of the yellowtail OY by the end of the year. On July 1, the two-month cumulative trip limit for *Sebastes* south of Cape Mendocino was lowered to match the 40,000 pound limit north of Cape Mendocino because *Sebastes* landings in the southern area had been proceeding at a faster rate than had been anticipated. In 1998, fishers landing *Sebastes* complex species south of Cape Mendocino were finding unusually large concentrations of splitnose rockfish (also known as "rosefish"), and large splitnose rockfish landings had driven the *Sebastes* harvest rate south of Cape Mendocino sharply upward. On September 1, the two-month trip limits were converted to one-month trip limits and were set at 20,000 lb cumulative per month for the *Sebastes* complex, of which no more than 6,500 pounds could be yellowtail rockfish north of Cape Mendocino, no more than 1,000 pounds could be bocaccio south of Cape Mendocino, and no more than 7,500 pounds could be canary rockfish coastwide.

Despite the July 1 reduction to the *Sebastes* trip limit south of Cape Mendocino, rockfish landings in the southern area continued at an unusually fast rate, forcing the Council to reduce limits for that area again in October. On October 1, the monthly cumulative trip limit for *Sebastes* complex species south of Cape Mendocino was reduced to 15,000 pounds. Coastwide landings of canary rockfish had also been proceeding at an accelerated rate, and at its September meeting, the Council announced that it expected that the 953 mt limited entry allocation for canary rockfish would be reached by October 1, 1998. The Council further expected that, even if all landings of canary rockfish were prohibited from October 1, 1998 through the end of the year, fishers would still have to discard at least 500 pounds (227 kg) per month of incidentally-caught canary rockfish. Because incidentally-caught canary rockfish are dead when brought to the surface, requiring fishers to discard these fish would not reduce fishing mortality. For this reason, the Council decided to exceed the 1998 limited entry allocation for canary rockfish by allowing a small monthly trip limit of 500 pounds within the overall *Sebastes* complex limit, effective October 1, 1998, so that fishers would not have to discard all of their incidentally caught canary rockfish. The Council expected that this amount would be small enough to discourage targeting on canary rockfish. Projected 1998 landings of *Sebastes* complex species north of Cape Mendocino, yellowtail rockfish north of Cape Mendocino, and canary rockfish coastwide were all expected to be within 5% of the HG for those species or species groups. Landings of *Sebastes* complex species south of Cape Mendocino were projected to be 5,272 mt, 12.7% above the HG, while bocaccio landings were projected to be over 60% below that species' HG.

Open access *Sebastes*. Landings in the open access fishery of yellowtail, canary rockfish, bocaccio, and the *Sebastes* complex as a whole were initially constrained in 1998 by cumulative limits that were 50% of the two-month limited entry cumulative limits. Open access limits were linked to limited entry limits when the limited entry limit for yellowtail rockfish north of Cape Mendocino was increased on May 1 and, as a consequence, the open access limit for yellowtail increased from 5,500 pounds to 6,500 pounds. However these limits were not low enough to keep open access harvest rates at levels that could be sustained throughout the year, particularly for northern rockfish fisheries and for canary rockfish coastwide. Conversely, *Sebastes* complex harvest attainment in the limited entry fishery south of Cape Mendocino was unusually fast, which meant that the associated open access limit did not need to be reduced as quickly as the limited entry limit for that species complex. Open access limits for *Sebastes* complex species were first unlinked from limited entry limits on July 1, when the monthly limit for *Sebastes* complex species coastwide was set at 33,000 pounds, and the monthly canary rockfish limit was reduced from 7,500 pounds to 200 pounds. Following these changes, open access fisheries in the Vancouver and Columbia management areas attained all of their rockfish allocations before the end of the year, and coastwide fisheries attained

the canary rockfish allocation before the end of the year. For these reasons, on October 1, all rockfish landings were prohibited north of Cape Blanco (the southern border of the Columbia management area), and all canary rockfish landings were prohibited coastwide.

Pacific Ocean Perch For Pacific ocean perch, the ABC remained at zero for the Vancouver and Columbia areas, and the landed catch harvest guideline was reduced from 750 mt to 650 mt, based on recent landings. The limited entry fishery was managed under a 8,000 pound per two month limit until September 1 when limits became monthly and remained at 4,000 pounds per month.

Pacific Whiting: In 1998, the U.S. whiting allocation continued to be fully utilized by the domestic and tribal fishing industries. Eighty percent or 232,000 mt of the 290,000 mt transboundary whiting ABC was apportioned to the U.S. As in 1997, 25,000 mt was set aside for Treaty Indian Tribes on the coast of Washington state, resulting in a commercial harvest guideline of 207,000 mt. The commercial harvest guideline was further divided with 34% going to the catcher/processor sector; 24% going to the mothership sector; and 42% going to the shoreside sector. When applied to the 1998 commercial harvest guideline of 207,000 mt, these percentages resulted in whiting allocations of 70,400 mt for the catcher/processor sector, 49,700 mt for the mothership sector, and 86,900 mt for the shoreside sector. Provisions for reallocating any unused allocation to other sectors were not needed in 1998.

Since mid-1997, when the Department of Justice approved the catcher/processor industry's allocation of whiting shares among the members of the Whiting Conservation Cooperative, this fishery has operated as a voluntary quota share program where each of the catcher/processor companies has agreed to harvest a specific share of the allocation. With harvests assured, the catcher/processors are able to operate more cautiously to avoid areas of salmon and rockfish abundance. During 1998, the mothership and shore-based sectors continued to operate under more competitive conditions (first come first served) for their sector's allocation. The shore-based fishery continued to operate under exempt fishing permits that enabled the fleet to bring unsorted catches to shore.

Season start dates were the same in 1998 as in 1997. The shore-based season in most of the Eureka area (between 42°N. latitude and 40°30' N. latitude) began on April 1, south of 42° N latitude opened April 15, and north of 42° started on June 15. The primary seasons for the mothership and catcher/processor sectors began May 15.

In total 232,509 mt were harvested in 1998, slightly over the 232,000 mt HG. About 1,718 mt of the total catch of whiting was discarded due to small size and poor quality (673 mt by catcher/processors, 382 mt by non-tribal motherships, and 663 mt by the tribal fishery). No discards were anticipated for the shore-based fishery.

Six mothership vessels received 50,087 mt of whiting (1% over its allocation of the commercial harvest guideline) and closed on May 31, 1998. Seven catcher/processor vessels took 70,365 mt of whiting (virtually equal to its allocation) and closed on August 7, 1998. For the tribal fishery, one mothership processed 24,509 mt of whiting (2% below the tribal allocation). The Washington, Oregon, and California shore-based sector took 87,548 mt (1% over its allocation) and closed on October 13, 1998. Upon closure of the primary season for the shore-based sector, the 10,000 pound trip limit resumed as before the primary season. This small trip limit was intended to accommodate small bait and fresh fish markets and bycatch in other fisheries.

The 1998 Pacific whiting fishery was strongly affected by the downturn in the Asian market. Low prices for surimi resulted in processors, both at-sea and shore-based, converting to different products such as minced blocks, fillets and headed & gutted fish. The fishery was further complicated by smaller fish. Because of a northward population shift, fish of sizes that the Oregon fleet normally catch were off Canada, and the smaller fish, normally off California, were being caught off Oregon. Growth rates also tend to be reduced during El Niño years. While the catcher/processor and mothership sectors were able to overcome the problems associated with fish size and condition by targeting stocks far offshore, the combination of market conditions and fish conditions caused the shore-based fishery to slow its pace with several processors shutting down their lines early in the season.

The major groundfish bycatch species in the whiting fishery are yellowtail and widow rockfish. Bycatch of yellowtail rockfish in the at-sea processing portion of the whiting fishery was 536 mt (64 mt by catcher/processors, 313 mt by non-tribal motherships, 159 mt by the tribal fishery). Bycatch of widow rockfish in the at-sea processing portion of the whiting fishery was 307 mt (121 mt by catcher/processors, 172 mt by non-tribal motherships, 14 mt by the tribal fishery). Yellowtail and widow rockfish bycatch levels from the shoreside sector were not available at the time this report was prepared.

In 1998, preliminary figures indicated chinook salmon bycatch in the at-sea processing fleet remained similar to the low levels of 1996 and 1997. Although final figures are not yet available, it appeared the chinook bycatch rate of 0.007 chinook per metric ton of whiting in the catcher-processor fleet was down from the 1997 rate of 0.008 and the 1996 rate of 0.010 chinook per metric ton of whiting, this was well below the guideline of 0.05 chinook per mt. Chinook bycatch in the non-tribal mothership fishery was 0.019, less than half the guideline of 0.05 chinook per mt. This was similar to the 1996 mothership rate of 0.018, but less than the 1997 rate of 0.026 chinook per mt of whiting, but was still half the guideline. Chinook bycatch in the tribal whiting fishery was 0.085 chinook per metric ton of whiting, down from the 1997 rate of 0.102 chinook per metric ton of whiting. The mothership fishery as a whole, tribal and non-tribal therefore had a chinook bycatch rate of .04 chinook per mt of whiting (3051 chinook in 74,596 mt of whiting), which was within the 0.05 rate specified under the biological opinion for the fishery. The salmon rate of fishery bycatch for the shore-based sector were not available at the time this report was prepared.

As in previous years, all at-sea processors carried at least one NMFS trained observer when they participated in the whiting fishery. To provide additional data for monitoring their voluntary individual quota program, catcher/processor vessels carried two observers as did the tribal mothership.

Note: Catch data in this section on the whiting fishery are preliminary and may differ from those found elsewhere in this document.

Dover sole, thornyheads, and trawl-caught sablefish (DTS) complex A new assessment in 1997 evaluated the Dover sole resource north of 36° N. latitude as a unit, and provided an ABC for landed catch based on the $F_{35\%}$ harvest rate. The Conception Area Dover sole ABC was set at the level established in the original FMP. The coastwide Dover sole harvest guideline for landed catch was reduced from 13,900 mt to 8,955 mt. The two thornyhead species were both assessed in 1997 and were managed with separate harvest guidelines as in 1997. For shortspine thornyheads north of Point Conception the landed catch harvest guideline was reduced from 1,380 mt in 1997 to 1,082 mt in 1998. The longspine landed catch harvest guideline was reduced from 6,000 mt to 3,733 mt. Based on a new assessment the sablefish ABC was reduced from 9,125 mt in 1997 to 5,200 mt in 1998 and the landed catch harvest guideline was reduced from 7,800 mt to 4,680 mt . Harvest by Washington treaty Indian tribes was set at 468 mt, 10% of the harvest guideline. This amount was taken "off the top" before any nontreaty allocations were established.

Management of the DTS complex at the outset of 1998 was similar to 1997; the Council continued the policy of separating the two thornyhead species, with a separate sublimit for sablefish also. In January-February, the two-month cumulative trip limit for the DTS complex was 59,000 pounds. Within this two-month cumulative limit, no more than 40,000 pounds could be Dover sole, no more than 10,000 pounds could be longspine thornyheads, no more than 4,000 pounds could be shortspine thornyheads, and no more than 5,000 pounds could be trawl-caught sablefish. Throughout the year, no more than 500 pound per trip could be sablefish smaller than 22 inches.

At certain times of year, particularly in winter months, it is possible to catch Dover sole in deep water more selectively, without large associations of sablefish and shortspine thornyheads. Therefore, the Dover sole two-month cumulative trip limit was set high for January-February and lowered to 18,000 pounds on March 1, 1998. The two-month cumulative trip limit for the DTS complex correspondingly decreased to 37,000 pounds at that time.

On May 1, the two-month cumulative trip limits were increased for Dover sole to 22,000 pounds; for longspine thornyheads to 12,000 pounds; for shortspine thornyheads to 5,000 pounds, and; for trawl-caught sablefish to 6,000 pounds. Due to difficult winter weather, landings for the DTS complex were well below

projections for the first quarter of 1998. The limits were increased on May 1 to allow the fishery the opportunity to achieve the harvest guidelines for these species by the end of the year. Also on May 1, NMFS removed the overall DTS complex limit, because that limit had been a remnant of pre-1998 management, when there was no specific cumulative limit for longspine thornyheads within the complex limit. On September 1, the two-month cumulative trip limits for the components of the DTS complex were converted to one-month cumulative limits: for Dover sole, 11,000 pounds; for longspine thornyheads, 6,000 pounds; for shortspine thornyheads, 2,500 pounds; for trawl-caught sablefish, 3,000 pounds. On October 1, limits in the DTS complex were adjusted to account for the different harvest rates for each species. The one-month cumulative trip limits were: increased for Dover sole to 18,000 pounds; increased for longspine thornyheads to 7,500 pounds; decreased for shortspine thornyheads to 1,500 pounds, and; increased for trawl-caught sablefish to 5,000 pounds. Finally, on December 1, the Dover sole limit was increased to 36,000 pounds in recognition of the ease of targeting Dover sole without catching other species in the winter months, and so that the limited entry fishery might have further access to the Dover sole HG for 1998.

Projected landings for Dover sole, longspine thornyheads, and for trawl-caught sablefish were below the HGs for those species, primarily because the cumulative limits for those species had to be kept low enough to prevent overharvest of the closely associated shortspine thornyheads. Projected landings of shortspine thornyheads for 1998 are 2.3% above the HG for that species. The shortspine thornyhead biomass was estimated to be at 32% of its unfished state.

Widow rockfish Based on a new assessment in 1997, the widow rockfish ABC was reduced from 7,700 mt in 1997 to 5,750 mt in 1998. The 5,750 mt total catch ABC for widow rockfish was based on the $F_{40\%}$ harvest rate, which was the current MSY proxy for rockfish species. The landed catch harvest guideline was 4,276 mt, based on a more conservative $F_{45\%}$ harvest rate.

For limited entry in 1998, the limited entry two-month cumulative limit of 25,000 pounds was in effect until May 1, at which time it was increased to 30,000 pounds. On September 1, when limited entry trip limits were converted to one-month cumulative limits, the widow rockfish limit of 30,000 pounds was converted to 15,000 pounds and was in effect until October 1, at which time it was increased to 19,000 pounds, where it remained to the end of the year. Landings were projected to be 3,746 mt in 1998, 5.4% below the HG. For open access, landings of widow rockfish were initially managed with a monthly limit that was 50% of the limited entry two-month cumulative limit, or 12,500 pounds, until May 1, when it was raised to 15,000 pounds. On July 1, the open access widow rockfish limit was separated from the limited entry widow rockfish limit and reduced to 3,000 pounds. From October 1 through the end of the year, all open access widow rockfish landings were prohibited, due to early attainment of the open access allocation.

Lingcod The 1998 HG for lingcod was severely reduced from previous years' levels to 838 mt. During Council activities to set 1998 cumulative limits, the U.S. industry disagreed as to whether the lingcod reduction should or could fall equally on both commercial and recreational sectors. The 1998 management measures were intended to divide the HG almost equally between the commercial and recreational sectors, which resulted in a proportionately larger decrease over past years' catch for the commercial fishery. To accommodate the reduced amount of lingcod available to the commercial sector in 1998, the two-month cumulative trip limit for lingcod in 1998 was 1,000 pounds. This limit was in place until it was modified to a monthly cumulative limit of 500 pounds on October 1. The open access lingcod monthly cumulative limit was 500 pounds until July 1, when it was modified to account for unusually rapid harvest rates to 250 pounds for the month of July, and to a prohibition against all open access lingcod landings beginning August 1. Lingcod smaller than 24 inches could not be landed in the commercial or recreational fisheries except for 100-pounds per trip for limited entry trawl-caught lingcod. This increase from 22 inches in 1997 to 24 inches in 1998 in the size limit, along with a reduction in the recreational bag limit off California from 5 to 3 lingcod was expected to reduce recreational lingcod harvest. Reducing the California lingcod bag limit brought that state's bag limit down to a level consistent with bag limits off Washington and Oregon.

Nontrawl Sablefish In 1998, as in 1997, a vessel was required to have an endorsement on its limited entry permit in order to participate in the regular or mop-up sablefish seasons. In 1998, this endorsement program was refined to a three-tier system that divided vessels with sablefish endorsements into three different tiers based on cumulative catch history. Each of the three tiers was associated with a different cumulative limit

level, which tier members had the opportunity to fish towards during the regular season. Also new in 1998, the post-season closure was reduced from 48 to 30 hours. The season began on August 1, and the cumulative limit levels were: 52,000 pounds for Tier 1; 23,500 pounds for Tier 2, and; 13,500 pounds for Tier 3.

A number of provisions for the 1997 regular season remained in place for 1998. The preseason closure was 48 hours, and advance set of pot gear was not allowed. The regular season ended at sea rather than at dockside. The trip limit for sablefish smaller than 22 inches of 1,500 pounds or 3% of all legal sablefish on board, whichever was greater, remained in effect during the regular and mop-up seasons. The mop-up season began about three weeks after the close of the regular season, lasting from August 28 - September 11, and allowing limited entry permit holders with sablefish endorsements to fish against an equal cumulative limit of 3,200 pounds. Severe weather was reported in Northern California during both the primary season and the mop-up fishery.

Small daily trip limits were applied to the nontrawl fishery before and after the "regular" and "mop-up" seasons. A 300-pound daily trip limit was applied only north of 36°00' N. Latitude, with a two-month cumulative limit of 1,500 pounds. Unlike other two-month cumulative limits, fixed gear sablefish cumulative limits could be taken at any time during the two-month period. On May 1, the two-month cumulative limit was increased from 1,500 to 1,800 pounds. Following the September Council meeting, trip limits were again increased to allow the limited entry nontrawl fishery to achieve its 1,652 mt sablefish allocation by the end of the year. The two-month limit for the September - October period was increased to 2,700 pounds, and the months of November and December were split into two separate month-long cumulative limit periods, each with a cumulative limit of 1,500 pounds.

Limited entry, nontrawl sablefish south of 36° N. latitude: In January 1998, the Conception area limited entry daily trip limit was set at 350 pounds to accommodate most landings without encouraging excessive effort shifts into that area. There was no cap on the amount that could be landed under the daily trip limit in the Conception area. On May 3, an option was provided that allowed a vessel to either land 350 pounds per day, or to make one landing a week above 350 pounds but less than 1,050 pounds. This measure was intended to allow greater flexibility for fixed gear fishers who target groundfish on fishing trips of several days in duration, while still constraining harvest within the 425 mt HG for this area.

The open access sablefish allocation for north of 36° N. lat. was 6.6% of the HG. In 1998, the open access fishery began the year with a two-month cumulative limit of 600 pounds, which stayed in place until May 1, when it was increased to 700 pounds per two-month period. As with the limited entry daily trip limit fishery, open access daily trip limit landings of sablefish proceeded at a slower rate than the Council had expected at the beginning of the year. On July 1, the open access two-month cumulative limit was again increased to 1,800 pounds, a level that matched the limited entry two-month cumulative limit. October and November changes to the open access daily trip limit fishery for sablefish matched the changes to the limited entry daily trip limit fishery for the rest of the year. Open access nontrawl fisheries for sablefish south of 36° N. Latitude were managed under a 350-pound daily trip limit with no monthly cumulative limit throughout 1998.

1999 Fishery

With the exception of Pacific whiting, acceptable biological catches (ABCs) and optimum yields (OYs - equivalent to the former harvest guidelines) for 1999 were approved by the Council at the November 1998 meeting held in Portland, Oregon. Approval of the Pacific whiting OY was delayed until the March 1999 meeting pending evaluation of 1998 survey results. The Council again set optimum yields for lingcod, sablefish, jack mackerel, Pacific ocean perch, shortbelly rockfish, widow rockfish, Sebastes complex (north and south), bocaccio, yellowtail rockfish (northern and southern areas), Dover sole, canary rockfish, shortspine thornyhead and longspine thornyhead. Also, for the first time, OYs were set for both splitnose and chilipepper rockfish in the southern area.

Limited entry and open access allocations were identical to 1998. Optimum yields were generally set for total catch, less than the respective ABCs in many cases as dictated by stock abundance and the Council's default 40-10 harvest policy. Species for which the OY was below the ABC include lingcod, sablefish,

Pacific ocean perch, widow rockfish, shortspine thornyhead, *Sebastes* complex, canary and yellowtail rockfish. Landed catches for a number of species are less than total catch OYs due to discard resulting from trip limit management or market acceptability.

The Council adopted a new structure of cumulative limits for the limited entry fishery in 1999. With lower OYs for a number of species, the Council believed that continuing a year round fishery with equal, two-month cumulative limits could result in unacceptable discard levels. The Council evaluated different strategies to allow the limited entry fleet to operate with cumulative limits at a high enough level to avoid increasing discards. They considered a proposal that would allow the limited entry fishery to operate year round, but would restrict limited entry fishers to select a subset of the total cumulative periods in which they would fish. Instead the Council adopted a proposal from industry that restructured cumulative limit periods, and also adjusted harvest rates for various species or species groups away from year round equal limits to take into account availability, bycatch rates, and market conditions. The projected cumulative limits for the entire year were adopted in November, with the understanding they would be adjusted inseason as necessary. The fishing year was divided into seven cumulative limit periods; one 3-month period, three two-month periods, and three 1-month periods. The monthly sub-limit provision that was in place for 1998 was dropped. The limited entry fishing periods for 1999 were: January through March, April through May, June through July, August through September, October, November, and December. The final three months of the year were left as single, monthly cumulative limits to allow opportunity for year-end adjustments to achieve OY targets. As in 1998, vessels could elect to operate in a "B-platoon" whose cumulative limits began on the 16th, rather than the first day of a calendar month.

Cumulative limits for the open access fishery in 1999 continued to be set on a monthly basis as in 1998.

In November of 1998, the Council reduced the groundfish bycatch allowance for the pink shrimp fishery from 500 pounds per fishing day to 300 pounds per fishing trip, effective January 1, 1999. However, after considering testimony from shrimp fishers and shrimp fishery managers that groundfish bycatch in the shrimp fishery was both unavoidable and an historical part of the shrimp fishery, the Council in March restored the bycatch allowance to levels similar to 1998 prior to the April 1 start of the pink shrimp fishery.

Sebastes Complex Optimum yields for the *Sebastes* complex were established for the Vancouver/Columbia area and the Eureka/Monterey/Conception area. Species assemblage for the complex remained the same in the north, but for the first time, chilipepper and splitnose rockfish were individually separated from the southern *Sebastes* complex. The OY for the northern *Sebastes* complex was 6,617 mt, a reduction of about a 6% from 1998. The southern *Sebastes* complex OY was set at 2,705 mt, a drop of nearly 68%. The majority of the reduction in the south resulted from removing chilipepper and splitnose rockfish from the *Sebastes* complex. The total catch OY for splitnose was set at 868 mt. The chilipepper OY was set equal to the ABC of 3,724 mt based on the 1998 assessment and application of the $F_{40\%}$ harvest rate. Subsequently, after considering the conservation concerns over possible bocaccio bycatch, the Council adopted a "target catch" of 2,000 mt for 1999.

Beginning January 1, the limited entry fishery for the *Sebastes* complex was managed under a three-month cumulative limit of 24,000 pounds north of Cape Mendocino (40° 30' N), and 13,000 pounds in the south. Within these cumulative *Sebastes* complex limits, no more than 15,000 pounds could be yellowtail rockfish north of Cape Mendocino, while south of Cape Mendocino no more than 750 pounds per month could be bocaccio rockfish. Canary rockfish were limited to 9,000 pounds of the total *Sebastes* limit in both areas. (*Note: Although chilipepper and splitnose rockfish were removed from the southern* Sebastes *complex for the first time this year, trip limit regulation for those species is described in this section.*) The three-month cumulative limit was 45,000 pounds for chilipepper rockfish and 32,000 pounds for splitnose rockfish south of Cape Mendocino. On April 1, the cumulative two-month *Sebastes* limit in the north was set at 25,000 pounds of which no more than 13,000 pounds could be yellowtail and no more than 9,000 pounds could be canary. The cumulative limit south of 40°30' N was set at 6,500 pounds (including canary rockfish) of which no more than 750 pounds per month could be bocaccio rockfish. The two-month cumulative limit for chilipepper rockfish south of Cape Mendocino during the second period was 25,000 pounds; the two-month limit for splitnose rockfish in this same area was 19,000 pounds. Due to lower than expected fishing

rates earlier in the year, primarily resulting from adverse weather, the *Sebastes* two-month cumulative limit in the north (originally intended to be set at 25,000 pounds for the third and fourth periods) was increased to 30,000 pounds during the third period (June-July) and 35,000 pounds in the fourth period (August-September). Of this total, no more than 16,000 pounds could be yellowtail and no more than 14,000 pounds could be canary in period three. Additionally, no more than 10,000 pounds could be *Sebastes* other than yellowtail or canary. For period four, no more than 20,000 pounds could be yellowtail while canary and non-yellowtail/canary *Sebastes* remained at 14,000 pounds and 10,000 pounds respectively.

Two-month cumulative limits for *Sebastes* south of Cape Mendocino for periods three and four (June-July and August-September), originally intended to be set at 6,500 pounds were reduced to 3,500 pounds since catch rates progressed at higher than anticipated levels in the south. The two-month canary rockfish limit was reduced to 3,500 pounds to be consistent with overall *Sebastes* opportunity and the bocaccio rockfish limit remained at 750 pounds per month. Chilipepper and splitnose rockfish in the southern area remained at 25,000 pounds and 19,000 pounds respectively for periods three and four.

When inseason catches were reviewed at the September Council meeting, it was apparent that rockfish catches, especially southern *Sebastes* and northern yellowtail catches, were higher than anticipated and would need to be dramatically constrained to remain within the OYs. High bycatch rates for yellowtail rockfish in the Pacific whiting fishery contributed to the problem. Beginning October 1, a one-month coastwide cumulative limit for *Sebastes* was set at 500 pounds. North of 40°30' N Latitude, no more than 300 pounds could be yellowtail rockfish. These limits were intended to provide for unavoidable bycatch for fisheries targeting other species and were expected to remain in place until the end of the year.

Open Access *Sebastes* The Council continued to manage the open access fishery by one-month cumulative limits. Beginning January 1, one-month cumulative limits were set at 3,600 pounds for *Sebastes* complex north of Cape Mendocino and 2,000 pounds in the south. Within this limit, no more than 2,600 pounds could be yellowtail rockfish in the north while no more than 500 pounds (1,000 pounds for setnets) could be bocaccio rockfish in the south. The canary sublimit was set at 1,000 pounds coastwide. The monthly cumulative limits for chilipepper and splitnose in the south were set at 6,000 pounds and 100 pounds respectively.

Open access *Sebastes* catches stayed at fairly low levels in the north during the first quarter of the year; therefore, the northern monthly cumulative *Sebastes* limit was increased April 1 to 12,000 pounds. Of this amount, no more than 6,500 pounds could be yellowtail rockfish, no more than 2,000 pounds could be canary rockfish, and a new sublimit of 3,500 pounds was established for black and blue rockfish. A limit of 2,000 pounds was set for *Sebastes* species other than yellowtail, canary, black or blue rockfish. Limits remained the same in the south. Catches remained higher than anticipated in the south through the summer and on October 1, the open access monthly cumulative limit was reduced to 500 pounds and the monthly chilipepper limit was reduced to 3,000 pounds.

Pacific ocean perch A monthly cumulative trip limit of 4,000 pounds was in place throughout the year for the limited entry fishery while a 100 pound per month limit was established for the open access fishery to provide for catch incidental to other fishing strategies.

Pacific whiting For 1999, the Council set ABC and OY in a similar way to most other groundfish stocks. The GMT suggested application of the $F_{40\%}$ or $F_{45\%}$ harvest rates and the default 40-10 OY adjustment. The $F_{40\%}$ calculation was similar but slightly below the 1997-1998 harvest guideline of 232,000 mt. The Council opted to continue the status quo harvest level for 1999 and 2000, setting both the ABC and OY at 232,000 mt. Both terms apply only to the portion of the stock in available for U.S. harvest.

As in previous years, a portion of the OY was set aside for treaty Indian tribes on the coast of Washington state. In 1999, the Quileute treaty tribe for the first time expressed interest in harvesting whiting. The Quileute and Makah tribes jointly submitted a framework proposal for determining tribal allocations which was based on the level of OY. The initial request was for 35,000 mt of whiting for 1999, but this was reduced to 32,500 (14% of the 232,000 mt) when the Quileutes decided not to participate. The Council recommended the tribal allocation remain at 25,000 mt, the same as in 1997 and 1998. However, NMFS

determined that the tribal request of 32,500 mt was a reasonable accommodation of the treaty right in 1999 in view of the uncertainty surrounding the appropriate quantification. This resulted in a commercial harvest guideline of 199,500 mt (7,500 mt lower than 1998). Current regulations allocate the commercial whiting harvest guideline with 34% (67,800 mt) for the catcher/processor sector; 24% (47,900 mt) for the mothership sector; and 42% (83,800 mt) for the shoreside sector.

In 1999, season start dates were the same as in 1997 and 1998. The catcher/processor sector continued to operate as a voluntary quota sharing program, while the mothership and shore-based sectors each continued to operate under the "derby" system. The shore-based fishery continued to operate under exempted fishing permits that allow the fleet to bring unsorted catches to shore.

During 1999, six mothership vessels received 47,581 mt of whiting (0.7% below their allocation) and the fishery closed on June 2, 1999. Six catcher/processor vessels took 67,563 mt of whiting (0.3% below their allocation) and closed on July 21, 1999. The shore-based fishery took approximately 82,700 mt of whiting and closed on September 13. Complete data for the tribal whiting fishery were not available at the time this report was prepared.

As in previous years, all at-sea processors carried at least one NMFS trained observer when they participated in the whiting fishery. To provide additional data for monitoring their voluntary allocation program, catcher/processor vessels carried two observers, when available, as did the tribal mothership.

Note: Catch data in this section on the whiting fishery are preliminary and may differ from those found elsewhere in this document.

Dover sole, thornyheads, and trawl-caught sablefish (DTS) complex

Management of the DTS in 1999 was designed to provide a relatively higher opportunity for Dover sole in the winter when spawning aggregations could be targeted more cleanly than at other times during the year. Opportunity to harvest thornyheads and sablefish was somewhat more consistent throughout the year. DTS limits for the first (three-month) period of the year were: Dover sole - 70,000 pounds, longspine thornyheads - 12,000 pounds, shortspine thornyheads - 3,000 pounds and trawl-caught sablefish 13,000 pounds. Limits for the following three, two-month periods were Dover sole - 20,000 pounds, longspine thornyheads - 8,000 pounds, shortspine thornyheads - 2,000 pounds and trawl-caught sablefish 10,000 pounds. For the final three, one-month periods cumulative limits were set at 22,000 pounds for Dover sole, 4,000 pounds for longspine thornyheads and 1,000 pounds for shortspine thornyheads. The limit for trawl-caught sablefish for the final three months, originally established at 6,000 pounds per month was increased to 7,000 pounds to provide opportunity to harvest available fish.

Widow rockfish The ABC established for widow rockfish remained unchanged from 1998 at 5,750 mt and is based upon the $F_{40\%}$ harvest rated from the 1997 assessment. The stock is estimated to be at 29% of its unfished spawning potential; application of the 40-10 harvest policy results in a total catch OY of 5,023 mt. Subtraction of recreational catch and projected discard in the directed fishery and whiting fishery results in an anticipated landed catch of 3,962 mt. Cumulative limits for the limited entry fishery for widow rockfish began at 70,000 pounds for the first 3-month period followed by three, two-month limits of 16,000 pounds. When considering inseason adjustments at their September meeting, the Council struggled with management measures that would provide an opportunity to harvest the 30,000 pound per month cumulative limits originally scheduled for widow in the face of the need to significantly reduce catches for other rockfish, especially yellowtail in the north, since examination of fishery data demonstrated an association of widow and yellowtail rockfish. Widow rockfish can be harvested relatively cleanly with midwater trawl, causing the Council to seek a mechanism to provide this opportunity without risking unacceptable levels of yellowtail rockfish bycatch. Since gear restrictions could not be implemented at the federal level through a one-meeting Council process, the states of Washington and Oregon agreed to adopt state landing regulations requiring that midwater gear be used to land monthly cumulative widow rockfish in excess of 500 pounds (up to a total of 30,000 pounds). California was unable to adopt such a regulation, however the yellowtail rockfish reduction was implemented only in the north since yellowtail are included in *Sebastes* in the south and are not part of the northern assessment. Also, the midwater widow rockfish

fishery is primarily a northern fishery. The open access fishery for widow rockfish began the year at a cumulative limit of 2,000 pounds per month. In July, this limit was raised to 8,000 pounds per month since the fishery was progressing more slowly than anticipated. On October 1, the cumulative limit was reduced to 4,000 pounds per month.

Lingcod The most recent stock assessment of lingcod in 1997 addressed the entire Vancouver area, including Canada, and the Columbia area. The final ABC of 960 mt is the same as in 1998 and is based upon the $F_{35\%}$ rate from the assessment. The ABC applies only to the U.S. portion of the stock; 44% of the stock in the Vancouver area is in U.S. waters based upon triennial survey information. The Council applied the 60% reduction resulting from the stock assessment in the north to the southern area based upon scientific information that the stock in the south had experienced a similar decline. Since lingcod are presently estimated to be at only 8.8% of pristine levels, application of the 40-10 harvest policy would have resulted in a OY of zero. While a rebuilding plan for lingcod was being developed for 2000, the Council chose to set the 1999 OY at 730 mt to address unavoidable bycatch, interim rebuilding needs, and competing use by several fishing sectors. The expected landed catch of 666 reflects 64 mt of anticipated discards in the limited entry fishery. Lingcod in the limited entry fishery were managed on the equivalent of 500 pounds per month primarily to account for unavoidable mortality associated with fishing for other species. Therefore, the cumulative limit was 1,500 for the first, three-month period of the year, 1,000 pounds for the next three, two-month periods and 500 pounds for the final three, one-month periods of the year. The lingcod limit for the open access fishery was set at 250 pounds per month and was scheduled to be open from April 1 through November 30, however catches progressed more rapidly than anticipated and retention of lingcod in the open access fishery was prohibited beginning October 1. A 24-inch minimum size was in place for all commercial fisheries with the exception that 100 pounds of lingcod per trip below this size could be retained in the limited entry trawl fishery. The coastwide recreational limit for lingcod was lowered to two fish greater than 24 inches. Prior to 1999 the bag limit in Washington and Oregon was 3 fish while California had a bag limit of five fish. All states had a 22-inch minimum size limit prior to 1999.

Nontrawl sablefish As in 1998, only vessels with a sablefish endorsement on their limited entry permits could participate in the regular or mop-up sablefish seasons. Also as in 1998, vessels were divided into three tiers, each having different limits: 84,800 pounds for tier one; 38,300 pounds for tier two, and 22,000 pounds for tier three. After a 48-hour closure during which all fixed groundfish gear was required to be out of the water, the fishery opened at noon, August 16 and closed at noon, August 25. The provision that no more than 1,500 pounds (or 3% of all legal sablefish onboard) of small sablefish could be retained per trip remained in effect during the regular season. The regular season fishery achieved the target quota more closely than in 1998; the mop-up fishery provided a cumulative limit of 1,100 pounds for sablefish endorsed fishers for the five-day period from noon, September 20 through noon, September 26.

Outside of the regular and mop-up fisheries, the non-trawl sablefish fishery north of 36° N latitude was again managed under daily trip limits and two-month cumulative caps. For the limited entry fishery, the year began with a 300 pound daily trip limit and a cumulative two-month limit of 2,400 pounds. The cumulative limit was raised to 4,200 pounds per two-month period starting July 1. Beginning September 1, the fishery was changed back to single-month cumulative limits, set at 2,100 pounds for September and increased to 3,600 pounds on October 1. The open access fishery north of 36° N began the year with a 300 pound trip limit and a two-month cumulative limit of 1,800 pounds. The two-month cumulative limit was increased to 3,000 pounds on July 1. As with the limited entry sector, monthly cumulative limits went into effect on September 1, set at 1,500 pounds for September and increased to 2,700 pounds on October 1.

Nontrawl sablefish south of of 36° N latitude.
As in 1998, the limited entry nontrawl sablefish fishery south of 36° N latitude was managed under a daily trip limit of 350 pounds or one landing per fishing week not to exceed 1,050 pounds. The open access fishery in this area was managed under a daily trip limit of 350 pounds, but without the opportunity to land the larger, weekly limit. Neither fishery was constrained by a monthly cumulative cap.

ECONOMIC STATUS OF THE WASHINGTON, OREGON, AND CALIFORNIA COMMERCIAL GROUNDFISH FISHERY IN 1998

This section briefly summarizes economic data presented in Appendix EC of this document. Shoreside landings of groundfish decreased by 11,316 mt in 1998 to 129,657 mt, a decrease of 8% from 1997. At-sea processors of whiting (factory trawlers and motherships) processed 139,898 mt in 1998, a decrease of 2.2% (3,159 mt) from 1997. As a result, total commercial landings of groundfish taken from waters under federal jurisdiction decreased by 5.1% from 284,030 mt in 1997 to 269,555 mt in 1998. The value of shoreside landings, after adjusting for inflation, fell by 34.3% to $52.5 million in 1998. The inflation adjusted value of raw product to domestic at-sea processors fell by 21% to $15.4 million, bringing the total inflation adjusted value of Pacific coast landings of groundfish to $67.8 million, a decrease of 31.8% from 1997. The decrease in value of shoreside landings resulted from a decline in overall groundfish landings and continuation of a general trend toward lower exvessel prices (after adjusting for inflation) except for Dover, English, and petrale soles, widow rockfish, and lingcod which increased from 1997. The decrease in value of at-sea deliveries during 1998 was due to a reduction in the amount delivered and a $.01 decrease in average price per pound. Groundfish and crab contributed 22% of the total exvessel value of marine fish species landed in 1998, second only to the "other" species category, as the most valuable commercial fisheries on the West Coast in 1998. The groundfish share of total exvessel value of marine fish species continues a general downward trend since 1991.

In the California shore-based fishery, groundfish landings in 1998 decreased by 22.7% to 22,420 mt. Real exvessel value dropped by 31.3% to $21.7 million. Significant decreases in landings of relatively high-valued sablefish, thornyheads, as well as Dover and other soles account for these changes in California during 1998. Total groundfish landings in Oregon during 1998 decreased 6.3% to 89,809 mt, while real exvessel value fell 33.4% to $22.7 million. This can be largely attributed to major decreases in Oregon landings of widow rockfish, thornyheads, and sablefish during 1998. In Washington, total groundfish landings rose 9% from 1997 to 1998 to 17,428 mt. The exvessel value, however, decreased 44.4% to $8 million. The change in Washington groundfish landings was due mainly to a significant increase in whiting and arrowtooth flounder landings. Conversely, major declines in widow rockfish, lingcod, and sablefish landings contributed greatly to the drop in exvessel value. Oregon continued to account for the largest share of west coast groundfish landings, with 69.0% of the 1998 total.

The number of vessels with total West Coast landings greater than $10,000 decreased 13.8% from 1997 to 1998. For the first time since 1986, the number of vessels with groundfish as their principle species (the species accounting for the largest share of total exvessel revenue) fell below 500, decreasing to 475 vessels, a 21.5% reduction from 1997 to 1998. For vessels with groundfish as their principle species, the groundfish share of total exvessel revenue has been relatively stable at about 86% since 1991, increasing 2% from 1997 to 1998. Average total exvessel revenue for these vessels fell 20.8% to $119,656 from 1997 to 1998, while average groundfish revenues fell 16.7% to $103,352.

After a sharp decrease in 1994, the total number of West Coast processors or buyers for which groundfish represented the greatest share of their total exvessel expenditures remained fairly stable through 1998 at about 455 operations. However, the structure of the groundfish processing sector has changed in recent years, based on exvessel expenditures over the 1994-1998 period. From 1996 through 1998 the number of processors/buyers with average expenditures less than $200,000 per year over the 1994-1998 period increased, 18.6% to 345. At the same time, the number of processors/buyers with annual average expenditures greater than $200,000, but less than $2 million, fell 22.5%, to 79; while the number of processors with annual average expenditures greater than $2 million declined 30% to 35%.

FOREIGN AND JOINT VENTURE FISHING

Two types of fishing operations involving foreign vessels were conducted off Washington, Oregon, and northern California after implementation of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) in 1977. The foreign trawl fishery (sometimes called the "directed fishery") in which fish are both caught and processed by foreign vessels, began before the Magnuson-Stevens Act and continued through 1988. The joint venture fishery, a domestic fishery in which U.S. trawl vessels deliver their catch to foreign processing vessels at sea, began in 1978 and ended in 1990. Foreign vessels were managed according to the groundfish fishery management plan's regulations at 50 CFR 611.70 and the conditions and restrictions attached to individual foreign vessel permits issued by the National Marine Fisheries Service (NMFS). The U.S. catcher vessels in the joint venture were managed according to the regulations at 50 CFR 663, the same as U.S. vessels delivering shoreside.

Consistent with the intent of the Magnuson-Stevens Act to encourage development of domestic fisheries, joint venture, and shore-based landings of whiting generally increased after 1978 (Table 53). Although shore-based deliveries of whiting grew during this period, they comprised less than 5% of the total foreign and domestic harvest of whiting each year from 1978 to 1990. However, with the introduction of the domestic at-sea processing fleet in late 1990, U.S. processors took 7% of the whiting quota (8,115 mt by shore-based plants and 4,713 mt by at-sea processing vessels). In 1991, U.S. processors completely displaced joint venture foreign processing.

In spite of the opportunities for joint venture and foreign fisheries, only 64% of the total whiting quota between 1978 and 1990 was landed. However, after 1989, more than 90% was taken annually.

The last year of foreign domination of groundfish landings was 1979 (Figure 2). After 1980, domestic landings (joint venture and U.S. processed) annually contributed at least two thirds of the total groundfish landings, over 90% in 1982, 1983, 1984, and 1988. In 1985, due to the resurgence of the Polish directed fishery and diminished Soviet joint venture, about 70% of the total groundfish landings were made by domestic vessels. This percentage was maintained in 1986 as joint venture and foreign trawl landings increased. However, in 1986, shore-based landings of whiting decreased, apparently U.S. fishers switched to the more lucrative shrimp fishery. The proportion of domestic landings of groundfish increased to 80% in 1987 and 93% in 1988. In 1989 and 1990, with no foreign trawl fishery for whiting, the groundfish fishery off Washington, Oregon, and California was 100% domestic, as intended by the authors of the Magnuson-Stevens Act. In 1991, foreign processing of whiting at sea by joint ventures was replaced by the expanding domestic processing industry, predominantly the at-sea processing fleet that had been built primarily to harvest pollock in Alaska.

From its inception in 1978 until 1984, the joint venture for whiting grew steadily, and in 1984 accounted for almost half (47%) of the domestic landings of *all* groundfish species. However, in 1985, only 26% of the domestic groundfish landings were attributed to joint ventures. This decline occurred from reduced Soviet participation. (When the Soviets were "certified" by the U.S. Secretary of Commerce for excessive harvest of minke whales, their potential allocations were cut in half. The Soviets responded by not accepting any allocation for directed fishing in 1985 and reducing their joint venture contracts by half.) The trend of increasing proportions of joint venture landings in the domestic groundfish fishery resumed in 1986 and continued until displaced by U.S. processors in 1991. In 1986, joint venture landings virtually equaled shore-based landings of all groundfish species (including whiting) taken off Washington, Oregon, and California. In 1988, 1989, and 1990, joint venture landings contributed 59%, 68%, and 64%, respectively, of the domestic groundfish landings off Washington, Oregon, and California.

Considering *all* groundfish (foreign and domestic) landed off Washington, Oregon, and California, the joint venture accounted for 43% in 1983, 1984, and again in 1987. In 1988, the proportion increased to 54%, peaked at 68% in 1989, and dropped to 64% in 1990, before being eliminated in 1991.

Some species that are fully utilized by domestic processors were caught unavoidably in the foreign and joint venture fisheries. These catches were not counted against quotas imposed on U.S. landings, and only small allowances were permitted in order to discourage their harvest. Only once did incidental species account for more than 2% of the annual catch in the foreign trawl fishery; in 1980 when 6% were taken. In the joint venture, less than 5% of the annual U.S. catch delivered to foreign processing vessels (including species that subsequently were discarded) were incidental species, and generally less than a quarter of these were retained by the foreign vessels.

Salmon and Pacific halibut are prohibited species, which means they must not be retained by any vessel involved in the directed foreign or joint venture fishery. Between 1977 and 1988, the average catch rate of salmon in the foreign fishery was one salmon per 12 mt of whiting (0.086 salmon per mt of whiting, (Table 51). Between 1978 and 1990, the joint venture vessels averaged about one salmon per 9 mt of whiting received (0.110 salmon per mt of whiting). Interception of salmon in joint ventures was unusually high in 1986. Although the whiting quota was at its highest level in 1986, joint venture trawlers had difficulty finding fishable concentrations. In the areas where they operated, the abundance and availability of some salmon stocks were quite high, contributing to the unusually large interceptions of salmon in 1986. In 1987 and thereafter, the catch and catch rate of salmon in both the foreign and joint venture fisheries were lower than in 1986. In 1990, the joint venture catch of salmon was slightly higher than in the previous year, and the catch rate was about half (one salmon per 18 mt of whiting) the 1978 to 1990 average (one salmon per 9 mt of whiting).

Generally over 90% of the salmon taken in these fisheries were chinook. In the joint venture in 1990, 98% of the salmon were chinook, averaging 55.3 cm (21.77 inches) in fork length and 2.23 kg (4.9 pounds) in weight. Only 1.4% were chum, averaging 51.5 cm (20.3 inches) in fork length and 1.86 kg (4.1 pounds) in weight. Less than 0.4% were coho salmon in the 1990 joint venture.

Between 1977 and 1990, small numbers of Pacific halibut were taken in these fisheries, averaging about one halibut in 1,100 mt of whiting in the foreign fishery and one halibut in 1,700 mt of whiting in the joint venture. The joint venture took one halibut in approximately 2,300 mt of whiting in 1990, well below the 13-year average.

WHITING SEASON SUMMARY, 1994-1999

1994

In 1994, whiting continued to be fully utilized by the domestic industry. As in 1992 and 1993, the resource was allocated between at-sea and shoreside processing sectors. However, 1994 was the first year of a three-year allocation plan which reserved 40% of the annual harvest guideline for shore-based processing after the first 60% had been taken in open competition (first come, first serve). A provision was included for making surplus whiting available for at-sea processing on August 15, or a later date, if the shore-based industry does not need the remainder of the harvest guideline.

This also was the first year of implementation of a license limitation program in the Pacific groundfish fishery. Catcher vessels were required to possess a permit to operate in the fishery. Vessels that did not initially qualify for a permit had to buy or lease one or more permits from qualifying vessels to gain access to the fishery. This changed the composition of the at-sea processing fleet considerably, increasing the number of motherships, because permits were not required of vessels that only process. Eight vessels operated as motherships in the spring 1994 fishery, including six that in previous years had operated as catcher-processors. No catcher-processors initially qualified for a permit, but seven purchased permits in time to operate in the spring fishery.

The large-scale season started on March 1 south of 42° N latitude (the Oregon-California border) for shore-based operations and on April 15 north of 42° N latitude for both at-sea and shore-based operations. The first 60% (156,000 mt) of the 260,000 mt harvest guideline was projected to be reached on May 13, at which time further processing at sea was prohibited. The catch was higher than projected, at about 166,000 mt for both the at-sea and shore-based sectors combined. During the 1994 spring fishery, about 163,000 mt of whiting were taken by the at-sea processing fleet (76,000 mt by catcher-processors and 87,000 mt by mothership operations), and about 3,000 mt were delivered shoreside. The remaining 94,000 mt of the harvest guideline were reserved for shore-based processing which continued after at-sea processing was prohibited on May 13.

Progress of the shore-based fishery was evaluated in early August. No additional whiting were made available for at-sea processing on August 15, because it appeared the shore-based industry could use the remainder of the harvest guideline. Shore-based production was reevaluated in late September. Shore-based landings were about 59,300 mt through September 25. Of the 38,000 mt of the harvest guideline remaining after September 25, 16,000 mt was determined to be surplus to shore-based needs and was released for at-sea processing on October 1. The remaining 22,000 mt were held in reserve for the shore-based sector until the end of the year. The shore-based industry did not take the entire remainder of the reserve, even though the fishery remained open to the end of the year.

During the brief fall fishery, which lasted from October 1 to October 5, an additional 16,000 mt were taken by the at-sea processing fleet (about 11,000 mt by catcher-processors and 5,000 mt by motherships).

In 1994, the at-sea processing fleet took 179,073 mt of whiting. For the first time since domestic vessels started processing whiting at sea in 1990, the mothership fleet took a higher percentage and tonnage of whiting than catcher-processors (91,926 mt [51%] for motherships, and 87,147 mt [49%] for catcher-processors). In 1994, deliveries to at-sea processors contained about 4,001 salmon, of which 3,626 (91%) were chinook salmon, for a ratio of 0.020 chinook salmon per mt of whiting (or one chinook in 50 mt of whiting). This is about one-fifth the 0.11 average rate for all salmon species taken in the joint venture in 1978 to 1990 (Table 51) and two-thirds the 0.035 average rate for chinook salmon taken by the at-sea processing sector in 1991 to 1993. About 1,288 mt of groundfish were taken as bycatch by the at-sea processing fleet in 1994, 0.7% of the total catch in that fishery. This is about 60% of the average percentage in the joint venture (1.15%) and in the 1991 to 1993 at-sea processing fishery (1.22%).

For the year, a total of 252,729 mt of whiting had been caught by both the at-sea and shore-based sectors (179,073 mt at-sea and 73,656 mt shoreside), over 97% of the 260,000 mt harvest guideline. In 1994 as in 1991 to 1993, NMFS-certified observers were on board all at-sea processors. Observers also monitored most vessels delivering whiting shoreside.

Regulations implemented in 1993 to minimize bycatch, most notably of salmon, continued in 1994. Also as in 1993, a whiting trip limit of 10,000 pounds was implemented before the large-scale "regular" season. This trip limit was designed to reduce the need for discarding incidental catches of whiting in other fisheries and to accommodate small, traditional fresh fish and bait fisheries for whiting.

Note: Catch figures in this section are preliminary and may differ from those found elsewhere in this document. The catch of whiting in this section includes approximately 3,424 mt of whiting discarded from at-sea processors in 1994. These discards were counted against the allocations and harvest guideline. There were virtually no discards from shore-based vessels participating in the 1994 experimental fishery (predominantly in Oregon), because these vessels were not allowed to discard groundfish or salmon at sea. There is no estimate for discards from catcher vessels delivering to at-sea processors or for the catcher vessels delivering shoreside that did not participate in the experimental fishing permit program.

1995

In 1995, whiting continued to be fully utilized by the domestic industry. As in 1992 to 1994, the resource was allocated between at-sea and shoreside processing sectors. This was the second year of a three-year allocation plan which reserves 40% of the annual harvest guideline for shore-based processing after the first 60% has been taken in open competition (first come, first serve). A provision is included for making surplus whiting available for at-sea processing on August 15, or a later date, if the shore-based industry does not need the remainder of the harvest guideline.

As in past years, the large-scale "regular" season started on March 1 south of 42° N latitude (the Oregon-California border) for shore-based operations and on April 15 north of 42° N latitude for both at-sea and shore-based operations. The first 60% (107,000 mt) of the 178,400 mt harvest guideline was projected to be reached on May 4, at which time further processing at sea was prohibited. Approximately 106,556 mt were taken, 102,624 mt delivered at-sea and 3,932 mt shoreside. The remaining 71,844 mt of the harvest guideline were reserved for shore-based processing. The large-scale shoreside fishery ended on July 24 when the harvest guideline was projected to be reached. At that time, the 10,000 pound (4,536 kg) trip limit resumed, the same trip limit that was in effect before the regular season. This trip limit was designed to reduce the need for discarding incidental catches of whiting in other fisheries and to accommodate small, traditional fresh fish and bait fisheries for whiting.

In 1995, 17 at-sea processors operated: nine catcher-processors and eight motherships. The at-sea processing fleet took 102,159 mt of whiting: 61,571 mt (60%) by catcher-processors and 40,588 mt (40%) by the mothership fleet. In 1995, the at-sea processing fleet took about 15,992 salmon, of which 11,578 (72.4%) were chinook salmon, for a ratio of 0.113 chinook salmon per mt of whiting (or one chinook in nine mt of whiting). This is similar to the 0.11 average rate for all salmon species taken in the joint venture in 1978 to 1990 (Table 51) and more than three times the 0.03 average rate for chinook salmon taken by the at-sea processing sector in 1991 to 1994. About 1,436 mt of groundfish were taken as bycatch by the at-sea processing fleet in 1995, 1.4% of the total catch in that fishery. This is double the rate seen in 1994 and slightly higher than the average percentage in the joint venture (1.2%) and in the 1991 to 1994 at-sea processing fishery (1.1%).

For the year, a total of 176,107 mt of whiting had been caught by both the at-sea and shore-based sectors (102,159 mt at-sea and 73,949 mt shoreside), virtually the entire 178,400 mt harvest guideline. In 1995 as in 1991 to 1994, NMFS-certified observers were on board all at-sea processors. Observers also monitored most vessels delivering whiting shoreside. Regulations in effect during 1993 and 1994 to minimize bycatch, most notably of salmon, continued in 1995.

Note: Catch data in this section are preliminary and may differ from those found elsewhere in this document. The catch of whiting in this section includes approximately 1,837 mt of whiting discarded from at-sea processors in 1995. These discards were counted against the allocations and harvest guideline. There were virtually no discards from shore-based vessels participating in the 1995 experimental fishery (predominantly in Oregon), because these vessels were not allowed to discard groundfish or salmon at sea. There is no estimate for discards from catcher vessels delivering to at-sea processors or for the catcher vessels delivering shoreside that did not participate in the experimental fishing permit program.

1996

In 1996, the 212,000 mt harvest guideline for whiting continued to be fully utilized by the domestic industry. As in 1992 to 1995, the resource was allocated between at-sea and shoreside processing sectors. However, this was the first year that a specific amount (15,000 mt) was set aside for treaty Indian tribes on the coast of Washington state. This was the last year of a three-year allocation plan which reserved 40% of the commercial harvest guideline (the annual harvest guideline minus the tribal allocation) for shore-based processing after the first 60% had been taken in open competition by the at-sea and shore-based sectors. A provision was included for making surplus whiting available for at-sea processing on August 15, or a later date, if the shore-based industry did not need the remainder of the commercial harvest guideline.

As in past years, the large-scale "regular" season started on March 1 south of 42° N latitude (the Oregon-California border) for shore-based operations, but was changed from April 15 to May 15 north of 42° N latitude for both at-sea and shore-based operations.

The first 60% (118,200 mt) of the 197,000 mt commercial harvest guideline was projected to be reached at noon on June 1, at which time further processing at sea was prohibited. Approximately 120,977 mt were taken during that period: 112,776 mt delivered at sea and 8,201 mt shoreside. The remainder of the commercial harvest guideline was reserved for shore-based processing. The large-scale shoreside fishery ended at midnight on September 10 when the commercial harvest guideline was projected to be reached. At that time, the 10,000 pound (4,536 kg) trip limit resumed, the same trip limit that was in effect before the regular season. This trip limit was designed to reduce the need for discarding incidental catches of whiting in other fisheries and to accommodate small, traditional fresh fish and bait fisheries for whiting.

In 1996, the non-tribal at-sea processing fleet took 112,776 mt of whiting: 68,359 mt (61%) by catcher-processors and 44,416 mt (39%) by the non-tribal motherships. The Makah tribal fishery took it's full allocation of 15,000 mt. In 1996, the non-tribal at-sea processing fleet took about 1,725 salmon, of which 1,446 (83.8%) were chinook salmon (650 mt by catcher/processors and 795 by non-tribal motherships), for a ratio of 0.013 chinook salmon per mt of whiting (or one chinook in 77 mt of whiting). This is about one-tenth the rate for chinook salmon in 1995 and the 0.11 average rate for all salmon species taken in the joint venture in 1978 to 1990 (Table 51), and about one-quarter of the 0.04 average rate for chinook salmon taken by the at-sea processing sector in 1991 to 1995. The tribal fishery took 1707 chinook salmon, at a ratio of 0.114 Chinook per mt of whiting. Based on preliminary data from Oregon Department of Fish and Wildlife (ODFW), the coastwide salmon bycatch rate for the shore-based sector was 0.019 salmon per mt of whiting, well below the 0.05 guideline.

About 1,114 mt of groundfish were taken as bycatch by the non-tribal at-sea processing fleet in 1996, one percent of the total catch in that fishery. This is lower than the rate of 1.4% in 1995, and lower than the average percentages in the joint venture (1.2%) and in the 1991 to 1995 at-sea processing fishery. Approximately 2% of the total groundfish catch in the tribal fishery was bycatch. In the shore-based fishery roughly 1,667 mt of other groundfish was taken as bycatch.

In 1996, the entire 212,000 mt harvest guideline was taken: 112,776 mt by the at-sea processors, 85,731 mt by the shore-based fishery, and 14,999 mt by the treaty tribe fishery. In 1996 as in 1991 to 1995, all at-sea processors voluntarily carried observers. The whiting shore-based fishery was monitored by observing about 12% of the deliveries. Regulations in effect in 1993 to 1995 to minimize bycatch, most notably of salmon, continued in 1996.

Note: Catch data in this section are preliminary and may differ from those found elsewhere in this document. The catch of whiting in this section includes approximately 6,570 mt of whiting discarded from at-sea processors in 1996. These discards were counted against the allocations and harvest guideline. There were virtually no discards from shore-based vessels participating in the 1996 experimental fishery (predominantly in Oregon), because these vessels were not allowed to discard groundfish or salmon at sea. There is no estimate for discards from catcher vessels delivering to at-sea processors or for the catcher vessels delivering shoreside that did not participate in the experimental fishing permit program.

1997

In 1997, the harvest guideline for whiting in U.S. waters was 232,000 mt, of this 25,000 mt was set aside for treaty Indian tribes on the coast of Washington State; this was an increase over the 15,000 mt set-aside in 1996. The 207,000 mt commercial harvest guideline (the annual harvest guideline minus the tribal allocation) for whiting continued to be fully utilized by the domestic industry. The commercial harvest guideline was divided among the non-tribal sectors based on a new allocation derived by industry agreement. The allocations, within a few percent of the proportions actually harvested in 1994 to 1996, are: 42% for the shoreside sector (catcher vessels delivering to shoreside processors), 24% for the mothership sector (motherships and catcher vessels delivering to motherships), and 34% for the catcher/processor sector (catcher/processor vessels). These allocations are expected to remain in effect for at least five years. When applied to the 1997 commercial harvest guideline of 207,000 mt, these percentages resulted in whiting allocations of 86,900 mt for the shoreside sector, 49,700 mt for the mothership sector, and 70,400 mt for the catcher/processor sector. A provision was included for reallocating any unused allocation to other sectors in proportion to their initial allocations on or after September 15. The new regulations also included a provision that allows at-sea processors to process fish waste from shore whiting plants even when other at-sea processing by catcher-processors and mothership processors is prohibited, except for 48 hours before and after the primary seasons for at-sea processing. This is intended to reduce disposal and fish meal production problems during peak shore-based production periods.

A new framework was established for setting primary season dates based on the following factors: size of the harvest guidelines for whiting and bycatch species, age/size structure of the whiting population, expected harvest of bycatch and prohibited species, availability and stock status of prohibited species, expected participation by catchers and processors, environmental conditions, timing of alternate or competing fisheries, industry agreement, fishing or processing rates, and other relevant information. The starting dates are also constrained by the incidental take statement to protect threatened or endangered salmon, requiring the fishery north of 42° N latitude to start after May 14. The California shore-based season (south of 42° N latitude) opened in late April, closed at noon on May 27 when the five percent cap (4,334 mt) was attained, and resumed June 15 when the shore-based "regular" (north of 42° N latitude) season and the mothership and catcher/processor sectors opened on May 15.

The mothership sector took 50,401 mt (1.4% over its allocation of the commercial harvest guideline) and closed at 3 p.m. on June 1. The catcher/processor sector took 70,771 mt (.5% over its allocation of the commercial harvest guideline) and closed at noon on June 11. The Washington, Oregon, and California shoreside sector took 87,499 mt (.27% over its allocation) and closed August 22 at noon. At this time, the 10,000 pound trip limit resumed as before the primary season. This trip limit is intended to accommodate small bait and fresh fish markets and bycatch in other fisheries. The tribal whiting fishery harvested 24,840 mt of whiting.

In 1997, preliminary figures indicate chinook salmon bycatch in catcher/processor and mothership processing sectors remained similar to the low levels of 1996. The chinook bycatch rate in the

catcher-processor fishery was about .008 chinook per metric ton of whiting, down from 0.009 in 1996 and well below the guideline of 0.05 chinook per mt. Chinook bycatch in the mothership fishery increased slightly from 0.018 to 0.026 salmon per mt of whiting. Chinook bycatch taken during the tribal whiting fishery was 0.102 chinook per metric ton of whiting, which exceeded the chinook guideline of 0.05 per metric ton of whiting. However, when the tribal and non-tribal mothership data are combined they are just at the 0.05 rate. Based on preliminary ODFW data, the coastwide salmon bycatch rate for the shore-based sector was 0.017, well below the 0.05 guideline.

Preliminary NMFS data indicates that yellowtail rockfish bycatch in the catcher/processor and mothership fisheries was 290 mt (116 mt for catcher/processors and 174 mt for non-tribal motherships) and 113 mt in the tribal fishery. Widow rockfish bycatch rate in the catcher/processor and mothership fisheries was 207 mt (73 mt for catcher/processors and 134 mt for non-tribal motherships) and 9 mt in the tribal fishery. Industry reportedly took steps to reduce bycatch by reporting catch and bycatch to a central location. Areas of high bycatch were reported to the participating vessels so those areas could be avoided. In addition, the four catcher/processor companies formed a cooperative with an agreement that each company would limit its share of the harvest. With its harvest assured, the catcher-processors could operate more cautiously to avoid areas of salmon and rockfish abundance. The mothership and shore-based sectors did not have such an agreement. Based on preliminary ODFW data, the coastwide shore-based estimates of yellowtail and widow rockfish in the whiting fishery were, 230 mt and 159 mt, respectively. Shore-based yellowtail and widow rockfish bycatch rates were substantially lower than in 1996.

As in previous years, all at-sea processors voluntarily carried at least one observer while participating in the whiting fishery. The whiting shoreside fishery was monitored by observing about 14% of the deliveries. Regulations in effect in 1993 to 1996 to minimize bycatch, most notably of salmon, continued in 1997.

Note: Catch data in this section are preliminary and may differ from those found elsewhere in this document. The catch of whiting in this section includes 2,917 mt of whiting discarded from catcher/processor and non-tribal mothership vessels and 92 mt of whiting discard in the tribal fisheries. These discards were counted against the allocations and harvest guideline. There were virtually no discards from shore-based vessels participating in the 1997 experimental fishery (predominantly in Oregon), because these vessels were not allowed to discard groundfish or salmon at sea. There is no estimate for discards from catcher vessels delivering to at-sea processors or for the catcher vessels delivering shoreside that did not participate in the experimental fishing permit program.

1998

In 1998, the U.S. whiting allocation continued to be fully utilized by the domestic and tribal fishing industries. Eighty percent or 232,000 mt of the 290,000 mt transboundary whiting acceptable biological catch (ABC) was apportioned to the U.S. As in 1997, 25,000 mt was set aside for treaty Indian tribes on the coast of Washington State, resulting in a commercial harvest guideline of 207,000 mt. The commercial harvest guideline was further divided with 34% going to the catcher/processor sector; 24% going to the mothership sector; and 42% going to the shoreside sector. When applied to the 1998 commercial harvest guideline of 207,000 mt, these percentages resulted in whiting allocations of 70,400 mt for the catcher/processor sector, 49,700 mt for the mothership sector, and 86,900 mt for the shoreside sector. Provisions for reallocating any unused allocation to other sectors were not needed in 1998.

Since mid-1997, when the Department of Justice approved the catcher/processor industry's allocation of whiting shares among the members of the Pacific Whiting Conservation Cooperative, this fishery has operated a voluntary catch sharing program where each of the catcher/processor companies has agreed to harvest a specific share of the allocation. With harvests assured, the catcher/processors are able to operate more cautiously to avoid areas of salmon and rockfish abundance. During 1998, the mothership and shore-based sectors continued to operate under more competitive conditions (first come first served) for their sector's allocation. The shore-based fishery continued to operate under exempted fishing permits that enabled the fleet to bring unsorted catches to shore.

Season start dates for 1998 were the same as in 1997. The shore-based season in most of the Eureka area (between 42°- 40°30' N latitude) began on April 1, the fishery south of 40°30' N latitude opened April 15, but as in recent years, no fishing occurred. The fishery north of 42° N latitude started on June 15. The primary seasons for the mothership and catcher/processor sectors began May 15.

In total, 232,588 mt were harvested in 1998, slightly over the 232,000 mt harvest guideline. About 1,718 mt of the total catch of whiting was discarded due to small size and poor quality (673 mt by catcher/processors, 382 mt by non-tribal motherships, and 663 mt by the tribal fishery). No discards are expected for the shore-based fishery.

Six mothership vessels received 50,087 mt of whiting (1% over its allocation of the commercial harvest guideline) and closed on May 31, 1998. Seven catcher/processor vessels took 70,365 mt of whiting (virtually equal to its allocation) and closed on August 7, 1998. For the tribal fishery, one mothership processed 24,509 mt of whiting (2% below the tribal allocation). Thirty eight vessels in the Washington, Oregon, and California shore-based sector delivered 87,862 mt (1% over its allocation) to 13 processors (7 in Oregon, 3 in Washington, and 3 in California) before the October 13, 1998 closure. Upon closure of the primary season for the shore-based sector, the 10,000 pound trip limit resumed as before the primary season. This small trip limit is intended to accommodate small bait and fresh fish markets and bycatch in other fisheries.

The 1998 Pacific whiting fishery was strongly affected by the downturn in the Asian market. Low prices for surimi resulted in processors, both at-sea and shore-based, converting to different products such as minced blocks, fillets, and headed and gutted fish. The fishery was further complicated by smaller fish. Because of a northward population shift, fish of sizes that the Oregon fleet normally catch were in more northern waters, and the smaller fish, normally off California, were being caught off Oregon. Growth rates also tend to be reduced during El Niño years. While the greater mobility of the catcher/processor and mothership sectors enabled them to overcome some of the problems associated with fish size and condition, the combination of market and fish conditions caused the shore-based fishery to slow its pace, with several processors shutting down their lines early in the season.

The major groundfish bycatch species in the whiting fishery are yellowtail and widow rockfish. Bycatch of yellowtail rockfish in the at-sea processing portion of the whiting fishery was 536 mt (64 mt by catcher/processors, 313 mt by non-tribal motherships, 159 mt by the tribal fishery). Bycatch of widow rockfish in the at-sea processing portion of the whiting fishery was 307 mt (121 mt by catcher/processors, 172 mt by non-tribal motherships, 14 mt by the tribal fishery). Yellowtail and widow rockfish bycatch levels from the shoreside sector were 518 mt and 366 mt, respectively.

In 1998, chinook salmon bycatch in the at-sea processing fleet remained similar to the low levels of 1996 and 1997. The chinook bycatch rate of 0.007 chinook per metric ton of whiting in the catcher-processor fleet is down from the 1997 rate of 0.008 and the 1996 rate of 0.010 chinook per metric ton of whiting, this was well below the guideline of 0.05 chinook per mt. Chinook bycatch in the non-tribal mothership fishery was 0.019, less than half the guideline of 0.05 chinook per mt. This is less than the 1997 rate of 0.026 chinook per mt of whiting, but similar to the 1996 mothership rate of 0.018. Chinook bycatch in the tribal whiting fishery was 0.085 chinook per metric ton of whiting, down from the 1997 rate of 0.102 chinook per metric ton of whiting. The mothership fishery as a whole, tribal and non-tribal therefore had a chinook bycatch rate of .04 chinook per mt of whiting in 1998 (3051 chinook in 74,596 mt of whiting), which is within the 0.05 rate specified under the biological opinion for the fishery. The bycatch rate of all salmon species taken by the shore-based sector was 0.016 per metric ton of whiting.

As in previous years, all at-sea processors carried at least one NMFS trained observer when they participated in the whiting fishery. To provide additional data for monitoring their voluntary allocation program, catcher/processor vessels carried two observers as did the tribal mothership.

Note: Catch data in this section on the whiting fishery are preliminary and may differ from those found elsewhere in this document.

Because there would not be a new stock assessment for whiting in 2000, the Council recommended averaging the coastwide ABC for the U.S.-Canada for 1999-2000, applying the 40-10 default harvest policy (because whiting is at 37% of its unfished biomass), and then allocating 80% to the U.S., which resulted in a 1999 optimum yield (OY) for the U.S. of 232,000 mt. The U.S. ABC then was set equal to OY.

As in previous years, a portion of the OY was set aside for treaty Indian tribes on the coast of Washington State. In 1999 the Quileute treaty tribe for the first time joined the Makah tribe in expressing an interest in harvesting whiting. The two tribes jointly submitted, to the Council, a framework proposal for determining tribal allocations which was based on the level of OY. With an OY of 232,000, the tribes initially requested 35,000 mt of whiting for 1999, but later reduced the request to 32,500 (14% of the 232,000 mt) when the Quileutes decided not to participate in 1999. The final Council recommendation was for a tribal allocation of 25,000 mt, which was the same as the tribal allocation in 1997 and 1998. However, NMFS determined that the tribal request of 32,500 mt was a reasonable accommodation of the treaty right in 1999 in view of the uncertainty surrounding the appropriate quantification. This resulted in a commercial harvest guideline of 199,500 mt (7,500 mt lower than 1998).

The commercial harvest guideline was further divided with 34% going to the catcher/processor sector; 24% going to the mothership sector; and 42% going to the shoreside sector. When applied to the 1999 commercial harvest guideline of 199,500 mt, these percentages resulted in whiting allocations of 67,800 mt for the catcher/processor sector, 47,900 mt for the mothership sector, and 83,800 mt for the shoreside sector.

In 1999, season start dates were the same as in 1997 and 1998. The shore-based season in most of the Eureka area (between 42^{o}- 40^{o}30' N latitude) began on April 1, while the season south of 40^{o}30' N latitude opened on April 15, and the fishery north of 42^{o} N latitude started on June 15. The primary seasons for the mothership and catcher/processor sectors began May 15, as seen in previous years. The catcher/processor sector continued to operate as a voluntary quota sharing program where each of the catcher/processor companies agreed to harvest a specific share of the allocation, while the mothership and shore-based sectors continued to operate under more competitive conditions (first come first served) for their sector's allocation. The shore-based fishery continues to operate under exempted fishing permits that allow the fleet to bring unsorted catches to shore.

Preliminary data indicate that the six mothership vessels received 47,581 mt of whiting (0.7% under its allocation of the commercial harvest guideline) and closed on June 2, 1999. Six catcher/processor vessels took 67,563 mt of whiting (0.3% under its allocation of the commercial harvest guideline) and closed on July 21, 1999. Complete data for the shore-based sector and tribal whiting fishery were not available at the time this report was prepared.

As in previous years, all at-sea processors carried at least one NMFS trained observer when they participated in the whiting fishery. To provide additional data for monitoring their voluntary allocation program, catcher/processor vessels carried two observers, when available, as did the tribal mothership.

Note: Catch data in this section on the whiting fishery are preliminary and may differ from those found elsewhere in this document.

FINAL GROUNDFISH MANAGEMENT TEAM ABC AND HARVEST GUIDELINE RECOMMENDATIONS FOR 2000

Stock assessments for West Coast groundfish are conducted by staff scientists of the California Department of Fish and Game (CDFG), Oregon Department of Fish and Wildlife (ODFW), Washington Department of Fish and Wildlife (WDFW), Oregon State University (OSU), Southwest Fisheries Science Center of the National Marine Fisheries Service (NMFS), the Alaska Fisheries Science Center of NMFS, and the Northwest Fisheries Science Center, Fishery Resource Analysis and Monitoring Division of NMFS.

In 1997, the Council implemented a new stock assessment review process in an attempt to improve public participation in the process, to increase the level of scientific peer review, and to provide a greater separation between the scientific and management processes. This process was modified in 1998 and again in 1999 to better accomplish these goals (1999 terms of reference for the process and the STAR Panel reports are included in this document). In March 1999, a pre-assessment workshop was held to review and evaluate data and identify problems and modeling assumptions. Stock assessments were prepared by Stock Assessment Teams (STAT Teams) and then reviewed by three Stock Assessment Review Panels (STAR Panels) at three public workshops. This year, assessments were completed for Pacific whiting, black rockfish, bocaccio rockfish, canary rockfish, cowcod rockfish, petrale sole, and lingcod in the southern portion of its range. The Groundfish Management Team (GMT) then met in August to develop preliminary acceptable biological catch (ABC) and optimum yield (OY) recommendations based on the "best scientific information" forwarded by the STAR Panels. STAR Panel chairs, several panel members, and several STAT Team members (i.e., assessment authors) attended the August 1999 (GMT) meeting.

The GMT concluded its final discussions of appropriate ABCs and OYs for the year 2000 at its October 4-8, 1999 meeting. Following is a synopsis of the GMT's final ABC and OY recommendations for each principal species, including species that were assessed in previous years. Assessments of some stocks are updated only about every three years and, where appropriate, ABCs are based on average potential yields for the three year period following the preparation of the assessment. Other ABCs are based on previous assessments (e.g., sablefish and Dover sole), and some are based on historic landings. The GMT used the available information to calculate ABCs and generally based its OY recommendations on the default harvest policy in the FMP.

GENERAL FEATURES

Assessment Models

Prior to 1997, assessments of West Coast groundfish stocks were generally conducted through use of a microcomputer program known as the stock synthesis model.[1/] This model is similar to other stock assessment tools in its handling of the interaction between a fishery and the exploited stock, but it provides greater flexibility in the types of auxiliary data that can be examined. Perhaps more importantly, the stock synthesis model provides a bridge between strictly biomass-based models (e.g., Stock Reduction Analysis) and strictly age-structured models (e.g., cohort analysis) and also provides the capability to examine size composition data. The model is structured to simultaneously analyze catch biomass, age and length composition and catch per unit effort from multiple fisheries, and abundance and age and length composition from multiple surveys. This flexibility has allowed quantitative examination of stocks and fisheries that could not be analyzed by other techniques. The model has provided a useful tool for organizing the available data and exploring the limits of our knowledge with regard to the history and current status of each stock, although the nature of the available information often does not provide narrow constraints on the range of feasible model results.

1/ Methot, Richard D. 1990. Synthesis Model: An adaptable Framework for Analysis of Diverse Stock Assessment Data. International Pacific Fishery Commission Bulletin Number 50: 259-277.

In 1997, a significant event in the evolution of population dynamics models used for West Coast groundfish stock assessments occurred. For the first time, analysts preparing the yellowtail rockfish assessment in 1997 used the Auto-Differentiation (AD) Model Builder package developed by Fournier. AD Model Builder uses the same model fitting approach as that used by the synthesis model, and given the same inputs and parameter specifications in that assessment, AD Model Builder produced essentially the same results as the synthesis model. In many respects the AD Model Builder approach is more computationally efficient than synthesis, utilizing much improved computing algorithms and producing variance estimates of key model outputs. This latter feature provides a way for investigators to characterize the degree of uncertainty in assessment results. Since 1997, this package has been used regularly by assessment analysts, along with stock synthesis.

Exploitation Rate

The FMP specifies that, in general, a fixed fraction of the exploitable stock may be harvested each year by applying a constant fishing mortality rate (F). The level of exploitation is designed to achieve a large fraction of MSY while protecting the spawning potential of the stock. Prior to 1997, $F_{35\%}$ was treated as a default target rate for species where it could be calculated. $F_{35\%}$ is the fishing mortality rate that would reduce average egg production per female to 35% of its unfished level (Figure 4). The selection of the $F_{35\%}$ policy as a reasonable proxy for MSY was based on theoretical work by Clark (1991). In that report, he concluded, that the $F_{35\%}$ rate provides a good approximation to F_{msy} for the particular range of conditions he examined.

The long-term expected yield under an $F_{35\%}$ policy depends upon the level of density-dependence in recruitment (Figure 5), which is unknown. If the reduction to 35% of the unfished total egg production causes no reduction in recruitment, the long-term average female spawning stock level will be 35% of its unfished level and a large long-term average yield will be obtained. However, if this reduction in total egg production causes some reduction in average recruitment, future female spawning stock levels will be less than 35% of the unfished level and future yields will be reduced as well. Thus, the expected, long-term average level of female spawning biomass, relative to the unfished level, is between 35% on the upper end and perhaps no lower than about 20% on the lower end. In some cases, MSY is calculated under the assumption that recruitment declines to 90% as spawning biomass is fished down to 50% of its unfished level. This is just one of several plausible levels of MSY, depending on the true level of density-dependence in recruitment, and is included for reference and continuity with past reports.

The short-term yield under an $F_{35\%}$ policy will vary as the abundance of the exploitable stock varies. This is true for any fishing policy that is based on a constant exploitation rate. The abundance of the stock will vary because of the effects of fishing and because of natural variation in recruitment. When stock abundance is high (i.e., near its average unfished level), short-term annual yields can be approximately two to three times greater than the expected long-term average annual yield. For some long-lived groundfish species on the West Coast, this "fishing down" transition can take decades, if exploitation rates are held near MSY. Many of the declines in ABC that occurred during the 1980s were the result of this transition from a lightly exploited, high abundance stock level to a fully or over-exploited stock level.

More recent work (Clark 1993, Mace 1994, and Ianelli 1995) indicates that $F_{35\%}$ may not be the best approximation of F_{msy}, given more realistic information about recruitment than was initially used by Clark in 1991. In his 1993 publication Clark extended his 1991 results by improving the realism of his simulations and analysis. In particular he (1) modeled stochasticity (that is, he put a random factor) into the recruitment process, (2) introduced serial correlation into recruitment time series (that is, periods of particularly strong or particularly weak reproduction), and (3) performed separate analyses for the Ricker and Beverton-Holt spawner-recruit functions. For rockfish, these changes improved the realism of his SPR harvest policy calculations, because these species are known to have stochastic (random) recruitment and they appear to display serial correlation in recruitments (especially on interdecadal time scales), and because the Beverton-Holt spawner-recruit curve is biologically the most plausible recruitment model. The effect of each of these changes, in isolation and in aggregate, was to decrease F_{msy}. Consequently, the estimated SPR reduction needed to provide an optimal F_{msy} proxy (defined as that level of fishing which produces the largest assured proportion of MSY), must necessarily be increased (the higher the F%, the lower the exploitation rate. Clark concluded that $F_{40\%}$ is the optimal rate for fish stocks exhibiting recruitment

variability similar to Alaska groundfish stocks. Likewise, Mace (1994) recommended the use of $F_{40\%}$ as the target mortality rate when the stock-recruitment relationship is unknown. Ongoing investigations into the productivity of west coast groundfish species seems to indicate they are less productive than previously believed.

In 1998, the GMT concluded that $F_{40\%}$ should be used as the proxy for F_{msy} for rockfish, in the absence of specific knowledge of recruitment or life history characteristics which would allow a more accurate determination of F_{msy}. The Council endorsed this recommendation. The GMT has continued its discussion of F_{msy} proxies for groundfish species, and the Scientific and Statistical Committee will conduct a review of current literature on this issue early in 2000. The results will be utilized for 2001 ABCs and OYs. In the interim, the GMT believes that OYs for all species except flatfish and whiting should be reduced in 2000. This would be accomplished by increasing the F% used in calculating the OYs by 5% (e.g., from $F_{40\%}$ to $F_{45\%}$).

Most groundfish species have never been assessed, and some have been assessed by less-rigorous methods than stock synthesis or AD Model Builder. ABCs for these species are generally based on historic catch levels. In cases where there is no assessment or the assessment does not provide an estimate of current spawning potential relative to unfished levels, the GMT believes precautionary reductions to current ABC levels are appropriate. For 1998, the contributions of minor rockfish species in the *Sebastes* complex to the overall OY were reduced. Specifically, the OY contribution of species with informal assessments was reduced 25%, and the contribution of non-assessed species was reduced 50%. The GMT believes such adjustments are probably appropriate for other species as well, but the GMT has been unable complete this task at this time. The GMT intends to evaluate these other cases over the coming year.

Overfishing Considerations

The Magnuson-Stevens Act and National Standard Guidelines state that overfishing occurs whenever a stock is harvested at a level in excess of MSY. A stock is considered to be overfished when its abundance falls below a specified threshold. Overfished stocks must be rebuilt to a level consistent with producing MSY within a specified time period.

In 1998, the Council amended the FMP definitions of overfished and overfishing to comply with the revised Magnuson-Stevens Act. The FMP defines overfishing as exceeding the fishing mortality rate that produces the MSY, the term used for this is F_{msy}. Because scientists can seldom calculate the true value of F_{msy} for any stock, a proxy value is typically used. The proxy value is the best scientific estimate of MSY. Amendment 11 to the FMP specified the default value for F_{msy} is $F_{40\%}$ for rockfish and $F_{35\%}$ for other groundfish species; this may be superseded based on better scientific information. Faster growing stocks, or stocks with quicker recruitment, can sustain a higher fishing mortality rate (such as $F_{35\%}$), while slower growing stocks, or stocks with lower reproduction can only be fished at a lower fishing mortality rate (such as $F_{40\%}$ or $F_{45\%}$). Under this policy, MSY is a constant fishing mortality rate, that is, a constant fraction of the stock may be harvested each year. The ABC for a species generally is derived by multiplying the exploitation rate ($F_{40\%}$ or $F_{35\%}$) times the current biomass estimate.

The figure below illustrates the default relationship between current biomass levels (or spawning potential), ABC, and OY. The point labeled $B_{40\%}$ is the default value for the MSY stock size (or spawning potential). It is 40% of the best estimate of the unfished biomass size, preferably measured as unfished spawning potential. The point labeled $B_{25\%}$ represents the "overfished" threshold.

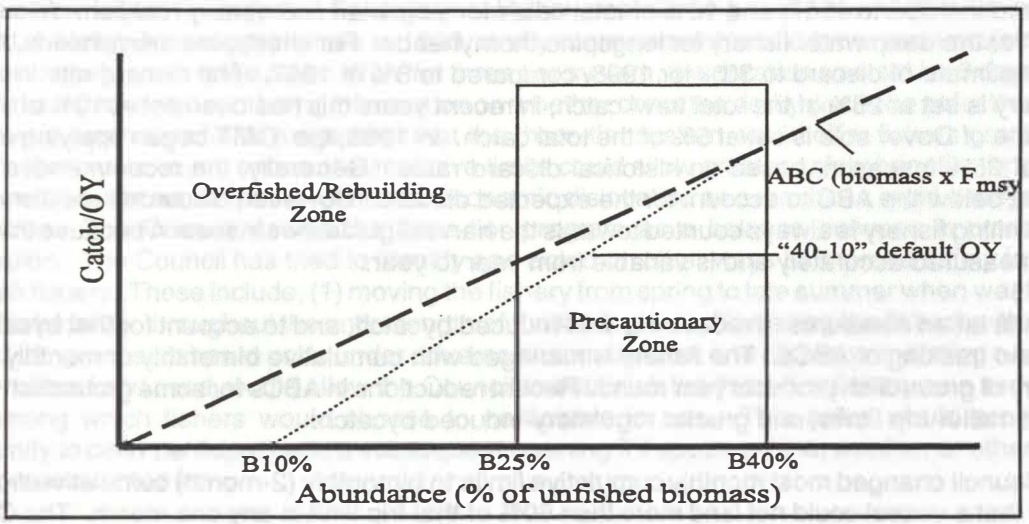

Illustration of default OY rule compared to ABC.

If the stock biomass is larger than $B_{40\%}$, the OY may be set equal to or less than ABC. A stock whose current biomass is between 25% of the unfished level and the precautionary threshold is said to be in the "precautionary zone." The Council's default OY harvest policy (represented by the line labeled 40-10 default OY in Figure 1) reduces the exploitation rate when a stock is at or below its precautionary threshold. The farther the stock is below the precautionary threshold, the greater the reduction in OY will be relative to the ABC, until, at $B_{10\%}$, the OY would be set at zero. This is, in effect, a default rebuilding policy that will foster quicker return to the B_{msy} level than would fishing at the ABC level.

If a stock falls below 25% of its unfished biomass ($B_{25\%}$), it is considered overfished under the default definition. In such cases, the Magnuson-Stevens Act requires the Council to develop a formal rebuilding plan within the following year. In limited cases, the Council may set the OY higher than the default OY if justified, as long as the OY does not exceed the ABC (F_{msy}) harvest rate and is consistent with the requirements of the Magnuson-Stevens Act and NOAA National Standard Guidelines. Additional precaution may be added on a case-by-case basis at any level of current biomass, and may be warranted by uncertainty in the data or understanding of stock status.

Bycatch and Discard Mortality Information

Under the Magnuson-Stevens Act, bycatch is defined as "fish which are harvested in a fishery, which are not sold or kept for personal use, and includes economic discards and regulatory discards." Bycatch occurs as a result of market forces and regulations. Although the term bycatch is commonly used to describe nontargeted species that are landed and sold or used, and the term "discard" used to describe those that are not landed or used, in this section the term "bycatch" is consistent with the definition in the Magnuson-Stevens Act. Economic bycatch and discard of commercial species are usually related to fish size or lack of immediate market. It also includes catch and discard of unmarketable species. Regulatory bycatch may be caused by trip limits when a fisher catches more than an intended amount when making a targeted tow. Regulatory bycatch also occurs when a vessel continues to fish for other species after the cumulative limit for the species has been reached

Bycatch information in the groundfish fishery is scarce. In April 1990, the GMT presented its best estimates of discard mortality to the Council. These assumed levels of discard in other fisheries were generally based on field observations in the mid-1980s[2/] and information on species compositions in landings. However, there is no monitoring to verify the current level of discard, and the rates have undoubtedly changed over time. The assumed level of discard for widow rockfish is 16% of landed catch annually, based on discard

2/ Pikitch, Ellen, K., Daniel L. Erickson and John R. Wallace. 1988. An evaluation of the effectiveness of trip limits as a management tool. NWAFC Processed Report 88-27, 33p.

levels measured in 1985 to 1987, and 16% of total catch for yellowtail and canary rockfish. A lower level of 9% is used for the deep water fishery for longspine thornyheads. For shortspine thornyheads, the GMT increased its estimate of discard to 30% for 1998, compared to 8% in 1997. The discard rate in the trawl sablefish fishery is set at 25% of the total trawl catch; in recent years this has been set at 10% of the ABC. The discard rate of Dover sole is set at 5% of the total catch. In 1998, the GMT began applying a lingcod discard rate of 25% inseason, based on historical discard rates. Generally, the recommended harvest guideline is set below the ABC to account for the expected discard. However, discarded rockfish bycatch in the at-sea whiting fishery is always counted towards the harvest guidelines inseason because this source of discard is measured accurately and is variable from year to year.

The Council has taken measures to reduce trip limit-induced bycatch, and to account for that bycatch in its calculations and tracking of ABCs. The fishery is managed with cumulative bimonthly or monthly limits to extend delivery of groundfish products year round. Recent reductions in ABCs for some groundfish species have caused smaller trip limits, and greater regulatory-induced bycatch.

In 1996, the Council changed most monthly cumulative limits to bimonthly (2-month) cumulative limits, with the restriction that a vessel could not land more than 60% of that trip limit in any one month. The Council's intent was that vessels should continue to target 50% of the bimonthly limit, but if a vessel inadvertently exceeded that target, it did not need to immediately discard amounts over that target. The additional allowance provided some flexibility intended to prevent or reduce discard. In addition, the GMT has been able to estimate the ratios in which some species are caught in a complex, such as the Dover sole, thornyheads and trawl-caught sablefish (DTS) complex. Using this information, the GMT attempts to set trip limits in proportion to how species occur in landings. This can mean reducing trip limits on more abundant species to prevent bycatch of less abundant species, or setting different trip limits in different times of the year, depending on when the species tend to associate. In 1999, the Council adopted two- and three-month periods and dropped the restriction that not more than 60% be landed in any given month.

There are several efforts underway to improve information on bycatch in the groundfish fishery and ultimately to reduce bycatch, to the extent practicable. The recently completed Enhanced Data Collection program (a cooperative industry-state program) was a pilot observer and logbook program that collected some bycatch information in the trawl fishery. Data from the pilot phase are currently being analyzed. In addition, the NMFS Northwest Fisheries Science Center received a grant from the Office of Science and Technology to develop an electronic logbook program that may collect information on total catch in a timely and useable form. In 1999, the Council appointed and convened the Groundfish Observer Program Implementation Committee, whose charge is develop an observer program to be implemented in 2000. Also in 1999, the Council reconstituted its legal gear committee to evaluate gear selectivity and potential modifications to reduce bycatch. A related issue is the Council's consideration of a program to allow fishers to land trip limit overages for contribution to a groundfish research fund. This voluntary program does not attempt to measure bycatch in the fishery, but at least serves to capture value from these fish that would otherwise be bycatch.

Safety Considerations

Safety considerations in the groundfish fishery primarily relate to flexibility afforded to fishers so that they are not compelled to harvest fish in short time periods during adverse weather conditions. In the groundfish limited entry and open access fisheries, trip limits are *generally* set for monthly or bimonthly periods to allow fishers discretion within that time period over when to go fishing. For fisheries that operate within certain seasons within the year, such as fixed gear limited entry sablefish and limited entry whiting, the Council has built in flexibility in setting the season each year based on safety related factors such as expected weather conditions and tidal patterns. Also, in the whiting fishery, the Pacific Whiting Conservation Cooperative has developed a system to divide the catcher-processor allocation among participating vessels, allowing flexibility in times of operation.

The limited entry fixed gear sablefish fishery season had been reduced to an eight day derby fishery in 1994, and a five day derby by 1996. After exploring other remedies, in 1997 the Council replaced the unrestricted derby with an equal cumulative limit fishery that lasted 10 days. For 1998, the management regime was

changed from equal limits for all fixed gear sablefish vessels to a 3-tier cumulative limit system. With reduced sablefish harvest guidelines in 1998, derby management would have been projected to result in a season lasting two or three days. With the three tier system, the duration was set for 6 days. The Council reviewed extensive and conflicting information on whether or not the derby would be safer than the three-tier system and determined in its judgement that the three-tier system would offer fishers greater safety. It is possible that a year-round series of cumulative limits could allow greater safety benefits, however, such an option would cause a substantial social and economic dislocation as a result of a rapid change in the harvest distribution. The Council viewed the three-tier program as a balance between improving safety and reallocation. The Council has tried to identify and acted on other ways to improve safety in the fixed gear sablefish fishery. These include, (1) moving the fishery from spring to late summer when weather conditions tended to be better throughout the entire length of the fishing area, (2) ending the fishery with vessels at-sea to avoid dangerous rushes to ports under adverse circumstances, and (3) recommending a framework that, if implemented and used, would allow the Council to establish the three-tier fishery as a series of openings from among which fishers would choose to participate in one. This setup would provide fishers an opportunity to defer participation to a subsequent opening if it appeared that weather or other safety related conditions warranted it.

Calculation of Limited Entry And Open Access Shares

In 1999, problems arose due to the misalignment of the *Sebastes* complex OY boundary (Cape Blanco, Oregon) and the trip limit management boundary (near Cape Mendocino, California). The identified solution was to combine the Eureka area with the Vancouver and Columbia areas rather than with the Monterey and Conception areas. The GMT recognized this would require recalculation of the open access allocation shares for the *Sebastes* complex in the redefined areas. In the interim since the previous calculations were made in 1994, the list of qualifying vessels for all original permits was updated, as was the commercial landings data base. When difference between the new and previous *Sebastes* calculations were observed, the GMT also reviewed the calculations for other species. This analysis has not yet been completed.

For 1999, the GMT applied the open access and limited entry percentages to the total catch OYs and then applied any appropriate discard factors on a sector-by-sector basis. The GMT intends to do the same for 2000. Default discard rates used in recent years for the limited entry fishery will be continued, while discard rates for open access will be evaluated using trip frequency analysis, discussions with industry, and other relevant information, and applied during the season. Similar adjustments may need to be made during the season for limited entry *Sebastes* species for which zero discard was previously assumed.

ROUNDFISH

Pacific Whiting

A new assessment of the Pacific whiting resource was prepared early in 1999, incorporating data from the 1998 whiting surveys. The Council delayed adoption of the 1999 ABC and OY until its March 1999 meeting. Prior to 1999, ABC specifications for whiting were based on a "Hybrid-F" harvest policy. This approach and the '40-10' default OY reduce yields when biomass falls below a prescribed threshold. However, the Hybrid-F incorporated a steeper initial reduction that was likely to result in greater annual variability of harvest amounts than the 40-10 approach. The GMT believes that these two approaches afford comparable protection to the stock and recommended application of the 40-10 default OY in 1999. The Council endorsed this change.

The STAR Panel concluded that $F_{40\%}$ is a legitimate proxy for F_{msy} for this stock. However, the GMT reviewed additional information that suggested a lower exploitation rate may be appropriate. The GMT could not reach consensus on a single approach and provided a range bounded by $F_{40\%}$ and $F_{45\%}$ for Council consideration.

The range of coastwide 1999 ABCs corresponding to $F_{45\%}$ and $F_{40\%}$ was 259,000 - 320,000 mt. Since the stock was at 37% of the unfished level at that time, and application of the 40-10 policy yielded coastwide targets of 243,000 - 301,000 mt for 1999, and 236,000 - 275,000 mt for 2000. The corresponding U.S. OYs,

calculated at 80% of the coastwide amounts, were 194,000 - 241,000 mt in 1999, and 188,800-220,000 mt in 2000. The GMT recommended adoption of equal OYs at an intermediate level in both years, ranging from 230,000 mt ($F_{40\%}$) to 190,000 mt ($F_{45\%}$). The spawning stock is projected to continue its recent decline, falling by 16% from 1999 to 2001 using an $F_{40\%}$ base rate. This projected decline, by itself, may be insufficient to justify adoption of a more conservative base harvest rate. However, this stock has experienced a noteworthy reduction in fish size-at-age over the past 20 years, and recruitment patterns evidenced in the 1990s have been considerably different than those of the previous decade. In addition, lack of international allocation of harvests has led to coastwide catches that have consistently exceeded recommended ABCs by roughly 10% annually in recent years.

For 1999, the Council adopted a status quo ABC and OY of 232,000 mt, stating its intention that this apply to 2000 as well. The GMT concurs.

Sablefish

Two stock assessment teams (STAT1 and STAT2) conducted independent evaluations of the status of the Pacific coast sablefish population in 1998. Both assessments used very similar data and modeled the sablefish population as a unit stock extending from the US-Vancouver area in the north to the Monterey area in the south. STAT1 employed an "age-structured" model, the same type of model used in the 1997 sablefish assessment. STAT2 used a simpler "delay difference" model, that required the estimation of far fewer parameters.

The STAR Panel noted that, due to uncertainty regarding the fraction of the sablefish population measured by the NMFS slope survey (Q), and limitations of available fishery data, neither model provided a reliable estimate of current biomass. In an effort to incorporate this uncertainty into its recommendations, the STAR Panel elected to characterize model results using a simple "Bayesian" approach with respect to uncertainty in Q.

As a first step, the STAT Teams and the STAR Panel identified a plausible range of Q values (0.25, 0.5, 0.75, 1.0, 1.5). Next, each value of Q was assigned a probability based on comparative studies, personal experience, and qualitative information provided by those present at the meeting, including industry representatives. A Bayesian approach was used to integrate these probabilities across the range of values of Q, in order to estimate posterior probability distributions for Q and model results. A weighted average of model outputs was calculated using the posterior probabilities for Q as weighting factors.

Results from both STAT Teams were generally similar for a particular value of Q. However, the assessment models provided different posterior probabilities for Q, except for the value Q=1.5, which had zero posterior probability for both assessments. The posterior probabilities for the STAT1 model were highest for Q-values in the 0.25-0.5 range, whereas the posterior probabilities for the STAT2 model were highest for Q-values in the 0.5-0.75 range.

Because the value of Q is inversely related to stock biomass, the STAT1 model estimated a higher biomass in 1998 than did the STAT2 model. Sablefish biomass estimates from the STAT1 model ranged from 35,000 to 290,000 mt, with an expected value of 173,000 mt. Estimates of 1998 biomass from the STAT2 model ranged from 30,000 to 250,000 mt, with an expected value 104,000 mt. For comparison, terminal-year biomass estimates from the age-structured assessment of sablefish conducted in 1997 were between 48,000 mt and 126,000 mt, depending on the model scenario. During its August meeting, the GMT reviewed the summary reports from the STAT teams and STAR Panel, and discussed ways of combining the range of model outcomes into a harvest recommendation. Because the range of biomasses associated with plausible values of Q was so large, the GMT adopted a Bayesian approach similar to that used by the STAT Teams and STAR Panel. In particular, the GMT used expected values from the posterior distributions of both assessment models to derive a risk-neutral yield recommendation. Because the STAR Panel found the modeling and results of both STAT teams to be plausible, the GMT weighted the posterior outcomes

from both models equally in developing their preliminary harvest recommendations. Subsequent to the August GMT meeting, the Team requested clarification from the STAR Panel on the appropriateness of weighting the STAT1 and STAT2 models equally and the STAR Panel agreed with the weights used by the GMT.

Accordingly, the GMT's recommended annual ABC for 1999-2001, based on an $F_{35\%}$ harvest rate, is 9,692 mt (see Table 1 below). Although the GMT's formal F_{msy} proxy for sablefish remains $F_{35\%}$, new analysis provided at the August meeting, along with the range of uncertainty embodied in the assessments, led the GMT to recommend an OY of 7,919 mt, based on an $F_{40\%}$ harvest rate for 1999 and application of the 40-10 harvest policy. The GMT plans a more thorough review of the adequacy of harvest rates used as proxies for F_{MSY} for several species, during the coming year. A separate ABC/OY of 472 mt has been established for the Conception area in recent years, based on recent average landings. Applying a 10% discard rate results in a landed catch equivalent of 425 mt.

Table 1. Combined decision table for sablefish.

	Distinct State of Nature					
	Q=0.25	Q=0.5	Q=0.75	Q=1		
Approximate Probability	21%	42%	28%	9%		
Quantity					**Expected**	**Coefficient of**
Unfished Stock Biomass	475657	345389	299164	278161	355019	17%
Stock Biomass in 1998	270009	127640	77770	53969	138815	49%
B1998/Unfished Stock	57%	37%	26%	20%	**37%**	30%
F35% Yield (mt)	18914	9149	5658	3938	**9692**	47%
F40% Yield (mt)	16246	7840	4844	3367	8340	47%
F40-10 Yield at F35%	18914	8907	4652	2554	9200	54%
F40-10 Yield at F40%	16246	7630	3980	2182	**7919**	54%
Annual Catch			**Stock Biomass in 2001**			
3000 mt	289958	142663	90101	63893	153874	46%
4000 mt	287258	140183	87787	61742	151329	46%
5000 mt	284558	137630	85074	59050	148600	47%
6000 mt	283308	135753	82760	56632	146739	48%
7000 mt	280608	132598	80047	54207	143810	49%
8000 mt	276658	130720	77732	51789	141365	50%
9000 mt	275409	128241	75418	49097	139255	51%
Annual Catch			**Ratio of Stock Biomass in 2001 to 1998 Level**			
3000 mt	108%	112%	116%	119%	114%	3%
4000 mt	107%	110%	113%	115%	111%	2%
5000 mt	106%	108%	110%	110%	109%	1%
6000 mt	105%	107%	107%	105%	106%	1%
7000 mt	104%	104%	103%	101%	104%	1%
8000 mt	103%	103%	100%	96%	101%	2%
9000 mt	102%	101%	97%	91%	99%	3%
Annual Catch			**Ratio of Spawning Stock Biomass in 2001 to Unfished**			
3000 mt	61%	42%	30%	23%	41%	27%
4000 mt	60%	41%	30%	22%	40%	28%
5000 mt	60%	40%	29%	21%	40%	29%
6000 mt	60%	40%	28%	21%	39%	30%
7000 mt	59%	39%	27%	20%	38%	31%
8000 mt	58%	38%	26%	19%	37%	31%
9000 mt	58%	37%	25%	18%	37%	32%

The combined decision table for sablefish (Table 1) is based on the integration of the two assessments. The states of nature are values of the NMFS slope survey catchability (Q) which is the fraction of the stock measured by this survey. Each state of nature (Q=0.25 to Q=1.0) has a probability of being the truth based

on the combination of the assessment results. For example, the probability that Q=0.75 is the true state of nature is 28%. Assessment results for the possible states of nature are listed by column. For example, if Q=0.75 is the true state of nature then the level of unfished biomass of the sablefish stock is 299,164 mt with probability 28%.

Based on the combined decision table, there is roughly a 9% chance that the sablefish stock is below 25% of its unfished biomass and a 70% chance that it is in the precautionary zone of 25% to 40% of its unfished biomass. Similarly, there is a 21% chance that the stock is above the precautionary level of 40% of its unfished biomass.

The likely consequences of 3-year constant catches ranging from 3,000 to 9,000 mt are also listed below each of the possible states of nature. For catch levels of 5,000 to 7,000 mt, stock biomass would be projected to increase by the year 2001. At catch levels of 5,000 to 6,000 mt, there would be a 28% chance that the stock would be in the precautionary zone in 2001 and a 9% chance that it would be below 25% of its unfished level. At a catch level of 7,000 mt, there would be a 70% chance that the stock would be in the precautionary zone by the year 2001. At a catch level of 8,000 mt, there is a 63% chance that the stock biomass would increase, a 28% chance it would be constant, and a 9% chance it would decline by the year 2001, while there would be a 70% chance that the stock would be in the precautionary zone in 2001. At a catch level of 9,000 mt, there is a 63% chance that the stock would increase and a 37% chance that it would decrease by the year 2001. In addition, there would be a 70% chance that the stock would be in the precautionary zone and a 9% chance that it would be overfished by the year 2001. Based on the GMT recommended 1999 OY level of 7,919 mt, the combined assessment results indicate that sablefish biomass would likely remain in the precautionary zone with an expected value of roughly 37% of its unfished level in the year 2001. For the year 2000, the GMT recommends OY be based on $F_{40\%}$ and application of the 40-10 OY reduction. OY would be 6,895 mt.

Pacific Cod

The GMT recommends no change in the coastwide ABC for Pacific cod from the previous level of 3,200 mt which was set in 1989 near the highest catch on record. The coastwide catch reported by the Pacific Coast Fisheries Information Network (PacFIN) shows a steady decline each year since then to about 1,500 mt in recent years. No quantitative assessment is attempted for Pacific cod off Washington, Oregon, and California, because changes in stock abundance in this area are probably dominated by environmental factors which influence the contribution of fish from the north.

Lingcod

In 1997, an assessment of the portion of the lingcod stock in the Columbia and Vancouver areas (including the Canadian portion of the Vancouver management area) was prepared. The STAR panel endorsed a single model for the stock, including a point estimate of the 1997 biomass of 6,714 mt. The proportion of younger fish in the commercial catch has increased in recent years, which could reflect strong incoming year-classes or increased selectivity toward younger fish. These two scenarios imply very different capacities for the stock to support the projected $F_{35\%}$ catch amounts. In addition, the current biomass estimate has wide confidence bounds, which led the STAR panel to develop a decision table incorporating alternative ending biomass scenarios set at one standard deviation above and below the point estimate.

The GMT calculated the lingcod ABC for the assessment area would be 1,021 mt, based on $F_{35\%}$ yield from the preferred model. This amount was 46.4% of the 1997 amount, which was a 53.6% reduction. The GMT noted that current egg production is estimated to be only about 9% of the unfished level and recommended the harvest guideline be set below ABC. Based on the projected ability of the stock to reverse its decline under an $F_{40\%}$ harvest rate, even under the pessimistic state of nature portrayed in the decision table, the GMT suggested the harvest guideline for the Columbia and (U.S.) Vancouver areas combined be based on the $F_{40\%}$ yield of the preferred model (392 mt), which represents 40.5% of the 1997 level, a reduction of 59.5%.

In 1999, an assessment of lingcod in the Eureka, Monterey and Conception areas was completed, using life-history, landings, length-frequency, age-frequency and survey data. Lingcod catch in the southern area has been declining steadily since 1973. Catch is larger in the Monterey area and has shifted from primarily trawl to an even mixture of trawl, nontrawl (mostly hook-and-line and some set net), and recreational catch. The assessment uses a new conceptual model that was developed at the NMFS Tiburon Laboratory. The model is essentially a forward projecting, separable, length-based, age-structured population model. The modeling concepts were applied using the AD Model Builder software. There are three distinct fisheries in the model: trawl, nontrawl, and recreational. Landings are available for the time period 1973 to 1998. Length and age composition data are available from 1992 to 1997. Auxiliary information is taken from three sources: NMFS triennial trawl survey data (1977-1998, every third year); California trawl logbook catch per unit of effort (CPUE) from 1978 to 1996; and MRFSS recreational CPUE data (1980-1989 and 1992-1998).

The assessment estimates the three-year, average, annual ABC to be 250 mt at $F_{35\%}$ and indicates the southern portion of the stock is heavily exploited. The current spawning potential is estimated to be 7.5% of the average unfished level. There is a 94% probability that the current spawning potential is 25% or less of the unfished level (overfished threshold). The current level of spawning potential has been reduced to 24.2% of levels corresponding to the 1973-1978 time period. Time series for estimates of exploitation rates indicate high levels of exploitation with values exceeding the $F_{35\%}$ guideline throughout the time series. A sensitivity analysis to changes in natural mortality (M) over a range of values from 0.35 to 0.1 has better model fit (lower likelihood) at lower mortalities. Spawning potential estimates are fairly robust to changes in natural mortality. It appears the southern portion of the lingcod stock (and the northern portion, also) is highly productive with good potential for rapid population increases given appropriate decreases in fishing effort.

On March 3, 1999, NMFS notified the Council that the lingcod stock is overfished, triggering preparation of a rebuilding plan. Preliminary calculations indicate the stock can be rebuilt within ten years. To achieve this, total catch coastwide catch must be reduced to approximately 335 mt to 378 mt in the year 2000.

ROCKFISH

"Rockfish" means all 55+ species of *Sebastes* and *Sebastolobus* (thornyheads) off Washington, Oregon, and California. Until 1999, the rockfish ABCs and OYs were divided into two groups: species that could be harvested relatively selectively (Pacific ocean perch, widow rockfish, shortbelly rockfish, and thornyheads), and the *Sebastes* complex, those species that generally could not be caught without other rockfish. The *Sebastes* complex initially included yellowtail, canary, bocaccio, chilipepper and minor species of the genus *Sebastes*, the latter are subdivided into "remaining rockfish" and "other rockfish" categories depending on the type of stock assessment. Rockfish stock assessments range from relatively rigorous individual assessments (POP, widow, shortbelly, thornyhead, yellowtail, bocaccio, canary) to more generalized, rudimentary individual assessments (for species in the "remaining rockfish" category) to virtually no assessment other than information provided by landings data (the "other rockfish" category).

In the *Sebastes* complex, species with more rigorous individual assessments were assigned individual ABCs and OYs, which often differed north and south of Cape Blanco, Oregon (42° N. lat.). Individual ABCs also were calculated for the "remaining rockfish" species, but individual OYs were not specified . For the "other rockfish" category, only one ABC was calculated, based on recent landings of the species in the category. An over-arching OY for the *Sebastes* complex was derived by adding the individual OYs for yellowtail and canary rockfish in the north, and bocaccio and chilipepper in the south, to the summed ABCs (or a fraction of the summed ABCs) for "remaining rockfish" and "other rockfish" in the northern and southern areas. Setting ABCs and OYs north and south of Cape Blanco resulted in some species having an individual ABC and OY in one area, but being included with the minor rockfish species in the other.

The Council removed chilipepper and splitnose rockfish from the *Sebastes* complex in 1999 and assigned separate ABCs and OYs based on concerns that this pooling of ABCs to derive the *Sebastes* OY was leading to over-exploitation of some higher-valued, less abundant rockfish. Because of continued concerns over disproportionate harvest of some pooled species, pending rebuilding plans for four rockfish species, the desire to manage by fishing strategy, and confusion over the definition of *Sebastes*, the GMT has

proposed a new organization for rockfish management for the 2000 fishery. This plan includes elimination of the over-arching *Sebastes* complex ABCs and OYs, continued specification of existing individual-species ABCs and OYs, and creation of a new "minor rockfish" group that combines "remaining rockfish" and "other rockfish" under a separate ABC and OY in each area. The minor rockfish OY will be further divided into harvest targets for near-shore, shelf, and slope species subgroups.

In addition to the development of these new subgroups, the GMT recommends moving the line that has been used to divide the northern and southern ABC areas (at Cape Blanco) further south to a location in the vicinity of the line used to divide northern and southern trip limits (currently 40°30'N. lat., near Cape Mendocino, California). This change is expected to improve the ability to manage to the OYs specified for each area. In conjunction with this change, fractions of the previous southern-area ABCs and OYs for species occurring in the Eureka area were transferred to the new northern area. Those fractions were determined using survey and landings data.

Pacific Ocean Perch

Since 1982, Pacific ocean perch (POP) have been under a rebuilding policy that discouraged targeting on POP. That policy arrested further decline in abundance, but achieved little recovery. An assessment prepared in 1998 indicated the POP stock is currently at 13% of its unfished spawning biomass size, which is below the default overfished threshold. On March 3, 1999, NMFS notified the Council the stock is overfished under the new definition established by FMP Amendment 11. The 1998 stock assessment contained a rebuilding analysis, but the SSC questioned a key assumption used in the stock-recruitment relationship, and recommended the analysis not be used. A separate rebuilding plan was developed, based on estimates of recent (1980 to present) reproductive rates. Harvest rates giving catches of 270 and 294 mt in year 2000 were associated with 79% and 50% chances of meeting the minimum requirement that rebuilding to $B_{40\%}$ be achieved within one generation time (29 years) of what would be achieved with no fishing. Median times to rebuild were 43 and 48 years under the two harvest rate scenarios.

Shortbelly Rockfish

The potential yield of shortbelly rockfish was last examined in 1989. Shortbelly rockfish remains an unexploited stock, and is difficult to assess quantitatively. Alternative yield calculations have given a range of 13,900 mt to 47,000 mt. This species is an important source of forage for seabirds, marine mammals, salmon, groundfish, and other marine life. Recruitment surveys conducted by the Tiburon Laboratory indicate poor recruitment in most of the years since 1989, indicating low recent productivity and a naturally declining population. The GMT recommends ABC and OY be reduced to 13,900 mt, which is the low yield estimate, until more is known about this stock.

Widow Rockfish

In 1998, the GMT recommended setting the ABC for 1998-2000 at 5,750 mt, the projected three-year average total catch at the $F_{40\%}$ harvest rate. However, the GMT recognized that at that fishing rate there may be a further reduction in spawning output through the year 2000 compared with 1995 and 1997. As a precautionary measure, recognizing the uncertainties surrounding the model projections, the Council adopted a total catch harvest guideline in 1998 of 5,090 mt, the projected three-year average catch at $F_{45\%}$ (4,276 mt landed catch, expanded by a discard factor that assumed 16% of the total catch was discarded).

In 1999, as in 1998, the 5,750-mt total catch ABC for widow rockfish was based on the $F_{40\%}$ harvest rate, the MSY proxy used for rockfish of the genus *Sebastes*. However, the Council developed a new default OY policy which it applied to this stock in 1999. The widow rockfish stock was believed to be at 29% of its unfished spawning biomass, and application of the default harvest policy resulted in the total catch OY of 5,023 mt. This is very close to the 1998 harvest guideline of 5,090 mt (which was based on $F_{45\%}$).

In 2000, the GMT recommends continuation of the ABC at 5,750 mt (based on $F_{40\%}$) as in 1998 and 1999. However, in view of progress toward a revised default MSY proxy, the GMT recommends a "transitional" fishing mortality rate of $F_{45\%}$ be used for OY in the year 2000. Under the 40-10 default OY policy, the 2000 OY would be 4,333 mt (based on the average yield for 1998-2000 under $F_{45\%}$).

In 1998, the GMT recommended setting the ABC for 1998-2000 mt at 5,750 mt, the projected three-year average total catch at the $F_{40\%}$ harvest rate. However, the GMT recognized that at that fishing rate there may be a further reduction in spawning output through the year 2000, compared to 1995 and 1997. As a precautionary measure, recognizing the uncertainties surrounding the model projections, the GMT recommended that the harvest guideline (OY, in 1999 and 2000) for 1998 to 2000 be set at 4,276 mt, the projected three year average landed catch at the $F_{45\%}$ fishing level. Setting the harvest guideline at the $F_{45\%}$ rate should help stabilize the stock decline at a temporary equilibrium. In 2000, the GMT recommends the ABC be set at 5,750 mt, as in 1998 and 1999. The widow rockfish stock is estimated to be at 29% of its unfished reproductive potential, and application of the default harvest policy results in a total catch OY of 5,023 mt. The landed catch OY would be reduced to account for 42 mt of anticipated recreational catch, a limited entry fishery discard rate of 16%, and anticipated bycatch in the at-sea whiting fishery.

Bocaccio

The first bocaccio assessment was prepared in 1990 with subsequent assessments in 1992, 1996, and 1999. For 1997, the Council set the ABC at 265 mt, the 1997-1999 average estimate of yields at the $F_{35\%}$ level presented in the 1996 document. When setting the 1998 ABC for bocaccio, the Council endorsed the $F_{40\%}$ harvest policy for rockfish in the *Sebastes* complex. This resulted in reduction of the bocaccio ABC to 230 mt, which was also established as the harvest guideline, which was also the 1999 OY. In 1998, the GMT calculated the bocaccio stock to be about 7% of unfished abundance, and on March 3, 1999 NMFS notified the Council that this stock is below its overfished threshold (defined as 25% of the unfished biomass).

In conjunction with the preparation of a bocaccio rebuilding plan, a new assessment was prepared and submitted for STAR Panel review and evaluation during 1999. As in previous assessments, the geographic range was limited to the waters off California. Trawl surveys and landings patterns show bocaccio distribution is split into northern (Washington) and southern (California) areas of abundance, with few fish found in the intervening area. Results of genetic research show little mixing between these areas of high abundance, indicating distinct genetic stocks.

The 1999 assessment confirms the overfished status and indicates exploitation rates have exceeded $F_{40\%}$ since the late 1970s. Based on $F_{40\%}$ yields presented in the assessment, the GMT recommends setting the year 2000 ABC at 164 mt. The GMT also recommends the southern bocaccio stock (in the Monterey and Conception areas) be managed separately, and not as part of a larger complex.

Canary Rockfish

Two new assessments were completed during 1999 for canary rockfish, in northern and southern areas, separated at Cape Blanco. Because these areas did not correspond to the new proposed *Sebastes* management areas, and due to the depressed nature of the stock, the GMT recommends a coastwide ABC and OY be set for this stock in 2000. This is the same approach used for widow and shortbelly rockfish. To develop a single ABC and OY requires combining the northern and southern assessments. Although different modeling approaches were used for the two assessments, the GMT determined that treatment of data and results were consistent and compatible. Consequently, results were combined to determine a coastwide range for ABC and OY. The following table provides an overview of these values. The coastwide ABC range at $F_{40\%}$ is 287-356 mt, depending upon which model scenario is chosen for the northern portion of the stock. The associated range for OY is 0-102 mt, using the 40-10 default OY policy and $F_{45\%}$.

Since 1982, coastwide commercial canary rockfish landings have ranged from a low of 897 mt during 1995 to a high of 5,137 mt during 1982. In 1995, trip limits specific to canary rockfish were first imposed, and commercial vessels were required to sort the canary rockfish from the remainder of the catch. Commercial

landings of canary rockfish have remained below 1,300 mt annually since 1994, compared to average annual landings of 3,016 mt during 1982-1993. Recent (1996-1998) recreational catches averaged about 110 mt per year.

The 1999 northern assessment was based on the age-based version of the stock synthesis model, as was the previous northern assessment that was completed in 1996. As in 1996, the authors of the new assessment chose two possible states of nature to explain the absence of older females in the data. The first assumes females die from natural mortality at a faster rate than males, and the difference becomes greater with age. The second assumes 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. As in 1996, the STAR review of the 1999 assessment concluded both assumptions were equally valid. However, they give significantly different results with respect to current abundance and the status of the stock compared to unfished conditions. Under the first scenario, current spawning biomass is estimated to be 949 mt for the northern area, which is 6.8% of the unfished spawning biomass. The population is in significantly better shape under the second scenario, with current spawning biomass estimated at 6,663 mt, which is 22.9% of the unfished spawning biomass. Recruitments during 1996-98 influence results but insufficient data are available to estimate them reliably, so they were set at levels that reflect the general trend toward lower recruitment in recent years. In accordance with the STAR review, the GMT found no evidence to reject one scenario over the other and both are used to give a range of current conditions for the northern portion of the range.

The southern assessment was the first ever for that portion of the geographic range of the stock. It was based on AD Model Builder 3.10 software. The southern model performed better under an assumption of constant natural mortality (Scenario 2 for the northern assessment) than under an assumption of increasing mortality with age for females (Scenario 1 for the northern assessment). Under base case conditions with natural mortality equal to 0.06, the current spawning biomass in the southern area is estimated to be 529 mt, which is 7.7% of the unfished spawning biomass.

There is no evidence for separate north/south stocks for canary rockfish. Since the data and assumptions in the two assessments were compatible, the GMT combined the results. Under Scenario 1 for the northern assessment, the coastwide spawning biomass is 1,478 mt, which is 7.1% of unfished. This places the stock in the overfished category and in need of a formal rebuilding plan. Under Scenario 2 for the northern assessment, the coastwide spawning biomass is 7,192 mt, which is 20% of unfished. Although less depressed than under Scenario 1, the Scenario 2 results also indicate an overfished stock in need of rebuilding.

ABC/OY results from combining northern and southern assessments for canary rockfish.

	Northern Assessment		Southern	Combined Assessments			
	Scenario 1	Scenario 2	Assessment	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		
% of unfished spawning biomass	6.8%	22.9%	7.7%	7.1%	20.0%		Average of the two assessments
F40% Yield	214	**283**	73	287	**356**	ABC - upper	322
40-10 multiplier	0%	43%	0%	0%	33%		
F40% 40-10 Yield	0	122	0	0	119		59
F45% 40-10 Yield				0	**102**	OY - upper	51

Note: the ABC for the U.S. Vancouver-Columbia areas alone in 1999 was 1,045 mt.

Chilipepper Rockfish

The 1998 assessment included data for the Eureka, Monterey, and Conception areas from 1970 through 1998. Estimated stock biomass for this area declined from about 50,000 mt in 1980 to approximately 32,000 mt in 1998. Biomass was at a low point in 1986 at 25,700 mt, but increased to 38,300 mt in 1991 due to recruitment of a very strong 1984 year class. Recruitment was relatively stable from 1986-1994, but appears to be poor in recent years.

The assessment presents harvest projections for 1999-2001 at $F_{40\%}$, $F_{50\%}$, and $F_{60\%}$. The three-year mean ABCs at those rates are 3,724 mt, 2,744 mt, and 1,978 mt respectively. The GMT supports continuation of ABC at the $F_{40\%}$ three-year average of 3,724 mt. Continued fishing at this rate with average recruitments (1993-1998) would reduce the spawning output to 43% of unfished in two years and 33% in four years.

In spite of recent ABCs ranging from 4,000 mt to the current 3,400 mt, recent landings (1992-1997) averaged about 2,000 mt. The GMT recommends setting an OY at this level in the year 2000.

Yellowtail Rockfish

Preliminary NMFS triennial survey results indicate the yellowtail biomass has not declined to the extent indicated in the 1995 survey. For the year 2000, the GMT recommends continuation of the ABC (3,539 mt), which is based on $F_{40\%}$. However, the GMT recommends OY be based on $F_{45\%}$ and application of the 40-10 default harvest policy, resulting in a total catch OY of 2,980 mt.

The 1997 STAR panel recommended a single preferred model (Model 8) in the yellowtail rockfish assessment, which included new indices of abundance based on yellowtail bycatch in the whiting fishery and Oregon trawl logbook catch per unit effort (CPUE) information. Although a single model was identified by the panel as reflecting the best available science, they also acknowledged the rather large confidence bounds around the ending-biomass point estimate of 56,736 mt. The GMT based its 1998 ABC recommendation on the STAR panel's preferred model biomass. Projections at the $F_{40\%}$ harvest rate indicated a three-year average yield of 4,657 mt, which was endorsed as the ABC for the entire assessment area. In order to determine the U.S. ABC, the GMT applied the percent distribution of biomass in U.S. waters (76%), based on NMFS triennial trawl survey results, which yielded 3,539 mt.

Splitnose Rockfish

Prior to 1999 splitnose rockfish south of Cape Mendocino was included in the "other" rockfish category of the *Sebastes* complex with an ABC of 868 mt. This ABC was based upon an informal assessment that assumed fishing mortality to be equal to natural mortality and used an absolute abundance estimate based upon the triennial shelf survey. In 1999, the Council removed splitnose from the southern *Sebastes* complex and set a separate ABC and OY in response to large aggregations of splitnose suddenly becoming available to the fishery. In addition, this was intended to avoid opportunity provided by the splitnose contribution to the total southern *Sebastes* ABC from being directed toward less abundant members of the complex. The 868 mt ABC was discounted 16% for discard, resulting in a landed catch OY of 729 mt.

In developing its ABC and OY recommendations for 2000, the GMT transferred 48 mt to the northern "remaining rockfish" category, leaving 820 mt as the ABC for the southern region. The 615 mt OY (total catch) recommendation reflects the 25% precautionary reduction applied to informally assessed rockfish; a similar adjustment was made to the 48 mt transferred to the northern component.

Thornyhead Rockfish

The individual assessments for shortspine thornyhead and longspine thornyhead in 1997 covered the area from central California at 36°00' N latitude (the southern boundary of the Monterey management area) to the Canadian border at 48°29' N latitude (the northern boundary of the U.S.-Vancouver management area). The STAR Panel expressed concern that current management requires more detailed information on thornyheads than can be obtained from the available data. Given the kinds and quality of data, there are

major uncertainties in the assessments regarding (1) growth and natural mortality for shortspine thornyhead; (2) problems with separating longspine and shortspine thornyheads in the historic landings; (3) difficulties estimating year class strength; and (4) unknown discard rates.

For longspine thornyhead, in 1997, total biomass and expected catches were projected for 1998 to 2000 under different harvest policies, assumptions about historic discards, and constant recruitment. Harvest policies ranged from $F_{20\%}$ to $F_{45\%}$. Two historic discard scenarios were considered, (1) a moderate discard rate where the discard rate gradually declined from a 1964 initial value of 35% to a 1997 ending value of 9% and (2) a steep discard rate, 1964 value of 70% and 1997 value of 5%. For each harvest policy under both discard scenarios total biomass decreased from 1998 through 2000, as did expected catch. There was consensus at the GMT meeting among industry representatives and STAR Panel members attending that the moderate discard rate was more realistic. The GMT based its preliminary ABC and harvest guideline recommendations for 1998 on the model that incorporated the moderate discard rate.

Based on the $F_{35\%}$ harvest policy, and assuming that the moderate historic discard scenario reflects industry activities, the mean ABC for 1998 to 2000 would be 4,102 mt north of the Conception area. The landed catch harvest guideline would be 3,733 mt, the ABC minus 9% for discards.

For the Conception area, the GMT recommends the ABC be set at 429 mt, which is the estimated 1995 to 1996 average total catch, reduced to reflect 9% discard. OY would be 390 mt. The coastwide ABC would be **4,611 mt with a corresponding harvest guideline of 4,196 mt.**

For shortspine thornyhead, two assessment models were presented: "STAT2" and "STAT3," which independently evaluated the status of the shortspine thornyhead stock using similar data sources. The STAR Panel preferred the STAT3 model, but there was some uncertainty in the posterior probability distribution for STAT3 (section 3.8 of the STAR Panel Report). The GMT considered two proposals to deal with uncertainty.

1. Combine assessment models with unequal weighting.
2. Use the STAT3 model under strong interpretation of Star Panel report; request clarification from STAR Panel.

The GMT noted there was inconsistency in the STAR Panel's opinion of the STAT2 model and decided to combine the models, but give more weight to the STAT3 model.

The GMT developed an integrated approach that used results from both the posterior and prior distributions from the STAT3 model and the prior distribution from the STAT2 model. Suggested weights were 40% for the STAT3 posterior, 40% for the STAT3 prior and 20% for the STAT2 prior. The GMT also requested clarification from the STAR Panel and the STAR Panel agreed with the weights used by the GMT.

The combined decision table for shortspine thornyhead (Table 2) is based on the integration of the two assessments. The states of nature are values of the NMFS slope survey catchability (Q) which is the fraction of the stock measured by this survey. Each state of nature (Q=0.25 to Q=1.0) has a probability of being the truth based on the combination of the assessment results. For example, the probability that Q=1.0 is the true state of nature is approximately 43%. Assessment results for the possible states of nature are listed by column. For example, if Q=1.0 is the true state of nature then the level of unfished spawning biomass of the shortspine thornyhead stock is 75,285 mt with probability 43%. Similarly, if Q=1.0 is the true state of nature then the level of spawning biomass in 1998 is 17,518 mt with probability 43%. Based on the combined assessment results, the ABC level for shortspine thornyhead is 1,260 mt from the expected value of the $F_{35\%}$ yield. Although the GMT used $F_{35\%}$ to determine ABC, work in progress suggests that the shortspine thornyhead stock is not as productive as the $F_{35\%}$ MSY proxy would indicate. Therefore, the GMT recommends the 2000 OY for shortspine thornyhead be 970 mt, based on $F_{40\%}$ and application of the 40-10 OY policy. For the northern portion of the Conception area, ABC is based on average landed catch, with the landed catch OY reflecting 30% assumed discard.

The expected value of the ratio of current spawning biomass to its unfished level is about 32%; however, there is considerable uncertainty in this ratio under the various possible states of nature. In particular, there is roughly a 43% chance that the shortspine thornyhead stock is currently at 23% of its unfished spawning biomass and overfished based on the default threshold of 25% for an overfished stock. In addition, there is a 27% chance that the stock is in the precautionary zone of 25% to 40% of its unfished spawning biomass and a 30% chance that the stock is relatively healthy and above 40% of its unfished level.

The likely consequences of 3-year constant catches ranging from 500 to 1,700 mt are also listed below. Note that values for 500 mt are extrapolated based on assessment results for 700 mt and 900 mt. For catch levels of 500 to 1,700 mt, there is a 43% chance that the stock would be overfished in 2001. Similarly, for catch levels of 500 to 1,700 mt, there would be a 27% the stock would be in the precautionary zone and a 30% chance it would be above 40% of its unfished level in the year 2001. For catch levels of 500 to 700 mt, combined assessment results indicate that the spawning biomass would increase by the year 2001. At a catch level of 900 mt, there is roughly a 57% chance that spawning biomass would increase by 1% to 3% and a 43% chance it would decrease by 1% in the year 2001. At catch levels of 1,100 to 1,300 mt, there is a 70% chance that the stock would decline by 1% to 6% in the year 2001 and a 30% chance that it would remain unchanged or increase by up to 3%. At catch levels of 1,500 to 1,700 mt, there is a 94% chance that the stock would decrease by 1% to 12% by 2001 while there is 6% chance that the stock would increase by 1% to 2%. Based on the GMT recommended OY level of 970 mt, the combined assessment results indicate that shortspine thornyhead spawning biomass would likely remain in the precautionary zone with an expected value of roughly 32% of its unfished level in the year 2001.

Table 2. Combined decisi on table for shortspi ne thornyhead.

	Distinct State of Nature					
	Q=0.25	**Q=0.5**	**Q=0.75**	**Q=1**		
Approximate	6%	24%	27%	43%		
Quantity					**Expected**	**Coefficient**
Unfished Spawning	139879	97151	82346	75285	86505	13%
Spawning Stock	88249	40497	24944	17518	29423	42%
SB1998/Unfished	63%	42%	30%	23%	**32%**	22%
F35% Yield (mt)	3647	1713	1075	776	**1260**	40%
F40% Yield (mt)	3073	1447	909	658	1063	40%
F40-10 Yield at F35%	3647	1713	960	591	1150	47%
F40-10 Yield at F40%	3073	1447	812	501	**970**	47%
Annual Catch			**Spawning Stock Biomass in 2001**			
500 mt	92156	42391	26068	18341	30720	42%
700 mt	91686	41912	25582	17849	30236	42%
900 mt	91217	41439	25104	17370	29760	43%
1100 mt	90749	40966	24630	16892	29285	44%
1300 mt	90277	40496	24152	16409	28807	45%
1500 mt	89809	40023	23674	15931	28331	45%
1700 mt	89340	39550	23200	15449	27855	46%
Annual Catch			**Ratio of Spawning Stock Biomass in 2001 to 1998**			
500 mt	104%	105%	105%	105%	104%	0%
700 mt	104%	104%	103%	102%	102%	1%
900 mt	103%	102%	101%	99%	100%	1%
1100 mt	103%	101%	99%	96%	99%	1%
1300 mt	102%	100%	97%	94%	97%	2%
1500 mt	102%	99%	95%	91%	95%	2%
1700 mt	101%	98%	93%	88%	93%	3%
Annual Catch			**Ratio of Spawning Stock Biomass in 2001 to Unfished**			
500 mt	66%	44%	32%	24%	33%	22%
700 mt	66%	43%	31%	24%	33%	23%
900 mt	65%	43%	31%	23%	32%	23%
1100 mt	65%	42%	30%	22%	32%	24%

Table 2. Combined decision table for shortspine thornyhead.

1300 mt	65%	42%	29%	22%	31%	24%
1500 mt	64%	41%	29%	21%	31%	25%
1700 mt	64%	41%	28%	21%	30%	26%

MINOR ROCKFISH

The Minor Rockfish category includes the "other rockfish" and "remaining rockfish" categories. These categories include the species that have never been assessed (other rockfish) or have been assessed by less-rigorous methods (remaining rockfish).

Vancouver, Columbia, and Eureka Areas

The remaining rockfish category in the north includes bocaccio, darkblotched, redstripe, sharpchin, silvergrey, splitnose, yelloweye, and yellowmouth rockfish, each of which has an individual ABC based on historical catch or a simple assessment. It also includes the northern portion of the chilipepper rockfish stock, which was assessed in 1998, and black rockfish, which was assessed in 1999. The other rockfish category includes all other rockfish species that have not been assessed; the ABC for this group is based on historical catch records. The final GMT ABC recommendation for the northern portion of the minor rockfish category is 5,693 mt, which is the sum of the ABCs for the remaining rockfish (3,625 mt) and other rockfish (2,068 mt). The GMT's final (total catch) OY recommendation (3,814 mt) is the sum of 75% of the remaining rockfish ABC and 50% of the other rockfish ABC. The GMT's final OY recommendation differs from the preliminary recommendation due to revision of the black rockfish OY.

The ABC levels for both the remaining rockfish and other rockfish categories are based on limited data. There is great uncertainty about the current biomass of these stocks and a serious lack of quantitative information on long-term sustainable yields. Recent ABC estimates were developed for the remaining rockfish component based on NMFS survey biomass estimates, assumed levels of catchability, and an assumption that a sustainable fishing mortality rate would be equal to the natural mortality rate for each species. ABC levels for the other rockfish component have been based on less information than the remaining rockfish component. For 1999, the Council endorsed the GMT's proposal to reduce the remaining rockfish component by 25% (i.e., to 75% of the current level) and the other rockfish component by 50%. These reductions of 25% and 50% were based on suggested target catch levels for data-poor situations from Restrepo et al. (1998. Technical Guidance on the Use of Precautionary Approaches to Implementing National Standard 1 of the Magnuson-Stevens Fishery Conservation and Management Act. Draft NOAA Tech. Memo.). This technical guidance suggests a 25% reduction for stocks above the B_{MSY} level and a 50% reduction for stocks between the minimum stock size threshold (i.e., the overfished/ rebuilding threshold) and the B_{MSY} level. The GMT recommends continuation of this reduction.

Species assigned to 'Minor Rockfish' Subgroups in the northern area (Vancouver, Columbia, and Eureka areas).

		NEAR-SHORE	SHELF	SLOPE
Minor Rockfish				
	'Other rockfish'			
		Principal species	Principal species	Principal species
		BLUE RKF	CHILIPEPPER	AURORA RKF
		CHINA RKF	GREENSTRIPED RKF	ROUGHEYE RKF
		COPPER RKF	PYGMY RKF	SHORTRAKER RKF
		QUILLBACK RKF	REDBANDED RKF	
			ROSETHORN RKF	
			STRIPETAIL RKF	
			VERMILION RKF	
		Secondary species	Secondary species	Secondary species
		BLACK-AND-YELLOW RKF	BRONZESPOTTED RKF	BANK RKF
		BROWN RKF	CHAMELEON RKF	BLACKGILL RKF
		CALICO RKF	COWCOD	
		GOPHER RKF	DWARF-RED RKF	
		GRASS RKF	FLAG RKF	
		KELP RKF	FRECKLED RKF	
		OLIVE RKF	GREENBLOTCHED RKF	
		TREEFISH	GREENSPOTTED RKF	
			HALFBANDED RKF	
			HONEYCOMB RKF	
			MEXICAN RKF	
			PINK RKF	
			PINKROSE RKF	
			ROSY RKF	
			SPECKLED RKF	
			SQUARESPOT RKF	
			STARRY RKF	
			SWORDSPINE RKF	
			TIGER RKF	
	'Remaining rockfish'			
		BLACK RKF	BOCACCIO	DARKBLOTCHED RKF
			REDSTRIPE RKF	SHARPCHIN RKF
			SILVERGREY RKF	SPLITNOSE RKF
			YELLOWEYE RKF	YELLOWMOUTH RKF
Associated species with individual OYs				
			YELLOWTAIL RKF	PACIFIC OCEAN PERCH
Associated species with individual coastwide OYs				
			CANARY RKF	
			SHORTBELLY RKF	
			WIDOW RKF	

Monterey and Conception Areas

The remaining rockfish category in the southern area includes bank, blackgill, canary, darkblotched, Pacific ocean perch, and sharpchin rockfish, each of which has an individual ABC based on historical catch or a simple assessment. The other rockfish category includes all other rockfish species that have not been

assessed; the ABC for this group is based on historical catch records. The final GMT ABC recommendation for the combined Minor Rockfish category (3,457 mt) is the sum of the ABCs remaining rockfish (680 mt) and other rockfish (2,777 mt). The GMT's final (total catch) OY recommendation (1,899 mt) is the sum of 75% of the remaining rockfish ABC and 50% of the other rockfish ABC.

As in the northern area, the current ABC levels for both the remaining rockfish and other rockfish categories in the southern area are based on limited data. There is great uncertainty about the current biomass of these stocks and a serious lack of quantitative information on long-term sustainable yields. Therefore, the GMT recommends continuing to apply the same reductions to the southern minor rockfish category as in the north. Specifically, the remaining rockfish component would be reduced by 25% (i.e., to 75% of the current level) and the other rockfish component by 50%.

Species assigned to 'minor rockfish' subgroups in the southern area (Monterey and Conception).

	NEAR-SHORE	SHELF	SLOPE
Minor Rockfish			
"Other rockfish"			
	Principal species	Principal species	Principal species
	BLACK RKF	BRONZESPOTTED RKF	AURORA RKF
	BLACK-AND-YELLOW RKF	CHAMELEON RKF	
	BLUE RKF	COPPER RKF	
	BROWN RKF	GREENBLOTCHED RKF	
	CALICO RKF	GREENSPOTTED RKF	
	CHINA RKF	REDBANDED RKF	
	GOPHER RKF	SPECKLED RKF	
	GRASS RKF	STARRY RKF	
		STRIPETAIL RKF	
		VERMILION RKF	
		YELLOWEYE RKF	
	Secondary species	Secondary species	Secondary species
	KELP RKF	DWARF-RED RKF	ROUGHEYE RKF
	OLIVE RKF	FLAG RKF	SHORTRAKER RKF
	QUILLBACK RKF	FRECKLED RKF	YELLOWMOUTH RKF
	TREEFISH	GREENSTRIPED RKF	
		HALFBANDED RKF	
		HONEYCOMB RKF	
		MEXICAN RKF	
		PINK RKF	
		PINKROSE RKF	
		PYGMY RKF	
		REDSTRIPE RKF	
		ROSETHORN RKF	
		ROSY RKF	
		SILVERGREY RKF	
		SQUARESPOT RKF	
		SWORDSPINE RKF	
		TIGER RKF	
"Remaining rockfish"			
		BANK RKF	BLACKGILL RKF
		YELLOWTAIL RKF	DARKBLOTCHED RKF
			PACIFIC OCEAN PERCH
			SHARPCHIN RKF
Associated species with individual OYs			
		BOCACCIO	SPLITNOSE RKF
		CHILIPEPPER	
		COWCOD	
Associated species with individual coastwide OYs			
	Coastwide		
		CANARY RKF	
		SHORTBELLY RKF	
		WIDOW RKF	

Black Rockfish

In 1999, a new assessment of the portion of the black rockfish resource north of Tillamook Head, Oregon, was prepared. The previous (1994) assessment used an age-structured version of the stock synthesis model to fit age composition data from the recreational and commercial fisheries and CPUE data from the recreational fishery and a nearshore jigging survey. These data were updated and supplemented with tag release and recovery data for the 1999 assessment. A completely new model written in AD Model Builder was used to assess current black rockfish abundance. A new stock synthesis model and an updated version of the 1994 stock synthesis model were also provided as a basis for comparison. The AD model explicitly accounts for sampling uncertainty and provided the most statistically rigorous model with the fewest set of assumptions.

The AD model biomass projections for black rockfish were sensitive to tag recovery reporting rates, and therefore reporting rates were used to define alternative scenarios in the assessment. Results showed a general decline in black rockfish biomass since 1986, the base year in the assessment. At $F_{45\%}$ and tag reporting rates of 25%, 50% and 75%, the expected 1999 spawning biomass is 88%, 88% and 85% of unfished spawning biomass respectively. This indicates that although the black rockfish stock may be declining in abundance, it appears healthy relative to the 40-10 harvest policy. Projected 2000 yields at $F_{45\%}$ and tag reporting rates of 25%, 50% and 75% are 655, 737 and 844 mt respectively. The GMT considered the 75% reporting rate to be too high, and that projections based on the 25% and 50% recovery rates should be equally weighted in calculating an ABC for black rockfish. Based on the AD model results for the preferred recovery rates the GMT recommends a black rockfish ABC of 700 mt for the portion of the stock in the U.S. Vancouver and Columbia area north of Tillamook Head. Recent catch in the southern Columbia and Eureka areas has been about 500 mt in recent years. The sum of these (1,200 mt) is the ABC for the combined areas for 2000. In calculating the overall minor rockfish OY for the northern area, the GMT reduced the portion south of Tillamook by 50%, consistent with the precautionary policy for unassessed areas. Thus, the black rockfish total contribution to OY is 950 mt.

Cowcod Rockfish

In 1999, the first assessment of cowcod rockfish in the Conception management area was prepared. This species has been important to commercial and recreational fisheries in the Monterey and Conception areas. Cowcod are distributed from Oregon to central Baja California, Mexico. The Southern California Bight section of the Conception management area is the center of the cowcod distribution and is where most of the catch has been taken historically.

Estimated total cowcod catch peaked in 1976 at 194 mt. The recreational fishery accounted for most of the annual catch prior to 1981, at which point the commercial fishery became dominant. The estimated total catch had fallen to 61 mt in 1997. Commercial cowcod catches are primarily taken with hook-and-line and set net gear in the Conception area, and with trawl gear in the Monterey area. The largest of the central-southern California rockfishes, cowcod are highly prized by hook-and-line anglers fishing from private and commercial passenger fishing vessels (CPFV).

A delay-difference assessment model was developed to measure the "fishable" (recruited to the fishery) biomass in the Southern California Bight portion of the Conception management area. The assessment made innovative use of three data sources to derive indices of abundance and recruitment: 1) angler catch-per-unit-effort (CPUE) from CPFV logbooks covering 1963-97; 2) the proportion of California Cooperative Oceanic Fishery Investigation tows containing cowcod larvae, 1951-98; 3) proportion of positive tows for juvenile cowcod in demersal trawl surveys conducted by the Los Angeles and Orange County Sanitation Districts during, 1973-94; and 4) a long time series of reported recreational catch published in the Los Angeles Times.

The STAR Panel concurred that the assessment was sufficient for determining the status of cowcod in the Conception area. Model results indicate that the stock has experienced a pronounced decline in abundance in this area, and that current fishable biomass is about 5-12% of the maximum historical levels. At this level of fishable biomass the stock is in the overfished state according to the Council's 40-10 harvest policy and

in need of rebuilding. Based on $F_{40\%}$ harvest rate, fishable biomass is projected to decline at landings greater than 5-10 mt per year.

For the Conception area, the GMT recommends an ABC of 5 mt for 2000. In addition, the GMT recommends an ABC of 19 mt for the unassessed Monterey area, based on the average of commercial landings from this area during the period 1983-1997. Due to the severely depleted condition of this stock and the potential for fishers to avoid it, the GMT recommends OY for the Monterey and Conception areas combined be zero in 2000.

Blackgill Rockfish

A first assessment of blackgill rockfish in the Conception area was prepared in 1998. North of the Conception area, blackgill are primarily taken as bycatch in the trawl fishery. Blackgill landed in the Conception area are taken in a directed fixed gear fishery (set longline and setnet). The directed fishery in the Conception area developed in the mid-1970s. Landings peaked in 1983 at 1,112 mt and declined to a low of 153 mt in 1997.

A simple two-parameter stock assessment model was developed based on stock reduction analysis and an assumption of constant recruitment. Average fishing mortality during 1980 to 1997 based on catch curve analysis was an essential element in the assessment model.

The Stock Assessment Review (STAR) Panel had concerns that the total mortality estimated in the model may be low and should be interpreted with caution. The STAR Panel's preferred model configuration indicates catches above recent levels of 150 mt and 250 mt per year would likely lead to a spawning biomass decrease.

The GMT, recognizing the uncertainties inherent in the model results, recommended that an ABC be set for the Conception area derived from $F_{40\%}$ three-year average catch estimates based on three assumed levels of natural mortality. Using assumed natural mortality estimates for the decision table (Table 15, Page 54) of 0.037, 0.047, and 0.57, the resulting mean ABC is 365 mt.

In addition, the GMT, recognizing the STAR panel's concerns over exceeding 150 mt to 250 mt catch levels, recommends that a "point of concern" threshold be established at 300 mt for the Conception area. If landings reached this level, more intensive monitoring of this fishery would be initiated. If the Monterey area were to be included, then the threshold should be set at 400 mt to 450 mt.

FLATFISH

Arrowtooth Flounder

A stock assessment conducted in 1993 resulted in maintaining the ABC in U.S. waters at 5,800 mt (equal to peak catch in 1990). The assessment author recommended conservative management, especially until new data and models can estimate absolute biomass and exploitation rates. However, the GMT recommended no change in ABC because there was no decline in fishery CPUE during 1987 to 1992 and no trend in triennial bottom trawl survey CPUE during 1977 to 1992, although survey CPUE fluctuated over a three-fold range. Future work on this assessment probably should include the Canadian zone. Fishery logbook data indicate that most of the U.S. catch occurs near the U.S.-Canada border. The survey indicates that the biomass is about two times higher in the surveyed portion of the Canadian zone than in U.S. waters. Catch in Canada increased greatly in 1990 and was nearly 50% of the U.S. catch in 1992.

Dover Sole

The 1997 Dover sole stock assessment treated the entire population from the Monterey area through the U.S.-Vancouver area as a single stock, based on recent research on the genetic structure of the population. The previous assessment addressed stocks in the various areas separately. The Dover sole population in the Conception area was not included in the assessment.

The assessment author generated projections of spawning biomass and expecting landings for 1998 to 2000 under a variety of harvest policies and three recruitment scenarios. The hypothetical harvest policies ranged from an immediate reduction to the $F_{45\%}$ harvest rate to an increase up to the $F_{20\%}$ harvest rate. In all cases, for each of the low, medium, and high projected recruitments, the expected spawning biomass increased from the estimated year-end level in 1997 through the year 2000 due to growth of the exceptionally large 1991 year-class and to the lower catches observed in the fishery since 1991.

The 1998 to 2000 landed catch each year for the assessment area, assuming $F_{35\%}$ and medium recruitment (equal to the average recruitment estimated for the period 1983-1996) is 7,954 mt. The GMT added a discard factor to reflect an assumed discard rate of five percent to obtain the total catch ABC of 8,373 mt in the area, and summed it with the 1,053 mt ABC for the Conception area to obtain the coastwide total catch ABC of 9,426 mt. (The previous Conception area ABC of 1,000 mt was also inflated to reflect an assumed five percent discard rate). The GMT deducted 472 mt for estimated discard to obtain the coastwide landed catch harvest guideline recommendation of 8,955 mt.

English Sole

The GMT recommends continuation of the coastwide ABC of 1,100 mt set in 1994 for the Eureka through Conception areas, and 2,000 mt for the Columbia and Vancouver areas. The coastwide landed catch during 1992 to 1996 averaged 1,330 mt.

The age-structured version of the stock synthesis program was used to assess the status of the stock of female English sole occurring off Oregon and Washington (Columbia and U.S.-Vancouver management areas). The analysis used age-composition data from the Oregon and Washington trawl fisheries, and estimates of relative abundance and length composition from the 1977 to 1992 triennial bottom trawl surveys. The survey CPUE increased ten-fold over this period. The assessment indicated a large and steady increase in the biomass to about 133,000 mt of age-four and older females in 1992. The increase is attributed to high recruitment during the period examined. A specific ABC was not estimated, but the early age-at-maturity suggests the stock can sustain a high exploitation rate, and the large biomass suggests the stock is healthy in the Columbia and Vancouver areas. The 2,000 mt ABC recommended in 1994 is about a doubling of the average catch (1,145 mt) during 1985-1994. The GMT supports continuation of this ABC.

The Monterey and Conception areas contributed 52% of the total catch during 1983 to 1991, but there has been no recent assessment for these areas. The survey CPUE in the Monterey and Eureka areas has been without trend during 1983 to 1992. The ABC for these areas was set equal to the 1983 to 1991 average yield of 1,100 mt.

Petrale Sole

A new stock assessment for petrale sole in the Vancouver and Columbia areas was prepared in 1999. Based on the $F_{35\%}$ calculations included in the assessment, the GMT recommends the combined ABC for these areas be increased from 1,200 mt to 1,440 mt. The GMT recommends continuation of the ABCs in the southern areas: Eureka - 500 mt; Monterey - 800 mt; and Conception - 200 mt. However, recent catch in the southern areas has been only about 800 mt per year and these ABC levels should be reviewed. The coastwide ABC, which is the sum of the areas, would increase to 2,950 mt.

The previous (1993) stock assessment in the Columbia and U.S.-Vancouver Areas used the length-based version of the stock synthesis program. The 1999 assessment also used the length-based version of stock synthesis, but the data were separated into two distinct fisheries; a winter fishery which tends to catch larger and older fish from spawning aggregations, and a summer fishery that tends to operate closer to shore. The period covered by the 1999 assessment was 1977-1998. Initial age composition was not forced to conform to equilibrium conditions. Compared to the previous assessment, the 1999 assessment included more recent fishery length and age composition data, observations from the NMFS shelf survey for 1995 and 1998, and newly available break and burn age determinations. Retention and discard were modeled using logistic functions of length. The length at 50% retention was much larger in the 1999 assessment than in the previous one.

The U.S. Vancouver-Columbia spawning biomass was found to be 3,813 mt in 1998, which was estimated at 39% of the unfished level. However, the stock has been increasing in recent years, and is projected to be 42% of unfished in 1999. Although data were inadequate to provide acceptable base-run results for the Eureka-Monterey-Conception areas, the assessment indicated that recent catches in those southern areas appear to be sustainable, considering the triennial survey data. Therefore, the GMT retained the existing ABC of 1,500 mt for the southern areas, resulting in a coastwide total of 2,947 mt for 2000.

Other Flatfish

Arrowtooth flounder was removed from this group of species in 1991 and there was no change in the ABC for the remaining species: Vancouver - 700 mt; Columbia - 3,000 mt; Eureka - 1,700 mt; Monterey - 1,800 mt; and Conception - 500 mt. These ABC levels were originally set on the basis of historical catch levels prior to the development of the arrowtooth flounder fishery, and current catch levels remain well below the level of ABC.

OTHER GROUNDFISH

The GMT recommends no change in the coastwide ABC of 14,700 mt.

TABLE 1. Estimated commercial groundfish landings (mt) for all management areas, 1983-1998.a/ (Excludes joint venture, foreign and domestic at-sea catches).

Species		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Roundfish																	
	Lingcod	4,156	4,051	3,878	1,894	2,553	2,628	3,569	2,932	3,166	1,883	2,194	1,905	1,467	1,557	1,537	348
	Pacific Cod	597	585	409	331	2,280	3,343	2,188	1,064	1,795	1,778	1,369	866	504	445	595	404
	Pacific Whitingb/	1,051	2,721	3,894	3,463	4,795	6,867	7,414	8,115	21,040	56,128	42,108	73,607	74,968	76,797	84,448	87,862
	Sablefish	14,698	14,074	14,315	13,288	12,786	10,876	10,440	9,179	9,496	9,360	8,145	7,578	7,901	8,317	7,928	4,345
Total Roundfish		20,517	21,466	22,543	19,022	22,453	23,755	23,653	21,312	35,527	69,185	53,843	84,002	84,921	94,714	97,605	92,959
Rockfish																	
	Pacific Ocean Perch	1,860	1,644	1,495	1,382	1,154	1,398	1,442	1,017	1,394	1,072	1,266	970	814	733	580	602
	Shortbelly	4	3	39	22	0	0	3	9	4	3	8	53	34	34	78	19
	Widow	10,354	9,657	9,085	9,394	13,856	11,066	13,333	10,567	6,924	6,689	8,795	6,365	6,700	6,077	6,455	3,827
	Thornyheads	2,664	3,174	4,114	3,648	4,487	6,050	9,233	11,729	8,038	11,587	11,183	8,045	7,550	6,529	4,288	3,530
Other Rockfish																	
	Bocaccio	5,793	4,307	2,486	2,115	2,404	1,813	2,638	2,497	1,839	1,739	1,570	1,171	926	597	445	397
	Canary	4,667	2,191	2,470	1,952	3,105	2,863	3,016	2,597	3,174	2,901	2,116	1,287	897	1,146	1,097	1,133
	Chilipepper	2,162	2,179	2,286	1,755	3,075	3,283	3,417	3,410	4,481	3,446	3,415	1,862	1,980	1,711	2,054	1,273
	Yellowtail	8,902	5,147	3,445	4,398	4,410	5,885	5,177	4,487	3,956	6,208	5,223	5,415	4,858	5,197	2,096	2,777
	Remaining Rockfishc/	7,581	7,731	8,960	8,119	10,990	10,387	8,589	7,777	7,854	7,385	7,123	5,719	4,817	4,868	4,560	5,028
	Unspecified Rockfish	4,164	3,983	2,969	4,252	4,012	2,920	2,685	2,952	3,038	2,559	2,740	674	936	1,263	816	911
Total Rockfish		48,151	40,013	37,347	37,035	48,995	47,002	50,563	47,511	41,462	44,354	44,056	31,570	29,535	28,165	22,469	19,497
Flatfish																	
	Arrowtooth Flounder	2,077	2,379	2,679	2,231	2,830	1,946	3,552	5,824	4,945	3,576	2,713	3,251	2,321	4,391	2,343	3,168
	Dove Sole	19,993	19,205	20,537	17,354	18,440	18,116	18,815	15,697	18,223	16,035	14,339	9,359	10,544	12,152	10,089	7,969
	English Sole	2,355	1,721	1,929	2,036	2,481	2,102	2,412	1,912	2,185	1,626	1,603	1,124	1,133	1,153	1,505	1,129
	Petrale Sole	2,214	1,739	1,839	1,748	2,205	2,149	2,153	1,765	1,927	1,554	1,503	1,375	1,659	1,828	1,945	1,459
	Other Flatfish	2,994	2,655	3,455	2,758	2,913	2,729	2,966	2,502	3,235	2,015	1,937	2,437	2,558	1,998	2,332	1,700
Total Flatfish		29,633	27,700	30,439	26,128	28,868	27,042	29,898	27,699	30,515	24,805	22,094	17,545	18,216	21,522	18,215	15,426
Other Fish																	
	Jack Mackerel	1,302	3,234	136	55	142	1	0	109	45	408	491	359	249	344	1,534	1,563
	Other	357	514	536	333	351	424	490	730	1,160	1,449	2,087	2,390	1,374	3,832	2,504	2,695
Total Other Fish		1,659	3,749	672	388	493	425	491	839	1,205	1,857	2,578	2,749	1,623	4,176	4,038	4,258
Grand Total		99,960	92,928	91,002	82,572	100,808	98,224	104,604	97,361	108,709	140,201	122,571	135,866	134,295	148,576	142,327	132,139

Data Source: Data for 1983-1998 were extracted from PacFIN July 29th, 1999.

a/ The data for 1998 in Tables 1 through 18 are preliminary.
b/ Whiting landings in 1991 and later do not include catches by the U.S. at-sea whiting fleet.
c/ Remaining rockfish are all species of rockfish not specifically listed on this page.

TABLE 2. Estimated commercial groundfish landings (in thousands of dollars) for all management areas, 1983-1998. (Excludes joint venture, foreign, and domestic at-sea catches).

Species		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Roundfish																	
	Lingcod	$2,281	$2,183	$2,237	$1,322	$2,125	$2,116	$2,759	$2,291	$2,457	$1,617	$1,840	$1,738	$1,486	$1,605	$1,606	$567
	Pacific Cod	$311	$300	$221	$200	$1,653	$1,949	$1,249	$634	$1,188	$1,276	$974	$636	$432	$388	$510	$391
	Pacific Whiting a/	$194	$406	$583	$448	$663	$1,136	$1,071	$1,049	$2,395	$5,885	$2,843	$4,907	$7,821	$5,107	$7,844	$4,751
	Sablefish	$7,688	$6,806	$10,522	$10,965	$13,425	$12,499	$10,797	$9,661	$14,330	$13,634	$10,009	$13,766	$23,440	$25,875	$27,787	$11,227
Total Roundfish		$10,489	$9,711	$13,591	$12,953	$17,884	$17,721	$15,901	$13,652	$20,412	$22,482	$15,809	$21,336	$33,743	$33,843	$38,657	$16,936
Rockfish																	
	Pacific Ocean Perch	$888	$818	$830	$849	$832	$885	$865	$603	$920	$715	$837	$713	$638	$521	$402	$507
	Shortbelly	$1	$1	$8	$15	$0	$0	$2	$5	$3	$2	$4	$25	$15	$10	$37	$9
	Widow	$4,459	$4,811	$5,026	$5,760	$9,883	$7,083	$7,759	$6,311	$4,327	$4,270	$5,589	$4,431	$4,962	$4,170	$4,530	$3,131
	Thornyheads	$1,326	$1,681	$2,272	$2,245	$3,211	$4,697	$7,523	$9,941	$8,050	$11,895	$11,771	$12,864	$16,774	$12,563	$7,283	$5,588
Other Rockfish																	
	Bocaccio	$2,928	$2,401	$1,562	$1,509	$1,932	$1,331	$1,951	$1,866	$1,355	$1,363	$1,266	$1,060	$666	$544	$408	$378
	Canary	$2,046	$1,115	$1,410	$1,216	$2,302	$1,785	$1,834	$1,660	$2,200	$2,138	$1,584	$1,133	$999	$1,166	$1,228	$1,328
	Chilipepper	$1,061	$1,194	$1,441	$1,200	$2,368	$2,339	$2,340	$2,481	$3,227	$2,664	$2,880	$1,693	$1,854	$1,544	$1,798	$1,187
	Yellowtail	$4,015	$2,572	$1,941	$2,785	$3,185	$3,698	$3,142	$2,778	$2,777	$4,479	$3,624	$4,094	$3,977	$3,952	$1,766	$2,364
	Remaining Rockfish b/	$4,303	$4,984	$6,346	$6,581	$9,396	$8,494	$7,327	$6,825	$7,291	$7,315	$6,657	$6,388	$6,234	$5,988	$5,633	$5,579
	Unspecified Rockfish	$2,740	$2,560	$2,376	$3,540	$3,570	$2,466	$2,539	$2,938	$3,180	$2,791	$3,078	$829	$1,085	$1,463	$1,119	$1,365
Total Rockfish		$23,768	$22,137	$23,212	$25,700	$37,886	$33,759	$36,043	$35,784	$33,891	$38,232	$37,788	$33,239	$37,426	$31,930	$24,203	$21,436
Flatfish																	
	Arrowtooth Flounder	$456	$503	$578	$500	$913	$507	$775	$1,343	$1,250	$836	$584	$699	$569	$989	$502	$702
	Dover Sole	$9,862	$9,771	$10,861	$9,829	$12,383	$12,138	$11,394	$9,242	$12,085	$9,957	$8,615	$6,078	$7,578	$8,287	$6,530	$5,985
	English Sole	$1,670	$1,217	$1,407	$1,603	$2,194	$1,817	$1,941	$1,380	$1,656	$1,182	$1,122	$844	$922	$912	$1,079	$866
	Petrale Sole	$3,334	$2,714	$2,977	$2,985	$3,960	$3,862	$3,874	$3,209	$3,508	$2,760	$2,600	$2,536	$3,479	$3,691	$3,860	$3,035
	Other Flatfish	$2,410	$2,159	$2,829	$2,510	$2,828	$2,470	$2,550	$2,077	$2,748	$1,723	$1,746	$2,063	$2,088	$1,685	$1,856	$1,347
Total Flatfish		$17,731	$16,365	$18,652	$17,428	$22,278	$20,795	$20,535	$17,252	$21,247	$16,458	$14,667	$12,220	$14,636	$15,564	$13,827	$11,936
Other Fish																	
	Jack Mackerel	$184	$353	$34	$20	$16	$0	$0	$16	$11	$15	$57	$74	$76	$22	$282	$308
	Other	$241	$346	$346	$284	$289	$276	$308	$332	$441	$494	$656	$784	$498	$2,042	$1,333	$2,099
Total Other Fish		$425	$699	$380	$303	$305	$276	$308	$348	$453	$509	$713	$858	$574	$2,064	$1,615	$2,408
Grand Total		$52,413	$48,911	$55,835	$56,384	$78,353	$72,551	$72,787	$67,036	$76,002	$77,680	$68,977	$67,653	$86,379	$83,400	$78,302	$52,715

Data Source: Data for 1983-1998 were extracted from PacFIN July 29th, 1999.

a/ Whiting landings in 1991 and later do not include catches by the U.S. at-sea whiting fleet.

b/ Remaining rockfish are all species of rockfish not specifically listed on this page.

TABLE 3. Estimated commercial groundfish landings (mt) for the U.S. portion of the Vancouver management area, 1983-1998. (Excludes joint venture, foreign, and domestic at-sea catches).

Species		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Roundfish																	
	Lingcod	1,178	1,746	1,852	569	728	621	999	987	1,452	556	651	611	367	360	301	55
	Pacific Cod	528	493	374	291	1,386	1,981	1,270	825	1,366	1,470	958	731	451	375	548	342
	Pacific Whiting[a/]	6	2	0	1	0	0	0	12	92	2	0	192	130	5,249	2,164	3,323
	Sablefish	2,665	3,723	3,066	1,718	1,772	1,862	1,836	1,519	1,705	1,546	1,490	1,369	1,903	1,610	1,391	887
Total Roundfish		4,381	5,979	5,296	2,601	3,910	4,486	4,128	3,347	4,622	3,583	3,099	2,903	2,852	7,594	7,366	4,606
Rockfish																	
	Pacific Ocean Perch	337	607	567	644	375	585	486	429	656	626	599	528	449	256	181	312
	Shortbelly	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Widow	1,528	461	462	584	578	341	694	1,370	813	827	1,736	1,364	1,237	714	862	754
	Thornyheads	105	218	91	64	77	108	240	230	252	598	1,009	1,400	1,272	603	591	450
Other Rockfish																	
	Bocaccio	158	147	129	82	117	100	284	305	394	216	140	53	51	35	57	108
	Canary	636	590	944	857	980	852	1,292	1,141	916	838	340	356	222	194	280	323
	Chilipepper	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Yellowtail	2,736	1,013	943	1,544	1,193	1,709	1,522	1,461	958	1,242	1,658	2,033	1,849	1,358	513	836
	Remaining Rockfish[b/]	793	801	599	657	546	478	722	680	806	602	524	533	493	366	304	478
	Unspecified Rockfish	732	470	673	536	425	471	234	166	730	575	674	295	306	353	292	235
Total Rockfish		7,024	4,307	4,409	4,967	4,289	4,642	5,475	5,780	5,525	5,524	6,680	6,587	5,915	3,879	3,078	3,496
Flatfish																	
	Arrowtooth Flounder	1,466	1,828	1,696	1,436	2,004	1,298	2,429	4,182	3,288	2,782	1,965	2,667	1,705	3,094	1,671	2,525
	Dover Sole	3,098	3,184	2,683	1,540	1,339	2,272	2,551	2,264	2,396	1,771	1,691	1,358	1,399	1,435	977	1,238
	English Sole	244	314	310	284	408	428	647	512	496	318	398	304	328	182	301	225
	Petrale Sole	423	373	278	239	351	357	393	285	291	247	357	234	320	309	299	381
	Other Flatfish	278	188	408	133	109	285	469	146	396	139	87	60	68	80	93	798
Total Flatfish		5,509	5,886	5,374	3,633	4,211	4,640	6,488	7,388	6,868	5,257	4,497	4,624	3,820	5,100	3,341	5,167
Other Fish																	
	Jack Mackerel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Other	28	272	298	105	136	187	280	472	876	1,044	1,225	1,315	406	480	447	0
Total Other Fish		28	272	298	105	136	187	280	472	876	1,044	1,225	1,315	406	480	447	2
Grand Total		16,943	16,444	15,377	11,306	12,546	13,955	16,371	16,986	17,891	15,407	15,501	15,429	12,992	17,053	14,233	13,271

Data Source: Data for 1983-1998 were extracted from PacFIN July 29th, 1999.

a/ Whiting landings in 1991 and later do not include catches by the U.S. at-sea whiting fleet.
b/ Remaining rockfish are all species of rockfish not specifically listed on this page.

TABLE 4. Estimated commercial groundfish landings (in thousands of dollars) for the Vancouver area, 1983-1998. (Excludes joint venture, foreign, and domestic at-sea catches).

Species		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Roundfish																	
	Lingcod	$630	$904	$1,032	$380	$594	$474	$713	$703	$1,060	$456	$498	$498	$342	$346	$277	$68
	Pacific Cod	$273	$253	$201	$176	$1,006	$1,142	$734	$499	$904	$1,049	$679	$535	$387	$326	$470	$324
	Pacific Whitinga/	$0	$0	$0	$0	$0	$0	$0	$2	$13	$0	$0	$10	$14	$329	$231	$203
	Sablefish	$1,512	$1,966	$3,506	$1,834	$2,397	$2,883	$2,543	$2,219	$3,802	$3,039	$2,490	$2,875	$6,714	$5,678	$5,275	$2,516
Total Roundfish		$2,417	$3,127	$4,741	$2,397	$4,008	$4,507	$3,998	$3,425	$5,782	$4,548	$3,667	$3,918	$7,457	$6,680	$6,528	$3,111
Rockfish																	
	Pacific Ocean Perch	$159	$301	$315	$396	$268	$371	$295	$255	$432	$420	$402	$392	$356	$186	$128	$264
	Shortbelly	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	Widow	$685	$219	$252	$359	$411	$228	$407	$809	$521	$557	$1,083	$930	$903	$496	$608	$619
	Thornyheads	$52	$104	$50	$39	$55	$81	$184	$193	$251	$535	$942	$2,140	$2,703	$1,099	$952	$639
Other Rockfish																	
	Bocaccio	$80	$82	$81	$58	$94	$73	$210	$228	$290	$169	$113	$48	$48	$32	$45	$91
	Canary	$291	$282	$519	$528	$711	$541	$772	$683	$598	$575	$231	$268	$198	$146	$222	$298
	Chilipepper	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	Yellowtail	$1,237	$491	$519	$960	$857	$1,086	$908	$870	$632	$851	$1,121	$1,496	$1,479	$1,023	$395	$665
	Remaining Rockfishb/	$361	$382	$332	$404	$390	$314	$437	$424	$537	$419	$380	$418	$372	$268	$228	$395
	Unspecified Rockfish	$293	$226	$437	$374	$343	$324	$204	$161	$511	$401	$492	$299	$292	$320	$269	$244
Total Rockfish		$3,146	$2,073	$2,496	$3,112	$3,120	$3,008	$3,376	$3,575	$3,741	$3,905	$4,743	$5,999	$6,370	$3,561	$2,846	$3,215
Flatfish																	
	Arrowtooth Flounder	$320	$381	$363	$322	$644	$321	$533	$966	$837	$654	$425	$564	$416	$696	$355	$555
	Dover Sole	$1,586	$1,600	$1,439	$880	$881	$1,555	$1,563	$1,347	$1,573	$1,140	$1,085	$884	$1,046	$1,053	$659	$933
	English Sole	$160	$209	$204	$207	$331	$348	$497	$351	$352	$221	$272	$216	$257	$140	$206	$170
	Petrale Sole	$618	$587	$448	$399	$639	$668	$725	$529	$544	$452	$614	$433	$701	$594	$574	$793
	Other Flatfish	$190	$137	$276	$116	$92	$208	$332	$107	$280	$111	$67	$43	$56	$61	$63	$252
Total Flatfish		$2,873	$2,915	$2,730	$1,925	$2,587	$3,099	$3,649	$3,300	$3,585	$2,579	$2,463	$2,141	$2,476	$2,544	$1,858	$2,703
Other Fish																	
	Jack Mackerel	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1	$0	$0	$0
	Other	$6	$52	$57	$22	$33	$54	$86	$142	$274	$329	$357	$415	$122	$134	$145	$0
Total Other Fish		$6	$52	$57	$22	$33	$54	$86	$142	$274	$329	$357	$415	$123	$134	$145	$0
Grand Total		$8,442	$8,167	$10,024	$7,455	$9,748	$10,668	$11,109	$10,443	$13,382	$11,361	$11,231	$12,473	$16,426	$12,920	$11,377	$9,029

Data Source: Data for 1983-1998 were extracted from PacFIN July 29th, 1999.

a/ Whiting landings in 1991 and later do not include catches by the U.S. at-sea whiting fleet.

b/ Remaining rockfish are all species of rockfish not specifically listed on this page.

TABLE 5. Estimated commercial groundfish landings (mt) for the Columbia management area, 1983-1998. (Excludes joint venture, foreign, and domestic at-sea catches).

Species		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Roundfish																	
	Lingcod	1,873	1,259	1,273	736	890	1,029	1,230	758	867	851	778	620	494	638	631	96
	Pacific Cod	69	90	34	40	803	1,346	918	239	429	307	406	135	53	70	46	62
	Pacific Whiting/	65	383	882	480	240	249	88	2,570	13,768	51,148	39,003	69,803	70,747	68,480	75,938	78,816
	Sablefish	4,294	4,700	5,185	4,944	8,108	4,950	4,090	3,363	3,867	3,459	3,594	3,362	2,815	2,953	2,883	1,718
Total Roundfish		6,300	6,433	7,374	6,201	8,049	7,584	6,333	6,935	18,939	55,571	43,782	73,921	74,111	79,619	79,501	80,692
Rockfish																	
	Pacific Ocean Perch	1,422	971	814	703	615	733	915	570	718	399	635	431	354	458	365	266
	Shortbelly	1	1	11	2	0	0	2	0	2	3	6	49	24	4	15	1
	Widow	4,632	5,887	5,128	6,122	9,295	7,895	9,490	6,251	4,061	3,633	5,102	3,760	3,450	3,757	3,949	1,836
	Thornyheads	701	705	884	521	579	706	1,778	3,490	2,956	3,322	3,582	2,868	2,132	2,050	1,589	910
Other Rockfish																	
	Bocaccio	764	252	479	273	243	189	217	144	185	143	145	105	96	84	67	155
	Canary	3,154	1,128	1,069	892	1,598	1,661	1,393	932	1,772	1,450	1,429	666	395	674	517	453
	Chilipepper	10	2	2	1	0	0	3	2	5	13	6	19	11	9	7	5
	Yellowtail	5,216	3,432	1,910	2,340	2,566	3,734	2,637	2,215	2,164	3,930	3,123	2,980	2,650	3,521	1,143	1,347
	Remaining Rockfishb/	2,854	1,783	3,021	2,314	2,358	2,941	2,941	2,160	2,510	1,966	2,757	1,994	1,331	1,416	1,247	973
	Unspecified Rockfish	1,025	716	824	1,234	1,432	993	911	677	452	446	852	123	445	359	234	174
Total Rockfish		19,776	14,874	14,141	14,401	18,682	18,853	20,288	16,442	14,824	15,304	17,637	12,998	10,876	12,335	9,134	6,120
Flatfish																	
	Arrowtooth Flounder	569	502	932	770	774	602	1,091	1,571	1,467	660	665	490	488	1,141	591	581
	Dover Sole	6,778	5,279	4,837	4,031	5,534	6,817	7,651	6,156	7,153	4,848	5,030	3,058	2,692	3,508	3,139	2,580
	English Sole	691	360	518	648	703	560	690	488	860	702	681	339	293	353	454	353
	Petrale Sole	997	702	633	720	900	885	828	690	777	671	568	474	689	581	654	533
	Other Flatfish	1,334	1,146	1,203	899	1,056	723	784	933	1,468	937	860	985	992	444	625	455
Total Flatfish		10,369	7,989	8,123	7,068	8,967	9,588	11,044	9,839	11,725	7,818	7,804	5,345	5,154	6,027	5,463	4,502
Other Fish																	
	Jack Mackerel	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	188
	Other	78	31	15	26	14	14	30	58	116	146	356	414	413	753	497	553
Total Other Fish		78	31	15	26	14	14	30	58	116	146	356	414	415	754	497	740
Grand Total		36,523	29,327	29,653	27,696	35,712	36,039	37,694	33,274	45,604	78,840	69,560	92,677	90,556	98,735	94,595	92,055

Data Source: Data for 1983-1998 were extracted from PacFIN July 29th, 1999.

a/ Whiting landings in 1991 and later do not include catches by the U.S. at-sea whiting fleet.

b/ Remaining rockfish are all species of rockfish not specifically listed on this page.

TABLE 6. Estimated commercial groundfish landings (in thousands of dollars) for the Columbia area, 1983-1998. (Excludes joint venture, foreign, and domestic at-sea catches).

Species		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Roundfish																	
	Lingcod	$1,026	$672	$714	$473	$709	$781	$883	$549	$633	$519	$618	$550	$463	$596	$610	$133
	Pacific Cod	$38	$46	$19	$24	$580	$797	$515	$135	$284	$225	$291	$102	$45	$61	$40	$67
	Pacific Whitinga/	$32	$64	$183	$64	$46	$47	$15	$260	$1,466	$5,282	$2,499	$4,543	$7,351	$4,529	$7,029	$4,154
	Sablefish	$2,090	$2,270	$3,526	$4,193	$6,697	$6,022	$4,226	$3,389	$6,059	$5,315	$4,565	$6,352	$8,434	$9,793	$11,035	$4,604
Total Roundfish		$3,185	$3,053	$4,441	$4,754	$8,035	$7,653	$5,642	$4,337	$8,451	$11,348	$7,974	$11,548	$16,294	$14,981	$18,720	$8,958
Rockfish																	
	Pacific Ocean Perch	$683	$484	$453	$432	$448	$463	$545	$337	$475	$264	$415	$314	$272	$321	$251	$223
	Shortbelly	$0	$0	$5	$1	$0	$0	$1	$0	$1	$1	$3	$24	$11	$2	$8	$0
	Widow	$1,939	$2,967	$2,814	$3,713	$6,573	$4,967	$5,392	$3,587	$2,469	$2,255	$3,189	$2,579	$2,465	$2,492	$2,727	$1,399
	Thornyheads	$327	$359	$484	$324	$417	$540	$1,431	$2,950	$2,922	$3,168	$3,521	$4,429	$4,664	$3,871	$2,616	$1,297
Other Rockfish																	
	Bocaccio	$386	$126	$267	$168	$176	$118	$128	$88	$122	$96	$99	$88	$70	$70	$56	$136
	Canary	$1,366	$577	$597	$557	$1,202	$1,003	$827	$573	$1,185	$1,020	$996	$520	$373	$612	$547	$518
	Chilipepper	$4	$1	$1	$1	$0	$0	$2	$1	$3	$8	$4	$13	$7	$6	$5	$3
	Yellowtail	$2,287	$1,700	$1,062	$1,452	$1,826	$2,287	$1,538	$1,324	$1,433	$2,688	$2,120	$2,218	$2,141	$2,632	$896	$1,055
	Remaining Rockfishb/	$1,299	$891	$1,652	$1,446	$1,737	$1,849	$1,694	$1,256	$1,687	$1,376	$1,751	$1,339	$1,041	$1,040	$878	$799
	Unspecified Rockfish	$504	$361	$501	$808	$1,086	$635	$622	$530	$383	$329	$681	$124	$456	$379	$271	$182
Total Rockfish		$8,744	$7,467	$7,836	$8,904	$13,466	$11,862	$12,180	$10,646	$10,679	$11,205	$12,779	$11,648	$11,498	$11,425	$8,254	$5,614
Flatfish																	
	Arrowtooth Flounder	$127	$111	$202	$172	$252	$171	$232	$360	$363	$150	$141	$108	$119	$254	$128	$131
	Dover Sole	$3,337	$2,695	$2,656	$2,352	$3,832	$4,577	$4,676	$3,697	$4,815	$2,944	$2,975	$1,991	$1,981	$2,455	$2,087	$1,951
	English Sole	$488	$253	$375	$508	$619	$479	$542	$333	$628	$476	$446	$236	$228	$264	$310	$258
	Petrale Sole	$1,529	$1,113	$1,022	$1,209	$1,635	$1,638	$1,529	$1,267	$1,418	$1,188	$973	$885	$1,479	$1,247	$1,348	$1,103
	Other Flatfish	$1,105	$959	$1,001	$877	$1,146	$727	$779	$833	$1,301	$799	$751	$830	$728	$375	$477	$334
Total Flatfish		$6,586	$5,132	$5,256	$5,118	$7,484	$7,593	$7,760	$6,491	$8,524	$5,558	$5,286	$4,050	$4,535	$4,594	$4,349	$3,778
Other Fish																	
	Jack Mackerel	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$2
	Other	$39	$15	$13	$18	$18	$6	$12	$18	$26	$22	$84	$108	$129	$182	$116	$135
Total Other Fish		$39	$15	$13	$18	$18	$6	$12	$18	$26	$22	$84	$108	$129	$182	$116	$138
Grand Total		$18,555	$15,667	$17,546	$18,794	$29,004	$27,115	$25,594	$21,491	$27,681	$28,133	$26,124	$27,355	$32,457	$31,182	$31,440	$18,487

Data Source: Data for 1983-1998 were extracted from PacFIN July 29th, 1999.

a/ Whiting landings in 1991 and later do not include catches by the U.S. at-sea whiting fleet.

b/ Remaining rockfish are all species of rockfish not specifically listed on this page.

TABLE 7. Estimated commercial groundfish landings (mt) for the Eureka management area, 1983-1998. (Excludes joint venture, foreign, and domestic at-sea catches).

Species		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Roundfish																	
	Lingcod	410	288	238	207	322	312	389	422	213	170	197	212	229	203	264	101
	Pacific Cod	0	0	0	0	79	14	0	0	0	0	1	0	0	0	0	0
	Pacific Whiting[a/]	977	2,312	3,009	2,978	4,508	6,527	7,292	5,516	8,889	4,970	3,099	3,610	4,089	2,991	6,342	5,722
	Sablefish	2,861	2,358	2,552	2,557	1,931	1,554	1,659	1,966	1,848	2,229	1,630	1,625	1,364	1,596	1,782	886
Total Roundfish		4,247	4,969	5,832	5,756	6,842	8,408	9,340	7,904	8,951	7,374	4,929	5,453	5,689	4,796	8,412	6,709
Rockfish																	
	Pacific Ocean Perch	94	59	100	32	162	79	40	13	11	40	26	8	10	19	29	24
	Shortbelly	0	0	0	0	0	0	0	2	1	0	2	1	2	1	1	11
	Widow	2,556	2,243	2,325	1,678	2,111	1,701	1,665	1,388	722	1,059	1,413	888	993	801	777	700
	Thornyheads	1,003	1,070	1,506	1,673	2,100	4,200	5,206	4,970	3,182	4,155	4,175	2,039	1,944	1,957	1,694	1,163
Other Rockfish																	
	Bocaccio	469	239	261	87	115	95	101	141	57	64	121	56	61	39	11	16
	Canary	616	243	171	131	264	151	174	208	200	469	190	144	163	174	170	259
	Chilipepper	166	84	106	87	170	204	125	220	338	38	598	93	104	93	70	59
	Yellowtail	413	416	167	105	304	99	274	382	485	398	230	162	185	187	90	294
	Remaining Rockfish[b/]	742	794	1,099	449	3,396	1,970	1,026	974	905	1,043	910	896	791	860	740	830
	Unspecified Rockfish	518	284	325	437	412	410	394	630	539	268	202	64	67	76	109	128
Total Rockfish		6,576	5,433	6,061	4,680	9,126	8,973	9,037	8,982	6,471	7,533	7,922	4,338	4,321	4,205	3,691	3,483
Flatfish																	
	Arrowtooth Flounder	39	47	47	23	52	43	32	71	191	127	82	89	126	150	79	61
	Dover Sole	5,562	5,109	5,924	5,144	5,095	4,762	4,131	3,887	3,914	3,978	3,505	1,850	2,126	2,646	2,117	2,323
	English Sole	780	518	407	341	612	409	307	199	135	115	127	110	103	183	282	323
	Petrale Sole	389	317	386	243	396	383	369	283	343	260	264	354	287	487	505	278
	Other Flatfish	574	579	743	572	754	567	504	368	287	190	275	408	400	448	527	262
Total Flatfish		7,344	6,570	7,508	6,324	6,909	6,164	5,343	4,808	4,871	4,669	4,254	2,811	3,043	3,916	3,511	3,246
Other Fish																	
	Jack Mackerel	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2	7
	Other	35	26	51	59	50	129	81	97	77	167	317	324	149	366	346	326
Total Other Fish		35	26	51	59	50	129	81	97	77	168	317	324	149	366	349	332
Grand Total		18,203	16,996	19,452	16,818	22,927	23,674	23,800	21,791	20,370	19,744	17,422	12,926	13,202	13,283	15,962	13,770

Data Source: Data for 1983-1998 were extracted from PacFIN July 29th, 1999.

a/ Whiting landings in 1991 and later do not include catches by the U.S. at-sea whiting fleet.

b/ Remaining rockfish are all species of rockfish not specifically listed on this page.

TABLE 8. Estimated commercial groundfish landings (in thousands of dollars) for the Eureka area, 1983-1998. (Excludes joint venture, foreign, and domestic at-sea catches).

Species		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Roundfish																	
	Lingcod	$230	$167	$153	$169	$304	$292	$336	$370	$188	$156	$176	$204	$247	$224	$324	$178
	Pacific Cod	$0	$0	$0	$0	$57	$9	$0	$0	$0	$0	$1	$0	$0	$0	$0	$0
	Pacific Whitinga/	$162	$337	$397	$381	$609	$1,074	$1,045	$778	$876	$600	$342	$350	$453	$243	$583	$392
	Sablefish	$1,374	$964	$1,483	$1,864	$1,711	$1,342	$1,478	$1,831	$2,129	$2,751	$1,630	$2,750	$3,735	$4,513	$5,623	$2,152
Total Roundfish		$1,766	$1,474	$2,053	$2,421	$2,683	$2,717	$2,859	$2,979	$3,194	$3,510	$2,149	$3,308	$4,441	$4,988	$6,580	$2,722
Rockfish																	
	Pacific Ocean Perch	$42	$29	$55	$19	$113	$50	$24	$8	$7	$26	$18	$6	$9	$14	$19	$20
	Shortbelly	$0	$0	$0	$0	$0	$0	$0	$1	$1	$0	$1	$1	$1	$0	$0	$5
	Widow	$1,087	$1,054	$1,274	$1,018	$1,505	$1,063	$954	$783	$435	$672	$917	$627	$739	$556	$550	$613
	Thornyheads	$505	$587	$841	$1,040	$1,534	$3,311	$4,281	$4,238	$3,247	$4,449	$4,712	$3,465	$4,312	$3,706	$2,880	$1,802
Other Rockfish																	
	Bocaccio	$237	$133	$164	$62	$92	$69	$75	$105	$42	$50	$97	$51	$57	$35	$11	$14
	Canary	$267	$126	$95	$82	$191	$96	$104	$147	$153	$362	$192	$162	$231	$219	$249	$369
	Chilipepper	$73	$43	$59	$52	$122	$126	$74	$135	$223	$25	$418	$69	$82	$63	$55	$40
	Yellowtail	$182	$217	$93	$65	$217	$60	$165	$241	$339	$286	$174	$132	$160	$156	$88	$291
	Remaining Rockfishb/	$349	$399	$612	$288	$2,474	$1,333	$738	$756	$707	$816	$716	$741	$824	$823	$799	$773
	Unspecified Rockfish	$254	$160	$222	$332	$374	$328	$347	$568	$489	$228	$192	$66	$81	$91	$129	$227
Total Rockfish		$2,965	$2,737	$3,397	$2,949	$6,680	$6,466	$6,766	$6,997	$5,661	$6,909	$7,468	$5,306	$6,492	$5,665	$4,781	$4,154
Flatfish																	
	Arrowtooth Flounder	$9	$11	$10	$5	$17	$13	$9	$17	$50	$31	$18	$23	$33	$35	$17	$15
	Dover Sole	$2,740	$2,685	$3,234	$2,973	$3,543	$3,205	$2,509	$2,290	$2,653	$2,569	$2,158	$1,240	$1,537	$1,780	$1,393	$1,772
	English Sole	$566	$376	$308	$282	$570	$369	$255	$147	$112	$91	$92	$89	$87	$145	$204	$254
	Petrale Sole	$587	$483	$609	$395	$685	$640	$614	$476	$583	$435	$431	$578	$543	$901	$914	$529
	Other Flatfish	$464	$457	$610	$479	$679	$500	$421	$300	$241	$163	$231	$348	$328	$372	$399	$222
Total Flatfish		$4,366	$4,012	$4,771	$4,134	$5,493	$4,727	$3,808	$3,230	$3,639	$3,288	$2,930	$2,278	$2,527	$3,231	$2,927	$2,793
Other Fish																	
	Jack Mackerel	$0	$0	$0	$0	$0	$0	$0	$0	$9	$0	$0	$0	$0	$0	$1	$5
	Other	$16	$11	$15	$25	$23	$49	$33	$32	$22	$34	$86	$99	$52	$106	$127	$195
Total Other Fish		$16	$11	$15	$25	$23	$49	$33	$32	$31	$35	$86	$99	$52	$106	$127	$199
Grand Total		$9,113	$8,235	$10,237	$9,530	$14,878	$13,960	$13,466	$13,237	$12,524	$13,743	$12,632	$10,991	$13,512	$13,990	$14,415	$9,868

Data Source: Data for 1983-1998 were extracted from PacFIN July 29th, 1999.

a/ Whiting landings in 1991 and later do not include catches by the U.S. at-sea whiting fleet.

b/ Remaining rockfish are all species of rockfish not specifically listed on this page.

TABLE 9. Estimated commercial groundfish landings (mt) for the Monterey management area, 1983-1998. (Excludes joint venture, foreign, and domestic at-sea catches).

Species		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Roundfish																	
	Lingcod	647	736	489	360	581	626	893	705	559	441	489	396	318	314	341	77
	Pacific Cod	0	2	1	0	10	0	0	0	0	1	0	0	0	0	0	0
	Pacific Whiting[a]	3	23	3	3	9	5	0	0	1	0	0	2	0	70	0	1
	Sablefish	2,953	2,224	3,039	3,511	2,544	2,164	2,352	1,697	1,663	1,538	1,027	932	1,487	1,818	1,560	626
Total Roundfish		3,603	2,985	3,531	3,874	3,144	2,796	3,246	2,402	2,223	1,983	1,517	1,334	1,811	2,219	1,928	704
Rockfish																	
	Pacific Ocean Perch	8	7	4	3	2	0	0	4	7	5	1	2	1	0	5	0
	Shortbelly	3	0	28	19	0	0	1	7	1	0	0	3	8	30	62	8
	Widow	1,592	990	1,126	965	1,807	925	1,382	1,454	1,124	897	510	311	953	701	828	467
	Thornyheads	742	867	1,013	1,073	1,067	577	788	772	802	1,494	1,319	1,266	1,543	1,365	1,209	666
Other Rockfish																	
	Bocaccio	3,415	3,116	1,235	1,133	1,326	1,119	1,550	1,264	838	740	651	434	425	277	250	82
	Canary	255	222	263	68	257	191	147	314	272	142	152	114	102	103	127	96
	Chilipepper	1,777	1,821	1,860	1,443	2,464	2,339	2,693	2,744	3,584	3,026	2,419	1,447	1,633	1,459	1,793	1,019
	Yellowtail	489	276	415	378	338	309	682	399	320	626	204	227	160	124	326	279
	Remaining Rockfish[b]	1,876	2,928	2,560	2,212	2,185	2,583	2,097	2,629	2,377	2,265	1,883	1,226	1,196	1,347	1,631	2,052
	Unspecified Rockfish	1,187	2,082	731	1,478	1,332	717	755	1,176	695	662	491	90	37	322	80	238
Total Rockfish		11,344	12,310	9,233	8,771	11,712	9,768	10,885	11,050	10,698	10,452	8,042	5,114	6,059	5,736	6,312	4,907
Flatfish																	
	Arrowtooth Flounder	1	2	3	1	0	2	1	0	0	0	0	6	1	5	1	1
	Dover Sole	4,185	4,347	4,261	5,398	3,994	2,609	2,869	2,011	3,285	3,599	2,894	2,124	3,226	3,239	2,741	1,264
	English Sole	584	497	639	711	674	621	703	667	653	467	378	359	399	423	453	222
	Petrale Sole	332	298	403	326	432	449	465	424	451	337	280	259	311	393	435	241
	Total Flatfish														855	954	779
Total Flatfish		5,770	5,814	6,161	7,425	5,877	4,537	4,954	3,786	5,256	5,013	4,098	3,468	4,883	4,915	4,584	2,507
Other Fish																	
	Jack Mackerel	1,302	3,234	136	55	142	1	0	109	26	91	214	157	100	91	0	0
	Other	136	66	59	44	38	23	18	28	36	40	140	284	366	2,059	1,085	907
Total Other Fish		1,439	3,300	195	99	178	25	19	137	62	131	354	440	466	2,150	1,085	907
Grand Total		22,156	24,409	19,120	20,169	20,912	17,125	19,104	17,376	18,240	17,579	14,011	10,357	13,220	15,020	13,909	9,025

Data Source: Data for 1983-1998 were extracted from PacFIN July 29th, 1999.

a/ Whiting landings in 1991 and later do not include catches by the U.S. at-sea whiting fleet.

b/ Remaining rockfish are all species of rockfish not specifically listed on this page.

TABLE 10. Estimated commercial groundfish landings (in thousands of dollars) for the Monterey area, 1983-1998. (Excludes joint venture, foreign, and domestic at-sea catches).

Species		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Roundfish																	
	Lingcod	$365	$425	$312	$276	$486	$528	$769	$603	$497	$415	$463	$402	$357	$369	$395	$146
	Pacific Cod	$0	$1	$1	$0	$7	$0	$0	$0	$0	$1	$0	$0	$0	$0	$0	$0
	Pacific Whiting[a]	$1	$4	$2	$1	$1	$1	$0	$0	$1	$0	$0	$1	$0	$4	$0	$0
	Sablefish	$1,288	$840	$1,789	$2,600	$2,286	$2,009	$2,135	$1,673	$1,869	$1,802	$931	$1,362	$3,907	$5,148	$4,894	$1,382
Total Roundfish		$1,653	$1,270	$2,105	$2,877	$2,780	$2,538	$2,904	$2,276	$2,366	$2,223	$1,394	$1,783	$4,292	$5,602	$5,436	$1,529
Rockfish																	
	Pacific Ocean Perch	$4	$4	$2	$2	$1	$0	$0	$2	$4	$4	$1	$2	$1	$0	$4	$0
	Shortbelly	$1	$0	$3	$13	$0	$0	$0	$4	$1	$0	$0	$1	$4	$8	$29	$4
	Widow	$722	$525	$649	$631	$1,330	$664	$927	$1,043	$742	$620	$368	$257	$794	$548	$611	$427
	Thornyheads	$376	$468	$560	$652	$755	$427	$633	$645	$793	$1,565	$1,473	$2,049	$3,599	$2,738	$2,232	$1,145
Other Rockfish																	
	Bocaccio	$1,726	$1,737	$776	$808	$1,065	$821	$1,147	$945	$617	$580	$524	$393	$397	$253	$219	$85
	Canary	$117	$120	$173	$42	$191	$132	$112	$252	$251	$177	$158	$167	$163	$182	$201	$138
	Chilipepper	$863	$977	$1,121	$957	$1,826	$1,609	$1,806	$1,996	$2,546	$2,308	$2,048	$1,301	$1,523	$1,319	$1,526	$940
	Yellowtail	$281	$156	$260	$282	$277	$242	$487	$330	$347	$642	$196	$232	$181	$135	$342	$329
	Remaining Rockfishb/	$1,112	$1,705	$1,646	$1,642	$1,855	$2,349	$2,064	$2,365	$2,393	$2,327	$1,859	$1,549	$1,445	$1,647	$1,933	$2,133
	Unspecified Rockfish	$768	$1,262	$604	$1,230	$1,163	$700	$751	$1,133	$718	$693	$580	$114	$55	$344	$138	$324
Total Rockfish		$5,927	$6,884	$5,752	$6,207	$9,094	$7,619	$8,485	$8,927	$8,914	$9,385	$7,547	$6,059	$8,170	$7,172	$7,235	$5,525
Flatfish																	
	Arrowtooth Flounder	$1	$1	$2	$0	$0	$2	$1	$0	$0	$0	$0	$3	$1	$4	$1	$1
	Dover Sole	$2,028	$2,194	$2,203	$2,972	$2,581	$1,724	$1,717	$1,134	$2,186	$2,285	$1,696	$1,334	$2,241	$2,076	$1,641	$880
	English Sole	$414	$355	$476	$562	$596	$544	$590	$507	$528	$373	$296	$293	$340	$352	$347	$179
	Petrale Sole	$485	$448	$635	$536	$736	$756	$798	$762	$827	$601	$506	$511	$634	$818	$908	$547
	Other Flatfish	$542	$537	$720	$885	$719	$759	$747	$542	$714	$514	$527	$602	$819	$704	$739	$591
Total Flatfish		$3,470	$3,534	$4,036	$4,956	$4,632	$3,785	$3,853	$2,946	$4,255	$3,773	$3,025	$2,743	$4,035	$3,954	$3,636	$2,198
Other Fish																	
	Jack Mackerel	$184	$353	$34	$20	$16	$0	$0	$16	$9	$14	$54	$66	$68	$13	$0	$0
	Other	$87	$60	$66	$43	$42	$26	$30	$31	$27	$28	$58	$99	$146	$733	$483	$752
Total Other Fish		$271	$414	$100	$62	$58	$27	$30	$47	$36	$42	$112	$165	$215	$746	$483	$752
Grand Total		$11,321	$12,102	$11,992	$14,103	$16,563	$13,968	$15,272	$14,196	$15,571	$15,423	$12,077	$10,750	$16,712	$17,475	$16,791	$10,004

Data Source: Data for 1983-1998 were extracted from PacFIN July 29th, 1999.

a/ Whiting landings in 1991 and later do not include catches by the U.S. at-sea whiting fleet.

b/ Remaining rockfish are all species of rockfish not specifically listed on this page.

TABLE 11. Estimated commercial groundfish landings (mt) for the Conception area, 1983-1998. (Excludes joint venture, foreign, and domestic at-sea catches).

Species		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Roundfish																	
	Lingcod	48	21	25	23	30	37	56	58	72	64	79	66	58	41	0	19
	Pacific Cod	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pacific Whiting[a/]	0	0	0	1	1	0	6	3	3	1	1	2	1	0	1	1
	Sablefish	1,926	1,070	473	558	390	346	502	621	412	585	403	290	332	341	262	201
Total Roundfish		1,974	1,091	498	582	421	383	564	682	487	660	500	391	456	477	333	220
Rockfish																	
	Pacific Ocean Perch	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	Shortbelly	0	2	0	0	0	0	0	0	0	0	0	0	0	0	793	0
	Widow	47	74	44	46	62	131	67	77	115	6	35	40	63	33	0	70
	Thornyheads	113	313	620	317	664	459	1,222	2,260	846	2,017	1,097	472	659	553	413	340
Other Rockfish																	
	Bocaccio	988	551	383	540	602	310	486	643	365	577	515	523	293	161	60	37
	Canary	6	7	22	4	6	9	10	2	14	2	4	7	15	2	1	1
	Chilipepper	209	270	318	225	440	741	596	443	553	370	392	304	231	150	184	190
	Yellowtail	48	10	9	31	8	5	43	8	28	3	7	13	13	6	23	12
	Remaining Rockfish[b/]	1,312	1,410	1,665	2,479	2,481	2,400	1,791	1,329	1,250	1,504	1,049	1,070	1,005	875	637	695
	Unspecified Rockfish	681	418	396	527	370	315	371	294	605	555	507	102	82	149	86	135
Total Rockfish		3,404	3,056	3,457	4,168	5,110	4,633	4,791	5,209	3,825	5,205	3,755	2,531	2,361	1,929	2,197	1,480
Flatfish																	
	Arrowtooth Flounder	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
	Dover Sole	369	1,286	2,832	1,241	2,468	1,656	1,612	1,375	1,474	1,834	1,218	968	1,101	1,322	1,099	562
	English Sole	57	32	55	52	73	83	65	45	39	21	17	12	11	11	12	5
	Petrale Sole	74	50	139	220	123	74	98	83	64	38	34	54	52	58	51	27
	Total Flatfish	140	72	247	164	210	290	284	351	209	83	156	263	153	165	123	91
Total Flatfish		640	1,440	3,272	1,678	2,873	2,104	2,059	1,854	1,786	1,976	1,425	1,297	1,317	1,556	1,286	684
																0	0
Other Fish																0	0
	Jack Mackerel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Other	79	119	112	99	113	71	81	70	54	51	49	53	40	167	128	112
Total Other Fish		79	119	112	99	113	71	81	70	54	51	49	53	40	167	128	112
Grand Total		6,098	5,706	7,340	6,527	8,518	7,190	7,494	7,815	6,153	7,892	5,728	4,272	4,175	4,130	3,945	2,497

Data Source: Data for 1983-1998 were extracted from PacFIN July 29th, 1999.

a/ Whiting landings in 1991 and later do not include catches by the U.S. at-sea whiting fleet.
b/ Remaining rockfish are all species of rockfish not specifically listed on this page.

TABLE 12. Estimated commercial groundfish landings (in thousands of dollars) for the Conception area, 1983-1998. (Exludes joint venture, foreign, and domestic at-sea catches).

Species		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Roundfish																	
	Lingcod	$29	$15	$26	$24	$31	$40	$57	$64	$76	$71	$86	$84	$79	$70	$0	$40
	Pacific Cod	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1	$0	$0
	Pacific Whiting[a]	$0	$0	$0	$1	$0	$1	$8	$8	$5	$2	$1	$3	$3	$0	$2	$2
	Sablefish	$1,425	$767	$218	$474	$270	$241	$415	$537	$470	$724	$391	$426	$650	$742	$749	$502
Total Roundfish		$1,454	$782	$244	$499	$301	$282	$479	$606	$552	$843	$603	$771	$1,253	$1,576	$1,126	$544
Rockfish																	
	Pacific Ocean Perch	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1	$0	$0	$0	$0	$0	$0
	Shortbelly	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,865	$0
	Widow	$26	$46	$37	$39	$61	$118	$58	$74	$106	$5	$33	$38	$60	$32	$0	$73
	Thornyheads	$66	$164	$337	$189	$450	$339	$994	$1,909	$837	$2,178	$1,122	$781	$1,495	$1,147	$831	$705
Other Rockfish																	
	Bocaccio	$499	$307	$240	$385	$484	$228	$359	$480	$269	$452	$415	$473	$274	$147	$77	$52
	Canary	$4	$10	$26	$7	$7	$14	$20	$6	$13	$5	$8	$16	$34	$6	$5	$3
	Chilipepper	$122	$173	$261	$190	$420	$604	$458	$348	$454	$322	$411	$311	$242	$156	$211	$204
	Yellowtail	$28	$7	$7	$27	$8	$5	$35	$11	$25	$6	$12	$16	$16	$6	$44	$17
	Remaining Rockfish[b]	$1,175	$1,588	$2,085	$2,787	$2,917	$2,630	$2,360	$2,016	$1,956	$2,367	$1,950	$2,339	$2,552	$2,208	$1,794	$1,479
	Unspecified Rockfish	$889	$532	$583	$747	$550	$463	$584	$531	$1,046	$1,057	$1,102	$225	$201	$325	$293	$385
Total Rockfish		$2,945	$2,935	$3,678	$4,466	$5,442	$4,704	$5,139	$5,591	$4,793	$6,565	$5,216	$4,224	$4,891	$4,051	$5,120	$2,918
Flatfish																	
	Arrowtooth Flounder	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1	$0	$0
	Dover Sole	$171	$597	$1,329	$652	$1,540	$1,077	$929	$772	$859	$1,016	$701	$629	$773	$923	$739	$447
	English Sole	$42	$24	$44	$45	$68	$77	$57	$41	$37	$19	$14	$10	$10	$9	$11	$5
	Petrale Sole	$114	$83	$264	$447	$258	$158	$209	$176	$137	$81	$76	$129	$121	$131	$115	$63
	Other Flatfish	$108	$65	$222	$152	$187	$270	$256	$276	$202	$100	$161	$240	$158	$169	$170	$116
Total Flatfish		$436	$769	$1,858	$1,296	$2,053	$1,581	$1,452	$1,264	$1,235	$1,216	$952	$1,008	$1,063	$1,233	$1,034	$630
Other Fish																	
	Jack Mackerel	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	Other	$93	$207	$195	$176	$173	$140	$147	$107	$91	$80	$71	$63	$49	$882	$461	$764
Total Other Fish		$93	$207	$195	$176	$173	$140	$147	$107	$91	$80	$71	$63	$49	$882	$461	$764
Grand Total		$4,928	$4,692	$5,974	$6,436	$7,970	$6,706	$7,217	$7,569	$6,670	$8,705	$6,842	$6,066	$7,257	$7,742	$7,741	$4,857

Data Source: Data for 1983-1998 were extracted from PacFIN July 29th, 1999.

a/ Whiting landings in 1991 and later do not include catches by the U.S. at-sea whiting fleet.

b/ Remaining rockfish are all species of rockfish not specifically listed on this page.

TABLE 13. Estimated commercial groundfish landings (mt) for Washington, 1983-1998. (Excludes joint venture, foreign, and domestic at-sea catches).

Species		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Roundfish																	
	Lingcod	1,524	2,043	2,130	714	1,023	757	1,137	993	892	561	676	477	278	360	290	38
	Pacific Cod	508	503	369	300	1,548	2,304	1,408	833	1,281	1,361	878	696	424	361	542	326
	Pacific Whitinga/	6	47	14	61	95	88	27	302	504	2,237	3,188	4,884	4,037	10,905	7,241	10,513
	Sablefish	3,363	4,413	3,869	2,415	3,144	2,938	2,416	1,724	2,237	1,790	1,713	1,388	1,951	1,947	2,036	1,159
Total Roundfish		5,405	7,021	6,386	3,513	5,837	6,109	5,011	3,855	4,921	5,959	6,455	7,445	6,691	14,083	10,109	12,035
Rockfish																	
	Pacific Ocean Perch	482	840	624	684	448	584	483	435	543	432	461	349	287	232	184	170
	Shortbelly	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Widow	3,211	1,446	1,532	2,550	3,712	3,075	3,375	2,234	1,148	936	1,669	1,062	1,080	953	1,000	532
	Thornyheads	118	253	56	25	63	69	131	156	134	214	604	685	580	430	365	162
Other Rockfish																	
	Bocaccio	136	152	123	80	110	96	247	265	363	206	132	50	47	43	54	37
	Canary	643	605	1,025	888	1,004	967	1,194	1,086	959	815	286	148	138	162	176	171
	Chilipepper	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Yellowtail	5,327	2,312	1,347	1,983	1,877	2,944	1,689	1,643	1,140	1,327	2,014	1,901	1,483	1,452	476	593
	Remaining Rockfishb/	856	863	709	728	685	645	657	661	855	699	450	302	301	256	224	244
	Unspecified Rockfish	1,180	842	982	1,215	1,125	961	777	477	342	438	596	357	598	484	342	344
Total Rockfish		11,952	7,313	6,399	8,153	9,023	9,342	8,552	6,956	5,485	5,066	6,212	4,854	4,515	4,011	2,822	2,253
Flatfish																	
	Arrowtooth Flounder	1,511	1,930	1,943	1,709	2,044	1,268	2,387	3,955	2,700	1,413	997	1,457	790	2,046	1,134	1,541
	Dover Sole	2,935	3,316	2,804	1,480	1,622	2,243	2,184	1,869	1,689	1,317	1,302	1,000	935	1,063	827	608
	English Sole	260	318	398	403	564	454	666	511	527	423	411	303	321	182	303	229
	Petrale Sole	525	460	405	313	526	452	450	342	261	251	265	210	270	290	308	304
	Other Flatfish	297	260	474	273	358	287	503	368	530	264	145	90	71	60	75	91
Total Flatfish		5,529	6,284	6,025	4,177	5,115	4,704	6,190	7,045	5,706	3,668	3,119	3,060	2,388	3,641	2,648	2,773
Other Fish																	
	Jack Mackerel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	38
	Other	30	273	299	113	143	197	291	474	835	1,044	1,233	1,323	316	477	415	598
Total Other Fish		30	273	299	113	143	197	291	474	835	1,044	1,233	1,323	316	477	415	636
Grand Total		22,917	20,891	19,109	15,956	20,118	20,351	20,044	18,331	16,947	15,737	17,019	16,682	13,910	22,212	15,994	17,697

Data Source: Data for 1983-1998 were extracted from PacFIN July 29th, 1999.

a/ Whiting landings in 1991 and later do not include catches by the U.S. at-sea whiting fleet.
b/ Remaining rockfish are all species of rockfish not specifically listed on this page.

TABLE 14. Estimated commercial groundfish landings (in thousands of dollars) for Washington, 1983-1998. (Excludes joint venture, foreign, and domestic at-sea catches).

Species		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Roundfish																	
	Lingcod	$821	$1,047	$1,176	$466	$819	$555	$787	$709	$666	$457	$518	$397	$264	$346	$267	$46
	Pacific Cod	$262	$253	$198	$182	$1,124	$1,321	$801	$503	$847	$968	$619	$508	$363	$314	$465	$308
	Pacific Whitinga/	$0	$6	$2	$8	$18	$19	$5	$46	$80	$209	$210	$253	$364	$721	$713	$598
	Sablefish	$1,936	$2,428	$4,229	$2,703	$4,532	$4,616	$3,327	$2,622	$5,551	$3,815	$3,053	$3,043	$7,037	$7,090	$8,515	$3,278
Total Roundfish		$3,021	$3,738	$5,606	$3,365	$6,504	$6,519	$4,928	$3,881	$7,147	$5,453	$4,400	$4,200	$8,029	$8,471	$9,960	$4,229
Rockfish																	
	Pacific Ocean Perch	$230	$411	$346	$422	$322	$365	$288	$258	$357	$288	$298	$257	$227	$172	$136	$143
	Shortbelly	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	Widow	$1,404	$670	$835	$1,550	$2,629	$1,978	$1,930	$1,325	$745	$646	$1,033	$718	$782	$631	$693	$396
	Thornyheads	$57	$116	$31	$16	$44	$50	$96	$114	$126	$189	$558	$988	$1,208	$776	$584	$225
Other Rockfish																	
	Bocaccio	$60	$70	$68	$50	$80	$63	$148	$157	$238	$140	$87	$37	$36	$29	$42	$30
	Canary	$293	$286	$564	$548	$727	$610	$712	$648	$626	$559	$193	$110	$128	$122	$141	$152
	Chilipepper	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	Yellowtail	$2,367	$1,085	$738	$1,232	$1,347	$1,840	$997	$972	$748	$908	$1,348	$1,392	$1,190	$1,070	$360	$436
	Remaining Rockfish	$393	$406	$391	$448	$490	$415	$403	$416	$572	$492	$351	$277	$230	$182	$167	$200
	Unspecified Rockfish	$499	$398	$610	$788	$877	$553	$481	$337	$255	$308	$417	$364	$598	$475	$359	$367
Total Rockfish		$5,303	$3,442	$3,582	$5,054	$6,517	$5,873	$5,055	$4,227	$3,667	$3,531	$4,287	$4,144	$4,398	$3,458	$2,482	$1,949
Flatfish																	
	Arrowtooth Flounder	$329	$404	$414	$383	$658	$310	$524	$918	$681	$331	$214	$310	$190	$461	$239	$335
	Dover Sole	$1,448	$1,613	$1,488	$834	$1,088	$1,483	$1,310	$1,079	$1,058	$808	$818	$642	$695	$775	$551	$454
	English Sole	$170	$211	$265	$295	$459	$368	$494	$349	$371	$289	$280	$215	$252	$141	$207	$172
	Petrale Sole	$773	$726	$650	$521	$959	$846	$825	$631	$488	$461	$459	$387	$586	$539	$584	$619
	Other Flatfish	$1,668	$194	$356	$252	$394	$238	$376	$271	$395	$219	$107	$73	$72	$49	$52	$70
Total Flatfish		$4,388	$3,147	$3,173	$2,283	$3,559	$3,244	$3,529	$3,248	$2,994	$2,108	$1,879	$1,627	$1,795	$1,965	$1,633	$1,651
Other Fish																	
	Jack Mackerel	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$4
	Other	$6	$53	$59	$25	$39	$57	$88	$144	$263	$329	$356	$415	$98	$133	$140	$190
Total Other Fish		$6	$53	$59	$25	$39	$57	$88	$144	$263	$329	$356	$415	$98	$133	$140	$194
Grand Total		$12,719	$10,380	$12,420	$10,727	$16,618	$15,693	$13,601	$11,499	$14,070	$11,421	$10,921	$10,386	$14,320	$14,027	$14,215	$8,023

Data Source: Data for 1983-1998 were extracted from PacFIN July 29th, 1999.

a/ Whiting landings in 1991 and later do not include catches by the U.S. at-sea whiting fleet.

b/ Remaining rockfish are all species of rockfish not specifically listed on this page.

TABLE 15. Estimated commercial groundfish landings (mt) for Oregon, 1983-1998. (Excludes joint venture, foreign, and domestic at-sea catches).

Species		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Roundfish																	
	Lingcod	1,734	1,057	1,052	656	717	1,004	1,174	874	1,486	708	833	859	649	717	767	161
	Pacific Cod	89	80	39	31	666	1,034	780	231	514	416	491	171	80	84	52	79
	Pacific Whitinga/	65	338	885	420	183	246	89	2,294	13,643	48,961	35,820	65,110	66,840	62,991	70,875	71,626
	Sablefish	4,641	4,835	5,275	4,653	5,238	4,082	3,948	3,705	3,906	3,856	3,835	4,005	3,133	3,175	2,925	1,750
Total Roundfish		6,530	6,323	7,283	5,774	6,811	6,378	5,999	7,110	19,558	53,949	40,982	70,152	70,708	73,941	77,602	73,616
Rockfish																	
	Pacific Ocean Perch	1,278	752	797	669	549	743	925	566	838	616	788	614	517	487	381	423
	Shortbelly	1	1	11	3	0	0	2	0	2	3	6	49	24	4	15	3
	Widow	3,119	5,368	4,353	4,329	6,314	5,461	6,937	5,653	3,871	3,955	5,306	4,365	3,864	3,753	4,105	2,366
	Thornyheads	835	795	1,117	673	727	1,043	2,553	4,529	3,506	4,281	4,460	4,043	3,336	2,786	2,326	1,460
Other Rockfish																	
	Bocaccio	855	325	495	282	260	207	278	194	224	167	165	141	125	82	71	226
	Canary	3,537	1,174	1,017	906	1,634	1,556	1,553	1,035	1,783	1,535	1,611	923	546	780	705	779
	Chilipepper	17	3	3	2	0	8	4	2	5	13	9	22	11	9	10	9
	Yellowtail	2,713	2,197	1,570	1,918	1,935	2,606	2,574	2,108	2,051	3,942	2,894	3,193	3,087	3,495	1,260	1,770
	Remaining Rockfishb/	2,959	1,968	3,114	2,340	2,362	2,991	3,144	2,289	2,644	2,228	3,141	2,474	1,666	1,730	1,610	1,441
	Unspecified Rockfish	774	438	620	648	855	535	428	597	1,044	611	937	82	161	261	284	130
Total Rockfish		16,089	13,022	13,097	11,768	14,637	15,148	18,400	16,974	15,968	17,350	19,318	15,905	13,338	13,388	10,767	8,608
Flatfish																	
	Arrowtooth Flounder	541	417	698	503	740	641	1,137	1,815	2,089	2,063	1,659	1,721	1,413	2,237	1,162	1,591
	Dover Sole	8,478	6,108	5,713	4,822	6,057	7,676	8,908	7,508	8,813	6,075	6,483	3,871	3,535	4,688	3,961	3,805
	English Sole	913	451	468	552	594	581	693	509	846	628	718	358	313	390	551	475
	Petrale Sole	1,105	689	577	709	855	902	862	744	932	771	775	616	797	720	806	683
	Other Flatfish	1,420	1,166	1,171	782	828	763	782	750	1,363	881	850	997	1,017	517	712	538
Total Flatfish		12,456	8,830	8,628	7,368	9,074	10,564	12,381	11,326	14,042	10,418	10,485	7,562	7,074	8,553	7,192	7,092
Other Fish																	
	Jack Mackerel	0	0	0	0	0	0	0	0	0	0	0	0	3	0	381	686
	Other	84	34	15	21	8	23	53	96	183	198	407	470	528	884	639	898
Total Other Fish		84	34	15	21	8	23	53	96	183	198	407	470	530	885	1,020	1,584
Grand Total		35,158	28,209	29,023	24,931	30,530	32,114	36,833	35,506	49,751	81,915	71,192	94,088	91,650	96,766	96,581	90,900

Data Source: Data for 1983-1998 were extracted from PacFIN July 29th, 1999.

a/ Whiting landings in 1991 and later do not include catches by the U.S. at-sea whiting fleet.

b/ Remaining rockfish are all species of rockfish not specifically listed on this page.

TABLE 16. Estimated commercial groundfish landings (in thousands of dollars) for Oregon, 1983-1998. (Excludes joint venture, foreign, and domestic at-sea catches).

Species		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Roundfish																	
	Lingcod	$950	$584	$604	$443	$599	$798	$871	$653	$1,083	$575	$669	$755	$611	$689	$786	$251
	Pacific Cod	$49	$45	$22	$18	$482	$625	$448	$131	$342	$306	$354	$129	$69	$74	$45	$83
	Pacific Whitinga/	$32	$59	$185	$56	$34	$41	$15	$219	$1,433	$5,078	$2,289	$4,300	$7,000	$4,147	$6,547	$3,759
	Sablefish	$2,249	$2,170	$3,408	$3,611	$5,080	$4,459	$3,847	$3,493	$5,081	$5,405	$4,479	$7,369	$9,130	$10,098	$10,206	$4,601
Total Roundfish		$3,280	$2,865	$4,239	$4,136	$6,197	$5,931	$5,186	$4,501	$7,948	$11,373	$7,793	$12,558	$16,816	$15,012	$17,897	$8,695
Rockfish																	
	Pacific Ocean Perch	$613	$381	$443	$410	$400	$474	$555	$335	$555	$410	$528	$451	$403	$338	$254	$357
	Shortbelly	$0	$0	$5	$2	$0	$0	$1	$0	$1	$1	$3	$24	$11	$2	$8	$2
	Widow	$1,291	$2,740	$2,394	$2,628	$4,465	$3,397	$3,942	$3,224	$2,333	$2,432	$3,330	$3,004	$2,781	$2,519	$2,843	$1,889
	Thornyheads	$393	$415	$615	$419	$524	$806	$2,068	$3,856	$3,484	$4,092	$4,379	$6,322	$7,275	$5,264	$3,828	$2,077
Other Rockfish																	
	Bocaccio	$374	$167	$277	$174	$191	$129	$165	$118	$148	$112	$114	$114	$103	$67	$59	$197
	Canary	$1,535	$605	$568	$566	$1,229	$940	$923	$637	$1,202	$1,096	$1,167	$737	$544	$748	$772	$933
	Chilipepper	$7	$2	$2	$1	$0	$4	$2	$1	$3	$8	$6	$15	$7	$6	$7	$6
	Yellowtail	$1,196	$1,139	$878	$1,190	$1,375	$1,598	$1,510	$1,268	$1,372	$2,704	$1,992	$2,387	$2,491	$2,644	$1,008	$1,467
	Remaining Rockfish	$1,350	$988	$1,704	$1,464	$1,739	$1,893	$1,817	$1,328	$1,798	$1,602	$2,051	$1,709	$1,362	$1,352	$1,268	$1,247
	Unspecified Rockfish	$392	$239	$397	$472	$678	$433	$395	$583	$855	$442	$767	$86	$171	$270	$301	$231
Total Rockfish		$7,152	$6,677	$7,283	$7,326	$10,601	$9,674	$11,378	$11,350	$11,752	$12,898	$14,336	$14,849	$15,146	$13,209	$10,348	$8,405
	Flatfish																
	Arrowtooth Flounder	$121	$92	$154	$113	$240	$185	$242	$412	$528	$481	$357	$368	$347	$499	$251	$357
	Dover Sole	$4,182	$3,196	$3,161	$2,829	$4,184	$5,216	$5,472	$4,534	$5,975	$3,738	$3,879	$2,532	$2,599	$3,273	$2,640	$2,882
	English Sole	$650	$320	$343	$438	$533	$501	$563	$350	$621	$429	$473	$250	$244	$292	$380	$353
	Petrale Sole	$1,698	$1,093	$936	$1,194	$1,552	$1,662	$1,590	$1,357	$1,689	$1,358	$1,307	$1,108	$1,701	$1,539	$1,646	$1,422
	Other Flatfish	$5,413	$976	$949	$760	$863	$737	$769	$702	$1,210	$736	$743	$831	$734	$427	$539	$399
Total Flatfish		$12,064	$5,676	$5,544	$5,334	$7,373	$8,300	$8,636	$7,354	$10,022	$6,742	$6,760	$5,089	$5,625	$6,031	$5,456	$5,413
Other Fish																	
	Jack Mackerel	$0	$0	$0	$0	$0	$0	$0	$0	$0	$74	$3	$4	$1	$0	$1	$44
	Other	$45	$19	$13	$19	$12	$10	$21	$29	$43	$32	$101	$126	$163	$221	$173	$298
Total Other Fish		$45	$19	$13	$19	$12	$10	$21	$29	$44	$105	$104	$130	$164	$221	$174	$342
Grand Total		$22,541	$15,237	$17,079	$16,814	$24,183	$23,916	$25,221	$23,234	$29,766	$31,119	$28,992	$32,625	$37,751	$34,473	$33,876	$22,855

Data Source: Data for 1983-1998 were extracted from PacFIN July 29th, 1999.

a/ Whiting landings in 1991 and later do not include catches by the U.S. at-sea whiting fleet.

b/ Remaining rockfish are all species of rockfish not specifically listed on this page.

TABLE 17. Estimated commercial groundfish landings (mt) for California, 1983-1998. (Excludes joint venture, foreign, and domestic at-sea catches).

Species		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Roundfish																	
	Lingcod	898	951	695	524	812	867	1,257	1,064	788	613	685	568	539	479	480	149
	Pacific Cod	0	2	1	0	66	5	0	0	0	1	0	0	0	0	0	0
	Pacific Whitinga/	980	2,335	2,996	2,982	4,518	6,533	7,298	5,519	6,893	4,930	3,100	3,613	4,091	2,901	6,332	5,723
	Sablefish	6,694	4,826	5,171	6,220	4,404	3,856	4,075	3,750	3,353	3,714	2,597	2,186	2,818	3,195	2,967	1,436
Total Roundfish		8,583	8,123	8,875	9,734	9,805	11,268	12,644	10,347	11,048	9,278	6,406	6,406	7,522	6,691	9,894	7,308
Rockfish																	
	Pacific Ocean Perch	100	52	74	29	157	72	35	16	13	24	17	7	10	14	15	8
	Shortbelly	3	2	28	19	0	0	1	9	2	0	3	4	10	30	63	16
	Widow	4,024	2,842	3,200	2,515	3,831	2,530	3,021	2,680	1,905	1,798	1,820	938	1,755	1,371	1,349	928
	Thornyheads	1,711	2,126	2,940	2,950	3,697	4,939	6,549	7,044	4,398	7,092	6,119	3,316	3,634	3,313	1,597	1,908
Other Rockfish																	
	Bocaccio	4,801	3,830	1,868	1,753	2,034	1,510	2,112	2,037	1,252	1,366	1,274	979	754	471	321	135
	Canary	488	412	428	158	466	340	269	476	432	551	219	216	213	204	216	183
	Chilipepper	2,144	2,175	2,283	1,753	3,075	3,276	3,413	3,407	4,476	3,433	3,406	1,841	1,969	1,701	2,044	1,264
	Yellowtail	862	638	527	497	599	336	914	716	765	939	315	321	288	250	360	413
	Remaining Rockfishb/	3,766	4,899	5,138	5,052	7,943	6,751	4,788	4,828	4,354	4,458	3,532	2,944	2,849	2,882	2,726	3,343
	Unspecified Rockfish	2,211	2,703	1,367	2,390	2,032	1,424	1,480	1,877	1,651	1,511	1,207	235	177	518	190	437
Total Rockfish		20,110	19,677	17,851	17,114	25,335	22,512	23,611	23,580	20,010	21,937	18,526	10,810	11,682	10,766	8,881	8,635
Flatfish																	
	Arrowtooth Flounder	25	32	38	19	45	36	28	54	157	99	57	73	118	108	48	37
	Dover Sole	8,579	9,781	12,020	11,052	10,761	8,197	7,724	6,320	7,721	8,643	6,554	4,488	6,075	6,401	5,301	3,556
	English Sole	1,183	952	1,062	1,082	1,322	1,067	1,053	892	812	575	474	463	499	581	650	425
	Petrale Sole	584	591	857	726	824	795	841	678	734	532	464	550	592	818	831	472
	Other Flatfish	1,277	1,230	1,810	1,704	1,727	1,679	1,681	1,384	1,343	870	942	1,350	1,470	1,420	1,545	1,071
Total Flatfish		11,648	12,586	15,786	14,583	14,679	11,774	11,326	9,328	10,767	10,719	8,490	6,923	8,755	9,328	8,375	5,561
Other Fish																	
	Jack Mackerel	1,302	3,234	136	55	142	1	0	109	45	408	491	359	246	344	1,152	838
	Other	242	208	221	199	200	204	147	160	141	207	447	598	531	2,470	1,450	1,199
Total Other Fish		10,072	9,356	7,097	4,976	8,220	5,271	10,892	3,382	1,853	1,540	2,192	3,384	2,272	2,814	2,602	2,037
Grand Total		50,412	49,742	49,610	46,407	58,038	50,825	58,473	46,638	43,678	43,474	35,614	27,523	30,230	29,599	29,752	23,541

Data Source: Data for 1983-1998 were extracted from PacFIN July 29th, 1999.

a/ Whiting landings in 1991 and later do not include catches by the U.S. at-sea whiting fleet.

b/ Remaining rockfish are all species of rockfish not specifically listed on this page.

TABLE 18. Estimated commercial groundfish landings (in thousands of dollars) for California, 1983-1998. (Excludes joint venture, foreign, and domestic at-sea catches).

Species		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Roundfish																	
	Lingcod	$509	$552	$458	$413	$708	$763	$1,101	$929	$707	$585	$653	$586	$611	$570	$553	$270
	Pacific Cod	$0	$1	$1	$0	$48	$3	$0	$0	$0	$2	$1	$0	$0	$0	$0	$0
	Pacific Whitinga/	$162	$341	$396	$384	$611	$1,076	$1,052	$784	$882	$597	$343	$354	$456	$239	$583	$394
	Sablefish	$3,503	$2,208	$2,885	$4,651	$3,813	$3,423	$3,622	$3,546	$3,698	$4,414	$2,477	$3,354	$7,273	$8,687	$9,065	$3,348
Total Roundfish		$4,188	$3,107	$3,746	$5,452	$5,183	$5,272	$5,788	$5,271	$5,317	$5,656	$3,616	$4,577	$8,898	$10,359	$10,800	$4,011
Rockfish																	
	Pacific Ocean Perch	$46	$26	$41	$17	$110	$46	$21	$10	$8	$18	$12	$5	$8	$11	$11	$7
	Shortbelly	$1	$1	$3	$13	$0	$0	$0	$5	$1	$0	$1	$2	$4	$8	$29	$7
	Widow	$1,764	$1,402	$1,797	$1,583	$2,789	$1,708	$1,886	$1,763	$1,249	$1,192	$1,226	$709	$1,399	$1,021	$994	$846
	Thornyheads	$875	$1,151	$1,626	$1,810	$2,643	$3,842	$5,360	$5,971	$4,440	$7,614	$6,833	$5,554	$8,292	$6,522	$2,871	$3,286
Other Rockfish																	
	Bocaccio	$2,427	$2,135	$1,173	$1,250	$1,634	$1,109	$1,562	$1,523	$922	$1,071	$1,027	$886	$705	$429	$307	$151
	Canary	$218	$224	$279	$102	$346	$235	$199	$376	$372	$483	$224	$286	$327	$296	$315	$243
	Chilipepper	$1,054	$1,192	$1,440	$1,199	$2,368	$2,335	$2,337	$2,479	$3,224	$2,656	$2,875	$1,678	$1,847	$1,538	$1,792	$1,181
	Yellowtail	$452	$348	$325	$363	$463	$261	$635	$538	$657	$867	$284	$315	$295	$239	$398	$462
	Remaining Rockfish	$2,560	$3,590	$4,251	$4,669	$7,167	$6,186	$5,107	$5,082	$4,921	$5,221	$4,254	$4,402	$4,642	$4,454	$4,198	$4,132
	Unspecified Rockfish	$1,849	$1,922	$1,369	$2,281	$2,015	$1,480	$1,663	$2,018	$2,070	$2,041	$1,895	$379	$317	$718	$459	$767
Total Rockfish		$11,313	$12,019	$12,346	$13,320	$20,768	$18,211	$19,609	$20,207	$18,472	$21,802	$19,166	$14,246	$17,882	$15,264	$11,374	$11,081
	Flatfish																
	Arrowtooth Flounder	$6	$8	$10	$4	$15	$12	$9	$13	$41	$24	$13	$21	$32	$28	$11	$10
	Dover Sole	$4,232	$4,963	$6,212	$6,166	$7,111	$5,439	$4,612	$3,630	$5,052	$5,411	$3,917	$2,904	$4,284	$4,238	$3,339	$2,649
	English Sole	$850	$686	$799	$871	$1,201	$949	$884	$681	$664	$463	$369	$379	$426	$478	$492	$341
	Petrale Sole	$863	$896	$1,391	$1,271	$1,449	$1,355	$1,459	$1,221	$1,331	$941	$834	$1,041	$1,192	$1,614	$1,631	$993
	Other Flatfish	$5,190	$989	$1,524	$1,499	$1,571	$1,495	$1,405	$1,104	$1,143	$768	$895	$1,159	$1,282	$1,209	$1,265	$879
Total Flatfish		$11,141	$7,542	$9,936	$9,811	$11,347	$9,250	$8,369	$6,649	$8,231	$7,608	$6,028	$5,504	$7,216	$7,567	$6,738	$4,872
Other Fish																	
	Jack Mackerel	$1,795	$1,366	$1,290	$846	$1,184	$796	$1,567	$435	$249	$237	$284	$381	$272	$0	$280	$261
	Other	$191	$274	$274	$240	$237	$208	$198	$160	$135	$134	$199	$243	$238	$1,688	$1,020	$1,611
Total Other Fish		$1,986	$1,640	$1,564	$1,086	$1,421	$1,004	$1,765	$595	$384	$371	$483	$624	$510	$1,688	$1,300	$1,872
Grand Total		$28,627	$24,307	$27,592	$29,670	$38,719	$33,737	$35,531	$32,722	$32,404	$35,437	$29,293	$24,947	$34,509	$34,879	$30,211	$21,837

Data Source: Data for 1983-1998 were extracted from PacFIN July 29th, 1999.

a/ Whiting landings in 1991 and later do not include catches by the U.S. at-sea whiting fleet.

b/ Remaining rockfish are all species of rockfish not specifically listed on this page.

TABLE 19. Total ocean recreational harvest in metric tons, 1981-1998 (all fishing modes). No data for 1990-1992, January-February 1995, for Oregon in July-August after 1992, for Oregon January-February and November-December in 1994.

	ALL AREAS (Shaded Columns Indicate Incomplete Data)														
Species	1981	1982	1983	1984	1985	1986	1987	1988	1989	1993	1994	1995	1996	1997	1998*
Roundfish															
Lingcod	1,479	1,508	658	615	1,211	1,125	1,256	1,299	1,172	765	515	448	536	494	471
Pacific Cod	0	-	0	0	2	0	13	1	-	-	0	-	-	-	-
Pacific Whiting	10	9	1	42	71	59	8	43	32	0	1	0	1	0	1
Sablefish	4	2	-	9	19	24	4	71	1	2	1	-	1	7	4
Total Roundfish	1,493	1,519	659	666	1,303	1,209	1,281	1,414	1,205	767	517	449	538	502	476
Rockfish															
Pacific Ocean Perch	0	-	0	-	0	-	0	0	-	-	1	-	-	1	-
Shortbelly	-	-	-	-	-	2	-	0	-	-	-	-	0	-	-
Shortspine Thornyheads	-	1	0	23	19	2	0	3	1	-	0	-	-	-	-
Widow Rockfish	22	168	55	71	49	54	22	35	42	37	4	4	27	43	62
Total Rockfish	22	168	56	94	68	57	23	39	44	37	5	4	27	43	62
Other Rockfish															
Black	2,741	1,847	601	1,019	1,297	689	802	797	634	939	827	717	720	707	921
Blue	1,435	1,134	801	600	468	305	460	449	413	581	229	176	310	462	454
Bocaccio	1,075	1,320	505	211	374	566	191	151	247	122	192	33	103	112	67
Canary	219	300	99	128	228	245	264	252	149	120	88	125	93	141	90
Chilipepper	272	316	154	140	350	385	203	413	308	17	23	11	37	74	12
Other	1,647	2,021	1,523	1,848	1,979	1,885	1,295	1,302	1,102	916	842	666	765	528	543
Rockfish Genus	214	314	57	54	92	77	77	0	20	114	207	263	278	42	43
Yellowtail	475	1,112	557	391	426	294	268	239	350	135	88	94	143	392	228
Total Other Rockfish	8,079	8,366	4,296	4,390	5,214	4,447	3,560	3,604	3,222	2,942	2,495	2,085	2,450	2,459	2,357
Flatfish															
Arrowtooth Flounder	-	-	0	-	-	-	-	-	-	-	-	-	-	-	-
Dover Sole	0	-	0	-	-	0	-	0	-	0	-	-	-	-	-
English Sole	0	0	-	-	0	0	2	-	-	0	0	-	-	-	-
Other Flatfish	437	251	126	138	333	351	573	472	456	261	410	553	455	508	435
Petrale Sole	7	9	1	4	11	3	0	3	4	2	-	-	1	-	-
Total Flatfish	444	261	127	142	344	354	575	476	461	263	410	553	456	508	508
Other Fish															
Cabezon	217	174	100	116	97	160	169	116	116	111	77	85	95	91	118
Greenling Genus	1	1	3	-	0	1	0	-	-	0	0	-	1	-	-
Jack Mackerel	1	2	4	14	20	7	8	353	3	17	1	6	1	7	10
Kelp Greenling	62	59	42	41	34	53	71	45	42	65	35	31	35	28	18
Leopard Shark	9	1	6	11	32	12	52	36	2	8	20	-	3	3	8
Rock Greenling	10	6	7	3	7	7	7	7	5	5	5	7	9	4	2
Soupfin Shark	-	-	0	-	13	1	-	-	-	-	-	3	2	-	-
Spiny Dogfish Shark	34	44	17	17	52	63	6	49	23	10	10	20	19	4	-
Total Other Fish	333	288	179	202	255	305	313	606	191	216	149	152	164	137	155
Grand Total	10,371	10,601	5,317	5,493	7,184	6,372	5,751	6,138	5,122	4,226	3,576	3,243	3,634	3,648	3,486

Data Source: Data was extracted from RecFIN September 27, 1999. * Indicates preliminary data.

TABLE 20. Washington ocean recreational harvest in metric tons, 1981-1998 (all fishing modes). Data not available for 1990-1992.

Species		WASHINGTON														
		1981	1982	1983	1984	1985	1986	1987	1988	1989	1993	1994	1995	1996	1997	1998*
Roundfish																
	Lingcod	137	199	43	30	66	33	142	114	38	77	110	61	54	48	24
	Pacific Cod	0	-	0	0	2	0	13	1	-	-	-	-	-	-	1
	Pacific Whiting	-	-	0	-	-	-	0	-	-	-	-	-	-	-	-
Total Roundfish		137	199	43	30	68	33	155	115	38	77	110	61	54	48	25
Rockfish		-	0	0	-	-	-	-	-	-	-	-	-	-	-	-
	Widow Rockfish	-	0	0	-	-	-	-	-	-	-	-	-	-	-	-
Total Rockfish		-	0	0	-	-	-	-	-	-	-	-	-	-	-	-
Other Rockfish																
	Black	1,454	1,044	282	276	428	27	238	172	-	237	319	213	231	180	122
	Blue	5	-	0	1	12	1	-	1	-	3	1	1	1	1	-
	Canary Rockfish	14	1	-	5	1	0	3	-	-	10	4	4	3	4	10
	Other Rockfish	15	22	9	14	14	2	81	6	-	13	5	5	5	7	15
	Rockfish Genus	-	-	-	-	-	5	-	-	-	-	-	-	1	0	2
	Yellowtail	10	2	0	12	2	-	1	-	-	22	7	5	4	6	38
Total Other Rockfish		1,497	1,070	292	308	456	34	323	178	-	285	336	227	245	199	186
Flatfish																
	Dover Sole	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	English Sole	0	-	-	-	-	-	2	-	-	-	-	-	-	-	-
	Other Flatfish	1	0	0	4	17	1	55	2	-	-	83	54	141	147	58
	Petrale Sole	0	-	-	-	1	-	-	0	-	-	-	-	-	-	-
Total Flatfish		2	0	0	4	17	1	56	2	-	-	83	54	141	147	58
Other Fish																
	Cabezon	18	0	0	1	1	1	9	2	-	4	1	1	2	2	5
	Greenling Genus	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
	Kelp Greenling	4	1	3	2	0	6	12	2	-	2	1	0	1	1	2
	Rock Greenling	-	-	-	-	0	0	0	1	-	-	-	-	0	-	-
	Spiny Dogfish Shark	-	-	0	-	-	2	2	-	-	-	-	-	2	-	-
Total Other Fish		22	1	4	3	1	10	24	5	-	5	2	2	5	2	7
Grand Total		1,658	1,270	338	345	543	79	558	300	38	367	531	344	445	397	276

Data Source: Data was extracted from RecFIN September 27, 1999. * Indicates preliminary estimate

TABLE 21. Oregon ocean recreational harvest in metric tons, 1981-1998 (all fishing modes). Data not available for 1990-1992, January-February 1995, July-August after 1992, and for January-February and November-December 1994.

Species		OREGON (Shaded Columns Indicate Incomplete Data)														
		1981	1982	1983	1984	1985	1986	1987	1988	1989	1993	1994	1995	1996	1997	1998
Roundfish																
	Lingcod	210	483	133	110	183	194	182	162	195	250	158	107	124	192	175
	Pacific Whiting	-	-	0	-	-	-	0	-	-	-	0	-	-	-	1
	Sablefish	-	-	-	-	-	0	-	-	-	2	1	-	0	7	3
Total Roundfish		210	483	133	110	183	194	182	162	195	252	159	107	124	199	179
Rockfish																
	Pacific Ocean Perch	-	-	-	-	-	-	-	0	-	-	0	-	-	-	-
	Shortspine Thornyheads	-	0	-	-	7	-	-	-	-	-	-	-	-	-	-
	Widow Rockfish	-	4	0	3	1	1	0	1	1	34	2	1	4	4	9
Total Rockfish		-	4	0	3	8	1	0	1	1	34	2	1	4	4	9
Other Rockfish																
	Black	814	337	105	331	379	253	338	336	421	422	294	338	337	438	685
	Blue	253	48	40	38	44	30	40	30	97	121	50	48	108	164	122
	Bocaccio	3	1	0	0	2	0	1	0	0	2	0	1	0	1	-
	Canary	47	41	4	20	60	21	30	56	25	46	33	50	26	43	49
	Other	145	76	4	38	48	16	32	26	52	62	33	35	19	44	51
	Rockfish Genus	-	-	0	-	-	-	-	-	-	-	-	-	1	-	-
	Yellowtail	35	14	21	32	45	12	13	8	31	42	41	63	41	26	41
Total Other Rockfish		1,297	518	174	459	577	333	455	457	626	694	451	535	531	716	948
Flatfish																
	English Sole	-	0	-	-	-	-	-	-	-	0	-	-	-	-	-
	Other Flatfish	1	12	0	0	3	0	14	23	58	2	52	40	25	126	117
	Petrale Sole	-	0	0	-	-	0	-	-	-	-	0	-	-	-	-
Total Flatfish		1	12	1	0	3	0	14	23	58	2	52	40	25	126	117
Other Fish																
	Cabezon	89	65	10	12	24	19	49	28	26	30	22	13	12	29	39
	Jack Mackerel	-	0	-	0	-	-	-	-	-	1	-	-	-	-	-
	Kelp Greenling	36	11	11	9	10	13	12	11	5	35	11	8	6	12	7
	Leopard Shark	-	-	-	0	-	-	-	-	-	-	-	-	-	-	-
	Rock Greenling	5	1	0	0	1	1	1	2	1	2	0	1	0	1	-
	Spiny Dogfish Shark	1	-	-	1	-	-	-	-	-	0	-	-	-	-	-
Total Other Fish		131	78	22	21	35	33	63	41	32	69	33	21	18	42	45
Grand Total		1,639	1,094	329	593	808	561	714	683	912	1,051	698	704	703	1,086	1,300

Data Source: Data was extracted from RecFIN September 27, 1999.

TABLE 22. California ocean recreational harvests in metric tons, 1981-1998 (all fishing modes). Data not available for 1990-1992 and January-February 1995.

Species		CALIFORNIA (Shaded Column Indicates Incomplete Data)														
		1981	1982	1983	1984	1985	1986	1987	1988	1989	1993	1994	1995	1996	1997	1998
Roundfish																
	Lingcod	1,132	827	483	475	961	899	932	1,023	939	439	246	280	359	254	272
	Pacific Cod	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-
	Pacific Whiting	10	9	1	42	71	59	7	43	32	0	1	0	-	0	-
	Sablefish	4	2	-	9	19	24	4	71	1	-	-	-	0	-	-
Total Roundfish		1,145	837	484	526	1,051	982	943	1,137	972	439	247	281	360	255	272
Rockfish																
	Pacific Ocean Perch	0	-	0	-	0	-	0	-	-	-	0	-	-	1	-
	Shortbelly Rockfish	-	-	-	-	-	2	-	0	-	-	-	-	-	-	-
	Shortspine Thornyheads	-	1	0	23	12	2	0	3	1	-	0	-	-	-	-
	Widow Rockfish	22	164	55	67	48	53	22	34	42	3	2	3	22	39	53
Total Rockfish		22	164	56	91	60	57	22	38	43	3	3	3	22	39	53
Other Rockfish																
	Black	473	465	214	412	491	409	226	289	213	280	214	166	152	89	114
	Blue	1,177	1,086	761	562	412	274	419	418	316	457	178	127	200	297	332
	Bocaccio	1,072	1,319	505	211	372	566	190	151	247	119	192	32	103	112	67
	Canary	158	258	95	103	167	224	231	196	124	65	50	72	64	95	31
	Chilipepper	272	316	154	140	350	385	203	413	308	17	23	11	37	74	12
	Other Rockfish	1,488	1,923	1,509	1,795	1,917	1,866	1,182	1,270	1,049	842	804	626	742	476	476
	Rockfish Genus	214	314	57	54	92	73	77	0	20	114	207	263	276	42	41
	Yellowtail	430	1,096	536	347	379	282	254	231	319	71	40	27	99	360	149
Total Other Rockfish		5,284	6,778	3,830	3,624	4,181	4,079	2,782	2,969	2,596	1,963	1,708	1,323	1,673	1,545	1,222
Flatfish																
	Arrowtooth Flounder	-	-	0	-	-	-	-	-	-	-	-	-	-	-	-
	Dover Sole	-	-	0	-	-	0	-	0	-	0	-	-	-	-	-
	English Sole	-	0	-	-	0	0	0	-	-	0	0	-	-	-	-
	Other Flatfish	435	239	125	134	313	349	504	447	399	259	275	459	289	234	260
	Petrale Sole	7	9	1	4	10	3	0	3	4	2	0	0	1	-	-
Total Flatfish		442	248	126	138	323	352	504	451	403	261	275	459	289	234	260
Other Fish																
	Cabezon	110	109	89	103	72	140	111	86	91	77	54	71	80	60	74
	Greenling Genus	1	1	3	-	0	-	0	-	-	0	0	-	1	-	-
	Jack Mackerel	1	2	4	14	20	7	8	353	3	17	1	6	1	7	10
	Kelp Greenling	22	46	27	31	24	34	46	31	37	28	24	23	28	15	9
	Leopard Shark	9	1	6	11	32	12	52	36	2	8	20	-	3	3	8
	Rock Greenling	5	5	7	3	6	6	5	4	4	3	5	7	8	3	2
	Soupfin Shark	-	-	0	-	13	1	-	-	-	-	-	3	2	-	-
	Spiny Dogfish Shark	33	44	17	16	52	61	4	49	23	9	10	20	18	4	-
Total Other Fish		181	209	153	178	218	262	227	560	159	142	114	129	140	92	102
Grand Total		7,075	8,237	4,650	4,555	5,834	5,732	4,479	5,155	4,172	2,808	2,348	2,195	2,486	2,165	1,910

Data Source: Data was extracted from RecFIN September 27, 1999.

TABLE 23. Washington ocean recreational harvest from private vessels in metric tons, 1981-1998. Data not available for 1989-1992.

Species		WASHINGTON - PRIVATE VESSELS													
		1981	1982	1983	1984	1985	1986	1987	1988	1993	1994	1995	1996	1997	1998*
Roundfish															
	Lingcod	8	54	32	17	31	20	94	1	18	23	19	21	22	16
	Pacific Cod	0	0	0	0	2	0	11	0	-	-	-	-	-	-
	Pacific Whiting	0	0	0	0	0	0	0	0	-	-	-	-	-	-
Total Roundfish		8	54	32	17	33	21	106	1	18	23	19	21	22	16
Rockfish															
	Widow Rockfish	0	0	0	0	0	0	0	0	-	-	-	-	-	-
Total Rockfish		0	0	0	0	0	0	0	0	-	-	-	-	-	-
Other Rockfish															
	Black	7	4	21	28	42	17	15	2	22	24	26	31	26	38
	Blue	0	0	0	0	12	1	0	0	1	0	0	0	0	0
	Canary	0	0	0	1	1	0	2	0	1	1	1	1	1	1
	Other Rockfish	0	12	9	8	14	2	80	1	3	2	2	2	3	5
	Yellowtail	0	2	0	0	2	0	0	0	1	0	0	0	0	1
Total Other Rockfish		8	18	31	37	70	20	96	3	29	28	29	34	30	45
Flatfish															
	English Sole	0	0	0	0	0	0	2	0	-	-	-	-	-	-
	Other Flatfish	0	0	0	4	17	1	52	0	-	22	23	70	80	36
	Petrale Sole	0	0	0	0	1	0	0	0	-	-	-	-	-	-
Total Flatfish		0	0	0	4	17	1	54	0	-	22	23	70	80	36
Other Fish															
	Cabezon	4	0	0	1	0	0	9	0	3	1	1	2	1	5
	Kelp Greenling	0	0	3	2	0	3	10	0	1	0	0	1	0	2
	Rock Greenling	0	0	0	0	0	0	0	0	-	-	-	-	-	-
	Spiny Dogfish Shark	0	0	0	0	0	0	2	0	-	-	-	-	-	-
Total Other Fish		4	0	3	3	1	3	21	0	4	1	1	2	2	7
Grand Total		20	73	66	61	120	44	277	4	51	75	72	128	134	105

Data Source: Data was extracted from RecFIN September 27, 1999. * Indicates preliminary estimate.

TABLE 24. Washington ocean recreational harvest from charter vessels in metric tons, 1981-1998. Data not available 1990-1992.

		WASHINGTON - CHARTER VESSELS													
Species		1981	1982	1983	1984	1985	1986	1987	1988	1993	1994	1995	1996	1997	1998*
Roundfish															
	Lingcod	129	142	11	13	35	7	46	87	59	87	43	31	27	7
	Pacific Cod	-	-	-	-	-	-	2	-	-	-	-	-	-	-
Total Roundfish		129	142	11	13	35	7	48	87	59	87	43	31	27	7
Other Rockfish															
	Black	1,446	1,032	260	248	386	-	221	164	215	295	187	194	154	79
	Blue	5	-	-	1	-	-	-	-	2	1	-	1	1	-
	Canary	14	1	-	3	0	-	1	-	8	3	3	2	3	8
	Other Rockfish	14	9	0	6	0	-	1	4	9	3	3	3	4	10
	Yellowtail	10	-	-	12	-	-	1	-	21	7	4	4	6	36
Total Other Rockfish		1,489	1,042	260	270	386	-	225	168	256	308	198	204	168	134
Flatfish															
	Dover Sole	0	-	-	-	-	-	-	-	-	-	-	-	-	-
	Olher Flatfish	0	-	-	-	-	-	2	2	-	60	31	71	68	22
	Petrale Sole	0	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Flatfish		1	-	-	-	-	-	2	2	-	60	31	71	68	22
Other Fish															
	Cabezon	13	-	-	0	0	-	0	1	1	-	-	1	-	-
	Kelp Greenling	3	-	1	0	0	-	0	-	0	-	-	-	-	-
Total Other Fish		17	-	1	0	1	-	0	1	2	-	-	1	1	1
Total		1,635	1,183	272	284	422	7	275	258	316	456	272	307	263	163

Data Source: Dala was extracted from RecFIN September 27, 1999. * Indicates preliminary estimate.

TABLE 25. Oregon ocean recreational harvest from private vessels in metric tons, 1981-1989 and 1993-1998. Data not available for 1990-1992, January -February 1995, July-August after 1992; and for January-February and November-December 1994.

		OREGON - PRIVATE VESSELS (Shaded Columns Indicate Incomplete Data)														
Species		1981	1982	1983	1984	1985	1986	1987	1988	1989	1993	1994	1995	1996	1997	1998*
Roundfish																
	Lingcod	15	61	32	42	104	92	71	74	52	167	97	47	50	101	130
	Pacific Whiting	-	-	-	-	-	-	0	-	-	-	0	-	-	-	1
	Sablefish	-	-	-	-	-	-	-	-	-	1	0	-	-	-	0
Total Roundfish		15	61	32	42	104	92	71	74	52	168	97	47	50	101	132
Rockfish																
	Shortspine Thornyheads	-	-	-	-	7	-	-	-	-	-	-	-	-	-	-
	Widow Rockfish	-	-	-	-	-	0	0	0	0	2	-	0	0	0	0
Total Rockfish		-	-	-	-	7	0	0	0	0	2	-	0	0	0	0
Other Rockfish																
	Black	148	107	40	254	220	89	162	96	66	209	135	146	123	192	421
	Blue	12	3	2	3	43	17	9	5	9	52	24	10	9	45	43
	Bocaccio	1	-	0	-	1	-	-	-	-	0	-	-	-	-	0
	Canary	8	11	0	9	38	5	8	19	7	22	10	17	7	11	18
	Other Rockfish	5	7	0	14	30	4	8	10	5	24	11	15	5	18	34
	Rockfish Genus	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	Yellowtail	3	3	6	1	9	3	3	1	1	6	3	3	1	3	9
Total Other Rockfish		177	131	48	281	341	118	189	132	88	314	183	192	145	269	526
Flatfish																
	English Sole	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-
	Other Flatfish	-	2	0	-	2	0	0	0	27	0	26	12	3	8	61
	Petrale Sole	-	-	0	-	-	-	-	-	-	-	0	-	-	-	-
Total Flatfish		-	2	0	-	2	0	0	0	27	0	26	12	3	8	61
Other Fish																
	Cabezon	3	12	4	4	12	4	21	12	4	19	10	8	6	15	33
	Kelp Greenling	2	4	1	4	5	2	3	2	1	16	6	4	3	5	4
	Rock Greenling	0	0	-	-	-	-	0	-	-	1	0	-	-	-	-
	Spiny Dogfish Shark	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-
Total Other Fish		5	17	5	8	17	6	23	14	5	36	16	12	8	20	37
Grand Total		197	211	85	332	470	217	284	221	172	520	323	262	205	399	755

Data Source: Data was extracted from RecFIN September 27, 1999. * Indicates preliminary data.

TABLE 26. Oregon ocean recreational harvest from charter vessels in metric tons, 1981-1990 and 1993-1998. Data not available for 1990-1992, January-February 1995, July-August after 1992; and for January-February and November-December 1994.

Species		OREGON - CHARTER VESSELS (Shaded Columns Indicate Incomplete Data)														
		1981	1982	1983	1984	1985	1986	1987	1988	1989	1993	1994	1995	1996	1997	1998*
Roundfish																
	Lingcod	194	419	92	67	77	98	100	27	143	75	59	58	73	88	44
	Pacific Whiting	-	-	-	-	-	-	-	-	-	-	0	-	-	-	0
	Sablefish	-	-	-	-	-	0	-	-	-	1	1	-	0	7	3
Total Roundfish		194	419	92	67	77	98	100	27	143	77	60	58	73	88	47
Rockfish																
	Pacific Ocean Perch	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-
	Widow Rockfish	-	4	0	3	1	1	0	-	1	32	2	1	4	4	9
Total Rockfish		-	4	0	3	1	1	0	-	1	32	2	1	4	4	9
Other Rockfish																
	Black	664	227	62	74	155	160	169	69	354	211	157	190	212	245	264
	Blue	242	45	38	35	1	12	31	7	87	69	26	38	99	119	78
	Bocaccio	1	1	0	0	1	0	1	0	0	2	0	1	0	1	0
	Canary	38	30	3	11	22	16	21	17	18	24	22	33	18	31	31
	Other Rockfish	140	69	4	24	18	12	22	8	47	37	22	20	13	26	17
	Rocklish Genus	-	-	0	-	-	-	-	-	-	-	-	-	0	-	0
	Yellowtail	33	11	15	31	36	9	10	2	30	35	39	60	40	24	32
Total Other Rocklish		1,117	384	123	175	233	210	255	104	537	378	267	341	383	445	422
Flatfish																
	English Sole	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-
	Other Flatfish	1	9	0	0	2	0	14	-	31	0	26	28	22	117	57
	Petrale Sole	-	0	0	-	-	0	-	-	-	-	0	-	-	-	0
Total Flatfish		1	10	0	0	2	0	14	-	31	0	26	28	22	117	57
Other Fish																
	Cabezon	84	52	6	7	11	12	26	7	20	8	11	4	6	13	6
	Jack Mackerel	-	0	-	0	-	-	-	-	-	1	-	-	-	-	-
	Kelp Greenling	18	3	1	1	1	3	2	1	3	4	3	1	2	4	2
	Rock Greenling	-	-	-	-	-	-	0	-	-	0	0	-	-	-	-
	Spiny Dogfish Shark	1	-	-	1	-	-	-	-	-	0	-	-	-	-	-
Total Other Fish		103	55	6	9	12	14	28	9	23	13	14	5	8	18	8
Grand Total		1,415	871	222	254	325	323	397	139	734	500	368	433	491	678	542

Data Source: Data was extracted from RecFIN September 27, 1999. * Indicates preliminary data.

TABLE 27. California ocean recreational harvest from private vessels in metric tons, 1981-1989 and 1993-1998. Data not available for 1990-1992 and January-February 1995.

Species		CALIFORNIA - PRIVATE VESSELS (Shaded Column Indicates Incomplete Data)														
		1981	1982	1983	1984	1985	1986	1987	1988	1989	1993	1994	1995	1996	1997	1998
Roundfish																
	Lingcod	520	513	287	355	778	647	719	395	663	420	233	265	240	111	195
	Pacific Cod	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-
	Pacific Hake	0	4	1	3	3	10	7	2	1	0	1	0	1	-	-
	Sablefish	2	1	-	0	1	2	3	0	-	-	-	-	-	-	-
Roundfish Total		523	518	287	359	783	658	729	397	664	420	234	265	241	111	195
Rockfish																
	Pacific Ocean Perch	-	-	-	-	-	-	-	-	-	-	0	-	-	1	-
	Shortspine Thornyheads	-	-	0	23	12	-	0	-	-	-	0	-	-	-	-
	Widow Rockfish	2	8	6	1	5	1	9	-	3	3	1	3	0	1	3
Total Rockfish		2	8	6	24	17	1	9	-	3	3	2	3	0	1	3
Other Rockfish																
	Black	438	378	185	377	447	394	187	126	192	277	206	160	122	72	106
	Blue	477	494	344	287	221	194	318	141	184	448	169	112	72	78	139
	Bocaccio	80	133	15	30	74	44	79	42	32	86	66	10	42	15	22
	Canary	79	101	49	63	109	155	110	66	54	65	50	71	26	20	11
	Chilipepper	15	18	3	1	3	8	5	7	21	17	17	11	14	1	6
	Other Rockfish	741	862	613	946	1,091	952	808	522	514	751	594	537	354	166	236
	Rockfish Genus	39	76	34	0	92	-	19	-	5	103	186	258	97	39	21
	Yellowtail	34	70	57	62	61	66	92	68	71	71	40	27	11	33	42
Total Other Rockfish		1,904	2,133	1,301	1,766	2,097	1,814	1,617	974	1,073	1,816	1,328	1,187	738	423	583
Flatfish																
	Arrowtooth Flounder	-	-	0	-	-	-	-	-	-	-	-	-	-	-	-
	Dover Sole	-	-	0	-	-	-	-	0	-	0	-	-	-	-	-
	English Sole	-	0	-	-	0	0	-	-	-	0	0	-	-	-	-
	Other Flatfish	159	170	74	91	235	280	415	143	320	241	213	409	220	204	228
	Petrale Sole	4	3	0	3	5	2	-	3	1	2	0	0	0	-	-
Total Flatfish		163	174	74	94	240	282	415	146	322	243	214	410	221	204	228
Other Fish																
	Cabezon	83	74	39	74	50	85	86	31	53	48	39	45	43	14	26
	Greenling Genus	-	0	2	-	-	-	-	-	-	-	0	-	0	-	-
	Jack Mackerel	0	1	2	5	2	3	3	1	1	14	-	5	0	0	2
	Kelp Greenling	10	31	9	15	10	21	22	15	14	18	14	12	10	5	3
	Leopard Shark	8	1	1	-	32	-	42	-	-	7	18	-	2	3	7
	Rock Greenling	-	0	1	-	0	1	-	-	0	1	0	1	0	0	0
	Soupfin Shark	-	-	0	-	10	-	-	-	-	-	-	3	2	-	-
	Spiny Dogfish Shark	27	44	9	14	47	56	3	14	14	9	9	16	11	4	-
Total Other Fish		128	151	63	108	152	166	156	62	83	97	81	82	69	27	37
Grand Total		2,721	2,983	1,731	2,351	3,288	2,921	2,926	1,579	2,145	2,579	1,858	1,946	1,269	766	1,046

Data Source: Data was extracted from RecFIN September 27, 1999.

TABLE 28. California ocean recreational harvest from charter vessels in metric tons, 1981-1989 and 1993-1998. Data not available for 1990-1992 and January-February 1995.

Species		CALIFORNIA - CHARTER VESSELS (Shaded Column Indicates Incomplete Data)														
		1981	1982	1983	1984	1985	1986	1987	1988	1989	1993	1994	1995	1996	1997	1998
Roundfish																
	Lingcod	598	274	172	99	167	235	194	226	199	7	7	3	108	138	63
	Pacific Whiting	9	5	0	38	67	49	-	24	30	-	-	-	0	-	-
	Sablefish	2	0	-	9	18	22	1	60	1	-	-	-	0	-	-
Total Roundfish		608	280	172	147	252	306	194	310	230	7	7	3	109	138	63
Rockfish																
	Pacific Ocean Perch	0	-	0	-	0	-	-	-	-	-	-	-	-	-	-
	Shortbelly Rockfish	-	-	-	-	-	2	-	0	-	-	-	-	0	-	0
	Shortspine Thornyheads	-	-	-	0	-	0	-	3	1	-	-	-	-	-	-
	Widow Rockfish	20	156	50	66	43	52	13	11	38	-	1	-	22	38	50
Total Rockfish		20	156	50	67	43	54	13	15	40	-	1	-	22	38	50
Other Rockfish																
	Black	23	60	19	14	36	14	33	16	16	-	-	-	30	17	5
	Blue	694	588	405	269	186	72	97	128	121	-	3	3	127	217	192
	Bocaccio	987	1,185	489	181	296	520	109	24	212	33	123	22	60	97	45
	Canary	79	156	46	38	57	69	121	32	69	-	-	0	39	74	20
	Chilipepper	257	298	150	139	346	377	199	155	284	-	6	-	24	73	6
	Other Rocklish	739	1,057	881	838	804	899	354	341	525	80	201	76	379	300	231
	Rockfish Genus	175	238	23	53	-	73	57	-	15	3	14	1	164	3	20
	Yellowtail	395	1,026	479	285	318	216	162	77	247	-	0	-	87	327	107
Total Other Rockfish		3,349	4,607	2,492	1,818	2,043	2,239	1,132	772	1,490	115	348	103	910	1,109	625
Flatfish																
	Dover Sole	-	-	0	-	-	0	-	-	-	-	-	-	-	-	-
	English Sole	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-
	Other Flatfish	75	55	32	33	58	51	70	36	67	15	49	30	52	27	24
	Petrale Sole	3	5	1	1	6	1	0	0	3	-	-	-	0	-	-
Total Flatfish		78	60	33	34	63	52	70	36	70	15	49	30	52	27	24
Other Fish																
	Cabezon	7	7	11	2	6	17	9	8	6	1	2	1	8	3	4
	Greenling Genus	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
	Jack Mackerel	0	1	1	5	16	3	4	347	1	1	1	0	1	7	2
	Kelp Greenling	1	1	1	4	1	2	1	0	3	-	-	-	1	2	0
	Leopard Shark	-	-	-	0	-	3	-	-	-	-	-	-	-	-	-
	Rock Greenling	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
	Soupfin Shark	-	-	-	-	3	1	-	-	-	-	-	-	-	-	-
	Spiny Dogfish Shark	4	-	7	2	5	5	1	14	8	-	1	2	6	-	-
Total Other Fish		13	8	21	14	30	32	15	370	18	2	3	4	17	12	6
Grand Total		4,068	5,112	2,769	2,080	2,431	2,683	1,426	1,503	1,848	138	409	139	1,109	1,324	768

Data Source: Data was extracted from RecFIN September 27, 1999.

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 1 of 32)

Regulations in a given year continue until modified, superseded or rescinded.

Effective October 13, 1982

- Established a 75,000-pound trip limit on widow rockfish for remainder of 1982 (coastwide OY = 26,000 mt).
- Sablefish OY exceeded; 3,000 pounds trip limit imposed (coastwide OY = 13,400 mt).

Effective November 30, 1982

- Extended 75,000-pound widow rockfish trip limit to January 31, 1983 (effective January 1, 1983).
- Extended sablefish trip limit of 3,000 pounds for remainder of 1982.
- Increased sablefish OY 30% to 17,400 mt for 1982 and recommended this be the preliminary specification for 1983 (ABC = 13,400 mt).

Effective January 1, 1983

- Extended widow rockfish trip limit of 75,000 pounds until superseded.
- Adopted policy to continue groundfish fishery over the entire year.
- Established coastwide trip limit of 30,000 pounds on widow rockfish, to be adjusted in midseason as necessary so that 10,500 mt OY is not reached prior to year end (the coastwide widow rockfish ABC and OY were 10,500 mt in 1983).
- Established a 40,000-pound coastwide trip limit on *Sebastes* complex, to be adjusted as necessary in midseason so that annual catch in the Vancouver and Columbia areas falls about halfway between the 1982 catch and 1983 aggregate ABC (about 14,000 mt). (Vancouver and Columbia areas ABC = 9,500 mt.)
- Established a 22-inch total length size limit on sablefish in all areas north of Point Conception (excluding Monterey Bay), with an incidental trip limit for fish smaller than 22 inches of 333 fish, 1,000 pounds or 10% of weight of all sablefish on board, to be adjust as necessary to stay within the 17,400 mt OY (ABC = 13,400 mt).

Effective June 28, 1983

- Increased *Sebastes* complex harvest guideline in Vancouver and Columbia areas for 1983 from 14,000 to 18,500 mt; retained 40,000-pound trip limit; trip frequency in Vancouver and Columbia areas set at one per week; when 18,500 mt quota is achieved, fishery closes (Vancouver and Columbia areas ABC = 9,500 mt).
- Harvest guidelines for the Vancouver and Columbia areas *Sebastes* complex and all flatfish managed under the FMP shall not be permitted to exceed 130% of the respective summed ABCs in 1984.
- Retained the 22-inch size limit on sablefish as before, but set incidental allowance of small fish (<22 inches) at 5,000 pounds per trip.

Effective September 10, 1983

- Established a 1,000-pound trip limit on coastwide widow rockfish to avoid reaching OY, with stipulation that if 10,500 mt OY reached, fishery closes.
- Established a 3,000-pound trip limit on *Sebastes* complex in Vancouver and Columbia areas, with stipulation that if 18,500 mt quota is reached, fishery closes. Removed once per week trip frequency limit.
- Continued 40,000-pound trip limit on *Sebastes* complex south of 43°N latitude; no limit on number of trips.

Effective November 10, 1983

- Closed Columbia area to Pacific ocean perch fishing until the end of the year, as 950 mt OY for this species has been reached; retained 5,000-pound trip limit or 10% of total trip weight on landings of Pacific ocean perch in the Vancouver area.

Effective January 1, 1984

- Established coastwide widow rockfish trip limit of 50,000 pounds; trip frequency limited to once per week; if OY of 9,300 mt is reached, fishery closes.
- Harvest guideline for *Sebastes* complex in the Vancouver and Columbia areas established at 10,100 mt (110% of the summed ABCs).
- Established 30,000-pound trip limit on *Sebastes* complex from Vancouver and Columbia areas; 1 trip per week north of 43°N latitude (changed to Cape Blanco, 42°50', on February 12, 1984).
- Continued 40,000-pound trip limit on *Sebastes* complex south of 43°00' (changed to 42°50' on February, 12, 1984); no limit on trip frequency.
- Continued 22-inch size limit on sablefish as in 1983; retained 5,000 pounds incidental allowance of small fish (<22 inches); fishery closes when coastwide OY of 17,400 mt is reached (ABC = 13,400 mt).
- Continued 5,000-pound trip limit or 10% of total trip weight on Pacific ocean perch as specified in FMP. Fishery to close when area OYs are reached (see action effective November 10, 1983 above).

Effective February 12, 1984

- Southern boundary of Vancouver and Columbia areas shifted south, from 43°00' N latitude to 42°50' N latitude for management of *Sebastes* complex; application of *Sebastes* complex regulations clarified.

Effective May 6, 1984

- Reduced coastwide widow rockfish trip limit from 50,000 pounds once per week to 40,000 pounds once per week.
- Reduced Vancouver and Columbia areas *Sebastes* complex from 30,000 pounds once per week to 15,000 pounds once per week, with stipulation that fishers have option to land 30,000 pounds once every 2 weeks with appropriate advance declaration of intent.
- Specified that fishing for groundfish on a *Sebastes* complex trip may occur on only one side of Cape Blanco (42°50'), which allows southern caught fish to be landed north of Cape Blanco using the southern trip limit of 40,000 pounds with appropriate declaration of intent.
- Recommended no change in *Sebastes* complex trip limit of 40,000 pounds in the Eureka, Monterey, and Conception areas.

Effective August 1, 1984

- Closed directed fishery for widow rockfish when 9,200 of the 9,300 mt OY was landed. Remaining 100 mt is a quota for incidental landings, to be taken in incidental landing limits of 1,000 pounds per trip. The fishery for this species to close when the 9,300 mt quota is taken.
- Reduced trip limit for Pacific ocean perch in the Vancouver and Columbia areas to 20% by weight of all fish on board, not to exceed 5,000 pounds per vessel per trip. Recommended that when OY is reached in either area, landings of Pacific ocean perch will be prohibited in that area (Oregon and Washington implemented Pacific ocean perch recommendation in mid July).
- Reduced *Sebastes* complex trip limit in Vancouver and Columbia areas to 7,500 pounds once each week or 15,000 pounds once every two weeks with appropriate advance declaration of intent. Recommended that when the 10,100 mt harvest guideline is reached, a 3,000 pounds trip limit will be imposed.
- Vessel operators on combined groundfish/*Sebastes* complex trips allowed to fish on both sides of a line at 42°50' N latitude (Cape Blanco), but landings of *Sebastes* complex in excess of 3,000 pounds controlled by the trip limit/trip frequency in effect north of the line (Vancouver and Columbia areas). Appropriate advance declaration of intent required.

Automatic Closure (effective August 16, 1984)

- Commercial fishing for Pacific ocean perch in the Columbia area closed for remainder of the year. (See items regarding this species effective January 1 and August 1, 1984 above.)

Automatic Action (effective September 9, 1984)

- Closed directed fishery for widow rockfish; incidental catch trip limit reduced to 1,000 pounds (based on action effective August 1, 1984); fishery for this species closed on November 28.

Effective January 10, 1985

- Established coastwide widow rockfish trip limit of 30,000 pounds; trip frequency limited to once per week (or 60,000 pounds once every 2 weeks with appropriate declaration to state in which fish are landed); to be adjusted after first trimester, as necessary (OY = 9,300 mt).
- Harvest guideline for *Sebastes* complex in Vancouver and Columbia areas fixed at 10,100 mt.
- For *Sebastes* complex north of Cape Blanco (42°50' N latitude), established a 30,000-pound weekly trip limit of which no more than 10,000 pounds may be yellowtail rockfish (or 60,000 pounds once every two weeks of which no more than 20,000 pounds may be yellowtail rockfish with appropriate declaration to state in which fish are landed).
- For *Sebastes* complex south of Cape Blanco, established a 40,000-pound trip limit without a trip frequency.
- If fishers fish on both sides of the Cape Blanco line during a trip, the northern (more restrictive) limit on *Sebastes* complex applies.
- Landings of *Sebastes* complex and widow rockfish smaller than 3,000 pounds unrestricted.
- Continued 22-inch size limit on sablefish in all areas north of Point Conception (abolished Monterey Bay exclusion); retained 5,000 pounds incidental landing limit for sablefish less than 22 inches.
- Established Vancouver and Columbia areas Pacific ocean perch trip limit of 20% by weight of all fish on board (no 5,000-pound limit as specified in last half of 1984).

Effective April 28, 1985

- Continued the coastwide widow rockfish trip limit of 30,000 pounds once per week, but rescinded the option to land 60,000 pounds once every two weeks.
- The coastwide widow rockfish trip limit will be reduced to 10% by weight of all fish on board not to exceed 3,000 pounds if

90% of the OY (about 8,400 mt) reached before the Council's July meeting (under this incidental limit, landings of widow rockfish less than 1,000 pounds will be unrestricted).

- For the *Sebastes* complex north of Cape Blanco (42°50' N latitude), reduced the trip limit to 15,000 pounds once per week of which no more than 5,000 pounds may be yellowtail rockfish (or 30,000 pounds once every two weeks of which no more than 10,000 pounds may be yellowtail rockfish). Added a third option to land 7,500 pounds twice each week of which no more than 3,000 pounds in each landing may be yellowtail rockfish; landings declaration applies.
- Reduced the Vancouver and Columbia areas Pacific ocean perch trip limit to 5,000 pounds or 20% by weight of all fish on board, whichever is less. Landings of Pacific ocean perch less than 1,000 pounds will be unrestricted. The fishery for this species will close when the OY in each area is reached.

Effective June 10, 1985

- Landings of Pacific ocean perch up to 1,000 pounds per trip will be unrestricted regardless of the percentage of these fish on board.

Effective July 21, 1985

- Reduced the coastwide widow rockfish trip limit to 3,000 pounds per trip without a trip frequency.

Effective July 25, 1985

- Prohibit the use of "tickler chains," which contact the sea floor ahead of the rollers, in roller and bobbin trawls.

Effective September 1, 1985

- Changed the management boundary line separating northern and southern trip limits for the *Sebastes* complex from Cape Blanco (42°50' N latitude) northward 30 miles to the north jetty at Coos Bay (43°22' N latitude).

Effective October 6, 1985

- Increased the Vancouver and Columbia areas *Sebastes* complex trip limit to 20,000 pounds once per week except that no more than 5,000 pounds may be yellowtail rockfish (or one landing once every 2 weeks of 40,000 pounds of which no more than 10,000 pounds may be yellowtail rockfish, or 2 landings per week of 10,000 pounds each of which no more than 3,000 pounds per landing may be yellowtail rockfish; landings declaration apply).

Effective November 25, 1985

- Established that 90% of sablefish quota had been reached and established a trip limit of 13% sablefish in all trawl landings containing sablefish.

Effective December 6, 1985

- Established that sablefish quota (OY) had been exceeded on November 22, 1985, and prohibited further landings of sablefish until January 1, 1986.

Effective January 1, 1986

- Established coastwide widow rockfish trip limit of 30,000 pounds per week with no biweekly option (coastwide OY=10,200 mt; ABC = 9,300 mt).
- Harvest guideline for *Sebastes* complex north of Coos Bay, Oregon (43°22'N) fixed at 10,100 mt.
- For *Sebastes* complex north of Coos Bay, established 25,000-pound weekly trip limit of which no more than 10,000 pounds may be yellowtail rockfish (or 50,000 pounds biweekly of which no more than 20,000 pounds may be yellowtail rockfish, or 12,500 pounds twice per week of which no more than 5,000 pounds may be yellowtail rockfish; biweekly and twice weekly landings require appropriate declaration to state in which fish are landed).
- For *Sebastes* complex south of Coos Bay, established 40,000-pound trip limit; no trip frequency.
- Landings of less than 3,000 pounds of *Sebastes* complex and widow rockfish unrestricted.
- Fishers fishing the *Sebastes* complex on both sides of the Coos Bay line during a trip must conform with the northern (more restrictive) trip limit.
- Continued the 22-inch size limit on sablefish in all areas north of Point Conception; retained 5,000-pound incidental landing limit for sablefish smaller than 22 inches; coastwide OY = 13,600 mt; ABC = 10,300 mt.
- Established the Pacific ocean perch trip limit north of Cape Blanco (42°50' N) at 20% (by weight) of all fish on board or 10,000 pounds whichever is less; landings of Pacific ocean perch unrestricted if less than 1,000 pounds regardless of percentage on board; Vancouver area OY = 600 mt; Columbia area OY = 950 mt.
- Established ABC and OY of 227,500 mt for Pacific whiting.
- Established ABC of 3,900 mt for yellowtail rockfish.

Effective April 11, 1986

- Increased the Pacific whiting ABC and OY to 295,800 mt, up 30% from 227,500 mt established at the beginning of 1986.
- Increased the yellowtail rockfish ABC to 4,000 mt, up 100 mt from 3,900 mt established at beginning of 1986. (Yellowtail rockfish is in the multispecies *Sebastes* complex and does not have a numerical OY.) The 100 mt increase assigned entirely to the Columbia area north of Coos Bay.

Automatic Action (see September 28, 1986 below)

- A 3,000-pound trip limit without a trip frequency will be implemented when the widow rockfish ABC is reached.

Effective August 22, 1986 (Emergency Regulation)

- Allocated the estimated remaining sablefish OY between trawl and fixed gear at 55% and 45%, respectively.
- Established an 8,000-pound sablefish trip limit on trawl gear.
- Retained the current regulation of a 5,000-pound trip limit on sablefish smaller than 22 inches.
- Any further landings of sablefish by trawl gear to be prohibited after trawl quota is reached.
- Any further landings of sablefish by fixed gear to be prohibited after fixed gear quota is reached.
- Any further landings of sablefish to be prohibited after the coastwide OY is reached.

Effective August 26, 1986 (see August 22, 1986 Emergency Regulation)

- Announced amounts of sablefish quota under emergency regulations (2,915 mt trawl; 2,385 mt fixed gear).

Effective August 31, 1986

- For *Sebastes* complex north of Coos Bay, Oregon, increased trip limits as follows: weekly = 30,000 pounds of which no more than 12,500 pounds may be yellowtail rockfish; biweekly = 60,000 pounds of which no more than 25,000 pounds may be yellowtail rockfish; and twice weekly = 15,000 pounds of which no more than 6,500 pounds may be yellowtail rockfish.

Effective September 28, 1986

- Widow rockfish ABC reached; coastwide 3,000-pound trip limit without trip frequency imposed (see Automatic Action above).

Effective October 23, 1986 (see August 22, 1986 Emergency Regulation)

- Fixed gear sablefish quota reached; fixed gear fishery closed.
- Trawl gear trip limit increased to 12,000 pounds for remainder of year or until trawl quota is reached.
- Sablefish quotas revised (2,800 mt trawl; 2,300 mt fixed gear).

Effective November 20, 1986 (see August 22, 1986 Emergency Regulation)

- Extended sablefish emergency regulation until the end of the year.

Effective December 1, 1986

- OY quota for Pacific ocean perch reached in the Vancouver area; fishery closed until January 1, 1987.

Effective January 1, 1987

- Established a coastwide widow rockfish trip limit of 30,000 pounds per week with no biweekly option. Only 1 landing per week above 3,000 pounds (coastwide OY = 12,500 mt; ABC = 12,100 mt).
- Harvest guideline for *Sebastes* complex north of Coos Bay, Oregon (43°21'34" N latitude) set at 10,200 mt.
- For *Sebastes* complex north of Coos Bay, established 25,000-pound weekly trip limit of which no more than 10,000 pounds may be yellowtail rockfish (or 50,000 pounds biweekly of which no more than 20,000 pounds may be yellowtail rockfish, or 12,500 pounds twice per week of which no more than 5,000 pounds may be yellowtail rockfish; biweekly and twice weekly landings require appropriate declaration to state in which fish are landed); no restriction on landings less than 3,000 pounds.
- For *Sebastes* complex south of Coos Bay, established 40,000-pound trip limit; no trip frequency limit.
- Allocated the sablefish OY between trawl and fixed gear at 52% (6,200 mt) and 48% (5,800 mt), respectively; if the quota for either gear type is reached, sablefish becomes a prohibited species for that gear; coastwide OY and ABC =12,000 mt.
- Established coastwide 5,000-pound trawl and 100-pound fixed gear trip limits (round weights) for sablefish smaller than 22-inches total length (16-inches dorsal total length).
- Established coastwide Pacific ocean perch limit at 20% of all legal fish on board or 5,000 pounds whichever is less (in round weight); landings of Pacific ocean perch unrestricted if less than 1,000 pounds regardless of percentage on board; Vancouver area OY = 500 mt; Columbia area OY = 800 mt.
- Established ABC and OY of 195,000 mt for Pacific whiting.

- Established ABC of 4,000 mt for yellowtail rockfish.

Effective April 5, 1987

- Changed the size limit for processed sablefish from 16.0 inches to 15.5 inches (dorsal total length).

Effective April 27, 1987

- Increased the trip limit for sablefish smaller than 22 inches (total length) caught by fixed gear from 100 pounds to 1,500 pounds coastwide.

Effective May 3, 1987

- Changed the definition of fishing week from Sunday through Saturday to Wednesday through Tuesday for *Sebastes* complex and widow rockfish.

Effective July 22, 1987

- Reduced the weekly trip limit for yellowtail rockfish caught north of Coos Bay to 7,500 pounds (or 15,000 pounds biweekly, or 3,750 pounds twice weekly).

Effective August 14, 1987

- Coastwide ABCs for widow and chilipepper rockfishes increased to 12,500 mt and 3,600 mt, respectively.

Effective October 2, 1987

- Established trawl trip limit for sablefish at 6,000 pounds or 20% of the legal fish on board, whichever is greater, including no more than 5,000 pounds of sablefish under 22 inches.

Effective October 14, 1987

- Reduced the weekly trip limit for widow rockfish from 30,000 pounds to 5,000 pounds when 95% of the widow rockfish OY was projected to be reached (i.e., at 11,875 mt). Closed the nontrawl (fixed gear) sablefish fishery because the nontrawl allocation of 5,800 mt was reached.

Effective October 22, 1987

- Closed the sablefish trawl fishery because the trawl allocation of 6,200 mt was reached.

Effective November 25, 1987

- Closed the widow rockfish fishery because 12,500 mt was reached.

Effective January 1, 1988

- Established coastwide widow rockfish trip limit of 30,000 pounds per week. Only 1 landing per week above 3,000 pounds. No restriction on landings less than 3,000 pounds (coastwide OY/ABC = 12,100 mt).
- Harvest guideline for *Sebastes* complex north of Coos Bay, Oregon (43°21'34"N) fixed at 10,200 mt.
- For *Sebastes* complex north of Coos Bay, established a 25,000-pound weekly trip limit of which no more than 10,000 pounds may be yellowtail rockfish (or 50,000 pounds biweekly of which no more than 20,000 pounds may be yellowtail rockfish, or 12,500 pounds twice per week, of which no more than 5,000 pounds may be yellowtail rockfish; biweekly and twice weekly landings require appropriate declaration to state in which fish are landed). No restriction on landings less than 3,000 pounds.
- For *Sebastes* complex south of Coos Bay, established a 40,000-pound trip limit; no trip frequency restriction.
- Allocated the sablefish OY between trawl and nontrawl (fixed gear) at 5,200 and 4,800 mt, respectively; if the quota for nontrawl gear is reached, sablefish becomes a prohibited species for that gear; manage the trawl fishery to achieve the trawl allocation, provided that up to an additional 800 mt may be added to the trawl allocation for unavoidable incidental catch; coastwide OY = 9,200 to 10,800 mt; ABC = 10,000 mt.
- For trawl-caught sablefish, established a trip limit of 6,000 pounds or 20% of legal fish on board, whichever is greater, with only two landings above 1,000 pounds allowed per vessel per week; no restriction on landings less than 1,000 pounds.
- Continued the 22-inch total length size limit (15.5-inch dorsal length) on sablefish in all areas; 5,000-pound trawl and 1,500-pound nontrawl incidental landing limits for sablefish smaller than the minimum size limit.
- Established the coastwide Pacific ocean perch trip limit at 20% (by weight) of all fish on board or 5,000 pounds, whichever is less; landings of Pacific ocean perch unrestricted if less than 1,000 pounds regardless of percentage on board; Vancouver area OY = 500 mt; Columbia area OY = 800 mt.

- Established ABC and OY of 232,000 mt for Pacific whiting.
- Established ABC of 4,000 mt for yellowtail rockfish.

Effective August 3, 1988

- Increased the trawl sablefish allocation to 6,000 mt; reduced the trawl trip limit to one landing per week, not to exceed 2,000 pounds (including sablefish smaller than 22 inches).
- Changed the nontrawl trip limit for sablefish smaller than 22 inches to 1,500 pounds or 3% of all sablefish on board, whichever is greater.

Effective August 26, 1988

- Closed the nontrawl sablefish fishery because the nontrawl allocation of 4,800 mt was reached.

Effective September 21, 1988

- Reduced the trip limit for widow rockfish to 3,000 pounds (with no restriction on the number of landings per week) on September 21, the date when just enough of the OY remained to allow continuation of this trip limit through the end of the year.

Effective October 5, 1988

- Removed the restriction that no more than 1 landing of sablefish by trawlers may be made during any week; reduced the weekly trip limit for yellowtail rockfish north of Coos Bay from 10,000 to 7,500 pounds (biweekly and twice weekly options to remain in effect).

Effective January 1, 1989

- Established a coastwide widow rockfish trip limit of 30,000 pounds per week. Only 1 landing per week above 3,000 pounds. No restriction on landings less than 3,000 pounds (coastwide OY/ABC = 12,400 mt).
- Harvest guideline for *Sebastes* complex north of Coos Bay, Oregon (43°21'34"N) set at 10,200 mt.
- For *Sebastes* complex north of Coos Bay, established a 25,000 pounds weekly trip limit of which no more than 7,500 pounds may be yellowtail rockfish (or 50,000 pounds biweekly of which no more than 15,000 pounds may be yellowtail rockfish, or 12,500 pounds twice per week, of which no more than 3,750 pounds may be yellowtail rockfish; biweekly and twice weekly landings require appropriate declaration to state in which fish are landed). No restriction on landings less than 3,000 pounds.
- For *Sebastes* south of Coos Bay, established a 40,000-pound trip limit; no trip frequency restriction.
- For coastwide sablefish, management measures designed to achieve the low end of the OY range (10,400 to 11,000 mt). After 22 mt set aside from the 10,400 mt harvest guideline for the Makah Indian fishery, the remaining 10,378 mt allocated 5,397 mt (52%) for trawl gear and 4,981 mt (48%) for nontrawl (fixed) gear.
- Established a coastwide trawl trip of 1,000 pounds or 45% of the deepwater complex (consisting of sablefish, Dover sole, arrowtooth flounder and thornyheads), whichever is greater. Within the 45% trawl limit, no more than 5,000 pounds of sablefish smaller than 22 inches (total length) may be taken per trip. If fishing under the 1,000-pound limit, all sablefish may be smaller than 22 inches. The coastwide nontrawl trip limit for sablefish smaller than 22 inches set at the greater of 1,500 pounds or 3% of all sablefish on board.
- The harvest guideline may be increased by up to 600 mt to enable small fisheries to continue operating after a gear allocation is met and to allow for landings of sablefish caught incidentally while fishing for other species. If the upper end of the OY range (11,000 mt) is reached, all further landings will be prohibited (coastwide ABC = 9,000 mt; OY = 10,400 to 11,000 mt).
- Established the coastwide Pacific ocean perch trip limit at 20% (by weight) of all fish on board or 5,000 pounds whichever is less; landings of Pacific ocean perch unrestricted if less than 1,000 pounds regardless of percentage on board (Vancouver area OY = 500 mt; Columbia area OY = 800 mt).
- ABC and OY set at 225,000 mt for Pacific whiting.
- ABC set at 4,300 mt for yellowtail rockfish.

Effective April 26, 1989

- Established coastwide weekly trip limit on the deepwater complex (consisting of sablefish, Dover sole, arrowtooth flounder and thornyheads) of only 1 landing above 4,000 pounds per week, not to exceed 30,000 pounds. No limit on the number of landings of deepwater complex less than 4,000 pounds. For each landing of the deepwater complex, no more than 1,000 pounds or 25% of the deepwater complex, whichever is greater, may be sablefish. If fishing under the 25% limit, no more than 5,000 pounds may be sablefish under 22 inches (total length). If fishing under the 1,000-pound limit, all sablefish may be under 22 inches. Biweekly and twice weekly trip limit options for trawl-caught sablefish are available but require appropriate declaration to state in which fish are landed.
- Revised the gear quotas for the remainder of the year by reducing the nontrawl quota 400 mt (to 4,581 mt) and increasing the trawl quota by 1,000 mt (400 mt from nontrawl gear plus the 600 mt reserve) so it totals 6,397 mt. If either gear quota is reached, further landings by that gear will be prohibited for the remainder of the year.

- Reduced the coastwide weekly trip limit for widow rockfish to 10,000 pounds.

Effective July 17, 1989

- Established a coastwide nontrawl sablefish trip limit of 100 pounds with no frequency limit for the remainder of the year, until the nontrawl allocation is reached, or until OY is reached, whichever occurs first. Because the trip limit is smaller than the limit on fish less than 22 inches, the 22-inch minimum size provision is rescinded.

Effective July 26, 1989

- Reduced the trip limit for yellowtail rockfish to 3,000 pounds or 20% of the *Sebastes* complex, whichever is greater.
- Reduced the coastwide trip limit for Pacific ocean perch to 2,000 pounds or 20% of all fish on board, whichever is less, with no trip frequency restriction.
- Increased the Columbia area Pacific ocean perch OY from 800 mt to 1,040 mt.

Effective October 4, 1989

- Removed the overall trawl poundage and trip frequency limits for the deepwater complex, while retaining the separate trip limit for sablefish at 25% of the deepwater complex or 1,000 pounds, whichever is greater.
- Increased the nontrawl trip limit to 2,000 pounds or 20% of all groundfish on board, whichever is less, when more than 100 pounds of sablefish on board. Because the trip limit remains small, the entire landing may be made up of sablefish less than 22 inches.

Effective October 11, 1989

- Reduced the trip limit for widow rockfish to 3,000 pounds (with no restriction on the number of landings per week) on October 11, the date when just enough of the OY remained to allow continuation of this trip limit through the end of the year.

Effective December 13, 1989

- Closed the Pacific ocean perch fishery in the Columbia area because 1,040 mt OY reached.

Effective January 1, 1990

- Established a coastwide widow rockfish trip limit of 15,000 pounds per week, or 25,000 pounds per 2 weeks. Only 1 landing per week above 3,000 pounds. No restriction on landings less than 3,000 pounds (coastwide ABC = 8,900 mt; OY = 9,800 to 10,000 mt).
- Harvest guideline for *Sebastes* complex north of Coos Bay, Oregon (43°21'34"N) set at 10,200 mt.
- For *Sebastes* complex north of Coos Bay, established the weekly trip limit at 25,000 pounds of which no more than 7,500 pounds may be yellowtail rockfish (or 50,000 pounds biweekly of which no more than 15,000 pounds may be yellowtail rockfish, or 12,500 pounds twice per week of which no more than 3,750 pounds may be yellowtail rockfish; biweekly and twice weekly landings require appropriate declaration to state in which fish are landed). No restriction on landings less than 3,000 pounds.
- For *Sebastes* south of Coos Bay, established the trip limit at 40,000 pound; no trip frequency restriction.
- Established the coastwide Pacific ocean perch trip limit at 20% (by weight) of all fish on board or 3,000 pounds whichever is less; landings of Pacific ocean perch be unrestricted if less than 1,000 pounds regardless of percentage on board. (Vancouver area OY = 500 mt; Columbia area OY = 1,040 mt).
- The ABC and OY for Pacific whiting set at 225,000 mt.
- The ABC for yellowtail rockfish set at 4,300 mt.
- The ABC and OY for sablefish set at 8,900 mt.
- [NMFS did not approve the Council's recommendations for sablefish management. The trawl and nontrawl restrictions in effect at the end of 1989 continued in effect on January 1, 1990. Specifically, the nontrawl trip limit remained at 2,000 pounds or 20% of all fish on board, whichever is greater, for all landings greater than 100 pounds. The trawl trip limit remained as the greater of 1,000 pounds or 25% of the deepwater complex.]

Effective January 31, 1990

- NMFS disapproved the Council's recommendations to modify the trawl/nontrawl sablefish allocations and management measures to achieve them.
- The nontrawl sablefish trip limit was rescinded as a result of NMFS' disapproval of the Council's recommendations. Thus, the nontrawl fishery was unlimited by any catch restrictions. The limit on sablefish less than 22 inches was not reinstated. A nontrawl trip limit of 500 pounds will go into effect when 300 mt of the nontrawl quota remains.
- The estimated tribal sablefish catch to the end of the year (300 mt) subtracted from the OY of 8,900 mt.
- The remaining 8,600 mt was allocated 58% (4,988 mt) to trawl gear and 42% (3,612 mt) to nontrawl gears.
- Continued in effect the coastwide trawl trip of 1,000 pounds or 25% of the deepwater complex (consisting of sablefish, Dover sole, arrowtooth flounder and thornyheads), whichever is greater. Within the 25% trawl limit, no more than 5,000

pounds of sablefish smaller than 22 inches (total length) may be taken per trip. If fishing under the 1,000-pound limit, all sablefish may be smaller than 22 inches.

Effective March 21, 1990

- Reestablished the nontrawl trip limit for sablefish less than 22-inches total length at 1,500 pounds or 3% of all sablefish on board, whichever is greater.

Effective June 24, 1990

- Established a nontrawl sablefish trip limit of 500 pounds when 300 mt of the nontrawl quota remained. The 500-pound limit replaces the trip limit for sablefish smaller than 22 inches.

Effective July 25, 1990

- Reduced the weekly trip limit for yellowtail rockfish caught with any gear north of Coos Bay to 3,000 pounds or 20% of the *Sebastes* complex, whichever is greater. Biweekly and twice weekly landing options remain in effect.
- Reduced the nontrawl sablefish trip limit to 200 pounds because GMT projections indicate the quota has been nearly reached.

Effective October 3, 1990

- In order to reduce trawl sablefish landings so the trawl quota would not be exceeded, established a 15,000-pound trip limit on the deepwater complex (sablefish, Dover sole and thornyheads); allowed only one landing per week of the deepwater complex above 1,000 pounds; and maintained the current sablefish trip limit of 1,000 pounds or 25% of the deepwater complex, whichever is greater. Biweekly and twice weekly landing options are provided. The 5,000-pound trip limit for sablefish smaller than 22 inches remained in effect for landings made under the biweekly option.
- Relaxed the nontrawl sablefish trip limit to 2,000 pounds per trip to enable the entire nontrawl quota to be taken. Reinstated the limit on sablefish less than 22 inches of 1,500 pounds or three percent of all sablefish on board.

Effective December 12, 1990

- Closed widow rockfish fishery.

Effective January 1, 1991

- FMP Amendment 4 combined all species into a single, multispecies OY, with Council authority to establish a quota or harvest guideline for any species in need of individual management attention; and established framework procedures for making adjustments to management measures, including routine actions intended to achieve a quota or harvest guideline.
- Established a coastwide widow rockfish trip limit of 10,000 pounds per week, with only 1 landing per week above 3,000 pounds. Biweekly option of 20,000 pounds with only 1 landing above 3,000 pounds in that two-week period. No restriction on landings less than 3,000 pounds (coastwide ABC = 7,000 mt; harvest guideline = 7,000 mt).
- Harvest guideline for *Sebastes* complex north of Coos Bay, Oregon (43°21'34"N) set at 11,100 mt; harvest guideline for yellowtail rockfish set at 4,300 mt.
- For *Sebastes* complex north of Coos Bay, the weekly trip limit remains at 25,000 pounds of which no more than 5,000 pounds may be yellowtail rockfish (or 50,000 pounds biweekly of which no more than 10,000 pounds may be yellowtail rockfish, or 12,500 pounds twice per week of which no more than 3,000 pounds may be yellowtail rockfish; biweekly and twice weekly landings require appropriate declaration to state in which fish are landed). No restriction on landings less than 3,000 pounds.
- For *Sebastes* south of Coos Bay, the trip limit established at 25,000 pounds, including no more than 5,000 pounds of bocaccio; no trip frequency restriction; harvest guideline for bocaccio set at 1,100 mt (ABC = 800 mt).
- Established the coastwide Pacific ocean perch trip limit at 20% (by weight) of all groundfish on board or 3,000 pounds whichever is less; landings of Pacific ocean perch be unrestricted if less than 1,000 pounds regardless of percentage on board (harvest guideline for combined Vancouver and Columbia areas = 1,000 mt).
- Established a coastwide weekly trawl trip for the deepwater complex (sablefish, Dover sole and thornyheads) of 27,500 pounds (including no more sablefish than 1,000 pounds or 25% of the deepwater complex, whichever is greater, and no more than 7,500 pounds of thornyheads). Only one landing above 4,000 pounds of deepwater complex per week. Biweekly and twice weekly options available. Of those sablefish taken under the weekly and biweekly trip limits, no more than 5,000 pounds of sablefish smaller than 22 inches (total length) may be taken per trip. All sablefish taken under the twice weekly limit may be smaller than 22 inches.
- Established a nontrawl trip limit of 1,500 pounds from January 1 through March 31.
- The harvest guideline for Pacific whiting set at 228,000 mt.

Effective April 1, 1991

- Revised nontrawl sablefish trip limit to a limit only on sablefish smaller than 22 inches (1,500 pounds or 3% of all sablefish on board, whichever is greater, effectively opening the nontrawl sablefish season.

Effective April 24, 1991

- Reduced the trip limit for yellowtail rockfish north of Coos Bay from 5,000 pounds per week to 5,000 pounds once per 2 weeks.

Effective May 24, 1991

- Established a nontrawl trip limit of 500 pounds of sablefish.

Effective July 1, 1991

- Closed the nontrawl sablefish fishery because the nontrawl quota had been exceeded.

Effective July 31, 1991

- Increased the weekly trip limit for thornyheads to 12,500 pounds within the deepwater complex trip limit. The overall deepwater complex trip limit remained at 27,500 pounds.
- Oregon and Washington agreed to no longer require fishers to declare their intent to use biweekly or twice weekly trip limit options. Instead, fishers are allowed to decide at sea which option to use without prior declaration.

Effective August 28, 1991

- Established a Pacific whiting allocation system with a quota of 104,000 mt for catcher-processors; a quota of 88,000 mt for vessels that catch but do not process, whether they deliver to shore-based or at-sea processors; and a reserve of 36,000 mt which could be released to either group, with priority for deliveries to shore-based processors. Prohibited further taking and retention of whiting by catcher-processors because their allocation had been exceeded.

Effective September 6, 1991

- Prohibited further at-sea processing of Pacific whiting for the remainder of the year.

Effective September 25, 1991

- Reduced the trip limit for widow rockfish to 3,000 pounds (with no restriction on the number of landings per week) on September 25, the date when just enough of the harvest guideline remained to allow continuation of this trip limit through the end of the year.

Effective September 30, 1991

- Established (by emergency regulation) a daily sablefish trip limit of 300 pounds for nontrawl gears.

Effective November 17, 1991

- Allowed resumption of at-sea processing by mothership vessels for up to 7,000 mt of Pacific whiting.

Effective January 1, 1992

- Established a coastwide widow rockfish cumulative landing limit of 30,000 pounds per specified four-week period. All landings apply toward the 30,000-pound limit. (coastwide ABC = 7,000 mt; harvest guideline = 7,000 mt).
- Harvest guideline for the *Sebastes* complex in the Vancouver and Columbia areas north of Cape Lookout, Oregon (42°20'15"N latitude) set at 8,000 mt; harvest guidelines for yellowtail rockfish north of Cape Lookout set at 4,000 mt and 1,400 mt for the Eureka and Columbia areas south of Cape Lookout (Vancouver, Columbia and Eureka ABC = 4,700 mt).
- For the *Sebastes* complex, established a cumulative landing limit per specified 2 week period of 50,000 pounds. Within this 50,000 pounds, no more than 8,000 pounds cumulative may be yellowtail rockfish landed north of Cape Lookout and no more than 10,000 pounds cumulative may be bocaccio landed south of Cape Mendocino, California (40°30'00"N latitude). All landings count toward the 50,000-pound limit.
- For Pacific ocean perch, established the coastwide trip limit at 20% (by weight) of all groundfish on board or 3,000 pounds whichever is less; landings of Pacific ocean perch be unrestricted if less than 1,000 pounds regardless of percentage on board (harvest guideline for combined Vancouver and Columbia areas = 1,550 mt).
- For the deepwater complex (sablefish, Dover sole, and thornyheads), established a cumulative landing limit per specified 2-week period of 55,000 pounds of which no more than 25,000 pounds may be thornyheads. In any landing, no more than 25% of the deepwater complex may be sablefish, unless less than 1,000 pounds of sablefish are landed, in which case the percentage does not apply. In any landing, no more than 5,000 pounds of sablefish may be smaller than 22 inches (total length).

- For the nontrawl sablefish fishery, established a daily-trip-limit of 500 pounds from January 1 through February 29.
- The harvest guideline for Pacific whiting set at 208,800 mt.

Effective January 17, 1992

- Established the opening date for the Pacific whiting season as April 15.

Effective March 1, 1992

- For the nontrawl sablefish fishery, establish a daily-trip-limit of 1,500 pounds from March 1 through March 31. However, if 440 mt is projected to be reached during this period, the daily-trip-limit may be reduced to 500 pounds through March 31.

Effective March 21, 1992

- For the nontrawl sablefish fishery, reduce the daily-trip-limit to 500 pounds.

Effective April 1, 1992

- Delay the opening of the nontrawl sablefish fishery until May 12 (Emergency Rule).

Effective April 15, 1992 through October 14, 1992

- Established (by emergency regulation) a Pacific whiting allocation system with an initial limit of 98,800 mt on at-sea processing, an initial allocation of 80,000 mt for vessels that deliver to shoreside processors, and the remaining 30,000 mt set aside as a reserve with priority for deliveries to shore-based processors. If less than 48,000 mt (60% of the initial shoreside allocation) is processed shoreside by September 1, the 30,000 mt reserve will be made available for at-sea processing on September 1 or as soon as practicable thereafter. Any amount of the harvest guideline the regional director determines will not be needed by shoreside processors may be available for at-sea processing on October 1.

Effective April 16, 1992 through October 19, 1992

- Established (by emergency regulation) restrictions on the Pacific whiting fishery to reduce bycatch of salmon and rockfish: no at-sea processing south of 42°N latitude; a trip limit of 2,000 pounds of whiting caught inside the 100 fathom contour; no fishing for whiting between midnight and one-half hour after official sunrise; no fishing for whiting in the Klamath River salmon conservation zone bounded on the north by 41°38'48"N latitude (approximately 6 nm north of the river mouth), on the west by 124°23'00" W longitude (approximately 12 miles from shore), and on the south by 41°26'48"N latitude (approximately six nm south of the river mouth); and no whiting fishing in the Columbia River salmon conservation zone bounded by a line extending for 6 nm due west from North Head along 46°18'00"N latitude to 124°12'18"W longitude, then southerly along a line of 167 True to 46°11'06"N latitude and 124°11'00"W longitude (Columbia River Buoy), then northeast along Red Buoy Line to the tip of the south jetty.

Effective April 17, 1992

- For the nontrawl sablefish fishery, reduced the daily-trip-limit to 250 pounds until the opening of the "regular" nontrawl sablefish season.

Effective May 9, 1992

- Increased the minimum legal codend mesh size for roller trawl gear north of Point Arena, California (40°30' N latitude) from 3.0 inches to 4.5 inches; prohibited double-walled codends; removed provisions regarding rollers and tickler chains for roller gear with codend mesh smaller than 4.5 inches.

Effective May 12, 1992

- Established (by emergency regulation) the opening date of the "regular" nontrawl sablefish fishery.

Effective May 27, 1992

- Established a nontrawl daily-trip-limit of 250 pounds of sablefish.

Effective June 10, 1992

- For black rockfish, established a trip limit for commercial fishing vessels using hook-and-line gear between the U.S. border and Cape Alava (48°09'30"N latitude), and between Destruction Island (47°40'00"N latitude) and Leadbetter Point (46°38'10"N latitude), of 100 pounds or 30% by weight of all fish on board (including salmon), whichever is greater.
- Harvest guidelines for commercial harvests of all species of rockfish by members of the Makah, Quileute, Hoh, and Quinault Indian tribes will be set annually and reviewed and adjusted as necessary. For 1992, established harvest

guidelines of 51,000 pounds between the U.S.-Canada border and Cape Alava and 10,000 pounds between Destruction Island and Leadbetter Point.

- For the recreational fishery, reduced the bag limit of all species of rockfish from 15 to 12 between the U.S.-Canada border and Leadbetter Point.

Effective July 29, 1992

- Reduced the cumulative 2-week landing limit for thornyheads from 25,000 pounds to 20,000 pounds.
- Reduced the cumulative 2-week landing limit of yellowtail rockfish north of the north jetty of Coos Bay, Oregon from 8,000 pounds to 6,000 pounds. If a vessel fishes north of the boundary during the 2-week period, the northern limit applies.

Effective August 12, 1992

- Established a 3,000-pound trip limit for widow rockfish coastwide (with no restriction on the number of landings per week) on August 12, the date when just enough of the harvest guideline was projected to remain to allow continuation of this trip limit through the end of the year.

Effective September 4, 1992

- Released the 30,000 mt whiting reserve and allowed resumption of at-sea processing until September 12 at 2 p.m.

Effective October 1, 1992

- Released 25,000 mt of the shore-based whiting allocation for at-sea processing and allowed resumption of at-sea processing through October 7.

Effective October 7, 1992

- Reduced the cumulative 2-week landing limit for thornyheads from 20,000 pounds to 15,000 pounds, and the cumulative two- week landing limit for the deepwater complex from 55,000 pounds to 50,000 pounds.

Effective October 31, 1992

- Established a 3,000-pound trip limit for Pacific whiting on October 31, the date when the harvest guideline was projected to be reached.

Effective December 2, 1992

- Re-established the coastwide widow rockfish cumulative landing limit of 30,000 pounds for the remainder of 1992. All landings apply toward the 30,000-pound limit.

Effective January 1, 1993

- Continued the coastwide widow rockfish cumulative landing limit of 30,000 pounds per specified 4-week period. All landings apply toward the 30,000-pound limit. (coastwide ABC = 7,000 mt; harvest guideline = 7,000 mt).
- Harvest guideline for *Sebastes* complex north of Coos Bay, Oregon (43°21'34"N) set at 11,200 mt; harvest guideline for yellowtail rockfish set at 4,400 mt.
- For *Sebastes* complex north of Coos Bay, established a cumulative landing limit per specified 2-week period of 50,000 pounds. Within this 50,000 pounds, no more than 8,000 pounds cumulative may be yellowtail rockfish caught north of Coos Bay and no more than 10,000 pounds cumulative may be bocaccio caught south of Cape Mendocino, California (40°30'00"N latitude). All landings count toward the cumulative limits. If a vessel fishes in the more restrictive area at any time during the 2-week period, the more restrictive limit applies for that vessel.
- For Pacific ocean perch, continued the coastwide trip limit at 20% (by weight) of all groundfish on board or 3,000 pounds whichever is less; landings of Pacific ocean perch unrestricted if less than 1,000 pounds regardless of percentage on board (harvest guideline for combined Vancouver and Columbia areas = 1,550 mt).
- For the deepwater complex (sablefish, Dover sole and thornyheads), established a cumulative landing limit per specified 2-week period of 45,000 pounds of which no more than 20,000 pounds may be thornyheads. In any landing, no more than 25% of the deepwater complex may be sablefish, unless less than 1,000 pounds of sablefish are landed, in which case the percentage does not apply. In any landing, no more than 5,000 pounds of sablefish may be smaller than 22 inches (total length).
- For the nontrawl sablefish fishery, established a daily-trip-limit of 250 pounds from January 1 through May 12.
- The harvest guideline for Pacific whiting set at 142,000 mt.
- For black rockfish, established a trip limit for commercial fishing vessels using hook-and-line gear between the U.S. border and Cape Alava (48°09'30"N latitude), and between Destruction Island (47°40'00"N latitude) and Leadbetter Point (46°38'10"N latitude), of 100 pounds or 30% by weight of all fish on board (including salmon), whichever is greater.
- Harvest guidelines for commercial harvests of all species of rockfish by members of the Makah, Quileute, Hoh, and Quinault Indian tribes will be set annually and reviewed and adjusted as necessary. For 1992, established harvest

guidelines of 51,000 pounds between the U.S.-Canada border and Cape Alava and 10,000 pounds between Destruction Island and Leadbetter Point.

Effective February 25, 1993

- Established a 10,000-pound trip limit for Pacific whiting coastwide (all landings were prohibited beginning January 1).

Effective April 1, 1993 (Approved by NMFS on March 25, 1993)

- Established a flexible starting date for the "regular" season for the fixed gear (nontrawl) sablefish fishery, including 72-hour closed periods both immediately before and immediately after the regular season. The flexible starting date will precede by 3 days the earliest sablefish fixed gear season in the Gulf of Alaska. For 1993, the season opened May 12.

Effective April 15, 1993

- Established a reserve of 30,000 mt of Pacific whiting for vessels delivering whiting to on-shore processing plants. [NOTE: In November 1992, the Council recommended a multi-year framework for allocating the whiting harvest guideline between vessels delivering onshore and those delivering at sea, including factory trawlers. This formula would have allocated the first 50,000 mt shoreside, reserved the next 30,000 mt with priority to shoreside needs, allocated the next 30,000 mt at sea, and any additional amounts would be allocated according to a sliding scale. This recommendation was disapproved by the Commerce Department, and only the 30,000 mt reserve was implemented, as noted above.]
- Established restrictions on the Pacific whiting fishery to reduce bycatch of salmon and rockfish: no at-sea processing south of 42°N latitude; a trip limit of 2,000 pounds of whiting caught inside the 100 fathom contour; no fishing for whiting at night (midnight to one-half hour after official sunrise) south of 42°00' N latitude; no fishing for whiting in the Klamath River salmon conservation zone bounded on the north by 41°38'48"N latitude (approximately 6 nm north of the river mouth), on the west by 124°23'00"W longitude (approximately 12 miles from shore), and on the south by 41°26'48"N latitude (approximately 6 nm south of the river mouth); and no whiting fishing in the Columbia River salmon conservation zone bounded by a line extending for 6 nm due west from North Head along 46°18'00"N latitude to 124°12'18"W longitude, then southerly along a line of 167 True to 46°11'06"N latitude and 124°11'00"W longitude (Columbia River Buoy), then northeast along Red Buoy Line to the tip of the south jetty.
- Starting in 1994, the whiting regular season will begin March 1 off northern California (42°00' to 40°30' N latitude) and remain April 15 elsewhere along the coast.

Announced April 19, 1993

- Under the provisions of Amendment 6, applications for groundfish limited entry permits must be submitted by June 30, 1993 for each vessel qualifying vessel. Permits will be issued based upon the fishing history of qualifying fishing vessels. Each permit will be endorsed for one or more of three gear types (trawl, longline, and fish trap or pot) and in addition, for each gear type, one of four possible types of endorsements ("A", "Provisional A", "B", and "Designated Species 'B'").

Effective April 21, 1993

- Reduced the 2-week cumulative trip limit for yellowtail rockfish caught north of Coos Bay, Oregon (43°21'34"N latitude) from 8,000 to 6,000 pounds (no change to the *Sebastes* complex limit).
- Reduced the cumulative trip limit for the deepwater complex from 45,000 pounds per 2-week period to 60,000 pounds per 4-week period, while maintaining the trawl-caught sablefish limit at 25% of the deepwater complex per landing. Also reduced the thornyhead trip limit from 20,000 pounds cumulative per 2-week period to 35,000 pounds cumulative per 4-week period.

Effective May 4 - August 9, 1993 (Emergency Rule)

- Prohibit further at-sea processing when 100,000 mt had been processed in order to provide 42,000 mt for processing by shoreside processors. Release the 30,000 mt reserve for vessels delivering to shoreside processors.

Effective June 2, 1993

- Closed the "regular season" for sablefish caught with nontrawl gear. On June 5, 1993, the 250-pound daily-trip-limit for sablefish caught with nontrawl gear was reimposed.

Effective September 4, 1993

- Closed the shore-based whiting fishery by reimposing the 10,000-pound trip limit coastwide for Pacific whiting.

Effective September 8, 1993

- Reduced the trip limit for trawl-caught sablefish to the greater of 1,000 pounds, or 25% of the deepwater complex not to exceed 3,000 pounds.

Announced September 20, 1993

- Extended the deadline for submitting applications for groundfish limited entry permits from June 30, 1993 to October 15, 1993.

Effective October 6, 1993

- Increased the cumulative trip limit for bocaccio caught south of Cape Mendocino, California from 10,000 pounds to 15,000 pounds per 2-week period.

Effective December 1, 1993

- Reduced the cumulative trip limit for widow rockfish from 30,000 pounds per 4-week period to no more than 3,000 pounds per vessel per trip, with no limit on the number of trips.
- Reduced the cumulative trip limits for the Dover sole/thornyhead/trawl-caught sablefish (DTS) complex. The previous limit was 60,000 pounds per 4-week period, of which no more than 35,000 pounds could be thornyheads and, in any trip, the limit for trawl-caught sablefish was the greater of 1,000 pounds or 25% of the complex up to 3,000 pounds. The new limit allows no more than 5,000 pounds of species in the DTS complex to be taken, retained, possessed or landed per vessel per trip, of which no more than 1,000 pounds may be sablefish. Only one landing of fish in the DTS complex may be made in any 1-week period.

Effective January 1, 1994

- Divided the commercial groundfish fishery into two components: the limited entry fishery and the open access fishery. A federal limited entry permit is required to participate in the limited entry segment of the fishery. Permits are issued based on the fishing history of qualifying fishing vessels. Each permit will be endorsed for one or more of three gear types (trawl, longline, and fish trap or pot) and in addition, for each gear type, one of four possible types of endorsements ("A", Provisional "A", "B", and "Designated Species B"). Vessels without valid limited entry permits may participate in the open access fishery with any legal groundfish gear except groundfish trawl, subject to any open access trip limits, quotas and harvest guidelines in effect.

Adopted the following management measures for the limited entry fishery in 1994:

Sebastes Complex (Including Yellowtail Rockfish and Bocaccio) cumulative limit of 80,000 pounds per calendar month, of which no more than 14,000 pounds may be yellowtail rockfish caught north of Cape Lookout, Oregon (45°20'15"N latitude), no more than 30,000 pounds may be yellowtail rockfish caught south of Cape Lookout, and no more than 30,000 pounds may be bocaccio caught south of Cape Mendocino, California (40°30'00"N latitude).

Black Rockfish established a trip limit for commercial fishing vessels using hook-and-line gear between the U.S. border and Cape Alava (48°09'30"N latitude), and between Destruction Island (47°40'00"N latitude) and Leadbetter Point (46°38'10" N latitude), of 100 pounds or 30% by weight of all fish on board (including salmon), whichever is greater. Harvest guidelines for commercial harvests of all species of rockfish by members of the Makah, Quileute, Hoh, and Quinault Indian tribes will be set annually and reviewed and adjusted as necessary. For 1992, established harvest guidelines of 51,000 pounds between the U.S.-Canada border and Cape Alava and 10,000 pounds between Destruction Island and Leadbetter Point.

Widow Rockfish cumulative limit of 30,000 pounds per calendar month.

Pacific Ocean Perch trip limit of 3,000 pounds or 20% of all fish on board, whichever is less, in landings of Pacific ocean perch above 1,000 pounds.

Sablefish for management of the sablefish fishery north of the 36°00' N latitude (the northern boundary of the Conception area), deduct 300 mt from the 7,000 mt harvest guideline for the northwest Washington treaty Indian tribes and allocate the remaining 6,070 mt between the limited entry and open access fisheries. The limited entry portion is allocated 3,520 mt (58%) to trawl gear and 2,550 mt (42%) to pot and longline gears.

DTS Complex cumulative limit of 50,000 pounds per month, of which no more than 30,000 pounds may be thornyheads and no more than 12,000 pounds may be trawl-caught sablefish. Sablefish trip limit is 1,000 pounds or 25% of the DTS complex, whichever is greater, and applies to each trip. In any landing, no more than 5,000 pounds of sablefish may be smaller than 22 inches.

Nontrawl sablefish daily-trip-limit of 250 pounds north of 36°00' N latitude and 350 pounds south of 36°00' N latitude through May 11, 1994. Only one landing of sablefish caught with nontrawl gear may be made per day, coastwide. (The regular season started May 15, following a 72-hour closure May 12-14.)

Pacific Whiting trip limit of 10,000 pounds taken before and after the regular season, which begins on March 1 between 42°00' and 40°30' N latitude and on April 15 north of 42°00' N latitude.

Adopted the following management measures for open access gear except trawls in 1994:

Rockfish limit of 10,000 pounds per vessel per trip, not to exceed 40,000 pounds cumulative per month, and the limits for any rockfish species or complex in the limited entry longline or pot fishery must not be exceeded.

Sablefish daily limit of 250 pounds north of 36°00' N latitude and 350 pounds south of 36°00' N latitude. Limit of one landing of sablefish per vessel per day.

Adopted the following management measures for non-groundfish trawls in 1994, in addition to the limits for any groundfish species or complex in the limited entry trawl fishery:

Pink Shrimp cumulative trip limit of 1,500 pounds (multiplied by the number of days of the trip) of groundfish species for any vessel engaged in fishing for pink shrimp.

Spot and Ridgeback Prawns limit of 1,000 pounds of groundfish species per trip for any vessel engaged in fishing for spot and ridgeback prawns.

California Halibut and Sea Cucumber limit of 500 pounds of groundfish species per trip for vessels engaged in fishing for California halibut or sea cucumbers south of Point Arena, California (38°57'30 N latitude). All fishing during the trip must occur south of Point Arena. Landings must contain California halibut or sea cucumbers taken in accordance with California fishing and permit restrictions.

Adopted the following management measures for the recreational fishery in 1994:

California bag limit of five lingcod, no smaller than 22 inches, and 15 rockfish per person per day. Multi-day limits are authorized by a valid permit issued by the State of California and must not exceed the daily limit multiplied by the number of days in the trip.

Oregon bag limit of three lingcod and 15 rockfish per person per day, of which no more than ten may be black rockfish.

Washington (South of Leadbetter Point (46°38'10"N latitude) bag limit of three lingcod and 15 rockfish per person per day.

Washington (North of Leadbetter Point): bag limit of 3 lingcod and 12 rockfish per person per day.

Effective April 1, 1994

- Extended for an additional 14 days, from April 1, 1994 to April 15, 1994, the 3-month suspension of the vessel size endorsement requirement for vessels operating in the limited entry fishery for Pacific groundfish.

Effective April 8, 1994

- Allocated the Pacific whiting harvest guideline between fishing vessels that either catch and process at sea or catch and deliver to at-sea processors, and fishing vessels that deliver to processors located on shore. In 1994, 1995 and 1996, after 60% of the annual harvest guideline is taken, the at-sea whiting fishery will be closed. The remaining 40% (104,000 mt in 1994) will be reserved initially for fishing vessels delivering to shore-based processors. On or about August 15, any amount of the harvest guideline not needed by the shoreside sector during the remainder of the year will be made available to the at-sea sector.
- Established requirements for combining two or more limited entry permits endorsed with vessel lengths from smaller vessels into a single limited entry permit endorsed with a larger length for use with a single vessel.

Effective May 1, 1994

- Changed trip limit for rockfish taken with setnet gear off California. The 10,000-pound trip limit for rockfish caught with setnets, which applied to each trip, was removed. The 40,000-pound cumulative limit that applies per calendar month remains in effect.

Effective May 13, 1994

- After noon on May 13, 1994, closed the at-sea whiting fishery.

Effective May 15, 1994

- Opened regular season for the nontrawl sablefish fishery off Washington, Oregon, and California for limited entry permitted vessels with longline and/or pot endorsements. Current trip limits continued until 0001 hours (local time) May 12, 1994, which marked the beginning of a 72-hour closure of the fishery for vessels operating in the regular season. Effective May 15, 1994 at 0001 hours (local time), the only trip limit in effect for sablefish caught with nontrawl gear is

1,500 pounds or 3% of all legal sablefish on board, whichever is greater, for sablefish smaller than 22 inches. Sablefish trip limits for open access gears did not change.

Effective June 4, 1994

- Closed nontrawl sablefish limited entry fishery off Washington, Oregon and California with a 72-hour closure beginning at 0001 hours (local time) June 4 and ending at 2400 hours (local time) June 6. During the closure, the taking and retaining, possessing or landing of sablefish taken with nontrawl gear by a vessel operating in the limited entry fishery was prohibited.

Effective July 1, 1994

- Reduced the trip limits for Dover sole, thornyheads, and trawl-caught sablefish (DTS complex) in the groundfish fishery off Washington, Oregon and California. The new cumulative limit is 30,000 pounds of the DTS complex per vessel per calendar month, of which no more than 8,000 pounds may be thornyheads and no more than 6,000 pounds may be trawl-caught sablefish. In any trip, no more than 1,000 pounds or 33.333% of the legal thornyheads and Dover sole, whichever is greater, may be trawl-caught sablefish smaller than 22 inches. (This is the equivalent of 25% of the DTS complex.)

Effective September 1, 1994

- Increased the cumulative trip limit for the *Sebastes* complex caught south of Cape Mendocino, California (40°30'00" N latitude) in the limited entry groundfish fishery from 80,000 pounds to 100,000 pounds per calendar month.

Effective October 1, 1994

- Release 16,000 mt of whiting from the shorebased reserve and made it available for at-sea processing.

Effective October 5, 1994

- Prohibit further at-sea processing for the remainder of the year (16,000 mt reserve release projected to be taken at 2 p.m.)

Effective December 1, 1994

- Prohibited all commercial sablefish fishing north of 36°N latitude; reduced the monthly cumulative trip limit number for Dover sole to 6,000 pounds north of 36°N latitude; reduced the thornyhead monthly cumulative trip limit to 1,500 pounds north of 36°N latitude; and reduced the widow rockfish trip limit to 3,000 pounds per trip coastwide.

Effective January 1, 1995

Adopted the following management measures for the limited entry fishery in 1995:

Sebastes Complex (Including Yellowtail Rockfish and Bocaccio) cumulative limit of 35,000 pounds per calendar month north of Cape Lookout, Oregon (45°20'15"N latitude), 50,000 pounds per month between Cape Lookout and Cape Mendocino, California (40°30'00"N latitude), and 100,000 pounds per month south of Cape Mendocino. Within the cumulative monthly limits for the *Sebastes* complex, no more than 14,000 pounds may be yellowtail rockfish caught north of Cape Lookout, Oregon, no more than 30,000 pounds may be yellowtail rockfish caught between Cape Lookout and Cape Mendocino, and no limit south of Cape Mendocino (other than the limit on the *Sebastes* complex). For bocaccio, the cumulative limit is 30,000 pounds per month south of Cape Mendocino, and no limit north of Cape Mendocino (other than the limit on the *Sebastes* complex). For canary rockfish, the cumulative yellowtail rockfish is 6,000 pounds per month coastwide.

Black Rockfish continued the trip limit for commercial fishing vessels using hook-and-line gear between the U.S. border and Cape Alava (48°09'30" N latitude), and between Destruction Island (47°40'00"N latitude) and Leadbetter Point (46°38'10"N latitude), of 100 pounds or 30% by weight of all fish on board (including salmon), whichever is greater. Harvest guidelines for commercial harvest of black rockfish by members of the Makah, Quileute, Hoh, and Quinault Indian tribes: 20,000 pounds between the U.S.-Canada border and Cape Alava and 10,000 pounds between Destruction Island and Leadbetter Point.

Widow Rockfish cumulative limit of 30,000 pounds per calendar month.

Pacific Ocean Perch established a cumulative trip limit of 6,000 pounds per month.

Sablefish for management of the sablefish fishery north of the 36°00' N latitude (the northern boundary of the Conception area), deduct 780 mt from the 7,100 mt harvest guideline for the northwest Washington treaty Indian tribes and allocate the remaining 6,320 mt between the limited entry and open access fisheries. The limited entry portion is allocated 3,420 mt (58%) to trawl gear and 2,480 mt (42%) to pot and longline gears.

Dover sole, thornyheads, and trawl-caught sablefish (DTS) complex cumulative limit of 35,000 pounds per month north of Cape Mendocino, California and 50,000 pounds per month south of Cape Mendocino; within the DTS complex limit, not more than 20,000 pounds may be thornyheads, of which not more than 4,000 pounds per month may be shortspine thornyhead. For trawl-caught sablefish, the cumulative limit is 6,000 pounds per month including a trip limit of 1,000 pounds or 25% of the DTS complex, whichever is greater, per trip. In any landing, no more than 500 pounds of sablefish may be smaller than 22 inches.

Nontrawl sablefish daily-trip-limit of 300 pounds north of 36°00' N latitude and 350 pounds south of 36°00' N latitude. Only one landing of sablefish caught with nontrawl gear may be made per day, coastwide. (The regular season started August 6, following a 24 to 72 hour closure).

Lingcod commercial trip and size limits are imposed for the first time in 1995. The cumulative limit for lingcod is 20,000 pounds per month. No lingcod may be smaller than 22 inches (total length).

Pacific Whiting trip limit of 10,000 pounds taken before and after the regular season, which begins on March 1 between 42°00' N latitude and 40°30' N latitude and on April 15 north of 42°00' N latitude.

Adopted the following management measures for open access gear except trawls in 1995:

Rockfish the cumulative limit is 35,000 pounds per month north of Cape Lookout and 40,000 pounds per month south of Cape Lookout, including a coastwide trip limit for hook-and-line and pot gear of 10,000 pounds per of rockfish per trip.

Sablefish daily limit of 300 pounds north of 36°00' N latitude and 350 pounds south of 36°00' N latitude. Limit of one landing of sablefish per vessel per day, and daily-trip-limits may not be accumulated.

Adopted the following management measures for certain non-groundfish pots (traps) and trawls in 1995, in addition to the limits for any groundfish species or complex in the limited entry fishery:

Pink Shrimp cumulative trip limit of 1,500 pounds (multiplied by the number of days of the trip) of groundfish species for any vessel engaged in fishing for pink shrimp.

Spot and Ridgeback Prawns limit of 1,000 pounds of groundfish species per trip for any vessel engaged in fishing for spot and ridgeback prawns.

California Halibut and Sea Cucumber limit of 500 pounds of groundfish species per trip for vessels engaged in fishing for California halibut or sea cucumbers south of Point Arena, California (38°57'30 N latitude). All fishing during the trip must occur south of Point Arena. Landings must contain California halibut of a size required at California Department of Fish and Game Code Section 8392(a), or sea cucumbers taken in accordance with California Department of Fish and Game Code Section 8396 which requires a state permit.

Adopted the following management measures for fishing in areas with different trip limits for the same species:

Trip limits for a species or species complex may differ in different geographic areas along the coast. The following "crossover" provisions apply to all vessels (limited entry and open access) operating in different geographical areas with different cumulative or "per trip" limits for the same species, except for species with daily-trip-limits (nontrawl sablefish), black rockfish off Washington state, or those otherwise exempted by a State declaration procedure (yellowtail rockfish and the *Sebastes* complex off Washington and Oregon).

If a vessel fishes (for any species) in an area where a more restrictive trip limit applies, then the vessel is subject to the more restrictive trip limit for the entire period to which that trip limit applies, no matter where the fish are taken and retained, possessed, or landed. Similarly, if a vessel takes and retains a species (or species complex) in an area where a higher trip limit (or no trip limit) applies, and possesses or lands that species (or species complex) in an area where a more restrictive trip limit applies, then that vessel is subject to the more restrictive trip limit for that trip limit period.

Adopted the following management measures for the recreational fishery in 1995:

California bag limit of 5 lingcod, no smaller than 22 inches, and 15 rockfish per person per day. Multi-day limits are authorized by a valid permit issued by the State of California and must not exceed the daily limit multiplied by the number of days in the trip.

Oregon bag limit of 3 lingcod, no smaller than 22 inches, and 15 rockfish per person per day, of which no more than 10 may be black rockfish.

Washington (South of Leadbetter Point (46°38'10" N latitude) bag limit of 3 lingcod, no smaller than 22 inches, and 15 rockfish per person per day.

Washington (North of Leadbetter Point): bag limit of 3 lingcod, no smaller than 22 inches, and 12 rockfish per person per

day.

Effective February 17, 1995 (Temporary rule through August 3, 1995)

- Delayed the opening of the 1995 "regular" nontrawl sablefish season until completion of the proposed regulation to modify the season opening date and management structure. (Under the framework regulation currently governing the fishery, the nontrawl sablefish regular season would start February 26, preceded by a 72-hour closure beginning February 23. This regulation tied the opening date to the Alaska season, which was changed to open March 1.)

Effective March 13, 1995 (Regulatory Amendment)

- Modified the marking requirements for commercial vertical hook-and-line gear that is closely tended by requiring only a single buoy clearly identifying the vessel's owner or operator.

Effective April 1, 1995

- Reduced the cumulative monthly limit of the two thornyhead species to 15,000 pounds, not more than 3,000 pounds of which may be shortspine thornyhead. The cumulative limits for the DTS complex north and south of Cape Mendocino remain at 35,000 pounds and 50,000 pounds, respectively.

Effective May 1, 1995

- Increased the harvest guideline for sablefish by 700 mt to 7,800 mt to correct 1994 landings estimate. The open access allocation becomes 463 mt. The limited entry allocation becomes 6,557 mt with 3,803 mt (58%) allocated to trawl gear and 2,754 mt (42%) allocated to nontrawl gears.
- The cumulative monthly trip limit for trawl-caught sablefish increased from 6,000 pounds to 7,000 pounds.
- The yellowtail rockfish cumulative monthly limit increased from 14,000 pounds to 18,000 pounds north of Cape Lookout, Oregon and 30,000 pounds to 40,000 pounds between Cape Lookout and Cape Mendocino, California.
- For the recreational fishery, the daily bag limit off Washington changed to 10 rockfish off the entire Washington coast.
- Lingcod conversion factors announced: 22 inches (56 cm) total length corresponds to 18 inches (46 cm) for lingcod that are "heads off." The current 20,000 pounds (9,072 kg) cumulative monthly trip limit corresponds to 13,333 pounds (6,048 kg) for headed and gutted lingcod, and 18,183 pounds (8,246 kg) for lingcod that are only gutted. Headed and gutted lingcod are measured from the front of the dorsal fin, where it meets the dorsal surface of the body closest to the head, to the tip of the upper lobe of the tail; the dorsal fin and tail must be intact.

Effective May 4, 1995

- At 2 p.m. May 4, closed the at-sea fishery for Pacific whiting.

Effective July 14, 1995

- Increased the monthly cumulative trip limit for widow rockfish from 30,000 pounds to 45,000 pounds.
- Removed the trip limit that required trawl-caught sablefish to comprise no more than 1,000 pounds or one third of the Dover sole and thornyheads. The 7,000-pound monthly cumulative trip limit, which includes a limit of 500 pounds of sablefish smaller than 22 inches per trip, remains in effect.

Effective July 14, 1995 (Regulatory Amendment)

- Delayed the opening date of the limited entry nontrawl sablefish "regular" season and establish a new season structure. The regular season will begin on August 6 and is designed to close when 70% of the limited entry nontrawl harvest guideline is reached. Due to the short nature of the fishery, the closing date will be determined and announced in advance. The 1995 closure date was August 13 at noon. Prior to the start of the season, sablefish taken with fixed gear in the limited entry or open access fishery may not be retained from noon August 3 until noon August 6. In addition, all fixed gear (open access and limited entry) used to take and retain groundfish must be out of the water from noon August 3 until noon August 6, except that pot gear may be baited and deployed after noon on August 5. When the regular season ends at noon August 13, the daily-trip-limit will be reestablished. About 3 weeks after the end of the regular season, if an adequate amount of the nontrawl allocation remains, the limited entry fishery may resume for a one-month "mop-up season" under a cumulative monthly trip limit for each vessel. This would be followed by resumption of the small daily-trip-limits.

Effective July 24, 1995

- Closed the "regular" shorebased fishery for Pacific whiting by reimposing the 10,000-pound trip limit coastwide (the whiting harvest guideline was reached).

Effective August 1, 1995

- Increased the monthly cumulative trip limit for canary rockfish from 6,000 pounds (2,722 kg) to 9,000 pounds (4,082 kg). The *Sebastes* complex limit was not increased.
- Established a 100-pound (45 kg) trip limit for lingcod smaller than 22 inches (56 cm) taken by trawl gear. This 100-pound trip limit corresponds to 91 pounds (41 kg) of lingcod smaller than 22 inches that are gutted (with head on) and 67 pounds (30 kg) of lingcod smaller than 22 inches that are headed and gutted.

Effective August 3, 1995 (see July 14 regulatory amendment, above)

- Sablefish taken with fixed gear in the limited entry or open access fishery may not be retained from noon August 3 until noon August 6. In addition, all fixed gear (open access and limited entry) used to take and retain groundfish must be out of the water from noon August 3 until noon August 6, except that pot gear may be baited and deployed after noon on August 5.

Effective August 6, 1995

- The regular nontrawl sablefish season opened at noon, August 6. During the regular season, the only trip limit in effect applies to sablefish smaller than 22 inches (56 cm) total length, which prohibits taking and retaining, possessing, or landing more than 1,500 pounds (680 kg) or 3% of all sablefish on board, whichever is greater, and applies per vessel per trip.

Effective August 13, 1995

- Closed the regular nontrawl sablefish season at noon; daily-trip-limit of 300 pounds (350 pounds in the Conception management area) resumes.

Effective September 1, 1995

- Reduced the thornyhead portion of the DTS complex cumulative monthly limit from 15,000 pounds, no more than 3,000 pounds of which may be shortspine thornyhead, to 8,000 pounds, no more than 1,500 pounds of which may be shortspine thornyhead. DTS and trawl-caught sablefish limits remain unchanged.
- Established a one-month cumulative trip limit of 5,500 pounds of sablefish per vessel with a valid limited entry permit with longline or pot endorsement. On October 1, 1995 the daily-trip-limit of 300 pounds (350 pounds in the Conception management area) resumes.

Effective September 8, 1995

- The trawl minimum mesh size now applies throughout the net; removed the legal distinction between bottom and roller trawls and the requirement for continuous riblines; clarified the distinction between bottom and pelagic (midwater) trawls; modified chafing gear requirements; changed the term "double-ply mesh" to "double-bar mesh."

Effective November 30, 1995

- Prohibit further landings of thornyheads and trawl-caught sablefish for the remainder of the year, and reduce the cumulative monthly limit of Dover sole to 3,000 pounds per vessel.

Effective January 1, 1996

Adopted the following management measures for the limited entry fishery in 1996:

- For the limited entry fishery, established cumulative vessel limits for specified 2-month periods, rather than 1-month periods, with the target harvest level per month being 50% of the 2-month limit. However, vessels could land as much as 60% of the 2-month limit during either of the two months, so long as the total would not exceed the specified limit. The specified periods were January-February, March-April, May-June, July-August, September-October, and November-December. All weights are round weight or round weight equivalents, unless otherwise specified.

- *Sebastes* Complex (Including Yellowtail Rockfish and Bocaccio) cumulative limit of 70,000 pounds per specified 2-month period north of Cape Lookout, Oregon (45°20'15"N latitude), 100,000 pounds per 2-months between Cape Lookout and Cape Mendocino, California (40°30'00"N latitude), and 200,000 pounds per 2-months south of Cape Mendocino. Within the cumulative 2-month limits for the *Sebastes* complex, no more than 32,000 pounds may be yellowtail rockfish caught north of Cape Lookout, Oregon, no more than 70,000 pounds may be yellowtail rockfish caught between Cape Lookout and Cape Mendocino, and no limit south of Cape Mendocino (other than the limit on the *Sebastes* complex). For bocaccio, the cumulative limit is 60,000 pounds per 2-months south of Cape Mendocino, and no limit north of Cape Mendocino (other than the limit on the *Sebastes* complex). For canary rockfish, the limit is 18,000 pounds per 2-months coastwide.

- Widow Rockfish cumulative limit of 70,000 pounds per specified two-month period.

- Pacific Ocean Perch cumulative trip limit of 10,000 pounds per two-month period.

- Dover sole, thornyheads, and trawl-caught sablefish (DTS) complex cumulative limit of 70,000 pounds per 2-month period north of Cape Mendocino, California and 100,000 pounds per 2-months south of Cape Mendocino; within the DTS complex limit, not more than 20,000 pounds may be thornyheads, of which not more than 4,000 pounds per 2-months may be shortspine thornyhead. For trawl-caught sablefish, the cumulative limit is 12,000 pounds per 2-months. In any landing, no more than 500 pounds of sablefish may be smaller than 22 inches.

- Lingcod the cumulative limit for lingcod should be 40,000 pounds per 2-month period. No lingcod may be smaller than 22 inches (56 cm) (total length) or 18 inches (46 cm) for lingcod that are "heads off." The 40,000 pounds cumulative limit corresponds to 26,666 pounds for headed and gutted lingcod, and 36,366 pounds for lingcod that are only gutted. Headed and gutted lingcod are measured from the front of the dorsal fin, where it meets the dorsal surface of the body closest to the head, to the tip of the upper lobe of the tail; the dorsal fin and tail must be intact. There is a 100-pound (45 kg) trip limit for lingcod smaller than 22 inches (56 cm) taken by trawl gear. This 100-pound trip limit corresponds to 91 pounds (41 kg) of lingcod smaller than 22 inches that are gutted (with head on) and 67 pounds (30 kg) of lingcod smaller than 22 inches that are headed and gutted.

- Pacific Whiting trip limit of 10,000 pounds taken before or after the regular season or inside the 100 fathom contour in the Eureka area.

- Nontrawl sablefish outside the regular derby and mop-up seasons, a daily-trip-limit of 300 pounds north of 36°00' N latitude and 350 pounds south of 36°00' N latitude. Only one landing of sablefish caught with nontrawl gear may be made per day, coastwide. During the derby and mop-up seasons, there is a per trip limit on the amount of sablefish that may be smaller than 22 inches total length (or 15.5 inches heads off): the amount of small sablefish may not exceed 1,500 pounds round weight or 3% of the sablefish larger than 22 inches, whichever is greater. The product recovery ratio (PRR) established by the state where the fish is or will be landed will be used to convert the processed weight to round weight for the purposes of applying the trip limit; the PRR currently is 1.6 in Washington, Oregon, and California.

Adopted the following management measures for open access gear except trawls (may not exceed 50% of any 2-month cumulative limit or any other limit for the limited entry fishery for any groundfish species or complex for the same area or gear):

- Rockfish the cumulative limit is 35,000 pounds per month north of Cape Lookout and 40,000 pounds per month south of Cape Lookout, including a coastwide trip limit for hook-and-line and pot gear of 10,000 pounds per of rockfish per trip.

- Thornyheads daily limit of 50 pounds coastwide. Limit of one landing of thornyheads per vessel per day, and daily-trip-limits may not be accumulated.

  Sablefish daily limit of 300 pounds north of 36°00' N latitude and 350 pounds south of 36°00' N latitude. Limit of one landing of sablefish per vessel per day, and daily-trip-limits may not be accumulated.

Adopted the following management measures for open access (non-groundfish) trawls in 1996, in addition to the limits for any groundfish species or complex in the limited entry fishery:

- Pink Shrimp cumulative trip limit of 1,500 pounds (multiplied by the number of days of the trip) of groundfish species for any vessel engaged in fishing for pink shrimp.

- Spot and Ridgeback Prawns limit of 1,000 pounds of groundfish species per trip for any vessel engaged in fishing for spot and ridgeback prawns.

- California Halibut and Sea Cucumber limit of 500 pounds of groundfish species per trip for vessels engaged in fishing for California halibut or sea cucumbers south of Point Arena, California (38°57'30 N latitude). All fishing during the trip must occur south of Point Arena. Landings must contain California halibut of a size required at California Department of Fish and Game Code Section 8392(a), or sea cucumbers taken in accordance with California Department of Fish and Game Code Section 8396 which requires a state permit.

Adopted the following management measures for fishing in areas with different trip limits for the same species:

- Trip limits for a species or species complex may differ in different geographic areas along the coast. The following "crossover" provisions apply to all vessels (limited entry and open access) operating in different geographical areas with different cumulative or "per trip" limits for the same species, except for species with daily-trip-limits (nontrawl sablefish, open access thornyheads), black rockfish off Washington State, or those otherwise exempted by a State declaration procedure (yellowtail rockfish and the *Sebastes* complex off Washington and Oregon).

- If a vessel fishes (for any species) in an area where a more restrictive trip limit applies, then the vessel is subject to the more restrictive trip limit for the entire period to which that trip limit applies, no matter where the fish are taken and retained, possessed, or landed. Similarly, if a vessel takes and retains a species (or species complex) in an area where a higher trip limit (or no trip limit) applies, and possesses or lands that species (or species complex) in an area where a

more restrictive trip limit applies, then that vessel is subject to the more restrictive trip limit for that trip limit period. In 1996, the trip limit period for most major groundfish species is two months.

Adopted the following management measures for the recreational fishery in 1996 (no change from 1995):

California bag limit of five lingcod, no smaller than 22 inches, and 15 rockfish per person per day. Multi-day limits are authorized by a valid permit issued by the State of California and must not exceed the daily limit multiplied by the number of days in the trip.

Oregon bag limit of three lingcod, no smaller than 22 inches, and 15 rockfish per person per day, of which no more than ten may be black rockfish.

Washington bag limit of three lingcod, no smaller than 22 inches, and ten rockfish per person per day.

Effective May 2, 1996

- Defined certain trip limits as routine management measures: for the open access fishery, trip limits for all groundfish, separately or in any combination; for the limited entry fishery, trip and size limits for lingcod, and trip limits for canary rockfish, shortspine thornyheads, and longspine thornyheads.

Effective April 15, 1996

- Delay the opening date of the Pacific whiting season from April 15 to May 15.
- Delay the opening date of the regular limited entry nontrawl sablefish fishery ("derby") from August 6 to September 1.

Effective May 3, 1996

- Prohibited further landings of thornyheads by vessels fishing with open access gear and landing north of Point Conception; established a cumulative monthly limit of 2,100 pounds of sablefish for vessels fishing with open access gear north of the Conception management area (i.e., north of 36°N latitude). The 300-pound daily-trip-limit remained in effect.

Effective May 15, 1996

- Establish the Pacific whiting ABC at 265,000 mt and the harvest guideline at 212,000 mt.

Effective June 1, 1996

- Closed the at-sea fishery for Pacific whiting at noon.

Effective May 31, 1996

- Established a framework for establishing groundfish allocations for tribal fisheries; established a 15,000 mt allocation of Pacific whiting for the Makah tribe.

Effective July 1, 1996

- Reduced the cumulative 2-month limit for Pacific ocean perch to 8,000 pounds, and established the cumulative 2-month limit for Dover sole north of Cape Mendocino at 38,000 pounds.

Effective September 1, 1996

- Reduced the cumulative 2-month limits for yellowtail rockfish north of Cape Lookout from 32,000 pounds to 20,000 pounds and widow rockfish coastwide from 70,000 pounds to 50,000 pounds.

Effective September 6, 1996

- Closed the limited entry nontrawl sablefish "derby" at noon by re-establishing the 300-pound daily-trip-limit north of 36°N latitude and 350-pound daily-trip-limit south of 36°N latitude.

Effective September 11, 1996

- Closed the "regular" shore-based fishery for Pacific whiting by reimposing the 10,000-pound trip limit coastwide (the whiting harvest guideline was reached).

Effective November 1, 1996

Reduced the cumulative limit for yellowtail rockfish north of Cape Lookout, Oregon (45°20'15"N latitude) to 6,000 pounds per month effective November 1 in an effort to keep landings within 10% of the harvest guideline. All *Sebastes* limits north of Cape Mendocino will be one-month cumulative limits to maintain the continuity of the Cape Lookout declaration option. The cumulative trip limit for the *Sebastes* complex taken and retained north of Cape Lookout is 35,000 pounds per month, of which no more than 6,000 pounds may be yellowtail rockfish and no more than 9,000 pounds may be canary rockfish. The 6,000-pound limit does not apply to the area between Cape Lookout and Cape Mendocino, California. The cumulative trip limit for the *Sebastes* complex taken between Cape Mendocino and Cape Lookout is 50,000 pounds per month, of which no more than 35,000 pounds may be yellowtail rockfish and no more than 9,000 pounds may be canary rockfish. For widow rockfish, the monthly cumulative limit takes effect November 1 also and will be half the previous two-month limit. Thus, the widow limit will be 25,000 pounds coastwide.

Effective January 1, 1997

Adopted the following management measures for the limited entry fishery in 1997:

- For the limited entry fishery, cumulative vessel limits for specified two-month periods, with the target harvest level per month being 50% of the two-month limit. However, vessels could land as much as 60 % of the two-month limit during one of the two months, so long as the total would not exceed the specified limit. The specified periods were January-February, March-April, May-June, July-August, September-October, and November-December. All weights are round weight or round weight equivalents, unless otherwise specified.

- *Sebastes* Complex (Including Yellowtail Rockfish and Bocaccio) cumulative limit of 30,000 pounds per specified 2-month period north of Cape Mendocino, California (40°30'00" N latitude), and 150,000 pounds per two-months south of Cape Mendocino. Within the cumulative 2-month limits for the *Sebastes* complex, no more than 6,000 pounds may be yellowtail rockfish caught north of Cape Mendocino, and no limit south of Cape Mendocino (other than the limit on the *Sebastes* complex). For bocaccio, the cumulative limit is 12,000 pounds per 2-months south of Cape Mendocino, and no limit north of Cape Mendocino (other than the limit on the *Sebastes* complex). For canary rockfish, the limit is 14,000 pounds per two-months coastwide.

- Widow Rockfish cumulative limit of 70,000 pounds per specified two-month period.

- Pacific Ocean Perch cumulative trip limit of 8,000 pounds per two-month period.

- Dover sole, thornyheads, and trawl-caught sablefish (DTS) complex cumulative limit of 70,000 pounds per two-month period north of Cape Mendocino, California and 100,000 pounds per two-months south of Cape Mendocino; within the DTS complex limit, not more than 20,000 pounds may be thornyheads, of which not more than 4,000 pounds per two-months may be shortspine thornyhead. For trawl-caught sablefish, the cumulative limit is 12,000 pounds per two-months. In any landing, no more than 500 pounds of sablefish may be smaller than 22 inches. For Dover sole north of Cape Mendocino, the cumulative limit will be 38,000 pounds per two months.

- Lingcod cumulative limit of 40,000 pounds per two-month period. No lingcod may be smaller than 22 inches (56 cm) (total length) or 18 inches (46 cm) for lingcod that are "heads off, " except for lingcod caught with trawl gear. (There is a 100-pound (45 kg) trip limit for lingcod smaller than 22 inches (56 cm) taken by trawl gear. This 100-pound trip limit corresponds to 91 pounds (41 kg) of lingcod smaller than 22 inches that are gutted (with head on) and 67 pounds (30 kg) of lingcod smaller than 22 inches that are headed and gutted). The 40,000 pounds cumulative limit corresponds to 26,666 pounds for headed and gutted lingcod, and 36,364 pounds for lingcod that are only gutted. Headed and gutted lingcod are measured from the front of the dorsal fin, where it meets the dorsal surface of the body closest to the head, to the tip of the upper lobe of the tail; the dorsal fin and tail must be intact.

- Pacific Whiting trip limit of 10,000 pounds taken before or after the regular season or inside the 100 fathom contour in the Eureka area.

- Nontrawl sablefish in 1997 the derby north of 36°N latitude will be replaced by a 3-week cumulative limit that will open sometime between August 1 and September 30. A sablefish endorsement will be required for participation in the cumulative fishery, and vessels without endorsements may not fish for or land sablefish during the 3-week season or subsequent mop-up season, if any. There will be a 48-hour closure before and after the three-week season. Outside the 3-week cumulative season, the mop-up season and associated closures, there will be a daily-trip-limit of 300 pounds (round weight), and only one landing of sablefish caught with nontrawl gear may be made per day. South of 36° N latitude there will be no cumulative or mop-up seasons; there will be a daily-trip-limit of 350 pounds (round weight), and only one landing of sablefish caught with nontrawl gear may be made per day. During the 3-week cumulative and mop-up seasons north of 36° N latitude, there is a per trip limit on the amount of sablefish that may be smaller than 22 inches total length (or 15.5 inches heads off): the amount of small sablefish may not exceed 1,500 pounds round weight or 3% of the sablefish larger than 22 inches, whichever is greater. The product recovery ratio (PRR) established by the state where the fish is or will be landed will be used to convert the processed weight to round weight for the purposes of applying the trip limit; the PRR currently is 1.6 in Washington, Oregon, and California.

Adopted the following management measures for open access gear except trawls (may not exceed 50% of any two-month

cumulative limit or any other limit for the limited entry fishery for any groundfish species or complex that applies to the same area or gear):

- Rockfish cumulative limit of 40,000 pounds per month coastwide, including a trip limit for hook-and-line and pot gear of 10,000 pounds per of rockfish per trip, which includes, south of Cape Mendocino, a trip limit of 300 pounds bocaccio not to exceed 2,000 pounds cumulative per month. Setnets, which are legal gear only south of 38°N latitude, will be subject to the 40,000-pound monthly cumulative limit but not the per trip limit, and will have a cumulative limit of 4,000 pounds of bocaccio per month.

- Thornyheads north of Point Conception, no retention of thornyheads. South of Point Conception, daily limit of 50 pounds. Limit of one landing of thornyheads per vessel per day, and daily-trip-limits may not be accumulated.

- Sablefish daily limit of 300 pounds north of 36°N latitude and 350 pounds south of 36° N latitude. Limit of one landing of sablefish per vessel per day, and daily-trip-limits may not be accumulated. North of 36° N latitude, there will also be a cumulative limit of 1,500 pounds per month.

Adopted the following management measures for open access (non-groundfish) trawls in 1997, in addition to the limits for any groundfish species or complex in the limited entry fishery:

- Pink Shrimp cumulative trip limit of 500 pounds (multiplied by the number of days of the trip) of groundfish species for any vessel engaged in fishing for pink shrimp. In addition, not more than 300 pounds per trip may be sablefish and not more than one landing per day may include sablefish. NOTE: vessels using shrimp gear may not exceed half the limited entry two-month cumulative limits in a month, and thus are limited to 3,000 pounds of yellowtail rockfish and 6,000 pounds of sablefish per month.

- Spot and Ridgeback Prawns limit of 500 pounds of groundfish species per trip for any vessel engaged in fishing for spot and ridgeback prawns, including not more than 300 pounds of sablefish per trip, and not more than one landing of sablefish per day.

- California Halibut and Sea Cucumber limit of 500 pounds of groundfish species per trip for vessels engaged in fishing for California halibut or sea cucumbers south of Point Arena, California (38°57'30" N latitude). All fishing during the trip must occur south of Point Arena. Landings must contain California halibut of a size required at California Department of Fish and Game Code Section 8392(a), or sea cucumbers taken in accordance with California Department of Fish and Game Code Section 8396 which requires a state permit. Not more than 300 pounds per trip per day may be sablefish.

Adopted the following management measures for the recreational fishery in 1997

- California bag limit of five lingcod, no smaller than 22 inches, and 15 rockfish per person per day. Multi-day limits are authorized by a valid permit issued by the State of California and must not exceed the daily limit multiplied by the number of days in the trip.

- Oregon bag limit of three lingcod, no smaller than 22 inches, and 15 rockfish per person per day, of which no more than ten may be black rockfish.

- Washington bag limit of three lingcod, no smaller than 22 inches, and ten rockfish per person per day.

Effective May 1, 1997

- *Sebastes* Complex (Including Yellowtail Rockfish and Bocaccio) reduced the two-month cumulative limit on bocaccio to 10,000 pounds south of Cape Mendocino.

- Widow Rockfish cumulative limit reduced to 60,000 pounds per specified two-month period.

- Non-trawl sablefish daily-trip-limit fishery limited to 5,100 pounds per month north of 36° N latitude.

- Dover sole, thornyheads, and trawl-caught sablefish (DTS) complex cumulative two-month limit for Dover Sole north of Cape Mendocino reduced to 30,000 pounds. Reduction in overall limit for thornyheads to 15,000 pounds, reduction in two-month cumulative limit on shortspines to 3,000 pounds. The cumulative limits for the whole complex will also be reduced to 57,000 pounds per two months north of Cape Mendocino.

- Open Access south of Cape Mendocino, trip limit reduction for hook-and-line and trap gear for Bocaccio from 300 pounds to 250 pounds with no change to the monthly trip limit (2000 pounds).

Effective May 14, 1997

- Set allocation of the commercial whiting harvest guideline among the nontribal sectors at: 42% shoreside, 24% for mothership sector, and 34% for catcher/processor, Set framework for setting whiting primary season opening dates (For

1997: Catcher/processor, May 15, 1997; mothership, May 15, 1997; and shore-based, June 15, 1997), and allows for processing fish waster at sea by a "waste processing vessel."

Effective May 27, 1997

- Temporary closure of the unrestricted primary season for whiting south of 42° N latitude, and reimposition of 10,000-pound trip limit until June 15, 1997 at 0001 hours.

Effective June 1, 1997

- Closed mothership fishery for whiting at 3 p.m.

Effective June 11, 1997

- Closed at-sea (catcher-processor) fishery for Pacific whiting at noon.

Effective July 1, 1997

- Reduced the 2-month cumulative limit for lingcod from 40,000 pounds to 30,000 pounds.
- Reduced monthly cumulative limit for fixed gear sablefish daily-trip-limit fishery North of 36°N latitude from 5,100 pounds to 600 pounds.
- Reduced the cumulative limit for fixed gear sablefish open-access north of 36°N latitude from 1,500 pounds to 600 pounds.

Effective July 28, 1997

- Requirement for a sablefish endorsement on limited entry permits for permit holders to participate in the regular and mop-up limited entry fixed gear sablefish fishery north of 36°N latitude

Effective August 21, 1997

- Set dates for the 1997 fixed gear limited entry sablefish season for August 25 at noon through September 3 at noon, with an equal cumulative limit of 34,100 pounds and a pre-and post season 48 hour closure. For 1998 and beyond, a framework is established that allows the start date of the regular, north of 36°N latitude limited entry fixed gear sablefish season to be set for any day from August 1 through September 30.

Effective August 22, 1997

- Closed the shore-based fishery for Pacific whiting, and reimposed the 10,000-pound trip limit (shore-based allocation met).

Effective September 1, 1997

- Change from 2-month cumulative limits to 1-month cumulative limits for Dover Sole, thornyheads, and trawl-caught sablefish. Authorized fixed gear sablefish fishers in the daily-trip-limit fishery South of 36°N latitude to make one landing per week above the 350-pound daily-trip-limit but not more than 1,050 pounds (this was designed to help vessels making longer trips reduce their discard). A fisher may not make a landing larger than 350 pounds and then continue to land sablefish under the daily-trip-limit for the rest of the week.

Effective October 1, 1997

- Fixed gear limited entry sablefish mop-up season begins October 1 at noon through October 15 at noon. Vessels may land one cumulative limit of 8,500 pounds. Following the mop-up fishery, fixed-gear limited entry daily-trip-limits will be 300 pounds per day, with an increased 1,500-pound monthly limit.

- *Sebastes* Complex (Including Yellowtail Rockfish and Bocaccio) changed from two-month limits to one-month limits for *Sebastes*. Increase *Sebastes* one month limits to 20,000 pounds north of Cape Mendocino and 75,000 pounds south of Cape Mendocino, no more than 5,000 pounds of which may be yellowtail rockfish north of Cape Mendocino, no more than 5,000 pounds of which may be bocaccio south of Cape Mendocino, and no more than 10,000 pounds of which may be canary rockfish coastwide.

- Dover sole, thornyheads, and trawl-caught sablefish (DTS) complex reduced monthly limit for the DTS complex to 11,000 pounds north of Cape Mendocino and 39,500 pounds south of Cape Mendocino. Within these limits, no more than 1,500 pounds may be dover sole north of Cape Mendocino, and 30,000 pounds south of Cape Mendocino; no more than 2,000 pounds coastwide may be may be trawl-caught sablefish; and no more than 7,500 pounds coastwide may be thornyheads. No more than 1,500 pounds of the thornyheads may be shortspines.

- Open-Access Sablefish increased the open-access monthly cumulative limit to 1,500 pounds.

Effective January 1, 1998

Adopted the following management measures for the limited entry fishery in 1998:

- For the limited entry fishery, cumulative vessel limits for specified two-month periods, with the target harvest level per month being 50% of the two-month limit. However, vessels may land as much as 60% of the two-month limit during one of the two months, so long as the total does not exceed the specified limit. The specified periods are January-February, March-April, May-June, July-August, September-October, and November-December. All weights are round weight or round weight equivalents, unless otherwise specified. The Council may revert to one-month limits later in the year.

- *Sebastes* Complex (Including yellowtail, canary and bocaccio rockfish): Cumulative limit of 40,000 pounds per specified two-month period north of Cape Mendocino, California (40° 30'00" N latitude), and 150,000 pounds per two-months south of Cape Mendocino. Within the cumulative two-month limits for the *Sebastes* complex, no more than 11,000 pounds may be yellowtail rockfish caught north of Cape Mendocino, and no limit south of Cape Mendocino (other than the limit on the *Sebastes* complex). For bocaccio, the cumulative limit is 2,000 pounds per two-months south of Cape Mendocino, and no limit north of Cape Mendocino (other than the limit on the *Sebastes* complex). For canary rockfish, the limit is 15,000 pounds per two-months coastwide.

- Widow Rockfish: Cumulative limit of 25,000 pounds per two-month period.

- Pacific Ocean Perch: Cumulative trip limit of 8,000 pounds per two-month period.

- Dover sole, thornyheads, and trawl-caught sablefish (DTS) complex: Coastwide cumulative limit of 40,000 pounds of Dover sole in the January-February period and 18,000 pounds per two-month period thereafter; not more than 5,000 pounds of sablefish, not more than 10,000 pounds of longspine thornyheads, and not more than 4,000 pounds of shortspine thornyhead. (The shortspine limit is separate from the longspine limit). In any landing, no more than 500 pounds of sablefish may be smaller than 22 inches total length.

- Lingcod: Cumulative limit of 1,000 pounds per two-month period. No lingcod may be smaller than 24 inches (total length), except for lingcod caught with trawl gear. A length conversion for lingcod landed "heads off" will be established. Headed and gutted lingcod are measured from the front of the dorsal fin, where it meets the dorsal surface of the body closest to the head, to the tip of the upper lobe of the tail; the dorsal fin and tail must be intact. There is a 100-pound (45 kg) trip limit for lingcod smaller that 24 inches taken by trawl gear. Vessel operators landing gutted (with head off) or headed and gutted lingcod should contact state fishery officials in the state where the fish will be landed to determine that state's official weight conversion factors.

- Pacific Whiting: Trip limit of 10,000 pounds taken before or after the regular season or year-round inside the 100-fathom contour in the Eureka area .

- Nontrawl sablefish: North of 36° N latitude, a daily-trip-limit of 300 pounds (round weight) and a cumulative limit of 1,500 pounds per two-month period. Only one landing of sablefish caught with nontrawl gear may be made per day. South of 36° N latitude there will be no cumulative or mop-up seasons; there is a daily-trip-limit of 350 pounds (round weight), and only one landing of sablefish caught with nontrawl gear may be made per day.

Adopted the following management measures for open access gear except trawls:

- Open access landings may not exceed 50% of any two-month cumulative limit or any other limit for the limited entry fishery for any groundfish species or complex that applies to the same area, unless specifically authorized (as for bocaccio caught with setnets and lingcod).

- Rockfish: For rockfish, a cumulative limit of 40,000 pounds per month coastwide, including a trip limit for hook-and-line and pot gear of 10,000 pounds of rockfish per trip, which includes, south of Cape Mendocino, a trip limit of 250 pounds bocaccio not to exceed 1,000 pounds cumulative per month. Setnets, which are legal gear only south of 38° N latitude, are subject to the 40,000-pound monthly cumulative limit, but not the per-trip limit, and have a cumulative limit of 2,000 pounds of bocaccio per month.

- Thornyheads: North of Point Conception, no retention of thornyheads. South of Point Conception, daily limit of 50 pounds. Limit of one landing of thornyheads per vessel per day, and daily-trip-limits may not be accumulated.

- Sablefish: Daily limit of 300 pounds north of 36° 00' N latitude and 350 pounds south of 36° 00' N latitude. Limit of one landing of sablefish per vessel per day, and daily-trip-limits may not be accumulated. North of 36° N latitude, there is a cumulative limit of 600 pounds per two-month period.

- Lingcod: Coastwide, a cumulative limit of 1,000 pounds per two-month period, with no monthly sublimit. A minimum size limit of 24 inches (total length) applies coastwide.

Adopted the following management measures for the open access (nongroundfish) trawls:

- May not exceed 50% of any two-month cumulative limit or any other limit for the limited entry fishery for any groundfish species or complex that applies to the same area or gear, unless specifically authorized.
- Thornyheads and sablefish: North of Point Conception, no retention of thornyheads. South of Point Conception, daily limit of 50 pounds. Limit of one landing of thornyheads per vessel per day, and daily-trip-limits may not be accumulated. For sablefish, no more than 300 pounds per day, and not more than one landing per day may include sablefish.
- Pink Shrimp: Per trip limit of 500 pounds of all groundfish species (multiplied by the number of days of the trip) for any vessel engaged in fishing for pink shrimp.
- Spot and Ridgeback Prawns: Limit of 500 pounds of all groundfish species per trip for any vessel engaged in fishing for spot and ridgeback prawns.
- California Halibut and Sea Cucumber: Limit of 500 pounds of all groundfish species per trip for vessels engaged in fishing for California halibut or sea cucumbers south of Point Arena, California (38° 57'30" N latitude). All fishing during the trip must occur south of Point Arena. Landings must contain California halibut of a size required at California Department of Fish and Game Code Section 8392(a), or sea cucumbers taken in accordance with California Department of Fish and Game Code Section 8396 which requires a state permit.

Adopted the following management measures for the recreational fishery in 1998:

- California: Bag limit of three lingcod, no smaller than 24 inches, and 15 rockfish per person per day, including not more than three bocaccio. Multi-day limits are authorized by a valid permit issued by the State of California and must not exceed the daily limit multiplied by the number of days in the trip.
- Oregon: Bag limit of three lingcod, no smaller than 24 inches, 15 rockfish per person per day, of which no more than ten may be black rockfish.
- Washington: Bag limit of three lingcod, no smaller than 24 inches, and ten rockfish per person per day.

Effective May 1, 1998

- Limited Entry:

  Widow Rockfish: increased cumulative limit to 30,000 pounds per specified two-month period.

  Sebastes Complex: increased cumulative limit for yellowtail to 13,000 pounds per specified two-month period north of Cape Mendocino.

  Dover sole, thornyheads, and trawl-caught sablefish (DTS) complex: increased the 2-month cumulative limit for dover sole to 22,000 pounds, for longspine thornyheads to 12,000 pounds, for shortspine thornyheads to 5,000 pounds, and trawl-caught sablefish, 6,000 pounds. The overall DTS complex cumulative limit is removed.

  Fixed Gear Sablefish: North of 36° N. lat., increased the cumulative limit to 1,800 pounds per 2-month period, but retained the 300-pound daily limit. South of 36° N. lat., gave fishers the option to choose each week to make daily landings of sablefish of up to 350 pounds, per day, or make a single landing above 350 pounds, but not exceeding 1,050 pounds (effective May 3).

- Open Access:

  Fixed gear sablefish: north of 36°N. Lat: increased the 2-month cumulative limit to 700 pounds.

  Bocaccio, South of Cape Mendocino: increase the per-trip limit to 500 pounds, retaining the one-month cumulative limit of 1,000 pounds.

  Shortspine Thornyheads in Pink Shrimp Trawl Fisheries: set a limit of 100 pounds of shortspine thornyheads per trip for vessels engaged in fishing for pink shrimp.

Effective May 31, 1998

- Mothership Pacific Whiting: Closed mothership fishery for whiting on May 31, 1998.

Effective July 1, 1998

- Limited Entry *Sebastes* Complex: south of Cape Mendocino, decreased the 2-month cumulative limit to 40,000 pounds.

- Open Access Widow Rockfish: decreased monthly cumulative trip limit to 3,000 pounds.
- Open Access Canary Rockfish: decreased monthly cumulative trip limit to 200 pounds.
- Open Access Rockfish: removed overall rockfish monthly limit and replaced it with limits for component rockfish species: for *Sebastes* complex, monthly cumulative limit is 33,000 pounds, for widow rockfish, monthly cumulative trip limit is 3,000 pounds, for Pacific Ocean Perch, monthly cumulative trip limit is 4,000 pounds.
- Open Access Lingcod: reduced the monthly cumulative limit to 250 pounds for the month of July. After August 1, no lingcod may be landed by any vessel participating in the open access fisheries.
- Open Access Fixed Gear Sablefish: increased the 2-month cumulative north of 36° N. lat. To 1,800 pounds.

Effective August 1, 1998

- Open Access Lingcod: No lingcod may be landed by any vessel participating in the open access fisheries.

Effective August 7, 1998

- Catcher/Processor Pacific Whiting: Closed catcher/processor fishery for whiting on August 7, 1998.

Effective September 1, 1998

- All limited entry cumulative limits become monthly limits.

Effective October 1, 1998

- For Limited Entry:

  Widow Rockfish: increased monthly limit to 19,000 pounds.

  Sebastes South(of Cape Mendocino): decreased monthly limit to 15,000 pounds.

  Canary Rockfish: decreased monthly limit to 500 pounds.

  Dover Sole: increased monthly limit to 18,000 pounds.

  Longspine Thornyhead: increased monthly limit to 7,500 pounds.

  Shortspine Thornyhead: decreased monthly limit to 1,500 pounds.

  Trawl-caught Sablefish: increased monthly limit to 5,000 pounds.

  Fixed-Gear Sablefish: increased the 2 month cumulative limit to 2,700 pounds; on November 1, instituted 1,500-pound monthly limit.

- For Open Access:

  All rockfish north of Cape Blanco: prohibited all landings.

  Canary Rockfish, Widow Rockfish (coastwide): prohibited all landings.

  Thornyheads (between Pt. Conception and Cape Blanco): prohibited all landings except for 100-pound per trip limit for shrimp trawl.

  Dover Sole: coastwide, increased monthly limit to 18,000 pounds.

  Exempted Trawl-caught sablefish: increased monthly limit to 5,000 pounds.

Effective October 13, 1998

- Shoreside Pacific Whiting: Closed shoreside fishery for whiting on May 31, 1998; resumed trip limit of 10,000 pounds.

Effective November 1, 1998

- Fixed-Gear Sablefish: changed to monthly limit, instituted 1,500-pound monthly limit.

Effective December 1, 1998

- Limited Entry Dover Sole: increased monthly limit to 36,000 pounds.

Effective January 1, 1999

Adopted the following management measures for the limited entry fishery in 1999:

- A new three-phase cumulative limit period system is introduced for 1999. Phase 1 is a single cumulative limit period that is 3 months long, from January 1 - March 31. Phase 2 has 3 separate 2-month cumulative limit periods of April 1 - May 31, June 1 - July 31, and August 1 - September 30. Phase 3 has 3 separate 1-month cumulative limit periods of October 1-31, November 1-30, and December 1-31. For all species except Pacific ocean perch and Bocaccio, there will be no monthly limit within the cumulative landings limit periods. An option to apply cumulative trip limits lagged by 2 weeks (from the 16th to the 15th) was made available to limited entry trawl vessels when their permits were renewed for 1999. Vessels that are authorized to operate in this "B" platoon may take and retain, but may not land, groundfish during January 1-15, 1999. All weights are round weights or round weights equivalents, unless otherwise specified. Percentages apply only to the round weight of legal fish on board, unless otherwise specified.
- *Sebastes* Complex (including Yellowtail Rockfish, Canary Rockfish, and Bocaccio):
  - North of Cape Mendocino, California (40° 30' 00" N latitude), Phase 1: 24,000 pounds per period, for this period, the *Sebastes* complex limit north of Cape Mendocino equals the sum of the yellowtail and canary rockfish limits, a vessel may not exceed the overall *Sebastes* limit, regardless of the amount of yellowtail and/or canary rockfish landed within that limit; Phase 2: 25,000 pounds per period; Phase 3: 10,000 pounds per period.
  - South of Cape Mendocino, California, Phase1: 13,000 pounds per period; Phase 2: 6,500 pounds per period; Phase 3: 5,000 pounds per period.
  - Canary Rockfish: coastwide, Phase 1: 9,000 pounds per period; Phase 2: 9,000 pounds per period; Phase 3: 3,000 pounds per period.
  - Yellowtail Rockfish: north of Cape Mendocino, Phase 1: 15,000 pounds per period; Phase 2: 13,000 pounds per period; Phase 3: 5,000 pounds per period.
  - Bocaccio: south of Cape Mendocino, Phase 1: 750 pounds per month; Phase 2: 750 pounds per month; Phase 3: 750 pounds per month.
- Widow Rockfish: cumulative limit, Phase 1: 70,000 pounds per period; Phase 2: 16,000 pounds per period; Phase 3: 30,000 pounds per period.
- Chilipepper Rockfish: cumulative limit, south of Cape Mendocino, Phase 1: 45,000 pounds per period; Phase 2: 25,000 pounds per period; Phase 3: 18,000 pounds per period.
- Splitnose Rockfish: cumulative limit, south of Cape Mendocino, Phase 1: 32,000 pounds per period; Phase 2: 19,000 pounds per period; Phase 3: 10,000 pounds per period.
- Pacific Ocean Perch: cumulative limit, Phase 1: 4,000 pounds per month; Phase 2: 4,000 pounds per month; Phase 3: 4,000 pounds per month.
- Dover Sole, Thornyheads, and Trawl-caught Sablefish (DTS) complex:
  - Dover Sole: coastwide, Phase 1: 70,000 pounds per period; Phase 2: 20,000 pounds per period; Phase 3: 22,000 pounds per period.
  - Longspine Thornyhead: coastwide, Phase 1: 12,000 pounds per period; Phase 2: 8,000 pounds per period; Phase 3: 4,000 pounds per period.
  - Shortspine Thornyhead: Phase 1: 3,000 pounds per period; Phase 2: 2,000 pounds per period; Phase 3: 1,000 pounds per period.
  - Trawl-caught Sablefish: Phase 1: 13,000 pounds per period; Phase 2: 10,000 pounds per period; Phase 3: 6,000 pounds per period. At any time of year unless otherwise announced, no more than 500 pounds per trip may be trawl-caught sablefish smaller than 22 inches total length. 22 inches total length is equivalent to 15.5 inches headed; processed weight will be converted to round weight using the States' conversion factor of 1.6.
- Lingcod: Phase 1: 1,500 pounds per period; Phase 2: 1,000 pounds per period; Phase 3: 500 pounds per period. No

lingcod may be smaller than 24 inches total length, except for a 100-pounds "per trip" limit for trawl-caught lingcod smaller than 24 inches. 24 inches total length is equivalent to 19.5 inches headed; processed weight will be converted to round weight using 1.5 for headed-and-gutted lingcod, and 1.1 for gutted lingcod with the head on.

- Nontrawl Sablefish: north of 36° N latitude, a daily trip limit of 300 pounds and a cumulative trip limit of 2,400 pounds per 2-month period; south of 36° N latitude, the daily trip limit is either (1) 350 pounds with no cumulative limit on the amount of sablefish that may be retained in a month; or (2) one landing of sablefish per week above 350 pounds, but not to exceed 1,050 pounds. Only one landing of sablefish caught with nontrawl gear may be made per day coastwide, and daily trip limits may not be accumulated. A limited entry permit holder must have a permit with a sablefish endorsement to participate in either the regular or mop-up seasons.
- Pacific Whiting: Trip limit of 10,000 pounds taken before and after the regular season. This trip limit also applies inside the 100-fathom contour between 43° 00' - 40° 30' N latitude during the regular season. The 1999 primary season start dates for the whiting fishery are as follows: Catcher/processor and mothership sectors, May 15; shore-based sector, June 15 north of 42° N latitude, April 1 between 42° - 40° 30' N latitude (the Eureka area), and April 15 south of 40° 30' N latitude.
- Black Rockfish: The 1998 black rockfish trip limits for commercial fishing vessels using hook-and-line gear off Washington state remain in effect in 1999: 100 pounds or 30% by weight of all fish on board, whichever is greater, per vessel, per fishing trip. These limits apply north of Cape Alava (48° 09' 30" N latitude) and between Destruction Island (47° 40' 00" N latitude) and Leadbetter Point (46° 38' 10" N latitude).

Adopted the following management measures for open access gear:

- Vessels using open access gear are subject to the trip limits for the open access fishery, whether or not the vessel has a valid limited entry permit endorsed for any other gear. Shrimp pot or prawn trap gear are considered open access groundfish gear if consistent with the groundfish gear requirements. Management measures apply to all gears unless otherwise specified.
- *Sebastes* complex: north of Cape Mendocino, 3,600 pounds per month.
    - Canary Rockfish: coastwide, 1,000 pounds per month.
    - Yellowtail Rockfish: 2,600 pounds per month.
- *Sebastes* complex: south of Cape Mendocino, 2,000 pounds per month.
    - Canary Rockfish: coastwide, 1,000 pounds per month.
    - Bocaccio: 500 pounds per month, except for setnet and trammel net gears.
    - Bocaccio: setnet and trammel net gears, legal only south of 38° N latitude, 1,000 pounds per month.
- Thornyheads: north of Point Conception, prohibited; south of Point Conception, 50 pounds per month.
- Widow Rockfish: coastwide, 2,000 pounds per month.
- Pacific Ocean Perch: coastwide, 100 pounds per month.
- Chilipepper Rockfish: south of Cape Mendocino, 6,000 pounds per month.
- Splitnose Rockfish: south of Cape Mendocino, 100 pounds per month.
- Sablefish:
    - North of 36° N latitude, 300 pounds per day, 1,800 pounds per 2-month period. 2-month periods for sablefish landings are January 1 - February 28; March 1 - April 30; May 1 - June 30; July 1 - August 31; September 1 - October 31; November 1 - December 31.
    - South of 36° N latitude, 350 pounds per day.
- Lingcod: coastwide, during January 1 - March 31, and December 1-31, lingcod landings are prohibited; from April 1 - November 30, trip limit of 250 pounds per month. No lingcod may be smaller than 24 inches total length.
- Dover Sole: coastwide, 100 pounds per month.
- Pacific Whiting: coastwide, 100 pounds per month.

Adopted the following management measures for Exempted Trawl Gear:

- Vessels fishing for pink shrimp, spot and ridgeback prawns, California halibut, and sea cucumbers, trip limit of 300 pounds of groundfish per trip. All limits and closures adopted for open access gear (above) also apply and are counted

toward the 300 pounds groundfish limit. The daily trip limits for sablefish and for Thornyheads south of Point Conception may not be multiplied by the number of days in the fishing trip. The groundfish "per trip" limit may not be multiplied by the number of days in the fishing trip, although this was allowed in 1998 for the pink shrimp fishery.

Adopted the following "crossover" provisions for fishing in areas with different trip limits for the same species:

- Trip limits for a species or species complex may differ in different geographic areas along the coast. The following "crossover" provisions apply to all vessels (limited entry and open access) operating in different geographical areas that have different cumulative or "per trip" limits for the same species, except for species subject only to daily trip limits or to black rockfish off Washington State.
- If a vessel takes and retains any species of groundfish in an area where a more restrictive trip limit applies before fishing in an area where a more liberal trip limit (or no trip limit) applies, then that vessel is subject to the more restrictive trip limit for the entire period to which that trip limit applies, no matter where the fish are taken and retained, possessed, or landed.
- If a vessel takes and retains a species (or species complex) in an area where a higher trip limit (or no trip limit) applies, and taken and retains, possesses or lands the same species (or species complex) in an area where a more restrictive trip limit applies, then that vessel is subject to the more restrictive trip limit for that trip limit period.

Adopted the following management measures for the recreational fishery in 1999:

- California: bag limit of 2 lingcod per person per day, no smaller than 24 inches (total length); and 15 rockfish per person per day, of which no more than 3 may be Bocaccio.
- Oregon: bag limit of 2 lingcod per person per day, no smaller than 24 inches (total length); and 15 rockfish per person per day, of which no more than 10 may be black rockfish.
- Washington: limit of 2 lingcod per person per day, no smaller than 24 inches (total length); and 10 rockfish per person per day.

Effective April 1, 1999 (April 16, 1999 for "B" platoon vessels)

- Limited Entry and Open Access *Sebastes* complex: north and south of Cape Mendocino, if a vessel takes and retains, possesses, or lands any splitnose or chilipepper rockfish south of Cape Mendocino, then the more restrictive *Sebastes* complex cumulative trip limit applies throughout the same cumulative limit period, no matter where the *Sebastes* complex is taken and retained, possessed, or landed.
- Limited Entry Canary Rockfish: south of Cape Mendocino, decreased 2-month cumulative limit from 9,000 pounds to 6,500 pounds. Landings of canary rockfish south of Cape Mendocino are limited by and count against the overall *Sebastes* complex 2-month cumulative limit south of Cape Mendocino, which is 6,500 pounds.
- Open Access *Sebastes* complex: north of Cape Mendocino, increased overall monthly limit from 3,600 pounds to 12,000 pounds;
    - Yellowtail Rockfish, increased cumulative limit from 2,600 pounds to 6,500 pounds per month;
    - Canary Rockfish, increased cumulative limit from 1,000 pounds to 2,000 pounds per month;
    - Combined Black Rockfish and Blue Rockfish cumulative limit is 3,500 pounds per month;
    - No more than 2,000 pounds per month may be species other than yellowtail, canary, black, and blue rockfish.
- Open Access Pink Shrimp Trawl: trip limit is 500 pounds of groundfish per day, which may be multiplied by the number of days in the trip, but which may not exceed 2,000 pounds per trip. The open access daily trip limit for sablefish north of 36° N latitude no longer applies to vessels engaged in trawling for pink shrimp; however, those vessels continue to be constrained by the 2-month cumulative sablefish limit of 1,800 pounds. Landings for all other species except Dover sole and whiting are constrained by monthly limits. Dover sole and whiting landings are constrained by the overall groundfish trip limits. In any landing of pink shrimp, the weight of groundfish landed may not exceed the weight of pink shrimp landed.

Effective May 1, 1999 (May 16, 1999 for "B" platoon; some changes do not take effect until June)

Limited Entry:

- Dover Sole: 2-month cumulative trip limit for the period April 1 through May 31 increased from 20,000 pounds to 25,000 pounds. Beginning June 1, 2-month cumulative Dover sole trip limit will revert to 20,000 pounds.
- Trawl-caught Sablefish: 2-month cumulative trip limit for the period April 1 through May 31 increased from 10,000 pounds to 12,000 pounds. Beginning June 1, 2-month cumulative trawl-caught sablefish trip limit will revert to 10,000 pounds.

- Widow Rockfish: 2-month cumulative trip limit for the periods June 1 through July 31, and August 1 through September 30 decreased from 16,000 pounds to 11,000 pounds.

- *Sebastes* complex: north of Cape Mendocino, 2-month cumulative trip limit for the periods June 1 through July 31 and August 1 through September 30 increased from 25,000 pounds to 30,000 pounds, within which: (1) yellowtail rockfish north of Cape Mendocino, 2-month cumulative trip limit increased from 13,000 pounds to 16,000 pounds, and (2) canary rockfish north of Cape Mendocino, 2-month cumulative trip limit increased from 9,000 pounds to 14,000 pounds.

- *Sebastes* complex: south of Cape Mendocino, limited entry 2-month cumulative trip limit for the periods June 1 through July 31 and August 1 through September 30 decreased from 6,500 pounds to 3,500 pounds, within which: (1) Bocaccio monthly trip limit of 750 pounds decreased and changed to a 2-month cumulative trip limit of 1,000 pounds with a 500 pounds per trip limit, and (2) canary rockfish 2-month cumulative trip limit decreased to 3,500 pounds.

Open Access:

- Exempted Trawl Gear fisheries for California halibut, sea cucumbers, and spot and ridgeback prawns: weight of groundfish landed not to exceed the weight of target species landed, except that the weight of spiny dogfish landed may exceed the weight of target species landed.

Effective May 19, 1999

- Set final 1999 Acceptable Biological Catch and Optimum Yield (OY) for whiting equal to 232,000 mt; set tribal allocation of whiting equal to 32,500 mt (14% of OY); set allocations of non-tribal commercial whiting OY at: 67,800 mt (34%) catcher/processor; 47,900 mt (24%) mothership; and 83,800 mt (42%) shoreside.

Effective June 2, 1999

- Mothership Pacific Whiting: At 9:00 PM (2100 hours), closed the mothership fishery for whiting.

Effective July 2, 1999

Limited Entry:

- Fixed-gear Sablefish: daily trip limit continues to be 300 pounds, but the 2-month cumulative trip limit for the period July 1 through August 31 increased from 2,400 pounds to 4,200 pounds. Beginning September 1, the 2-month cumulative trip limit will be converted to a 1-month cumulative trip limit of 2,100 pounds.

Open Access:

- Sablefish: daily trip limit continues to be 300 pounds, but the 2-month cumulative trip limit for the period July 1 through August 31 increased from 1,800 pounds to 3,000 pounds. Beginning September 1, the 2-month cumulative trip limit will be converted to a 1-month cumulative trip limit of 1,500 pounds.

- Widow Rockfish: increased monthly cumulative trip limit from 2,000 pounds to 8,000 pounds.

Effective July 21, 1999

- Catcher/Processor Pacific Whiting: At 12:00 PM (noon), closed catcher/processor fishery for whiting.

Effective August 1, 1999 (August 16, 1999 for "B" platoon vessels)

Limited Entry:

- *Sebastes* complex: north of Cape Mendocino, 2-month cumulative trip limit for the period August 1 through September 30 (August 16 through October 15 for "B" platoon) increased from 30,000 pounds to 35,000 pounds, within which: (1) yellowtail rockfish, north of Cape Mendocino, 2-month cumulative trip limit increased from 16,000 pounds to 20,000 pounds; (2) canary rockfish, north of Cape Mendocino, 2-month cumulative trip limit remains at 14,000 pounds; and (3) added 2-month cumulative trip limit of 10,000 pounds for rockfish other than yellowtail rockfish and canary rockfish north of Cape Mendocino.

Effective August 14, 1999

- To facilitate enforcement, there is a pre-season closure for all fixed gear north of 36° N latitude during the 48-hours before the start of the regular season. All fixed gear (open access or limited entry) used to take and retain groundfish must be out of the water from noon August 14 until noon August 16. Also, sablefish taken with fixed gear may not be retained or landed from noon August 14 until noon August 16, even if caught before noon on August 14. Shrimp, prawn or crab pot vessels may set their gear during the 48-hour closure only if groundfish are not retained or landed from noon

August 14 through noon August 16.

Effective August 16, 1999

- Tiered cumulative limit fishery ("regular season"): limited entry, fixed gear sablefish fishery off Washington, Oregon, and California, north of 36° N latitude, regular season begins at noon on August 16 and ends at noon on August 25. Only limited entry permit holders with sablefish endorsements may participate in the regular season. A participant in the regular sablefish season may catch no more than the amount associated with the tier assigned to his permit. The cumulative landings limits associated with each tier are: 84,800 pounds for Tier 1; 38,300 pounds for Tier 2, and 22,000 pounds for Tier 3 (all limits are round weight). No vessel may catch more than one cumulative limit. Aside from the overall tiered cumulative limits for the regular season, the only trip limit in effect is for sablefish smaller than 22 inches total length, which may comprise no more than 1,500 pounds or 3% of all legal sablefish 22 inches or larger, whichever is greater. This limit applies per vessel per trip.

  Immediately after the end of the regular season, there will be a 30-hour post-season closure, during which time no sablefish may be taken with fixed gear (limited entry or open access). During this closure, which ends at 1800 hrs on August 26, sablefish taken and retained during the regular season may be possessed and landed. Gear that was set during the regular season may remain in the water during the 30-hour post-season closure; however, gear used to take and retain groundfish may not be set or retrieved during this period. If a vessel offloads more than 300 pounds of sablefish taken and retained during the regular season, then that offloading must begin before 1800 hrs August 26, and be completed before the vessel returns to sea, or else the 300 pounds daily trip limit will apply to fish remaining on board after 1800 hrs August 26, 1999.

  During the regular season, there will be no limited entry, daily-trip-limit fishery north of 36° N latitude, and vessels registered to fixed gear limited entry permits that do not have sablefish endorsements may not harvest any sablefish. After the end of the 30-hour post-season enforcement closure, at 1800 hrs on August 26, daily trip limits currently in effect will resume. These limits are 300 pounds per day, and 4,200 pounds cumulative per two-month period, north of 36° N latitude.

  The regular season does not apply to the open access fishery coastwide, or to the limited entry fishery south of 36° N latitude The pre- and post-season closures north of 36° N latitude do apply to the open access fishery. The open access fishery for sablefish north of 36° N latitude will continue at current daily trip limits of 300 pounds per day, and 3,000 pounds cumulative per two-month period.

  About 3 weeks after the end of the regular season, if an adequate amount of the fixed gear sablefish allocation remains, the limited entry fishery for permit holders with sablefish endorsements may resume for a "mop-up season" under a cumulative trip limit for each vessel. Any mop-up fishery will be announced in the Federal Register. The mop-up fishery would be followed by resumption of the daily-trip-limit fishery.

Effective September 13, 1999

- Shoreside Pacific Whiting: At 12:00 PM (noon), closed primary season for the shoreside whiting fishery, and resumed trip limit of 10,000 pounds.

Effective September 20, 1999

- Limited Entry, Fixed Gear Sablefish: mop-up fishery, from 12:00 PM (noon) September 20, 1999 until 12:00 PM (noon) September 25, 1999. During the mop-up fishery, only one cumulative trip limit of 1,100 pounds round weight is available for each vessel with a limited entry, fixed gear permit with a sablefish endorsement. No vessel may catch more than one cumulative limit. Possession of more than one permit does not entitle a vessel to more than one cumulative limit. Once a vessel has landed its limit, no more sablefish may be landed by that vessel until the daily-trip-limit fishery resumes at 12:00 PM (noon) on September 25, 1999. The mop-up fishery takes place north of 36° N latitude only.

  The "per trip" limit for small sablefish in effect during the regular fishery is also in effect during the mop-up season. In any landing, the weight of sablefish smaller than 22 inches total length, or 15.5 inches dressed, may not exceed 3% of the sablefish larger than 22 inches.

  The limited entry daily-trip-limit fishery will be closed during the mop-up fishery. Limited entry permit holders without sablefish endorsements may not land any sablefish during the mop-up period. After the mop-up fishery has ended on September 25, 1999 at noon, the limited entry daily-trip-limit fishery for fixed gear vessels operating north of 36° N latitude will resume under a 300 pounds. daily trip limit, and a 2,100 pounds monthly cumulative limit.

Effective October 1, 1999 (October 16, 1999 for "B" platoon vessels)

- Limited Entry *Sebastes* Complex: north and south of Cape Mendocino, decreased 1-month cumulative trip limits from 10,000 pounds (north of Cape Mendocino) and 5,000 pounds (south of Cape Mendocino) to a coastwide limit of 500 pounds per month.

TABLE 29. Council groundfish management/regulatory actions since FMP implementation in 1982. (Page 32 of 32)

- Yellowtail Rockfish: north of Cape Mendocino, 1-month cumulative trip limit of 300 pounds.
- The 1-month cumulative trip limits for canary rockfish, coastwide; Bocaccio, south of Cape Mendocino; and other species in the *Sebastes* complex, which count together towards the overall *Sebastes* complex limit, may not exceed the 500-pound cumulative monthly limit.

- Limited Entry Chilipepper Rockfish: south of Cape Mendocino, 1-month cumulative trip limit decreased from 18,000 to 5,000 pounds.
- Limited Entry Splitnose Rockfish: south of Cape Mendocino, 1-month cumulative trip limit decreased from 10,000 to 5,000 pounds.
- Limited Entry Widow Rockfish: The states of Washington and Oregon will adopt regulations that require limited entry vessels landing the 30,000-pound 1-month cumulative trip limit of widow rockfish, to have midwater gear onboard. If a vessel does not have midwater gear on board, a state-imposed cumulative trip limit per month will be applied.

TABLE 30. Final OY and ABC specifications made under the FMP, 1982-1990. (Includes inseason adjustments, if any, in thousands of mt. From 1991 to 1998 all species were combined into a single non-numerical OY, with some species managed under a harvest guideline or quota.)

	1982	1983	1984	1985	1986	1987	1988	1989	1990
Pacific Whiting									
OY	175.5	175.5	175.5	175.0	295.8	195.0	232.0	225.0	196.0
ABC	175.5	175.5	175.5	175.0	295.8	195.0	232.0	225.0	196.0
Sablefish									
OY	17.4	17.4	17.4	13.6	13.6	12.0	9.2-10.8	10.4-11.0	8.9
ABC	13.4	13.4	13.4	12.3	10.6	12.0	10.0	9.0	8.9
Pacific Ocean Perch									
OY	1.55	1.55	1.55	1.55	1.55	1.3	1.3	1.54	1.54
ABC	0.00-1.55	1.55	1.55	1.55	1.55	0.0	0.0	0.0	0.0
Shortbelly Rockfish									
OY	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	13.0
ABC	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	13.0
Widow Rockfish									
OY	26.0	10.5	9.3	9.3	10.2	12.5	12.1	12.4	9.8-10.0
ABC	18.3	10.5	9.3	7.4	9.3	12.5	12.1	12.4	8.9
Jack Mackerel									
OY	NA	NA	12.0	12.0	12.0	12.0	12.0	12.0	12.0
ABC	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0

Sources: 1982 - 47 FR 43964 (October 5, 1982) and 48 FR 8542 (February 14, 1983)
1983 - 48 FR 6715 (February 15, 1985)
1984 - 49 FR 1060 (January 9, 1984) and 49 FR 27518 (July 5, 1984)
1985 - 50 FR 471 (January 4, 1985)
1986 - 51 FR 1255 (January 10, 1986) and 51 FR 12622 (April 14, 1986)
1987 - 52 FR 682 (January 8, 1987) and 52 FR 31034 (August 19, 1987)
1988 - 53 FR 248 (January 6, 1988)
1989 - 54 FR 32 (January 3, 1989)
1990 - 55 FR 1036 (January 11, 1990)

TABLE 31. ABCs for 1983 (mt) for the Washington, Oregon, and California region by management areas.

Species	Vancouver	Columbia	Eureka	Monterey	Conception	Total
Roundfish						
Lingcod	1,000	4,000	500	1,100	400	7,000
	2,200	900	a/	a/	a/	3,100
Pacific Whiting	-	-	-	-	-	175,500 b/
Sablefish	-	-	-	2,500c/	-	13,400 b/
Rockfish						
Pacific Ocean Perch	600	950	a/	a/	a/	1,550
Shortbelly	-	-	-	-	-	10,000 b/
Widow	*400*	*N 1,600**	1,500	2,100	d/	10,500
Other Rockfish e/						
Bocaccio	a/	a/	a/	4,100	2,000	6,100
Canary	800	1,300	600	a/	a/	2,700
Chilipepper	b/	b/	b/	1,300	1,000	2,300
Yellowtail	*1,400*	*1,500*	300	a/	a/	*3,200*
Remaining Rockfish	2,000	2,500	1,900	4,300	3,300	14,000
Flatfish						
Dover Sole	1,000	4,000	8,000	5,000	1,000	19,000
English Sole	600	2,000	800	900	200	4,500
Petrale Sole	600	1,100	500	800	200	3,200
Other Flatfish (Except Arrowtooth Flounder)	700	3,000	1,700	1,800	500	7,700
Other Fish f/						
Jack Mackerel	-	-	-	-	-	12,000 g/
Others	3,000	7,000	2,000	2,000	2,000	16,000

* Split into northern and southern Columbia subareas. *Italics denotes changes.*

a/ These species are not common nor important in the areas footnoted. Accordingly, for convenience, Pacific cod is included in the "Others" category for the areas footnoted and rockfish species are included in the "Remaining Rockfish" category for the area footnoted only.

b/ Total all areas.

c/ Monterey Bay only.

d/ There are insufficient data to calculate an ABC.

e/ "Other Rockfish" means rockfish species which do not have a numerical OY.

f/ Includes sharks, skates, rays, ratfish, morids, grenadiers, jack mackerel, and arrowtooth flounder.

g/ All areas north of 39°N latitude.

TABLE 32. ABCs for 1984 (mt) for the Washington, Oregon, and California region by management areas.

Species	Vancouver[a/]	Columbia	Eureka	Monterey	Conception	Total
Roundfish						
Lingcod	1,000	4,000	500	1,100	400	7,000*
Pacific Cod	2,200	900	b/	b/	b/	3,100*
Pacific Whiting[c/]	-	-	-	-	-	175,500*
Sablefish	-	-	-	2,500[d/]	-	13,400*
Rockfish						
Pacific Ocean Perch	600	950	b/	b/	b/	1,550*
Shortbelly[c/]	-	-	-	-	-	10,000*
Widow	300	5,400	1,800	1,800	b/	9,300
Other Rockfish						
Bocaccio	b/	b/	b/	4,100	2,000	6,100*
Canary	800	1,300	600	b/	b/	2,700*
Chilipepper	b/	b/	b/	1,300	1,000	2,300*
Yellowtail	1,400	1,500	300	b/	b/	3,200*
Remaining Rockfish	500	3,700	1,900	4,300	3,300	13,700
Flatfish						
Dover Sole	2,400	7,200	8,000	5,000	1,000	23,600
English Sole	600	2,000	800	900	200	4,500*
Petrale Sole	600	1,100	500	800	200	3,200*
Other Flatfish	700	3,000	1,700	1,800	500	7,700*
Other Fish[e/]						
Jack Mackerel[f/]	-	-	-	-	-	12,000*
Others	2,500	7,000	1,200	2,000	2,000	14,700

* No change from 1983.

a/ U.S. portion.

b/ These species are not common nor important in the areas footnoted. Accordingly, for convenience, Pacific cod is included in the "Others" category for the areas footnoted and rockfish species are included in the "Remaining Rockfish" category for the area footnoted only.

c/ Total all areas.

d/ Monterey Bay only.

e/ Includes sharks, skates, rays, ratfish, morids, grenadiers, jack mackerel, and arrowtooth flounder.

f/ All areas north of 39° N latitude.

TABLE 33. ABCs for 1985 (mt) for the Washington, Oregon, and California region by management areas.

Species	Vancouver[a/]	Columbia	Eureka	Monterey	Conception	Total
Roundfish						
Lingcod	1,000	4,000	500	1,100	400	7,000
Pacific Cod	2,200	900	b/	b/	b/	3,100
Pacific Whiting[c/]	-	-	-	-	-	175,000
Sablefish	-	-	-	2,500[d/]	-	12,300
Rockfish						
Pacific Ocean Perch	600	950	b/	b/	b/	1,550
Shortbelly[c/]	-	-	-	-	-	10,000
Widow	-	-	-	-	b/	7,400
Other Rockfish						
Bocaccio	b/	b/	b/	4,100	2,000	6,100
Canary	800	2,100	600	b/	b/	3,500
Chilipepper	b/	b/	b/	1,300	1,000	2,300
Yellowtail	600	2,100	300	b/	b/	3,000
Remaining Rockfish	800	3,700	1,900	4,300	3,300	14,000
Flatfish						
Dover Sole	2,400	11,500	8,000	5,000	1,000	27,900
English Sole[c/]	-	-	-	-	-	1,500
Petrale Sole	600	1,100	500	800	200	3,200
Other Flatfish	700	3,000	1,700	1,800	500	7,700
Other Fish[e/]						
Jack Mackerel[f/]	-	-	-	-	-	12,000
Others	2,500	7,000	1,200	2,000	2,000	14,700

a/ U.S. portion.
b/ These species are not common nor important in the areas footnoted. Accordingly, for convenience, Pacific cod is included in the "Others" category for the areas footnoted and rockfish species are included in the "Remaining Rockfish" category for the area footnoted only.
c/ Total all areas.
d/ Monterey Bay only.
e/ Includes sharks, skates, rays, ratfish, morids, grenadiers, jack mackerel, and arrowtooth flounder.
f/ All areas north of 39°N latitude.

TABLE 34. ABCs for 1986 (mt) for the Washington, Oregon, and California region by management areas.

Species	Vancouver[a/]	Columbia	Eureka	Monterey	Conception	Total
Roundfish						
Lingcod	1,000	4,000	500	1,100	400	7,000
Pacific Cod	2,200	900	b/	b/	b/	3,100
Pacific Whiting[c/]	-	-	-	-	-	300,000
Sablefish[c/]	-	-	-	-	-	10,600
Rockfish						
Pacific Ocean Perch	600	950	b/	b/	b/	1,550
Shortbelly[c/]	-	-	-	-	-	10,000
Widow[c/]	-	-	-	-	-	9,300
Other Rockfish						
Bocaccio	b/	b/	b/	4,100	2,000	6,100
Canary	800	2,100	600	b/	b/	3,500
Chilipepper	b/	b/	b/	1,300	1,000	2,300
Yellowtail	1,100	2,600	300	b/	b/	4,000
Remaining Rockfish	800	3,700	1,900	4,300	3,300	14,000
Flatfish						
Dover Sole	2,400	11,500	8,000	5,000	1,000	27,900
English Sole[c/]	-	-	-	-	-	1,500
Petrale Sole	600	1,100	500	800	200	3,200
Other Flatfish	700	3,000	1,700	1,800	500	7,700
Other Fish[d/]						
Jack Mackerel[e/]	-	-	-	-	-	12,000
Others	2,500	7,000	1,200	2,000	2,000	14,700

a/ U.S. portion.
b/ These species are not common nor important in the areas footnoted. Accordingly, for convenience, Pacific cod is included in the "Others" category for the areas footnoted and rockfish species are included in the "Remaining Rockfish" category for the area footnoted only.
c/ Total all areas.
d/ Includes sharks, skates, rays, ratfish, morids, grenadiers, jack mackerel, and arrowtooth flounder.
e/ All areas north of 39° N latitude.

TABLE 35. ABCs for 1987 (mt) for the Washington, Oregon, and California region by management areas.

Species	Vancouver[a/]	Columbia	Eureka	Monterey	Conception	Total
Roundfish						
Lingcod	1,000	4,000	500	1,1000	400	7,000
Pacific Cod	2,200	900	b/	b/	b/	3,100
Pacific Whiting[c/]	-	-	-	-	-	195,000
Sablefish	-	-	-	-	-	12,000
Rockfish						
Pacific Ocean Perch	0	0	b/	b/	b/	0
Shortbelly[c/]	-	-	-	-	-	10,000
Widow[c/]	-	-	-	-	-	12,500
Other Rockfish						
Bocaccio	b/	b/	b/	4,100	2,000	6,100
Canary	800	2,100	600	b/	b/	3,500
Chilipepper[c/]	-	-	-	-	-	3,600
Yellowtail	1,100	2,600[d/]	300	b/	b/	4,000
Remaining Rockfish	800	3,700	1,900	4,300	3,300	14,000
Flatfish						
Dover Sole	2,400	11,500	8,000	5,000	1,000	27,900
English Sole[c/]	-	-	-	-	-	1,900
Petrale Sole	600	1,100	500	800	200	3,200
Other Flatfish	700	3,000	1,700	1,800	500	7,700
Other Fish[e/]						
Jack Mackerel[f/]	-	-	-	-	-	12,000
Others	2,500	7,000	1,200	2,000	2,000	14,700

a/ U.S. portion.

b/ These species are not common nor important in the areas footnoted. Accordingly, for convenience, Pacific cod is included in the "Others" category for the areas footnoted and rockfish species are included in the "Remaining Rockfish" category for the area footnoted only.

c/ Total all areas.

d/ Includes 100 mt allocated to southern most portion of Columbia area not subject to trip limit regulations.

e/ Includes sharks, skates, rays, ratfish, morids, grenadiers, jack mackerel, and arrowtooth flounder.

f/ All areas north of 39° N latitude.

TABLE 36. ABCs for 1988 (mt) for the Washington, Oregon, and California region by management areas.

Species	Source[a/]	Vancouver[b/]	Columbia	Eureka	Monterey	Conception	Total
Roundfish							
Lingcod	FMP	1,000	4,000	500	1,100	400	7,000
Pacific Cod	FMP	2,200	900	c/	c/	c/	3,100
Pacific Whiting[d/]	FMP	-	-	-	-	-	327,000
Sablefish[e/]	1987	-	-	-	-	-	10,000
Rockfish							
Pacific Ocean Perch	1987	0	0	c/	c/	c/	0
Shortbelly[e/]	FMP	-	-	-	-	-	10,000
Widow[e/]	1987	-	-	-	-	-	12,100
Other Rockfish							
Bocaccio	FMP	c/	c/	c/	4,100	2,000	6,100
Canary		800	2,100	600	c/	c/	3,500
Chilipepper[e/]	1986	-	-	-	-	-	3,600
Yellowtail	1985	1,100	2,600[f/]	300	c/	c/	4,000
Remaining Rockfish	1984	800	3,700	1,900	4,300	3,300	14,000
Flatfish							
Dover Sole	1984	2,400	11,500	8,000	5,000	1,000	27,900
English Sole[e/]	1986	-	-	-	-	-	1,900
Petrale Sole	1987	600	1,100	500	800	200	3,200
Other Flatfish	FMP	700	3,000	1,700	1,800	500	7,700
Other Fish[g/]							
Jack Mackerel[h/]	FMP	-	-	-	-	-	12,000
Others	1984	2,500	7,000	1,200	2,000	2,000	14,700

a/ Date refers to the date of the Council status of stocks document.
b/ U.S. portion.
c/ These species are not common nor important in the areas footnoted. Accordingly, for convenience, Pacific cod is included in the "Others" category for the areas footnoted and rockfish species are included in the "Remaining Rockfish" category for the area footnoted only.
d/ Total U.S and Canada all areas.
e/ Total all areas.
f/ Includes 100 mt allocated to southern most portion of Columbia area not subject to trip limit regulations.
g/ Includes sharks, skates, rays, ratfish, morids, grenadiers, jack mackerel, and arrowtooth flounder.
h/ All areas north of 39° N latitude.

TABLE 37. ABCs for 1989 (mt) for the Washington, Oregon, and California region by management areas.

Species	Source[a/]	Vancouver[b/]	Columbia	Eureka	Monterey	Conception	Total	1988
Roundfish								
Lingcod	FMP	1,000	4,000	500	1,100	400	7,000	7,000
Pacific Cod	FMP	-	-	c/	c/	c/	3,200	3,100
Pacific Whiting[d/e/]	FMP	-	-	-	-	-	300,000	327,000
Sablefish[d/]	1988	-	-	-	-	-	9,000	10,800
Rockfish								
Pacific Ocean Perch	1987	0	0	c/	c/	c/	0	0
Shortbelly[d/]	FMP	-	-	-	-	-	10,000	10,000
Widow[d/]	1988	-	-	-	-	-	12,400	12,100
Other Rockfish								
Bocaccio	FMP	c/	c/	c/	4,100	2,000	6,100	6,100
Canary		800	2,100	600	c/	c/	3,500	3,500
Chilipepper[d/]	1986	-	-	-	-	-	3,600	3,600
Yellowtail	1988	1,100[f/]	2,900[g/]	300	c/	c/	4,300	4,000
Remaining Rockfish	1984	800	3,700	1,900	4,300	3,300	14,000	14,000
Flatfish								
Dover Sole	1984	2,400	11,500	8,000	5,000	1,000	27,900	27,900
English Sole[d/]	1986	-	-	-	-	-	1,900	1,900
Petrale Sole	1987	600	1,100	500	800	200	3,200	3,200
Other Flatfish	FMP	700	3,000	1,700	1,800	500	7,700	7,700
Other Fish[h/]								
Jack Mackerel[i/]	FMP	-	-	-	-	-	12,000	12,000
Others	1984	2,500	7,000	1,200	2,000	2,000	14,700	14,700

a/ Date refers to the date of the Council status of stocks document.
b/ U.S. portion.
c/ These species are not common nor important in the areas footnoted. Accordingly, for convenience, Pacific cod is included in the "Others" category for the areas footnoted and rockfish species are included in the "Remaining Rockfish" category for the area footnoted only.
d/ Total all areas.
e/ Combined U.S. and Canadian waters. About 75% of the harvestable stock or 225,000 mt is expected to occur in U.S. waters in 1989.
f/ U.S. portion of the Vancouver area, based on 50% of the total area stock.
g/ Includes 100 mt designated designated for southern most portion of Columbia area and subject to different trip limit regulations.
h/ Includes sharks, skates, rays, ratfish, morids, grenadiers, jack mackerel, and arrowtooth flounder.
i/ All areas north of 39° N latitude.

TABLE 38. ABCs for 1990 (mt) for the Washington, Oregon, and California region by management areas.

Species	Source[a/]	Vancouver[b/]	Columbia	Eureka	Monterey	Conception	Total	1989
Roundfish								
Lingcod	FMP	1,000	4,000	500	1,100	400	7,000	7,000
Pacific Cod	FMP	-	-	c/	c/	c/	3,200	3,100
Pacific Whiting[d/e/]	1989	-	-	-	-	-	245,000	300,000
Sablefish[d/]	1989	-	-	-	-	-	8,900	9,000
Rockfish								
Pacific Ocean Perch	1987	0	0	c/	c/	c/	0[f/]	0
Shortbelly[d/]	1989	-	-	-	-	-	13,000[g/]	10,000
Widow[d/]	1989	-	-	-	-	-	8,900	12,400
Other Rockfish								
Bocaccio	FMP	c/	c/	c/	4,100	2,000	6,100	6,100
Canary		800	2,100	600	c/	c/	3,500	3,500
Chilipepper[d/]	1986	-	-	-	-	-	3,600	3,600
Yellowtail	1988	1,100[h/]	2,900[i/]	300	c/	c/	4,300	4,300
Remaining Rockfish	1984	800	3,700	1,900	4,300	3,300	14,000	14,000
Flatfish								
Dover Sole	1984	2,400	11,500	8,000	5,000	1,000	27,900	27,900
English Sole[d/]	1986	-	-	-	-	-	1,900	1,900
Petrale Sole	1987	600	1,100	500	800	200	3,200	3,200
Other Flatfish	FMP	700	3,000	1,700	1,800	500	7,700	7,700
Other Fish[j/]								
Jack Mackerel[k/]	FMP	-	-	-	-	-	12,000	12,000
Others	1984	2,500	7,000	1,200	2,000	2,000	14,700	14,700

a/ Date refers to the date of the Council status of stocks document.
b/ U.S. portion.
c/ These species are not common nor important in the areas footnoted. Accordingly, for convenience, Pacific cod is included in the "Others" category for the areas footnoted and rockfish species are included in the "Remaining Rockfish" category for the area footnoted only.
d/ Total all areas.
e/ Combined U.S. and Canadian waters. About 70 to 80 percent of the harvestable stock or 172,000 to 196,000 mt is expected to occur in U.S. waters in 1989.
f/ The FMP limits ABC increases to 30 percent per year; 13,000 mt is below the ABC of 13,900 to 43,000 mt recommended by the GMT.
g/ GMT recommended 7,900 mt; the Council set ABC at 8,900 mt and OY at 9,800 to 10,000 mt.
h/ U.S. portion of the Vancouver area, based on 50 percent of the total area stock.
i/ Includes 100 mt designated for southern most portion of Columbia area and subject to different trip limit regulations.
j/ Includes sharks, skates, rays, ratfish, morids, grenadiers, jack mackerel, and arrowtooth flounder.
k/ All areas north of 39° N latitude.

TABLE 39. ABCs, harvest guidelines, and quotas for 1991 (mt) for the Washington, Oregon, and California region by management areas.

Species	Vancouver[a/]	Columbia	Eureka	Monterey	Conception	Total	Harvest Guideline/ Quota[b/]
Roundfish							
Lingcod	1,000	4,000	500	1,100	400	7,000	-
Pacific Cod[c/]	-	-	[d/]	[d/]	[d/]	3,200	-
Pacific Whiting[e/]	-	-	-	-	-	253,000	228,000
Sablefish[c/]	-	-	-	-	-	8,900	8,900
Rockfish							
Pacific Ocean Perch	0	0	[d/]	[d/]	[d/]	0	1,000[f/]
Shortbelly[c/]	-	-	-	-	-	13,000	13,000
Widow[c/]	-	-	-	-	-	7,000	7,000
Other Rockfish							
Bocaccio	-	-	800[g/]	800[g/]	800[g/]	800	1,100
Canary	800	1,500	600	[d/]	[d/]	2,900	3,500
Chilipepper[c/]	-	-	-	-	-	3,600	3,600[f/]
Yellowtail	1,200	3,100[h/]	300	[d/]	[d/]	4,600	4,300
Thornyhead	[d/]	3,200	1,300	1,400	[d/]	7,900[i/]	-
Remaining Rockfish	800	3,700	1,900	4,300	3,300	14,000	14,000
Sebastes Complex	2,800	8,300	-	-	-	11,100	11,100
Flatfish							
Dover Sole	2,400	6,100	8,000	5,000	1,000	22,500	22,500
English Sole[c/]	-	-	-	-	-	1,900	-
Petrale Sole	600	1,100	500	800	200	3,200	-
Other Flatfish	700	3,000	1,700	1,800	500	7,700	-
Other Fish[j/]							
Jack Mackerel[k/]	-	-	-	-	-	52,600	46,500
Others	2,500	7,000	1,200	2,000	2,000	14,700	-

a/ U.S. portion.
b/ All are harvest guidelines except Pacific whiting, shortbelly rockfish, and jack mackerel, which are quotas.
c/ Total all areas.
d/ These species are not common nor important in the areas footnoted. Accordingly, for convenience, Pacific cod is included in the "Others" category for the areas footnoted and rockfish species are included in the "Remaining Rockfish" category for the area footnoted only.
e/ The ABC is coastwide, including Canadian waters. The quota designated for all U.S. waters is based on 90% of the coastwide ABC.
f/ The harvest guideline is for the combined Columbia and Vancouver areas.
g/ Includes Eureka area, but its contribution is small, and recreational catch.
h/ Includes 100 mt designated for southern most portion of Columbia area and subject to different trip limit regulations.
i/ The Council set ABC above the GMT recommendation of 5,900 mt coastwide due to uncertainty in the assessment.
j/ Includes sharks, skates, rays, ratfish, morids, grenadiers, and jack mackerel.
k/ All areas north of 39° N latitude. The quota was reduced to account for catches outside the management area.

TABLE 40. Council ABCs and harvest guidelines for 1992 for the Washington, Oregon, and California region by management areas (in thousands of mt).

Species	Vancouver[a/]	Columbia	Eureka	Monterey	Conception	Total	Harvest Guidelines
Roundfish							
Lingcod	1.0	4.0	0.5	1.1	0.4	7.0	-
Pacific Cod[b/]	-	-	[c/]	[c/]	[c/]	3.2	208.8
Whiting	-	-	-	-	-	232.0	[d/]
Sablefish[b/]	-	-	-	-	-	8.9	8.9
Rockfish							
Pacific Ocean Perch	0.0	0.0	[c/]	[c/]	[c/]	0.0	1.55[e/]
Shortbelly[b/]	-	-	-	-	-	13.0	13.0
Widow[b/]	-	-	-	-	-	7.0	7.0
Sebastes Complex	2.8	8.3	[f/]	[f/]	[f/]	11.1	11.1
Bocaccio	-	-				0.8	1.1
Canary	0.8	1.5	0.6	[c/]	[c/]	2.9	-
Chilipepper[b/]	-	-	-	-	-	3.6	-
Yellowtail	1.2	3.1	0.3	[c/]	[c/]	4.6	4.3[e/]
Remaining Rockfish	0.8	3.7	1.9	4.3	3.3	14.0	-
Thornyheads	-	[f/]	[f/]	[f/]	-	-	7.0[g/]
Shortspine	-	f/	f/	f/	-	1.9	-
Longspine	-				-	10.1	-
Flatfish							
Dover Sole	2.4	6.1	4.9	5.0	1.0	19.4	19.4
English Sole[b/]	-	-	-	-	-	1.9	-
Petrale Sole	0.6	1.1	0.5	0.8	0.2	3.2	-
Arrowtooth	-	-	-	-	-	5.8	-
Other	0.7	3.0	1.7	1.8	0.5	7.7	-
Other Fish[h/]							
Jack Mackerel[i/]	-	-	-	-	-	52.6	46.5
Others	2.5	7.0	1.2	2.0	2.0	14.7	-

a/ U.S. portion.
b/ Total all areas.
c/ These species are not common nor important in the areas footnoted. Accordingly, for convenience, Pacific cod is included in the "Others" category for the areas footnoted and rockfish species are included in the "Remaining Rockfish" category for the area footnoted only.
d/ Coastwide ABC including Canadian waters; harvest guideline for U.S. waters only.
e/ Vancouver and Columbia areas combined.
f/ The ABC is for these areas combined. For bocaccio, the Eureka area contribution is small.
g/ The thornyhead preliminary harvest guideline applies coastwide for the two species combined.
h/ Includes sharks, skates, rays, ratfish, morids, grenadiers, and jack mackerel.
i/ All areas north of 39° N latitude. The 1991 quota was reduced to 46,500 mt to account for anticipated catches outside the management area.

TABLE 41. Council ABCs and harvest guidelines for 1993 for the Washington, Oregon, and California region by INPFC areas (in thousands of mt).

Species	Acceptable Biological Catch						Harvest Guideline
	Vancouver[a/]	Columbia	Eureka	Monterey	Conception	Total	
Roundfish							
Lingcod	1.0	4.0	0.5	1.1	0.4	7.0	-
Pacific Cod[b/]	-	-	b/	b/	b/	3.2	-
Whiting[c/]	-	-	-	-	-	177.0	142.0
Sablefish[d/]	-	-	-	-	-	5.0-7.0	7.0
Jack Mackerel[e/]	-	-	-	-	-	52.6	52.6
Rockfish							
Pacific Ocean Perch	0.0	0.0	b/	b/	b/	0.0	1.55[f/]
Shortbelly[g/]	-	-	-	-	-	13.0	13.0
Widow[g/]	-	-	-	-	-	7.0	7.0
Sebastes Complex	2.9	8.3	i/	i/	i/	11.2	11.2[h/]
Bocaccio	-	-				1.54	1.54[i/]
Canary	0.8	1.5	0.6	b/	b/	2.9	-
Chilipepper[g/]	-	-	-	-	-	3.6	-
Yellowtail	1.3	3.1	0.3	b/	b/	4.7	4.4[h/]
Remaining Rockfish	0.8	3.7	1.9	4.3	3.3	14.0	-
Thornyheads	-	i/	i/	i/	-	-	7.0[k/]
Shortspine	-	i/	i/	i/	-	1.9	-
Longspine	-				-	10.1	-
Flatfish							
Dover Sole	2.4	4.0[l/]	3.5	5.0	1.0	15.9	17.9[l/]
English Sole[g/]	-	-	-	-	-	1.9	-
Petrale Sole	0.6	1.1	0.5	0.8	0.2	3.2	-
Arrowtooth	-	-	-	-	-	5.8	-
Other	0.7	3.0	1.7	1.8	0.5	7.7	-
Other Fish[m/]							
Others	2.5	7.0	1.2	2.0	2.0	14.7	-

a/ U.S. portion.
b/ These species are not common nor important in the areas footnoted. Accordingly, for convenience, Pacific cod is included in the "Others" category for the areas footnoted and rockfish species are included in the "Remaining Rockfish" category for the area footnoted only.
c/ Coastwide ABC including Canadian waters. Preliminary harvest guideline for 1993 is 80% of coastwide value.
d/ Total all areas except Conception; the ABC for that area is 425 mt, with no harvest guideline.
e/ All areas north of 39° N latitude.
f/ The 1,550 mt harvest guideline applies to the Vancouver and Columbia areas combined.
g/ Total all areas.
h/ The harvest guideline applies to the Columbia and Vancouver areas.
i/ The ABC is for these areas combined. For bocaccio, the Eureka area contribution is small.
j/ The 1,540 mt harvest guideline applies to the Eureka, Monterey, and Conception areas.
k/ The thornyhead harvest guideline includes both species in the Monterey, Eureka, and Columbia areas.
l/ The Council adopted a 6,000 mt harvest guideline for the Columbia area in 1993. The 17,900 mt harvest guideline applies coastwide.
m/ Includes sharks, skates, rays, ratfish, morids, and grenadiers.

TABLE 42. Council ABCs and harvest guidelines for 1994 for the Washington, Oregon, and California region by management areas (in thousands of mt). Page 1 of 2.

Species	Acceptable Biological Catch[a/]						Harvest Guideline[a/]
	Vancouver[b/]	Columbia	Eureka	Monterey	Conception	Total	
Roundfish							
Lingcod	1.0	4.0	0.5	1.1	0.4	7.0	4.0
Pacific Cod	-	-	[c/]			3.2	
Whiting	-	-	-	-	-	325.0	260.0[d/]
Sablefish[e/]	-	-	-	-	-	7.0	7.0
Jack Mackerel[f/]	-	-	-	-	-	52.6	52.6
Rockfish							
Pacific Ocean Perch	0.0	0.0	[c/]			0.0	1.3[g/]
Shortbelly[h/]	-	-	-	-	-	23.5	23.5
Widow[h/]	-	-	-	-	-	6.5	6.5
Sebastes Complex							
Northern area	-	-					13.24[i/]
Southern area			-	-	-	13.44[j/]	13.44[j/]
Bocaccio	[c/]		1.54[k/]			1.54	1.54[k/]
Canary	0.8	1.5	0.6	[c/]		2.9	
Chilipepper	-	-	-	-	-	4.0	
Yellowtail	1.19	2.97[l/]	2.58[l/]	[c/]		6.74	[l/]
Remaining Rockfish	0.8	3.7	7.0			11.5	
Thornyheads	-	-	-	-	-		6.44[m/]
Shortspine	-	1.9			-	1.9	
Longspine	-	10.1			-	10.1	
Flatfish							
Dover Sole	2.4	4.0	3.5	5.0	1.0	15.9	16.9[n/]
English Sole	2.0		1.1			3.1	
Petrale Sole	1.2		0.5	0.8	0.2	2.7	
Arrowtooth[h/]	-	-	-	-	-	5.8	
Other flatfish	0.7	3.0	1.7	1.8	0.5	7.7	
Other Fish[o/]	2.5	7.0	1.2	2.0	2.0	14.7	

a/ ABCs for sablefish, widow rockfish, and bocaccio are calculated after regulation-induced discard has been deducted, and therefore apply to landed catch and observed incidental catch in the whiting fishery. Harvest guidelines for these species are set equal to the ABCs. Discard factors for Pacific ocean perch, yellowtail rockfish, and thornyheads are explained below in their harvest guideline notes.

b/ U.S. portion.

c/ These species are not common nor important in the areas footnoted. Accordingly, for convenience, Pacific cod is included in the "Other Fish" category for the areas footnoted and rockfish species are included in the "Remaining Rockfish" category for the areas footnoted only.

d/ Coastwide ABC including Canadian waters. The harvest guideline is 80% of the coastwide ABC.

e/ Total all areas except Conception; the ABC for that area is 425 mt, with no harvest guideline.

f/ All areas north of 39°N latitude, and includes the area beyond the EEZ (200nm).

TABLE 42. Council ABCs and harvest guidelines for 1994 for the Washington, Oregon, and California region by management areas (in thousands of mt). Page 2 of 2.

g/ The Pacific ocean perch harvest guideline applies to the Vancouver and Columbia areas combined. A discard factor of 16% was deducted from the 1993 harvest guideline to determine the 1994 harvest guideline.

h/ Total all areas.

i/ The Sebastes north harvest guideline applies to the Vancouver and Columbia areas and equals the sum of the ABCs in those areas: canary (2,300 mt), yellowtail (6,740 - 300 mt) and remaining rockfish (7,000 mt). The 300 mt subtracted from the yellowtail rockfish harvest guideline applies to the Eureka area.

j/ The Sebastes south ABC and harvest guideline for the Eureka, Monterey, and Conception areas is the sum of the ABCs in those areas: bocaccio (1,540 mt), canary (600 mt), chilipepper (4,000 mt), yellowtail (300 mt), and remaining rockfish (7,000 mt). The bocaccio harvest guideline for commercial fisheries will be reduced 200 mt to account for anticipated recreational harvest.

k/ The 1,540 mt bocaccio harvest guideline applies to the Eureka, Monterey and Conception areas.

l/ The yellowtail rockfish assessment addresses three separate areas: Vancouver, Columbia north of Cape Lookout, and Columbia south of Cape Lookout plus Eureka. For this table, the Columbia ABC applies to north Columbia only, and the Eureka ABC applies to Eureka plus south Columbia. The total yellowtail rockfish ABC is divided into two harvest guidelines: 4,160 mt for Vancouver plus Columbia north of Cape Lookout, and 2,580 mt for Eureka plus Columbia south of Cape Lookout. Separate harvest guidelines are established for the Sebastes complex north and south of the Eureka-Columbia border. Therefore, 300 mt of the yellowtail rockfish southern harvest guideline is included in the southern Sebastes complex harvest guideline and the remainder of the yellowtail rockfish southern harvest guideline is included in the northern Sebastes harvest guideline. A 16% discard factor will be added to certain landings inseason. This will affect inseason landings estimates for Sebastes complex also.

m/ The thornyhead harvest guideline includes both species in the Monterey, Eureka, and Columbia areas. A discard factor (eight percent) has been subtracted from the previous harvest guideline.

n/ The reduction in the harvest guideline for Dover sole in the Columbia area to 5,000 mt in 1994 is the second step towards the 4,000 mt ABC in 1995. The 16,900 mt Dover sole harvest guideline applies coastwide.

o/ Includes sharks, skates, rays, ratfish, morids, grenadiers, and other groundfish species noted above in c/.

TABLE 43. Open access and limited entry allocations for 1994 (in metric tons).

Species		Harvest Guideline	Open Access Percent	Open Access Metric Tons	Limited Entry Percent	Limited Entry Metric Tons
Lingcod		4,000	17.40	700	82.60	3,300
Sablefish	Nontreaty	6,700	8.75	590	91.25	6,110
POP		1,300	0.40	10	99.60	1,290
Widow		6,500	3.80	250	96.20	6,250
Sebastes Complex[a/]	North	13,240	10.30	1,360	89.70	11,880
	South	13,440	34.50	4,640	65.50	8,800
Bocaccio		1,340	34.50	460	65.50	880
Yellowtail[b/]	North	4,160	10.30	430	89.70	3,730
	South	2,580	10.30	270	89.70	2,310

a/ North or South of the Columbia-Eureka border (43° N latitude).
b/ North or south of Cape Lookout (45°20'15" N latitude).

TABLE 44. Council ABCs and harvest guidelines for 1995 for the Washington, Oregon, and California region by management areas (in thousands of mt). Page 1 of 2.

Species	Acceptable Biological Catch						Harvest Guideline a/
	Vancouver[a/]	Columbia	Eureka	Monterey	Conception	Total	
Roundfish							
Lingcod	1.3		0.3	.7	0.1	2.4[b/]	2.4
Pacific Cod	-	-	c/			3.2	
Whiting	-	-	-	-	-	223.0	178.4[d/]
Sablefish	8.7				.425	9.1[e/]	7.8
Jack Mackerel[f/]	-	-	-	-	-	52.6	52.6
Rockfish							
Pacific Ocean Perch	0.00000	0.00000	c/			0.00	1.3[g/]
Shortbelly[h/]	-	-	-	-	-	23.5	23.5
Widow[i/]	-	-	-	-	-	7.7	6.5[i/]
Sebastes Complex							
Northern area[j/]	-	-				11.9	11.8
Southern area[k/]			-	-	-	13.2	13.2
Bocaccio	c/		1.7[l/]			1.7	1.7
Canary	1.0		0.25	c/		1.25	.85[m/]
Chilipepper	c/		4.0			4.0	
Yellowtail[n/]	1.19	2.97	2.58	c/		6.74	4.16, 2.18
Remaining Rockfish	0.8	3.7	7.0			11.5	
Thornyheads	-	-	-	-	-	8.0[o/]	o/
Shortspine	-	-	-	-	-	1.0	1.5
Longspine	-	-	-	-	-	7.0	6.0
Flatfish							
Dover Sole	2.4	3.0	2.9	5.0	1.0	14.3	2.85;[p/] 13.6
English Sole	2.0		1.1			3.1	
Petrale Sole	1.2		0.5	0.8	0.2	2.7	
Arrowtooth[h/]	-	-	-	-	-	5.8	
Other flatfish	0.7	3.0	1.7	1.8	0.5	7.7	
Other Fish[q/]	2.5	7.0	1.2	2.0	2.0	14.7	

TABLE 44. Council ABCs and harvest guidelines for 1995 for the Washington, Oregon, and California region by management areas (in thousands of mt) Page 2 of 2.

a/ U.S. portion.

b/ The lingcod assessment is for the entire Vancouver area, including Canada, and the Columbia area north of Cape Falcon. The U.S. ABC is based on 50% of the ABC for this area plus 400 mt for the Columbia area south of Cape Falcon. The coastwide harvest guideline equals the sum of the ABCs and includes recreational harvest of 900 mt. The remaining 1,500 mt is allocated for all commercial gears.

c/ These species are not common nor important in the areas footnoted. Accordingly, for convenience, Pacific cod is included in the "Other Fish" category for the areas footnoted and rockfish species are included in the "Remaining Rockfish" category for the areas footnoted only.

d/ Total whiting ABC for U.S. plus Canada. The 1995 U.S. harvest guideline is 80% of the total ABC. There is a shorebased reserve of 71,400 mt, 40% of the harvest guideline.

e/ The 1995 sablefish ABC of 8,700 mt was calculated using a reduced estimated discard (900 mt), which is subtracted along with the Conception area ABC to obtain the harvest guideline. The harvest guideline applies to all areas except Conception; the ABC for that area is 425 mt.

f/ All areas north of 39°N latitude, and includes the area beyond the EEZ (200nm).

g/ The Pacific ocean perch harvest guideline applies to the Vancouver and Columbia areas combined. It is intended to allow landing of incidental and small directed catches, and includes an assumed discard factor of 16%.

h/ Total all areas.

i/ For 1995, a 16% discard factor is included in the ABC and subtracted out to obtain the harvest guideline.

j/ The 1995 Sebastes north harvest guideline, which applies to the Vancouver and Columbia areas, is established by summing the ABCs (except for canary rockfish, where the harvest guideline is used) in those areas: canary (850 mt), yellowtail (6,740 mt minus 300 mt) and remaining rockfish (4,500 mt). The 300 mt subtracted from the yellowtail rockfish harvest guideline applies to the Eureka area. All discard is counted toward the harvest guideline.

k/ The 1995 Sebastes south harvest guideline applies to the Eureka, Monterey, and Conception areas and equals the sum of the ABCs in those areas: bocaccio (1,700 mt), canary (250 mt), chilipepper (4,000 mt), yellowtail (300 mt), and remaining rockfish (7,000 mt). Anticipated recreational harvest of bocaccio will be deducted before limited entry/open access allocations are calculated.

l/ The 1995 bocaccio harvest guideline is set equal to the sum of the three ABCs; no discard adjustment was made because few trips were impacted by the limits in 1994. Anticipated recreational harvest is subtracted before determining open access and limited entry allocations.

m/ The 1995 ABC for canary rockfish in the combined Vancouver-Columbia area (1,000 mt) represents a 56% reduction fro 1994. That reduction was also applied to the Eureka area ABC, reducing it from 600 mt to about 250 mt. The 850 mt harvest guideline for Vancouver plus Columbia reflects a 150 mt reduction for discard resulting form trip limit management.

n/ For this table, the Columbia ABC applies to north Columbia only, and the Eureka ABC applies to Eureka plus south Columbia. The total 1995 yellowtail rockfish ABC is divided into two harvest guidelines: 4,160 mt for Vancouver plus Columbia north of Cape Lookout (close to Cape Falcon), and 2,580 mt for Eureka plus Columbia south of Cape Lookout. Separate harvest guidelines are established for the Sebastes complex north and south of the Eureka-Columbia border. Therefore, 300 mt of the yellowtail rockfish southern harvest guideline was included in the southern Sebastes complex harvest guideline and the remainder of the yellowtail rockfish southern harvest guideline was included in the northern Sebastes harvest guideline. As in 1994, a 16% discard factor will be added to certain landings inseason. This will affect inseason landings estimates for Sebastes complex also.

o/ The 1995 ABCs and harvest guidelines for the two thornyhead species are coastwide north of Pt. Conception. The 1995 shortspine harvest guideline is above its ABC but below its overfishing level. The longspine harvest guideline is less than its ABC in order to ease management of shortspines and because of expected future declines in longspine ABC. A discard factor will be added to landings inseason, depending on what trip limits are adopted.

p/ The GMT proposed ABC ranges for Dover sole in the Columbia area (1,700 mt to 3,800 mt) and the Eureka area (3,500 mt to 2,500 mt). The Council adopted ABCs of 3,000 mt and 2,900 mt, respectively. The coastwide and Columbia area harvest guidelines (13,600 mt and 2,850 mt) reflect a five percent discard deduction.

q/ Includes sharks, skates, rays, ratfish, morids, grenadiers, and other groundfish species noted above in c/.

TABLE 45. Open access and limited entry allocations for 1995 (in thousands of metric tons).

Species		Harvest Guideline	Open Access		Limited Entry	
			Percent	Metric Tons (thousands)	Percent	Metric Tons (thousands)
Lingcod[a/]		1.5	19.1	0.29	80.9	1.21
Sablefish[b/]	Nontreaty	6.32	6.6	0.463	93.4	6.557
Widow		6.5	3.7	0.24	96.3	6.26
Sebastes Complex	North	11.8	9.6	1.13	90.4	10.67
	South	13.0	32.6	4.24	67.4	8.76
Bocaccio		1.5	32.6	0.49	67.4	1.01
Yellowtail	North	4.16	9.6	0.40	90.4	3.76
	South	2.58	9.6	0.25	90.4	2.33

a/ The commercial harvest guideline of 1,500 mt is calculated by subtracting anticipated recreational catch (900 mt) from the overall harvest guideline (2,400 mt).

b/ Tribal harvest (780 mt) is subtracted from the overall harvest guideline (7,800 mt) before allocations are calculated. The limited entry allocation is further subdivided between trawl (3,803 mt) and nontrawl (2,754 mt).

TABLE 46. Council ABCs and harvest guidelines for 1996 for the Washington, Oregon, and California region by management areas (in thousands of mt). Page 1 of 2

Species	Acceptable Biological Catch						1996 Harvest Guideline
	Vancouver[a/]	Columbia	Eureka	Monterey	Conception	Total	
Roundfish							
Lingcod[b/]	1.3		0.3	.7	0.1	2.4	2.4
Pacific Cod	-	-	[c/]			3.2	
Whiting[d/]	-	-	-	-	-	265.0	212.0
Sablefish[e/]	8.7				.425	9.1	7.8
Jack Mackerel[f/]	-	-	-	-	-	52.6	52.6
Rockfish							
Pacific Ocean Perch[g/]	0.0	0.0	[c/]			0.0	0.75
Shortbelly[h/]	-	-	-	-	-	23.5	23.5
Widow[i/]	-	-	-	-	-	7.7	6.5
Sebastes Complex							
Northern area[j/]	-	-				11.9	11.18
Southern[k/]			-	-	-	13.2	13.2
Bocaccio[l/]	[c/]		1.7			1.7	1.7
Canary[m/]	1.0		0.25	[c/]		1.25	.85
Chilipepper	[c/]		4.0			4.0	
Yellowtail[n/]	1.19	2.97	2.58	[c/]		6.74	3.59, 2.58
Remaining Rockfish	0.8	3.7	7.0			11.5	
Thornyheads	-	-	-	-	-	8.0	
Shortspine[o/]	-	-	-	-	-	1.0	1.5
Longspine[o/]	-	-	-	-	-	7.0	6.0
Flatfish							
Dover Sole[p/ q/]	.82-1.57	3.0	2.9	3.16-4.36	1.0	10.88-12.83	11.05 2.85
English Sole	2.0		1.1			3.1	
Petrale Sole	1.2		0.5	0.8	0.2	2.7	
Arrowtooth[h/]	-	-	-	-	-	5.8	
Other flatfish	0.7	3.0	1.7	1.8	0.5	7.7	
Other Fish[r/]	2.5	7.0	1.2	2.0	2.0	14.7	

TABLE 46. Council ABCs and harvest guidelines for 1996 for the Washington, Oregon, and California region by management areas (in thousands of mt) Page 2 of 2.

a/ U.S. portion.

b/ The lingcod assessment is for the entire Vancouver area, including Canada, and the Columbia area north of Cape Falcon. The 1996 U.S. ABC is based on 50% of the ABC for this assessment area plus 400 mt for the Columbia area south of Cape Falcon. The 1996 harvest guideline equals the sum of the ABCs and includes estimated recreational harvest of 900 mt. The remaining 1,500 mt is for commercial harvest.

c/ These species are not common nor important in the areas footnoted. Accordingly, for convenience, Pacific cod is included in the "Other Fish" category for the areas footnoted and rockfish species are included in the "Remaining Rockfish" category for the areas footnoted only.

d/ The whiting ABC and harvest guideline were finalized at the March 1996 Council meeting. The harvest guideline is 80% of the coastwide ABC for harvest in U.S. waters.

e/ The 1996 sablefish ABC includes 900 mt of estimated trawl discard, which was subtracted along with the 425 mt Conception area ABC to obtain the harvest guideline. The harvest guideline applies to all areas except Conception.

f/ The jack mackerel harvest guideline includes all areas north of 39° N latitude, and includes the area beyond the EEZ (200nm).

g/ The Pacific ocean perch harvest guideline applies to the Vancouver and Columbia areas combined. The Council's final recommendation is 750 mt, slightly below the overfishing level and projected 1995 catch, which is 800 mt.

h/ The shortbelly rockfish ABC and harvest guideline are the total for all areas.

i/ The widow rockfish ABC includes a 16% discard factor which is included in the ABC and subtracted out to obtain the harvest guideline.

j/ The Sebastes north harvest guideline of 11,180 mt, which applies to the Vancouver and Columbia areas, is established by summing the ABCs (except for canary rockfish, where the harvest guideline is used) in those areas: canary (850 mt), yellowtail (6,740 mt coastwide minus 300 mt for the Eureka area minus 570 mt discard due to restrictive trip limits) and remaining rockfish (4,500 mt).

k/ The Sebastes south harvest guideline (13,200 mt) applies to the Eureka, Monterey, and Conception areas and equals the sum of the ABCs in those areas: bocaccio (1,700 mt), canary (250 mt), chilipepper (4,000 mt), yellowtail in the Eureka area (300 mt), and remaining rockfish (7,000 mt). Recreational catch of bocaccio (200 mt) is subtracted to determine the commercial harvest guideline of 1,500 mt.

l/ For bocaccio, no discard factor is deducted because few trips were impacted by the limits in recent years. Anticipated recreational harvest (200 mt) will be subtracted before determining open access and limited entry allocations.

m/ The 1996 canary rockfish ABC for the Vancouver and Columbia areas combined (1,000 mt) is the same as in 1995. The 850 mt harvest guideline reflects a 150 mt reduction for anticipated discard.

n/ The 1993 yellowtail rockfish assessment addressed three separate areas: U.S.-Vancouver, Columbia north of Cape Falcon, and Columbia south of Cape Falcon plus Eureka. For this table, the 2,970 mt Columbia ABC applies to north Columbia only, and the 2,580 mt Eureka ABC applies to Eureka plus south Columbia. The total 1996 yellowtail rockfish ABC is divided into two harvest guidelines: 3,590 mt for Vancouver plus Columbia north of Cape Lookout (close to Cape Falcon), and 2,580 mt for Eureka plus Columbia south of Cape Lookout. Separate harvest guidelines are established for the Sebastes complex north and south of the Eureka-Columbia border. Therefore, 300 mt of the yellowtail rockfish southern harvest guideline is included in the southern Sebastes complex harvest guideline and the remainder of the yellowtail rockfish southern harvest guideline is included in the northern Sebastes harvest guideline. 570 mt of anticipated discard is deducted in setting the northern harvest guidelines for both yellowtail and the Sebastes complex (4,160 mt ÷ 1.16 = 570 mt).

o/ The ABCs and harvest guidelines for the two thornyhead species are coastwide north of Pt. Conception. The 1996 harvest guideline for each species is the same as its 1995 harvest guideline. A discard factor will be added to landings inseason.

p/ The Vancouver ABC for Dover sole is a range from the ABC recommended in the recent assessment (818 mt) up to the 1990-1994 average landing level (1,565 mt). In the Monterey area, the lower end of the ABC range (3,164 mt) is the 1990-1994 average landing level and the upper end of the range is the level proposed in the recent assessment (4,363 mt). The coastwide ABC is the sum of the area ABCs, which is a range of 10,882 mt-12,828 mt. This includes a five percent discard inflation.

q/ The coastwide Dover sole harvest guideline (11,050 mt) is the sum of the ABCs minus five percent for assumed discard. The harvest guideline recommendation for the Columbia area is 2,850 mt, which also reflects a five percent discard deduction. The coastwide harvest guideline recommendation uses the recent average catch levels (the upper end of the Vancouver ABC and the lower end of the Monterey ABC) combined with the other ABCs and with 5 percent of the total deducted for discard.

r/ Includes sharks, skates, rays, ratfish, morids, grenadiers, and other groundfish species noted above in c/.

TABLE 47. Open access and limited entry allocations for 1996 (in thousands of metric tons).

Species	1996 ABC	1996 Harvest Guideline	Tribes	1996 Allocations			
				Limited Entry		Open Access	
				1,000 mt	Percent	1,000 mt	Percent
Roundfish							
Lingcod	2.4	2.4[a/]		1.21	80.9	0.29	19.1
Sablefish	9.1	7.8	0.78	6.557[b/]	93.4	0.463	6.6
Rockfish							
Widow	7.7	6.5		6.26	96.3	0.24	3.7
Shortspine	1.0	1.5		1.49	>99.0	0.004	<1.0
Sebastes Complex							
Northern area	11.9	11.2[c/]		10.12	90.4	1.08	9.6
Southern area	13.2	13.2[d/]		8.76	67.4	4.24	32.6
Bocaccio	1.7	1.7[e/]		1.01	67.4	0.49	32.6
Canary	1.25	0.85		0.78	91.2	0.07	8.8
Yellowtail	6.74	3.6N		3.25	90.4	0.35	9.6
		2.58S		2.33	90.4	0.25	9.6

a/ The open access and limited entry allocations for lingcod are applied only to the commercial portion of the harvest guideline, which is 1,500 mt in 1996 (900 mt is deducted for anticipated recreational harvest).

b/ The limited entry sablefish allocation is further allocated 58% (3,803 mt) to the trawl fishery and 42% (2,754 mt) to the nontrawl fishery.

c/ Within the Sebastes complex north, harvest guidelines for commercial harvest of black rockfish by the Makah, Quileute, Hoh, and Quinault Indian tribes remain at 20,000 pounds north of Cape Alava (48°09"30"N) and 10,000 pounds between Destruction Island (47°40"00"N) and Leadbetter Point (46°38"10"N).

d/ The Sebastes south harvest guideline includes the bocaccio harvest guideline. The open access and limited entry allocations are applied only to the commercial portion of the bocaccio harvest guideline. Therefore, 200 mt is deducted prior to calculating the allocations.

e/ The open access and limited entry allocations for bocaccio are applied only to the commercial portion of the harvest guideline, which is 1,500 mt in 1996 (200 mt is deducted for anticipated recreational harvest).

TABLE 48. Council ABCs and harvest guidelines for 1997 for the Washington, Oregon, and California region by management area (in thousands of metric tons).

ROUNDFISH	ABC					Total	HARVEST GUIDELINE	
	Vancouver[a/]	Columbia	Eureka	Monterey	Concep	ABC	HG	HG area
Lingcod[b/]	1.3		0.3	0.7	0.1	2.4	2.4	WOC
Pacific cod	3.2		c/			3.2	none	--
Whiting	290.0[d/]					290.0	232.0[e/]	US
Sablefish[f/]	8.7				0.425	9.125	7.8[f/]	VCEM
Jack mackerel[g/]	52.6					52.6	52.6	WOC +

ROCKFISH OTHER THAN SEBASTES COMPLEX	Vancouver[a/]	Columbia	Eureka	Monterey	Concep	ABC	HG	HG area
POP	0.00	0.00				0.00	0.75[h/]	VC
Shortbelly	23.5					23.5	23.5	WOC
Widow	7.7					7.7	6.5[i/]	WOC
Thornyheads	8[i/]					8	--	--
Shortspine	1[i/]					1[i/]	1.38[k/]	n of Pt Conc
Longspine	7[i/]					7[i/]	6.0[l/]	n of Pt Conc

SEBASTES COMPLEX	Vancouver[a/]	Col - N	Col - S	Eureka	Monterey	Concep	ABC	HG[m/]	HG area
Sebastes-N[n/]	7.130						7.130	6.656[o/]	VC
Sebastes-S[n/]				9.664			9.664	9.284[p/]	EMC
bocaccio				0.265			0.265	.387	EMC
canary	1.22						1.220	1.00	VC
chilipepper	c/			4.0			4.00	none	
yellowtail	.454	.984[q/]	.335[r/]				1.773[r/]	2.762	VC
remaining rockfish	2.295[s/]			1.431[s/]					
bank	c/			0.081			0.08	none	
bocaccio	0.424							none	
canary				0.085			0.085	none	
darkblotched	0.209			0.047			0.26	none	
POP				0.02[t/]			0.020	none	
redstripe	0.768			c/			0.77	none	
sharpchin	0.398			0.071			0.47	none	
silvergrey	0.051			c/			0.05	none	
splitnose	0.274			0.868			1.14	none	
yelloweye	0.039			c/			0.04	none	
yellowmouth	0.132			c/			0.13	none	
yellowtail				0.104[r/]	0.155		0.259	none	
Other rockfish[u/]	1.842			3.968				none	

TABLE 48. Council ABCs and harvest guidelines for 1997 for the Washington, Oregon, and California region by management area (in thousands of metric tons).
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FLATFISH

	Vancouver[a/]	Columbia	Eureka	Monterey	Concep	ABC	HG	HG area
Dover	.82- 1.57[v/]	3	2.9	3.16-4.36[w/]	1	10.88-12.83[x/]	11.05	WOC
							2.85	COL only
English sole	2		1.1			3.1	none	
Petrale sole	1.2		0.5	0.8	0.2	2.7	none	
Arrowtooth flounder	5.8					5.8	none	
Other flatfish	0.7	3	1.7	1.8	0.5	7.7	none	

OTHER FISH[y/]	Vancouver	Columbia	Eureka	Monterey	Concep	ABC	HG
	2.5	7	1.2	2	2	14.7	none

a/ U.S. portion, except as noted.

b/ Lingcod - same as 1996. The 1995 assessment addressed the entire Vancouver area, including Canada, and the Columbia area north of Cape Falcon. The 1997 ABC recommendation is the same as for 1996, and is based on 50% of the ABC for the assessment area, plus 400 mt for the Columbia area south of Cape Falcon. The harvest guideline recommendation is also the same as 1996, and equals the sum of the ABCs, including estimated recreational harvest of 900 mt. The remaining 1,500 mt is for commercial harvest.

c/ These species are not common nor important in the areas footnoted. Accordingly, for convenience, Pacific cod is included in the "other fish" category for the areas footnoted, and rockfish species are included in the "other rockfish" category for the areas footnoted only.

d/ Whiting - the ABC range is coastwide, including Canada, and is based on the hybrid F moderate exploitation rate policy, using the average of the 50th and 75th percentile recruitment levels.

e/ Whiting harvest guideline - the harvest guideline, which applies to U.S. waters, is 80% of the ABC range. Any allocation to tribal fisheries will be deducted prior to allocating among non-Indian sectors.

f/ Sablefish - Same as 1996; ABC includes 900 mt of estimated trawl discard. Harvest guideline (7,800 mt) applies only north of the Conception area (i.e., north of 36° N latitude), calculated by subtracting the 900 mt from the 8,700 mt ABC. The treaty tribes will be allocated 780 mt, and the remaining 7,020 mt is divided between the limited entry (6,557 mt) and open access (463 mt) fisheries. Allocation harvest guidelines are established: 58% (3,803 mt) to the trawl fishery and 42% (2,754 mt) to the nontrawl fishery.

g/ Jack mackerel - same as 1996. The FMP manages fishing only north of 39° N latitude; however, landings outside the EEZ and south of 39° N latitude are counted towards the ABC and harvest guideline. The DAP is equal to the harvest guideline.

h/ Pacific ocean perch - same as 1996. ABCs for Vancouver and Columbia remain at zero; the harvest guideline applies to the Vancouver and Columbia areas combined, and is set at the level of anticipated incidental catch. It applies to landed catch and assumes additional fish will be discarded.

i/ Widow rockfish - same as 1996. The 6,500 mt harvest guideline is derived by subtracting 16% (1,200 mt) of the ABC for estimated discards.

j/ Thornyheads - the ABCs and harvest guidelines for the two species are the same as 1996 and apply north of Pt. Conception.

k/ Shortspine thornyhead - the harvest guideline (1,380 mt) is for landed catch, equivalent to 1996. The total catch level of 1,500 mt is 50% above the ABC, but below the overfishing level, in order to allow greater harvest of longspine thornyhead. Eight percent is deducted for discard.

l/ Longspine thornyhead - harvest guideline same as 1996, which is 1,000 mt below the ABC to help prevent overharvest of shortspine thornyhead.

m/ Harvest guidelines for Sebastes complex (north and south), bocaccio, canary rockfish, and yellowtail rockfish are for total catch. Discard and bycatch adjustments will be made inseason based on best available data as it becomes available.

n/ The Sebastes complex (north) ABC includes all rockfish species listed below in the Vancouver and Columbia areas combined, including other rockfish and 335 mt of the ABC for yellowtail rockfish in the South Columbia/Eureka area. Likewise, Sebastes south includes all rockfish in the Eureka, Monterey and Conception areas combined, including 104 mt of the South Columbia/Eureka area yellowtail rockfish ABC.

o/ The Sebastes complex north harvest guideline is the sum of the harvest guidelines for canary and yellowtail rockfish, plus the sum of the ABC or recent catch, whichever is less, for all Vancouver/Columbia area rockfish species below, including "other rockfish." It includes 162 mt of the yellowtail rockfish harvest guideline for the Eureka area. Within the Sebastes north, harvest guidelines for commercial harvest of black rockfish by the Makah, Quileute, Hoh, and Quinault Indian tribes remain at 20,000 pounds north of Cape Alava (48°09'30"N) and 10,000 pounds between Destruction Island (47°40'00"N) and Leadbetter Point (46°38'10"N).

p/ The Southern Sebastes complex harvest guideline includes the bocaccio harvest guideline plus the sum of the lesser of the ABC or recent catch for all Eureka/Monterey/Conception area rockfish below in this table. It includes 162 mt of the yellowtail rockfish harvest guideline.

q/ Yellowtail rockfish ABC (N. Columbia area) - applies to the Columbia area north of Cape Falcon.

r/ Yellowtail rockfish (S. Columbia) - applies to the Columbia area south of Cape Falcon. The assessment combines the S. Columbia and Eureka areas; 104 mt of the ABC has been apportioned to the Eureka area ABC.

s/ Remaining rockfish includes the species below in the table, but not the "Other rockfish" catch.

t/ Pacific ocean perch - the new Sebastes complex assessment proposes a new ABC (20 mt) for the Eureka, Monterey and Conception area.

u/ Other rockfish includes offshore Sebastes species not identified above in this table. It is based on the Sebastes complex assessment of commercial landings and includes an estimate of recreation landings.

v/ Dover sole ABC - (Vancouver area) same as 1996, which is a range from the ABC recommended in the 1995 assessment (818 mt) up to the 1990-1994 average landing level (1,565 mt).

w/ Dover sole (Monterey) - same as 1996; the lower end of the ABC range (3,164 mt) is the 1990-1994 average landing level, and the upper end of the range is the level proposed in the 1995 assessment.

x/ Dover sole (coastwide) - same as 1996; the ABC is the sum of the area ABCs, which is a range of 10,882 - 12,828 mt; it includes a 5 percent discard inflation.

y/ Includes sharks, skates, rays, ratfish, morids, grenadiers, and other groundfish species noted above in c/.

TABLE 49. Open access and limited entry allocations for 1997 (in thousands of mt).

Species	1997 ABC	1997 Harvest Guideline	Tribes	1997 Allocations			
				Limited Entry		Open Access	
				1,000 mt	Percent	1,000 mt	Percent
Roundfish							
Lingcod	2.4	2.4[a/]		1.21	80.9	0.29	19.1
Sablefish	9.125	7.8	0.78	6.557[b/]	93.4	0.463	6.6
Rockfish							
Widow	7.7	6.5		6.26	96.3	0.24	3.7
Shortspine thornyhead	1.0	1.38		1.38	>99.0	0.004	<1.0
Sebastes Complex							
Northern area	7.130	6.656[c/]		6.02	90.4	.64	9.6
Southern area	9.664	9.284[d/]		6.26	67.4	3.03	32.6
Bocaccio	.265	.387[e/]		.224	67.4	0.108	32.6
Canary	1.22	1.0		.912	91.2	0.09	8.8
Yellowtail	1.773	2.762		2.5	90.4	0.27	9.6

a/ The open access and limited entry allocations for lingcod are applied only to the commercial portion of the harvest guideline, which is 1,500 mt in 1997 (900 mt is deducted for anticipated recreational harvest).

b/ The limited entry sablefish allocation is further allocated 58% (3,803 mt) to the trawl fishery and 42 percent (2,754 mt) to the nontrawl fishery.

c/ Within the Sebastes complex north, harvest guidelines for commercial harvest of black rockfish by the Makah, Quileute, Hoh, and Quinault Indian tribes remain at 20,000 pounds north of Cape Alava (48°09"30"N) and 10,000 pounds between Destruction Island (47°40"00"N) and Leadbetter Point (46°38"10"N).

d/ The Sebastes south harvest guideline includes the bocaccio harvest guideline. The open access and limited entry allocations are applied only to the commercial portion of the bocaccio harvest guideline. Therefore, 55 mt is deducted prior to calculating the allocations.

e/ The open access and limited entry allocations for bocaccio are applied only to the commercial portion of the harvest guideline, which is 387 mt in 1997 (55 mt is deducted for anticipated recreational harvest).

TABLE 50. Council ABCs and harvest guidelines for 1998 for the Washington, Oregon, and California region by management area (in thousands of metric tons). Page 1 of 3

ROUNDFISH	GMT Final ABC Recommendation						GMT Final Harvest Guideline Recommendation	
	Vancouver a/	Columbia	Eureka	Monterey	Concep	U.S. Total (except as noted)	Total Catch	Landed Catch
Lingcod b/	1.021		.139	.325	.046	1.532 b/	.838	c/
Pacific cod	3.2		d/			3.2	none	
Whiting e/	290.0					290.0 e/	232.0	232.0
Sablefish f/	3.0				0.425	3.0, 425 f/	3.0, .425	2.7, .425
Jack mackerel	52.6					52.6 g/	52.6	52.6

ROCKFISH OTHER THAN *SEBASTES* COMPLEX	Vancouver	Columbia	Eureka	Monterey	Concep	Coastwide Total (except as noted)	Total Catch	Landed Catch
POP	0.00	0.00				0.00	0.75 h/	
Shortbelly	23.5					23.5	23.5	23.5
Widow	5.75 i/					5.75 i/	4.960	4.276
Thornyheads								
Shortspine j/	.884 j/				.203	.884, .203 j/	.884, .203 j/	.557, .142
Longspine k/	4.102 k/				.509	4.102, .509 k/	4.102, .509 k/	3.733, .463

SEBASTES COMPLEX	Vancouver a/	Columbia	Eureka	Monterey	Concep	Total for areas noted	Total Catch	Landed catch
Sebastes-N l/	8.300					8.300 l/	7.057-7.404	6.391-6.683
Sebastes-S m/			8.999			8.999 m/	8.999	8.999
bocaccio n/			0.230			0.230 n/	.230	
canary o/	1.045					1.045 o/	1.045	.878
chilipepper	c/		3.4 p/			3.4 p/	none	
yellowtail q/	4.657					4.657 q/	3.118- 3.465	2.619- 2.911
remaining rockfish	2.295 r/		1.431 r/					
bank	c/		0.081			0.08	none	
bocaccio	0.424						none	
canary			0.085				none	
darkblotched	0.209		0.047			0.26	none	
POP			0.02 s/			0.020	none	
redstripe	0.768		c/			0.77	none	
sharpchin	0.398		0.071			0.47	none	
silvergrey	0.051		c/			0.05	none	
splitnose	0.274		0.868			1.14	none	
yelloweye	0.039		c/			0.04	none	
yellowmouth	0.132		c/			0.13	none	
yellowtail			0.074 m/	0.155		0.229	none	
Other rockfish t/	1.842		3.968				none	

TABLE 50. Council ABCs and harvest guidelines for 1998 for the Washington, Oregon, and California region by management area (in thousands of metric tons). Page 2 of 3

FLATFISH	GMT Final ABC recommendation						GMT Final Harvest Guideline Recommendation	
	Vancouver	Columbia	Eureka	Monterey	Concep	Coastwide ABC	Total Catch	Landed Catch
Dover sole u/	8.373				1.053	9.426	9.426	8.955 u/
English sole	2		1.1			3.1	none	
Petrale sole	1.2		0.5	0.8	0.2	2.7	none	
Arrowtooth flounder	5.8					5.8	none	
Other flatfish	0.7	3	1.7	1.8	0.5	7.7	none	
OTHER FISHv/	2.5	7	1.2	2	2	14.7	none	

a/ U.S. portion, except as noted.

b/ Lingcod - the 1997 assessment addresses the entire Vancouver area, including Canada, and the Columbia area. The 1998 GMT's final ABC recommendation of 1,021 mt is the $F_{35\%}$ level and includes the Canadian portion of the Vancouver area; it is approximately 40% of the 2,230 mt ABC estimated for this area in the previous assessment. The southern area ABCs are reduced from the 1997 levels in proportion to the reduction in the northern area. The Vancouver area ABC is apportioned between the U.S. and Canada in proportion of biomass distribution determined by the surveys (44% in U.S. waters). The coastwide harvest guideline recommendation (838 mt) applies to U.S. waters only and is the sum of the individual $F_{40\%}$ values for each area. Anticipated 1998 recreational catch, which is a range from 420 to 560 mt, must be deducted prior to establishing the commercial harvest guideline.

c/ Lingcod - the commercial total catch harvest guideline will be calculated after recreational catch is estimated.

d/ These species are not common nor important in the areas footnoted. Accordingly, for convenience, Pacific cod is included in the "other fish" category for the areas footnoted, and rockfish species are included in the "other rockfish" category for the areas footnoted only.

e/ The whiting ABC is coastwide including Canada. The 1997 STAR panel suggested a harvest range of 174,000 - 309,000 mt; the GMT's final ABC is the same as 1997; the harvest guideline is based on 80% taken in the U.S. The Council anticipates that NMFS will allocate 25,000 mt to the Makah Indian fishery; the remainder will be allocated 42% to the shore-based sector, 34% to the factory trawler fishery, and 24% to the mothership processor sector.

f/ Sablefish - the 3,000 mt ABC and 2,700 mt harvest guideline apply north of the Conception area (i.e., north of 36° N latitude). The harvest guideline reflects a 10% reduction for anticipated discard. The Conception area ABC, which is based on historical landings, remains the same as 1997. As in previous years, the northern harvest guideline will be reduced by 10% for the treaty tribes; the remainder will be divided between the limited entry and open access fisheries; and the limited entry portion will be allocated 58% to the trawl fishery and 42% to the nontrawl fishery. The GMT recommends establishment of a separate harvest guideline for the Conception area equal to the ABC (425 mt); limited entry and open access allocations will not be established unless landings approach the harvest guideline.

g/ Jack mackerel - the FMP manages fishing only north of 39° N latitude; however, landings outside the EEZ and south of 39° N latitude are counted towards the ABC and harvest guideline. The preliminary DAP is equal to the harvest guideline.

h/ Pacific ocean perch - ABCs for Vancouver and Columbia remain at zero; the harvest guideline is unchanged from 1997, applies to the Vancouver and Columbia areas combined, and is set at the level of anticipated incidental catch. It applies to landed catch and assumes additional fish will be discarded.

i/ Widow rockfish - the ABC is based on the $F_{40\%}$ harvest rate, which is the current MSY proxy for rockfish species. The landed catch harvest guideline (4,276 mt) is based on the $F_{45\%}$ harvest rate; a 16% discard adjustment factor is added to obtain the total catch harvest guideline.

j/ Shortspine thornyhead - the ABC (884 mt) is calculated based on the biomass estimated directly by the slope survey assuming q=1, F=M and M=0.06/yr. The 884 mt total catch harvest guideline would apply north of the Conception area; the landed catch harvest guideline reflects a 30% reduction for discard, and an additional 10% as a precautionary adjustment. The GMT recommends the Council consider a separate harvest guideline for the Conception area equivalent to the average 1995-1996 catch (142 mt for landed catch or 203 mt for total catch, which has been inflated to reflect the 30% assumed discard rate).

k/ Longspine thornyhead - the ABC (4,102 mt) north of the Conception area is the average of the 3 year individual ABCs. The harvest guideline represents a 5% reduction from ABC to account for market discard. The GMT recommends the Council consider a separate harvest guideline for the Conception area equivalent to the average 1995-1996 catch (463 mt for landed catch or 509 mt for total catch, which was inflated to reflect 5% assumed discard).

l/ *Sebastes* complex (north) includes all rockfish species listed below in the U.S. Vancouver and Columbia areas combined, including other rockfish. The **total catch** harvest guideline range is equal the sum of either the ABC or recent catch (whichever is less) or the total catch harvest guideline for each species. The **landed catch** harvest guideline is the sum of the landed catch harvest guidelines, where established, and either the ABC or recent catch for each species.

m/ *Sebastes* complex (south) includes all rockfish listed below in the Eureka, Monterey, and Conception areas combined, including 74 mt for the Eureka yellowtail rockfish ABC. The ABC is lower than in 1997 due to reduction in the ABCs for yellowtail rockfish in the Eureka area, bocaccio, and chilipepper, which are based on $F_{40\%}$. The harvest guideline is the sum of either the ABCs or recent catch levels, whichever is less (except the chilipepper ABC is used instead of the recent catch level to calculate the southern harvest guideline).

n/ For bocaccio, the ABC and harvest guideline range are based on the estimated $F_{40\%}$ value. Anticipated 1998 recreational catch is 55 mt.

o/ The canary rockfish ABC is based on the $F_{40\%}$ level; the landed catch harvest guideline reflects a 16% discard adjustment.

p/ Chilipepper rockfish - the ABC has been reduced to approximate the $F_{40\%}$ level.

TABLE 50. Council ABCs and harvest guidelines for 1998 for the Washington, Oregon, and California region by management area (in thousands of metric tons). Page 3 of 3

q/ Yellowtail rockfish - the GMT's final ABC (4,657 mt) applies to the Vancouver area (including the Canadian portion) and the Columbia area. Approximately 76% of the survey biomass estimate in the assessment area is in U.S. waters, so 3,539 mt is the U.S. portion of the ABC. 74 mt is transferred to the Eureka area, leaving 3,465 mt as the upper end of the total catch harvest guideline range. The lower end of the harvest guideline range is 90% (3,118 mt) of the U.S. ABC. The landed catch harvest guideline range reflects a 16% discard reduction factor.

r/ Remaining rockfish includes all rockfish species below in the table except the "Other rockfish" category.

s/ Pacific ocean perch - the ABC (20 mt) for the Eureka, Monterey and Conception area is based on the 1996 *Sebastes* complex assessment.

t/ Other rockfish includes offshore *Sebastes* species not identified above in this table. It is based on the 1996 *Sebastes* complex assessment of commercial landings and includes an estimate of recreation landings.

u/ Dover sole - the 1997 assessment evaluates the resource north of the Conception area as a unit. The ABC is for landed catch based on the $F_{35\%}$ harvest rate. The Conception area ABC is inflated to reflect 5% assumed discard. The coastwide total catch harvest guideline (9,452 mt) and the landed catch harvest guideline would be 8,955 mt. The Council may wish to establish a separate harvest guideline for the Conception area in conjunction with sablefish and thornyheads.

v/ Includes sharks, skates, rays, ratfish, morids, grenadiers, and other groundfish species noted above in c/.

TABLE 51. Open access and limited entry allocations for 1998 (in thousands of mt).

Species	1998 ABC	1998 Landed Catch Harvest Guideline	Tribes	1998 Allocations			
				Limited Entry		Open Access	
				1,000 mt	Percent	1,000 mt	Percent
Roundfish							
Lingcod	0.96	0.838[a/]		0.324	80.9	0.076	19.1
Sablefish	5.2	4.68	0.468	3.934[b/]	93.4	0.278	6.6
Rockfish							
Widow	5.75	4.276		4.118	96.3	0.158	3.7
Shortspine thornyhead	1.0	1.082[c/]		1.082	>99.0	0.004	<1.0
Sebastes Complex							
Northern area	7.057[d/]			6.127	90.4	.651	9.6
Southern area	8.999	8.439[e/]		5.6	67.4	2.738	32.6
Bocaccio	.230	.230[f/]		.128	67.4	0.062	32.6
Canary	1.045	.878		.801	91.2	.077	8.8
Yellowtail	3.465	2.911		2.631	90.4	0.279	9.6

a/ The open access and limited entry allocations for lingcod are applied only to the commercial portion of the harvest guideline, which is 400 mt in 1998 (438 mt is deducted for anticipated recreational harvest).

b/ The limited entry sablefish allocation is further allocated 58% (2,282 mt) to the trawl fishery and 42 percent (1,652 mt) to the nontrawl fishery.

c/ The shortspine harvest guideline of 1,082 mt applies north of the Conception area. There is a separate ABC of 113 mt for the portion of the Conception area north of Pt. Conception.

d/ Within the Sebastes complex north, harvest guidelines for commercial harvest of black rockfish by the Makah, Quileute, Hoh, and Quinault Indian tribes remain at 20,000 pounds north of Cape Alava (48°09"30"N) and 10,000 pounds between Destruction Island (47°40"00"N) and Leadbetter Point (46°38"10"N).

e/ The Sebastes south harvest guideline includes the bocaccio harvest guideline. The open access and limited entry allocations are applied only to the commercial portion of the bocaccio harvest guideline. Therefore, 40 mt of anticipated recreational catch is deducted prior to calculating the allocations.

f/ The open access and limited entry allocations for bocaccio are applied only to the commercial portion of the harvest guideline, which is 190 mt in 1998 (40 mt is deducted for anticipated recreational harvest).

TABLE 52. Final 1999 ABCs and Optimum Yields (harvest guidelines) for the Washington, Oregon, and California region by management area (metric tons). Page 1 of 3

ROUNDFISH	Final ABC						Final OY	Expected Landed Catch [a/]
	Vancouver [b/]	Columbia	Eureka	Monterey	Conception	U.S. Total	Total Catch	
Lingcod [c/]	450		139	325	46	960 c/	730 c/	666
Pacific cod	3,200			[d/]		3,200	NA d/	
Whiting [e/]	232,000 e/					232,000 e/	232,000	
Sablefish [f/]	9,692 f/					9,692 f/	7,919 f/	7,128
Conception area					472	472	472	425

ROCKFISH OTHER THAN SEBASTES COMPLEX							Final OY	
	Vancouver	Columbia	Eureka	Monterey	Conception	Total for areas noted	Total Catch	Expected Landed Catch
POP	695 g/					695 g/	595 [g/]	500 g/
Shortbelly	23,500					23,500	23,500	
Widow	5,750 [h/]					5,750 h/	5,023 h/	3,962 h/
Chilipepper	c/		3,724 [i/]			3,724 i/	3,724 i/	3,724 i/
Splitnose [j/]			868			868	868 j/	729 j/
Thornyheads								
Shortspine [k/]	1,261 k/					1,261 k/	1,150 k/	805 k/
Conception area					175	175	175	123
Longspine [l/]	4,102 l/					4,102 l/	4,102	3,733
Conception area					429	429	429	390

SEBASTES COMPLEX							Final OY	
	Vancouver b/	Columbia	Eureka	Monterey	Conception	Total for areas noted	Total Catch	Expected Landed Catch
Sebastes-N [m/]	8,647					8,647 m/	6,617 m/	5,421 m/
Sebastes-S [n/]			4,731			4,731 n/	2,705 [o/]	2,705
bocaccio [p/]	420		230 p/			230 p/	230 p/	230 p/
canary [q/]	1,045					1,045 q/	857 q/	689 q/
yellowtail [r/]	3,465					3,465 r/	3,435 r/	2,407 r/
remaining rockfish	2,295 [s/]		898 s/					
bank	c/		81			81	NA	
blackgill [t/]	c/				365	365 t/		
bocaccio	0					0	NA	
canary			85			85	NA	
darkblotched	209		47			260	NA	
POP			20 [u/]			20	NA	
redstripe	768		d/			770	NA	
sharpchin	398		71			470	NA	
silvergrey	51		d/			51	NA	
splitnose	274					274	NA	
yelloweye	39		d/			39	NA	
yellowmouth	132		d/			130	NA	
yellowtail			74 n/		155	229	NA	
Other rockfish [v/]	1,842 v/		3,603 v/				NA	

TABLE 52. Final 1999 ABCs and Optimum Yields (harvest guidelines) for the Washington, Oregon, and California region by management area (metric tons). Page 2 of 3

FLATFISH	Final ABC						Final OY	
	Vancouver	Columbia	Eureka	Monterey	Conception	Coastwide ABC	Total Catch	Expected Landed Catch
Dover sole w/	8,373				1,053	9,426	9,426 w/	8,955
English sole	2,000		1,100			3,100	NA	
Petrale sole	1,200		500	800	200	2,700	NA	
Arrowtooth flounder	5,800					5,800	NA	
Other flatfish	700	3,000	1,700	1,800	500	7,700	NA	
OTHER FISH x/	2,500	7,000	1,200	2,000	2,000	14,700	NA	

a/ In this table, expected landed catch usually refers to the target for the commercial fishery. However, in some cases (such as lingcod and chilipepper) it applies to the total expected catch by all sectors.

b/ ABC applies to the U.S. portion of the Vancouver area, except as noted.

c/ Lingcod - the 1997 assessment addressed the entire Vancouver area, including Canada, and the Columbia area. The GMT's final 1999 ABC recommendation of 960 mt is the F35% level and applies only to the U.S. portion of the stock (44% of the Vancouver area total) and is equivalent to the 1998 value. The Council applied the 60% reduction observed in the northern areas to the southern area ABCs based on scientific advice that stock conditions were at least as bad in the southern region. Under the default harvest policy adopted in September 1998, OY would be zero for this overfished stock (current egg production potential is estimated to be 8.8% of pristine); however, the Council chose a final total catch OY of 730 mt to address unavoidable bycatch, rebuilding needs, and competing use by several fishing sectors. The recreational sector is expected to take 310 mt. The expected landed catch of 666 mt for all fisheries reflects 64 mt of anticipated discard in the limited entry fishery.

d/ These species are neither common nor important in the areas footnoted. Accordingly, for convenience, Pacific cod is included in a non-numerical OY for the "other fish" category for the areas footnoted, and rockfish species are included in the "other rockfish" category for the areas footnoted only.

e/ The whiting ABC and OY (232,000 mt) applies to U.S. waters. ABC and OY are based on the 1999 stock assessment and application of F35% and the default OY policy, with 80% set as the U.S. share. The 1999 Treaty Tribes' allocation is 32,500 mt, which was subtracted from the final OY, and the remainder allocated 42% to the shore-based sector, 34% to the factory trawler fishery, and 24% to the mothership processor sector. The Council chose ABC at the upper end of the range of plausible harvests identified in the assessment.

f/ Sablefish - the 9,692 mt final Council ABC and 7,919 mt final OY apply north of 36°N latitude. The stock is estimated to be at 37% of its pristine level, but there is substantial uncertainty in the biomass estimate. The ABC is based on F35%, while the total catch OY is based on F40%. The 7,128 mt landed catch OY for the northern area is the total catch OY (7,919 mt) reduced by 10% (791 mt) for anticipated discard. Ten percent (713 mt) of the northern harvest guideline is set aside for the treaty tribes; the remainder (6,415 mt) is divided between the limited entry (5,992 mt) and open access (423 mt) fisheries. The limited entry portion will be allocated 58% (3,475 mt) to the trawl fishery and 42% (2,516 mt) to the nontrawl fishery. The ABC and OY for the Conception area (south of 36°N latitude), which are based on historical landings, remain the same as 1998. There are no limited entry and open access allocations for the Conception area at this time.

g/ Pacific ocean perch - the 695 mt final ABC for the combined Vancouver and Columbia areas is based on the 1998 stock assessment and application of the F40% harvest rate. The Council deviated from the default OY policy and set OY near the expected 1998 harvest level because incidental capture of this species is considered unavoidable under current management of other groundfish species. The landed catch OY is 500 mt.

h/ Widow rockfish - the 5,750 mt ABC, based on the F40% harvest rate, is unchanged from 1998. The stock is estimated to be at 29% of its pristine reproductive potential. The total catch OY (5,023 mt) will be reduced to account for an expected recreational catch of 42 mt and an assumed limited entry fishery discard rate of 16%. The commercial landed catch equivalent will also be reduced to account for anticipated bycatch in the at-sea fisheries for Pacific whiting.

i/ Chilipepper rockfish - the ABC (3,724 mt) is based on the 1998 assessment and application of the F40% harvest rate. The stock is estimated to be above the 40% precautionary threshold. The Council recommended removal of this species from the southern Sebastes complex and establishment of a separate ABC and OY. In accordance with the default harvest policy, OY is equal to the ABC. An open access allocation will be established for 1999.

j/ Splitnose rockfish (often called "rosefish") has been removed from the southern Sebastes complex, and a separate OY (868 mt) has been established. The landed catch OY (729 mt) reflects a 16% assumed discard.

k/ Shortspine thornyhead - the Council's final ABC recommendation (1,261 mt) is calculated based on a synthesis of two stock assessments prepared in 1998 and application of the F35% harvest rate. The assessment addressed the area north of 36°N latitude, which is the northern boundary of the Conception area. Therefore this ABC and OY apply only to that area. The GMT estimates the current stock size is 32% of the pristine (unfished) abundance. The final OY, which is based on the F35% harvest rate and application of the default harvest policy, is 1,150 mt. The landed catch equivalent (805 mt) reflects a 30% reduction for discard. A separate ABC and OY (based on historical catch) are established for the part of the Conception area north of Point Conception. There is no ABC or OY for the southern Conception area.

l/ Longspine thornyhead - the final ABC (4,102 mt) north of the Conception area is the same as in 1998, based on the average of the 3 year individual ABCs. The stock is estimated to be above the 40% precautionary threshold so the preliminary total catch OY is also 4,102 mt. The landed catch equivalent (3,733 mt) represents a 5% reduction to account for market discard. The ABC and OY for the Conception area apply north of Point Conception. The southern Conception area has neither an ABC or OY.

m/ Sebastes complex (north) includes all rockfish species listed below in the U.S. Vancouver and Columbia areas combined, including other rockfish and bocaccio in the north (420 mt). The total catch OY is the sum of 75% of the "remaining rockfish" total plus 50% of the "other rockfish" total, plus the final OYs for canary and yellowtail, and zero for bocaccio. The reduction in the contribution of remaining and other rockfish is intended to address uncertainty in stock status due to limited information. The expected commercial landed catch target reflects expected recreational harvest of 818 mt and a 16% discard adjustment for the limited entry fishery.

n/ Sebastes complex (south) includes all rockfish listed below in the Eureka, Monterey and Conception areas combined, except chilipepper and splitnose. The final ABC is the sum of all those individual species ABCs in the three areas.

o/ Sebastes South OY - the total catch OY is the sum of the final OY for bocaccio rockfish plus 75% of the "remaining rockfish" (except splitnose) ABC plus 50% of the "other rockfish" ABC. The recommendation to reduce the amounts contributed to OY by the other species is based on the extremely limited information on most rockfish species.

p/ For bocaccio in the south, the final ABC (230 mt) is based on the estimated F40% value. This stock in this area is estimated to be at only 7% of its unfished level and is considered to be overfished. Under the default harvest policy adopted in September 1998, OY would be zero; however, the Council chose a final OY of 230 mt to account for unavoidable bycatch expected to occur in the commercial and recreational fisheries under existing management of other rockfish species. The recreational sector in California is expected to take 80 mt.

q/ The canary rockfish final ABC is based on the F40% level; the GMT revised its estimate of stock size relative to pristine from 30% to 26%. This reduced the total catch OY recommendation to 857 mt; after subtracting expected recreational harvest (32 mt) the landed catch target for commercial fishers would be 689 mt, reflecting a 16% discard adjustment for the limited entry sector.

TABLE 52. Final 1999 ABCs and Optimum Yields (harvest guidelines) for the Washington, Oregon, and California region by management area (metric tons). Page 3 of 3

r/ Yellowtail rockfish - the final ABC recommendation (3,465 mt) applies to the Columbia area and the U.S. portion of the Vancouver area; it reflects a transfer of 74 mt to the Eureka area. The stock is estimated to be at 39% of its pristine level. The Council based its final OY recommendation (3,435 mt) on the F40% yield and the default OY policy. The landed catch equivalent for commercial fishers reflects a 16% discard reduction factor for the limited entry fishery and 600 mt of anticipated discard in the at-sea fisheries for Pacific whiting.

s/ Remaining rockfish: in the north this includes bocaccio and all rockfish species listed below in the table except the "Other rockfish" category. In the south, includes all rockfish species below in the table except the "Other rockfish" category; bocaccio in not included.

t/ Blackgill rockfish - the 1998 stock assessment estimates the Conception area stock to be at about 51% of pristine levels. The 365 mt ABC is based on F40%. This stock was previously included in the "other rockfish" category; the ABC for that group was reduced by 365 mt and the ABC for "remaining rockfish" increased by that amount. The GMT will monitor landings, and if they reach 300 mt, the GMT will alert the Council to the possible need for management action or a stock assessment.

u/ Pacific ocean perch - the ABC (20 mt) for the Eureka, Monterey and Conception area is based on the 1996 Sebastes complex assessment .

v/ Other rockfish includes offshore Sebastes species not identified above in this table. The final ABC recommendation is based on the 1996 Sebastes complex assessment of commercial landings and includes an estimate of recreational landings which has been revised from the 1998 estimate.

w/ Dover sole - The 1997 assessment evaluated the resource north of 36° N. lat. as a unit, and provided an ABC for landed catch based on the F35% harvest rate. The Conception area ABC is at the level established in the original FMP. The ABCs represent total catch, and were converted by estimating that 5% of the total catch is discarded. Therefore, the coastwide ABC and OY of 9,426 mt are for total catch, with a landed catch equivalent of 8,955 mt.

x/ Includes sharks, skates, rays, ratfish, morids, grenadiers, and other groundfish species noted above in d/.

TABLE 53. Landings and quotas/harvest guidelines for Pacific whiting (includes discards in the foreign, joint venture and at-sea processing sectors).

Year	Foreign Fishery (mt)	Joint Venture (mt)	U.S.-Processed (mt)[a]	Total Landings (mt)[b]	Quota or Harvest Guideline (mt)	Quota Landed (percent)
1978	96,827	856	689	98,372	130,000	76
1979	114,910	8,834	937	124,681	198,900	63
1980	44,023	27,537	793	72,353	175,000	41
1981	70,366	43,557	838	114,761	175,000	66
1982	7,089	67,465	1,024	75,578	175,500	43
1983	0	72,100	1,051	73,151	175,500	42
1984	14,772	78,889	2,721	96,382	175,500	55
1985	49,853	31,692	3,894	85,439	175,000	49
1986	69,861	81,639	3,463	154,963	295,800	52
1987	49,656	105,997	4,795	160,448	195,000	82
1988	18,041	135,781	6,876	160,698	232,000	69
1989	0	203,578	7,418	210,996	225,000	94
1990	0	170,972	12,828	183,800	196,000	94
1991	0	0	217,505	217,505	228,000	95
1992	0	0	208,575	208,575	208,800	100
1993[b]	0	0	141,222	141,222	142,000	99
1994[b]	0	0	252,729	252,729	260,000	97
1995[b]	0	0	176,571	176,571	178,400	99
1996[b]	0	0	212,912	212,912	212,000	100
1997[b]	0	0	233,422	233,422	232,000	100
1998[b]	0	0	232,823	232,823	232,000	100

a/ U.S. processing was entirely shorebased through 1989. Since 1990, domestic at-sea processing vessels have operated in the whiting fishery.

b/ Preliminary.

Table 54. Final GMT acceptable biological catch (ABC) and optimum yield (OY) recommendations for 2000 for the Washington, Oregon, and California region by management area (metric tons). Page 1 of 3.

ROUNDFISH	Final GMT ABC Recommendations						GMT Final OYs	Preliminary Council OYs
	Vancouver a/	Columbia	Eureka	Monterey	Conception	U.S. Total	Total Catch	
Lingcod b/	450		250			700 b/	335 - 378 b/	335 - 378
Pacific cod	3,200		c/			3,200	NA c/	
Whiting d/	232,000 d/					232,000 d/	232,000	232,000
Sablefish e/	9,692 e/					9,692 e/	**6,895** e/	7,919
Conception area					472	472	472	472

ROCKFISH	Vancouver	Columbia	Eureka	Monterey	Conception	Total for areas noted	Total Catch	
Pacific ocean perch	713 f/			c/		713 f/	270 - 294 f/	270-294
Shortbelly	**13,900** g/					**13,900**	**13,900 g/**	23,500
Widow	5,750 h/					5,750 h/	**4,333** h/	5,023
Canary i/	287 - 356 i/					287 - 356 i/	102 i/	102
Chilipepper				3,681 j/		3,681 j/	**2,000** j/	3,681 j/
Bocaccio k/	c/			164		164 k/	40-90 k/	40-90
Splitnose l/				**820**		**820**	**615** l/	624
Yellowtail m/	3,539			c/		**3,539** m/	**2,980** m/	3,539
Thornyheads								
Shortspine n/	1,261 n/					1,261 n/	**970** n/	1,150
Conception area					175	175	175	175
Longspine o/	4,102 o/					4,102 o/	4,102	4,102
Conception area					429	429	429	429
Cowcod				**19**	**5**	**24**	**<5** p/	
Minor Rockfish N q/	**5,693** i/					**5,693** q/	**3,814** q/	3,664 r/
Minor Rockfish S s/				**3,457**		**3,457** s/	**1,899**	1899
Remaining rockfish t/	**3,625**			**680** t/				
bank	c/			81		81	NA	
black u/	**1,200**					**1,200**	NA	
blackgill v/	c/			440		440 v/	NA	
bocaccio	420					420	NA	
darkblotched	**237**			**19**		**256**	NA	
redstripe	768			c/		768	NA	
sharpchin	409			60		469	NA	
silvergrey	51			c/		51	NA	
splitnose	**322**			c/		**322**	NA	
yelloweye	39			c/		39	NA	
yellowmouth	132			c/		132	NA	
yellowtail				155		155	NA	
Other rockfish w/	2,068 w/			2,777 w/			NA	

Table 54. Final GMT ABC and OY recommendations for 2000 for the Washington, Oregon, and California region by management area (metric tons). Page 2 of 3.

FLATFISH	GMT Final ABC Recommendations						GMT Final OY	Preliminary Council OYs
	Vancouver	Columbia	Eureka	Monterey	Conception	Coastwide ABC	Total Catch	
Dover sole x/	8,373				1,053	9,426	9,426 x/	9,426
English sole	2,000		1,100			3,100	NA	
Petrale sole	**1,450** y/		500	800	200	**2,950**	NA	
Arrowtooth flounder	5,800					5,800	NA	
Other flatfish	700	3,000	1,700	1,800	500	7,700	NA	
OTHER FISH z/	2,500	7,000	1,200	2,000	2,000	14,700	NA	

a/ ABC applies to the U.S. portion of the Vancouver area, except as noted. For lingcod, the U.S. ABC is set at 44% of the total for the area.

b/ Lingcod - the draft rebuilding analysis calculates the probability the northern (Vancouver-Columbia) stock would rebuild within 10 years if various levels of catch occur. The lower OY would result in greater confidence the stock would rebuild in the specified time; the larger OY has a lower probability of rebuilding in that time.

c/ These species are neither common nor important in the areas footnoted. Accordingly, for convenience, Pacific cod in the areas footnoted is included in the non-numerical OY for "other fish." Rockfish species are included in either the "other rockfish" or "remaining rockfish" category for the areas footnoted only.

d/ The Council recommends continuation of the 1999 whiting U.S. ABC and OY (232,000 mt), which is based on the 1999 stock assessment and continuation of the 1998 OY. The ABC and OY are 80% of the coastwide value. The treaty tribes' allocation will be subtracted from the final OY, and the remainder will be allocated 42% to the shore-based sector, 34% to the factory trawler sector, and 24% to the mothership processor sector.

e/ Sablefish - the 9,692 mt ABC, based on $F_{35\%}$, is the same as 1999; the GMT's final OY (6,895 mt) is based on $F_{40\%}$ and application of the default OY (40-10) policy. This OY will apply north of 36° N latitude. The stock is estimated to be at 37% of its unfished level, but there is substantial uncertainty in the biomass estimate. The landed catch OY for the northern area will be the total catch OY reduced by 10% for anticipated discard. Ten percent of the northern harvest guideline is set aside for the treaty tribes; the remainder is divided between the limited entry and open access fisheries. The limited entry portion will be allocated 58% to the trawl fishery and 42% to the nontrawl fishery. The ABC and OY for the Conception area (south of 36° N latitude), which are based on historical landings, also remain the same as 1999. There are no limited entry and open access allocations for the Conception area at this time.

f/ Pacific ocean perch - the ABC for this overfished stock in the combined Vancouver, Columbia, and Eureka areas is based on the 1998 assessment for Vancouver and Columbia (695 mt), plus 18 mt for Eureka. OY is based on calculations in the rebuilding program.

g/ Shortbelly rockfish remains an unexploited stock, and is difficult to assess quantitatively. The 1989 assessment provided two alternative yield calculations of 13,900 mt and 47,000 mt. NMFS recruitment surveys indicate poor recruitment in most years since 1989, indicating low recent productivity and a naturally declining population. The GMT recommends ABC and OY be reduced to 13,900 mt,

h/ Widow rockfish - the 5,750 mt ABC, based on the $F_{40\%}$ harvest rate, is unchanged from 1999. The stock is estimated to be at 29% of its unfished reproductive potential. The GMT's final total catch OY (4,333 mt) is based on $F_{45\%}$ and the 40-10 default OY policy; the commercial total catch target will be reduced to account for an expected recreational catch of 42 mt and an assumed limited entry fishery discard rate of 16%. The commercial landed catch equivalent will also be reduced to account for anticipated bycatch in the at-sea fisheries for Pacific whiting.

i/ Two canary rockfish assessments addressed the northern and southern portions of the stock. The GMT combined the results, which resulted in a biomass range estimated to be between about 7% of unfished in the south to 20% of unfished in the north. The coastwide ABC range (287-356 mt) is based on the upper end of each assessment, at $F_{40\%}$. The coastwide OY is 102 mt (based on the northern assessment). The 1999 canary rockfish OY applied to the Vancouver and Columbia areas only; coastwide landings have been about 1,100 mt in recent years. The stock appears to be overfished, and a rebuilding plan will be required in 2001.

j/ Chilipepper rockfish - In 1999, the 3,724 mt chilipepper ABC and OY included 43 mt for the Eureka area, which is moved to the northern remaining rockfish ABC in 2000. The revised ABC (3,681 mt) for the Monterey and Conception areas is based on the 1998 assessment and application of the $F_{40\%}$ harvest rate. The stock is estimated to be above the 40% precautionary threshold, so the default OY would equal ABC. However, the GMT recommends OY be set at 2,000 mt, the recent average landed catch.

k/ For bocaccio in the south, the preliminary ABC is based on $F_{40\%}$ and the proposed OY of 40-90 mt is based on the rebuilding plan.

l/ Splitnose rockfish (often called "rosefish") - a separate OY (868 mt) was established was established in 1999, equal to ABC. The For year 2000, 48 mt for the Eureka area is moved to the remaining rockfish ABC in that area. The OY (615 mt) reflects a 25% precautionary adjustment because of the less-rigorous assessment for this stock.

m/ Yellowtail rockfish - the ABC recommendation (3,539 mt) applies to the Eureka, Columbia, and U.S. portion of the Vancouver areas. The stock is estimated to be at 39% of its pristine level. The GMT's final OY recommendation (2,980 mt) is based on $F_{45\%}$ and application of the 40-10 policy. A landed catch equivalent for commercial fishers will based on a 16% discard reduction for landings in the limited entry fishery and subtraction of anticipated discard in the at-sea fisheries for Pacific whiting.

n/ Shortspine thornyhead - the ABC recommendation (1,261 mt) is the same as 1999, calculated based on a synthesis of two stock assessments prepared in 1998 and application of the $F_{35\%}$ harvest rate. The assessment addressed the area north of 36° N latitude, which is the northern boundary of the Conception area. Therefore, this ABC and OY apply only to that area. The GMT estimated the current stock size is 32% of the unfished abundance in 1999. The GMT's final OY recommendation (960 mt) is based on $F_{40\%}$ and the 40-10 policy. The landed catch equivalent will reflect a 30% reduction for discard. A separate ABC and OY (based on historical catch) have been established for the part of the Conception area north of Point Conception in recent years. There is no ABC or OY for the southern Conception area.

Table 54. Final GMT ABC and OY recommendations for 2000 for the Washington, Oregon, and California region by management area (metric tons). Page 3 of 3.

o/ Longspine thornyhead - the ABC (4,102 mt) north of the Conception area is the same as in 1999, based on the average of the 3 year individual ABCs at $F_{35\%}$. The stock is estimated to be above the 40% precautionary threshold. The landed catch equivalent will reflect a 5% reduction to account for market discard. The ABC and OY for the Conception area apply north of Point Conception. The southern Conception area has neither an ABC or OY.

p/ Cowcod - the 1999 assessment of the Conception area indicates this stock is overfished, with abundance below 10% of the unfished level. The GMT recommends ABC in the Conception area be 5 mt (based on the assessment) and 19 mt in the Monterey area (based on average landings from 1983-1997). The GMT recommends the total catch OY be less than 5 mt and the landed catch should be zero for both areas combined.

q/ Minor Rockfish (north) - this new category includes the "Remaining Rockfish" and "Other Rockfish" categories in the U.S. Vancouver, Columbia, and Eureka areas combined. The total catch OY is the sum of 75% of the "remaining rockfish" total plus 50% of the "other rockfish." The reduction in the contribution of remaining and other rockfish is intended to address uncertainty in stock status due to limited information. The expected commercial landed catch target in 1999 reflected **recreational harvest of 818 mt** and a 16% discard adjustment for the limited entry fishery.

r/ The remaining rockfish category includes the rockfish species that have been assessed by less-vigorous methods than stock synthesis. It includes all rockfish below in this table except the other rockfish category. The contribution of these species to the Minor Rockfish OY is reduced by 25% as a precautionary adjustment.

s/ Minor Rockfish (south) - this new category includes the "Remaining Rockfish" and "Other Rockfish" categories in the Monterey and Conception areas combined. The ABC is the sum of all those individual species ABCs in the three areas. The total catch OY is the sum of 75% of the "remaining rockfish" ABC plus 50% of the "other rockfish" ABC. This precautionary reduction reflects the extremely limited information on most rockfish species.

t/ Remaining rockfish includes all rockfish species below in the table except the "Other rockfish" category.

u/ Black rockfish: this 1,200 mt is the sum of the ABC calculated for the assessment area (700 mt) plus the average catch in the unassessed area (500 mt). This stock contributes 950 mt towards the Minor rockfish OY in the north: 700 mt for the assessed area and 50% of the unassessed area. The 50% reduction is a precautionary adjustment consistent with other GMT recommendations.

v/ Blackgill rockfish - the 1998 stock assessment estimates the Conception area stock to be at about 51% of pristine levels. The 365 mt ABC is based on $F_{40\%}$; 75 mt was added for the Monterey area. Upon completion of the assessment in 1998, this stock was moved from the "other rockfish" category to the "remaining rockfish" category. The GMT will continue to monitor landings, if landings reach 300 mt, the GMT will alert the Council to the possible need for management action or a stock assessment.

w/ Other rockfish includes rockfish species of the genus *Sebastes* not identified above in this table. The ABC recommendation is based on the 1996 *Sebastes* complex review of commercial landings and includes an estimate of recreational landings. These species have never been formally assessed.

x/ Dover sole - The 1997 assessment evaluated the resource north of 36° N latitude as a unit, and provided an ABC for landed catch based on the $F_{35\%}$ harvest rate. The Conception area ABC is at the level established in the original FMP. The ABCs represent total catch, and were converted by estimating that 5% of the total catch is discarded. Therefore, the coastwide ABC and OY of 9,426 mt are for total catch with a landed catch equivalent of 8,955 mt.

y/ Petrale sole - The 1999 assessment calculates the ABC in the Vancouver and Columbia areas at 1,447 mt, which the GMT has rounded to 1,450 mt. The stock size has been increasing and is estimated to be at 42% of its unfished size in 1999. The coastwide ABC (2,950 mt) is the sum of the areas.

z/ Includes sharks, skates, rays, ratfish, morids, grenadiers, and other groundfish species noted above in c/.

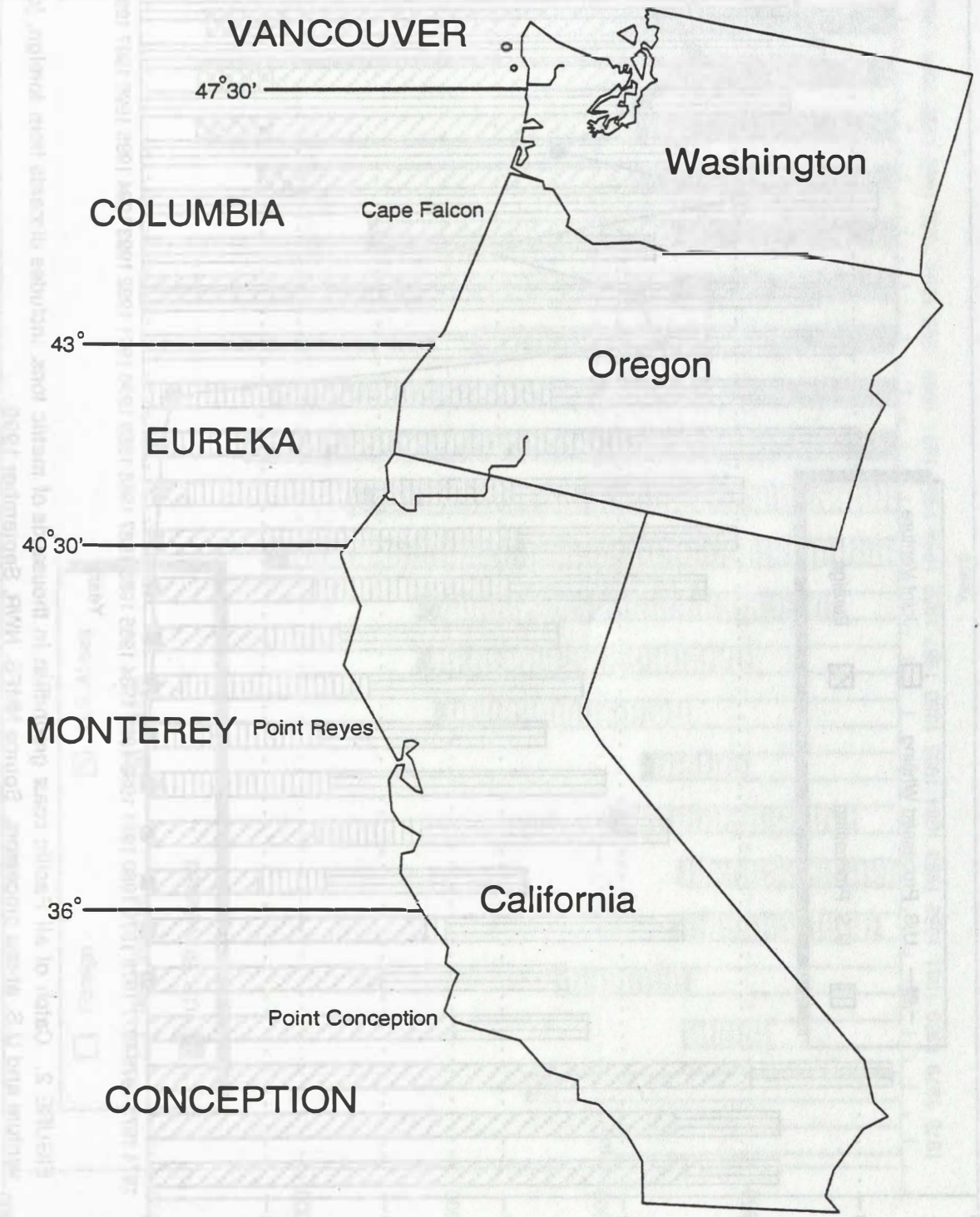

FIGURE 1. Management statistical areas in the U.S. exclusive economic zone seaward of Washington, Oregon, and California.

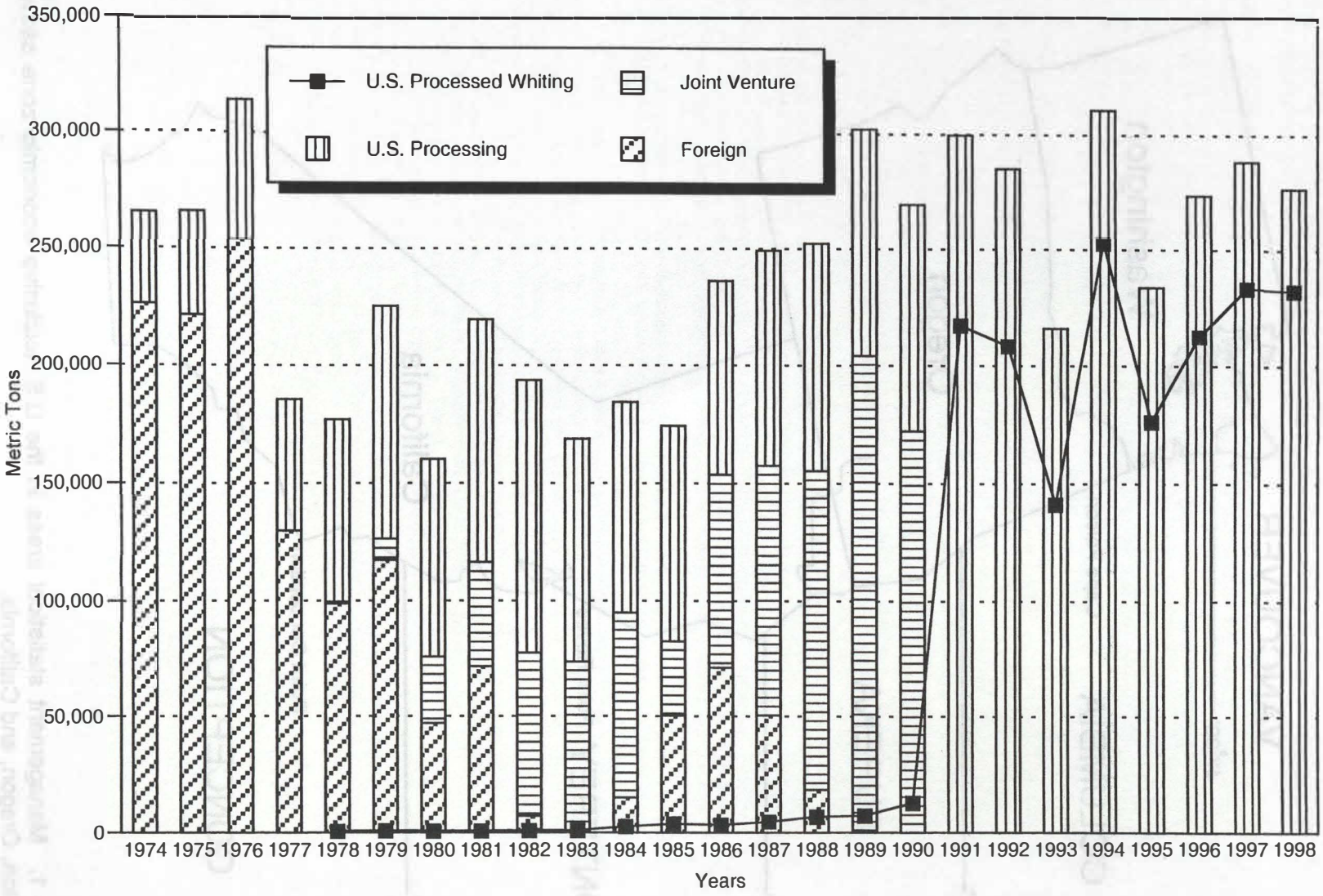

FIGURE 2. Catch of all Pacific coast groundfish in thousands of metric tons, includes discards from foreign, joint venture and U.S. at-sea processors. Source NMFS, NWR, September 1999.

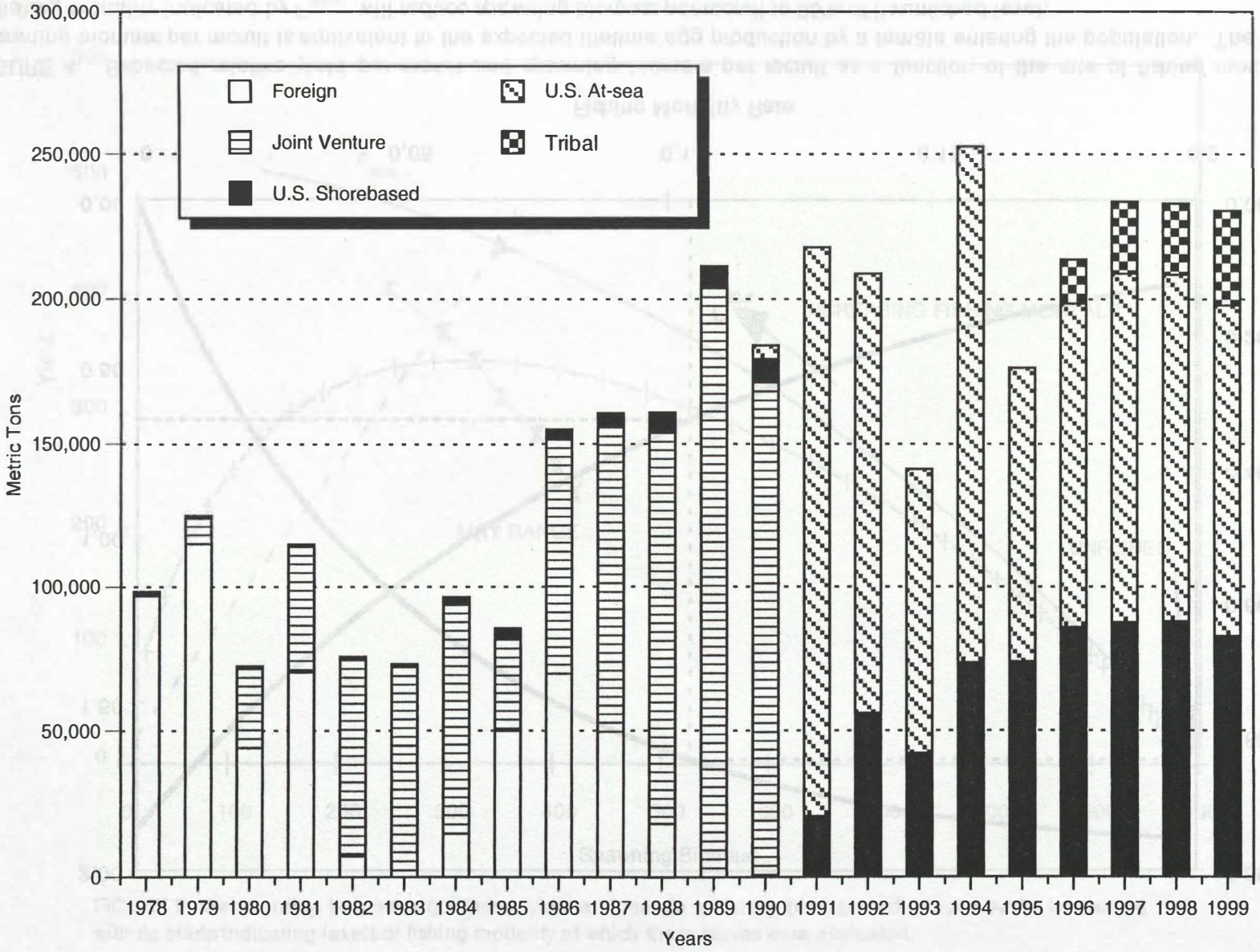

FIGURE 3. Landings of Pacific whiting, including discards by foreign, joint venture and U.S. at-sea processors. Source: NMFS, NWR, September 1999. 1997, 1998, and 1999 U.S. Shorebased, U.S. at-sea, and Tribal are preliminary.

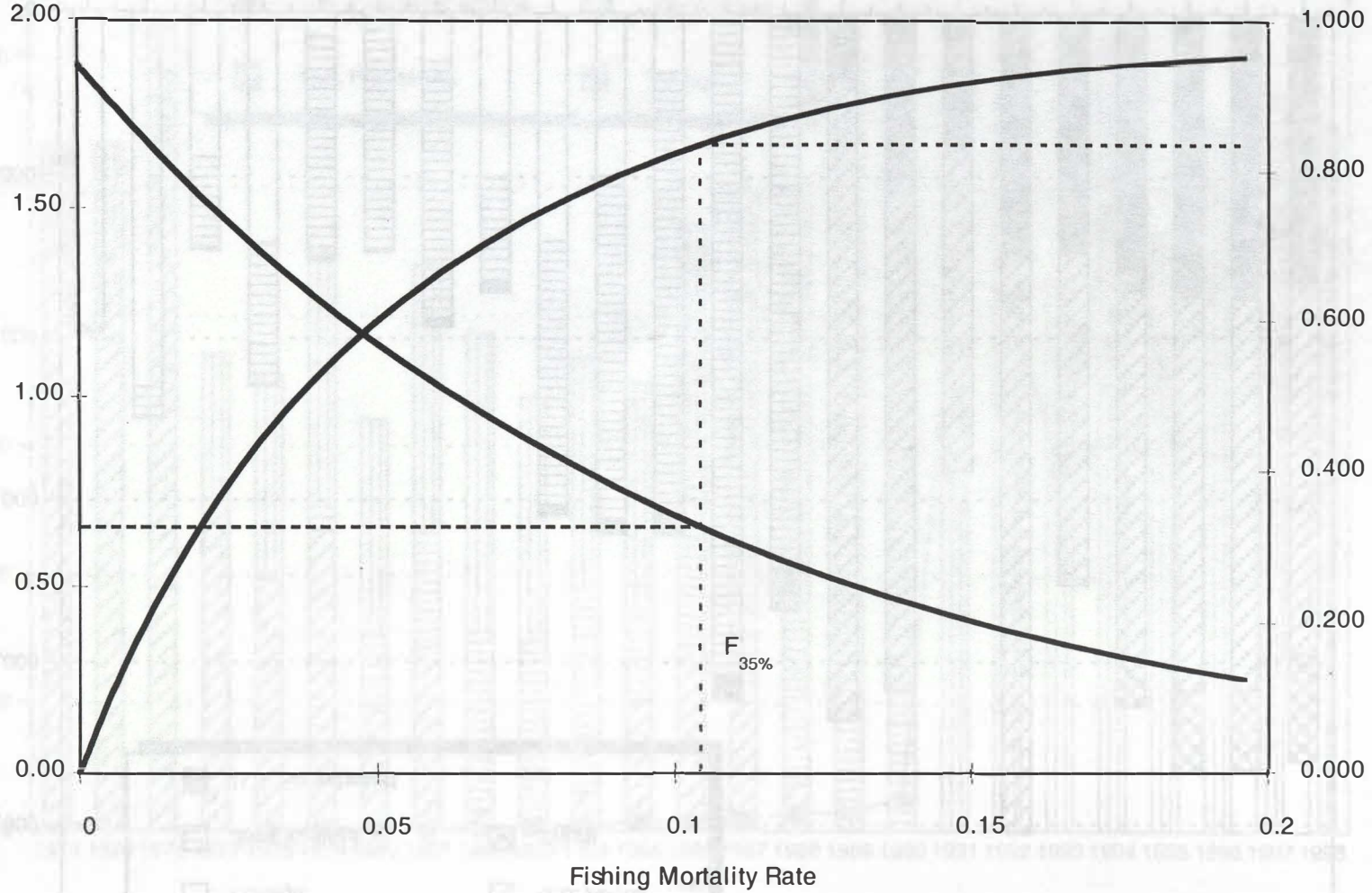

FIGURE 4. Expected relative yield per recruit and spawning biomass per recruit as a function of the rate of fishing mortality. Spawning biomass per recruit is equivalent to the expected lifetime egg production by a female entering the population. The level of fishing mortality indicated by $F_{35\%}$ will reduce spawning biomass per recruit to 35% of its unfished level.

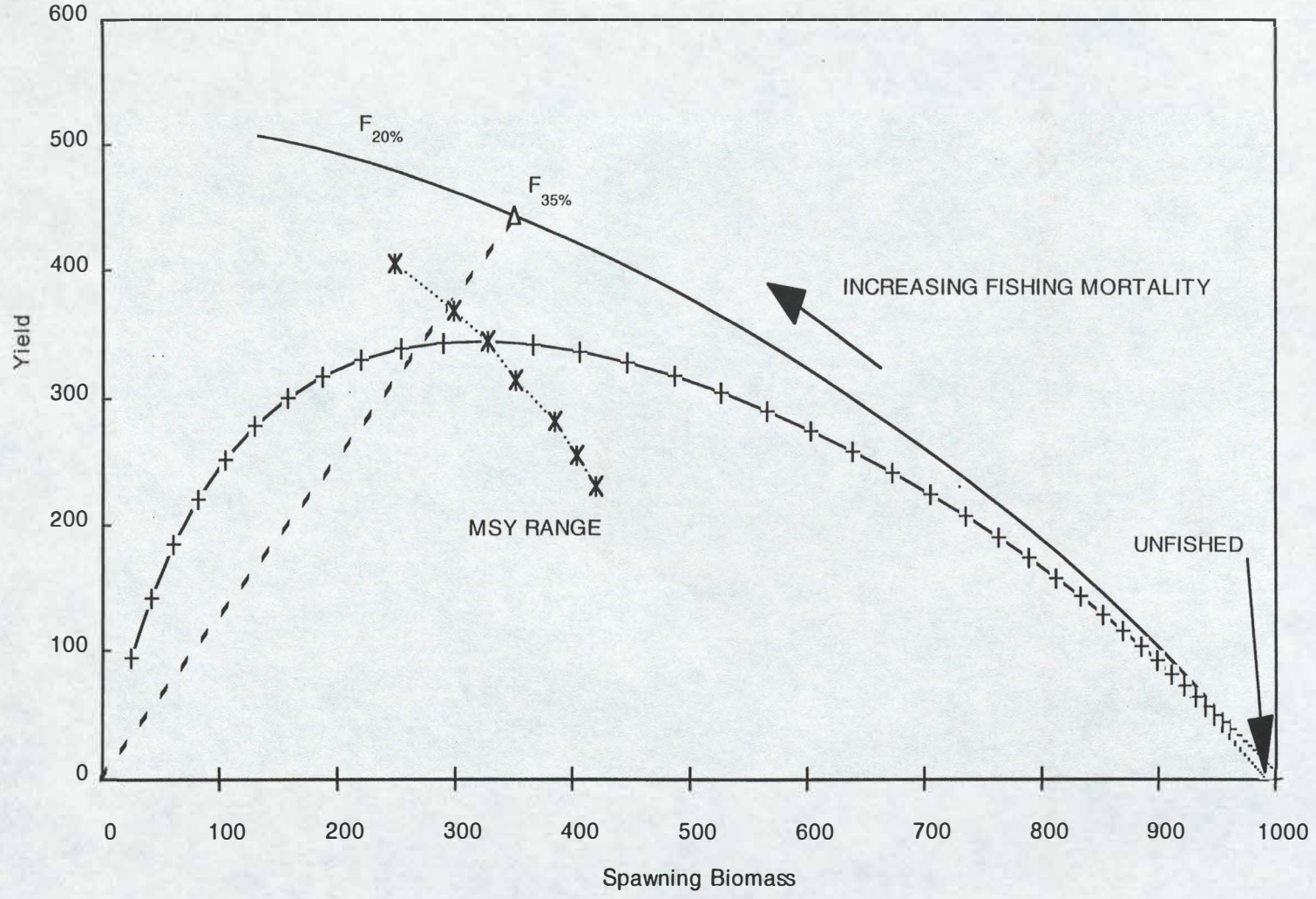

FIGURE 5. Relationship between equilibrium yield and female spawning biomass is displayed by the two curves, with tic marks indicating levels of fishing mortality at which these curves were evaluated.

ECONOMIC STATUS OF THE WASHINGTON, OREGON, AND CALIFORNIA GROUNDFISH FISHERIES

Compiled by

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October 1999

Table 1. Quantity and ex-vessel value of groundfish landings in Washington, Oregon, and California (WOC), including fish delivered to domestic floating processors in waters off these states, 1981 - 1998.[1]

	WOC Shoreside		Domestic At Sea Processors		Total	
Year	Landings (mt)	Real[2] Exvessel Revenues (1998 $)	Landings (mt)	Real Exvessel Revenues (1998 $)	Landings (mt)	Real Exvessel Revenues (1998 $)
1981	102,976	$76,960,687	0	$0	$102,796	$76,960,687
1982	118,910	$96,038,482	0	$0	118,910	$96,038,482
1983	98,657	$80,461,548	0	$0	98,657	$80,461,548
1984	89,693	$72,079,052	0	$0	89,693	$72,079,052
1985	90,868	$80,078,655	0	$0	90,868	$80,078,655
1986	82,517	$78,836,328	0	$0	82,517	$78,836,328
1987	92,008	$97,150,325	0	$0	92,008	$97,150,325
1988	92,228	$89,187,917	0	$0	92,228	$89,187,917
1989	99,386	$86,552,296	0	$0	99,386	$86,552,296
1990	93,004	$76,690,361	4,735	$948,450	97,740	$77,638,811
1991	102,748	$82,199,430	184,150	$25,097,722	286,628	$107,297,152
1992	132,439	$80,104,124	142,866	$19,694,159	275,305	$99,798,283
1993	116,269	$69,847,200	95,826	$8,095,285	212,095	$77,942,485
1994	135,522	$72,517,488	175,204	$15,109,472	310,727	$87,626,920
1995	134,040	$90,468,895	99,803	$10,337,808	233,842	$101,305,171
1996	144,965	$83,829,742	106,226	$11,953,076	251,191	$95,782,819
1997	140,973	$80,026,469	143,057	$19,452,782	284,030	$99,479,252
1998	129,657	$52,538,526	139,898	$15,365,385	269,555	$67,803,911

Source: PacFIN data extracted July, 1999.

[1] Does not include landings of fish caught in Puget Sound, Alaska, Canada, Mexico, or other waters not in the exclusive economic zone (EEZ) off Washington, Oregon, or California.

[2] Real values are current values adjusted to eliminate the effects of inflation. This adjustment has been made by dividing current values by the current year GDP implicit price deflator, with a base year of 1998. The GDP deflator is 0.9891 for 1997.

Table 2. Average annual real [1] ex-vessel prices ($/lb, 1998) paid for certain commercially important species, 1981 - 1998.[2]

Year	Arrowtooth Flounder	Dover Sole	English Sole	Lingcod	Pacific Whiting	Petrale Sole	Sablefish	Thornyheads	Widow Rockfish	All Rockfish
1981	$0.16	$0.37	$0.51	$0.39	$0.13	$0.88	$0.36	$0.38	$0.23	$0.29
1982	$0.17	$0.37	$0.51	$0.40	$0.13	$0.97	$0.41	$0.36	$0.25	$0.31
1983	$0.15	$0.34	$0.49	$0.38	$0.13	$1.05	$0.36	$0.35	$0.30	$0.34
1984	$0.14	$0.34	$0.47	$0.36	$0.10	$1.05	$0.32	$0.36	$0.33	$0.37
1985	$0.14	$0.34	$0.47	$0.37	$0.10	$1.05	$0.47	$0.36	$0.36	$0.40
1986	$0.14	$0.36	$0.51	$0.44	$0.08	$1.08	$0.53	$0.39	$0.39	$0.44
1987	$0.20	$0.41	$0.55	$0.52	$0.08	$1.10	$0.65	$0.44	$0.44	$0.47
1988	$0.15	$0.39	$0.52	$0.47	$0.10	$1.07	$0.69	$0.46	$0.38	$0.42
1989	$0.12	$0.34	$0.45	$0.44	$0.08	$1.03	$0.59	$0.46	$0.33	$0.40
1990	$0.13	$0.32	$0.39	$0.42	$0.08	$0.99	$0.58	$0.46	$0.32	$0.41
1991	$0.13	$0.35	$0.39	$0.40	$0.06	$0.96	$0.79	$0.53	$0.33	$0.42
1992	$0.12	$0.31	$0.37	$0.44	$0.06	$0.91	$0.75	$0.53	$0.32	$0.44
1993	$0.11	$0.30	$0.35	$0.41	$0.04	$0.86	$0.62	$0.42	$0.31	$0.42
1994	$0.10	$0.31	$0.36	$0.44	$0.04	$0.90	$0.89	$0.78	$0.34	$0.52
1995	$0.12	$0.34	$0.38	$0.48	$0.05	$1.00	$1.41	$1.06	$0.35	$0.61
1996	$0.10	$0.32	$0.37	$0.48	$0.04	$0.94	$1.44	$0.90	$0.32	$0.54
1997	$0.10	$0.29	$0.33	$0.48	$0.04	$0.91	$1.61	$0.79	$0.32	$0.51
1998	$0.10	$0.34	$0.35	$0.74	$0.03	$0.94	$1.17	$0.72	$0.37	$0.50

Source:PacFIN data extracted July, 1999.

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1 Real values are current values adjusted to eliminate the effects of inflation. This adjustment has been made by dividing current values by the current year GDP implicit price deflator, with a base year of 1998.

2 This report includes only data for PFMC Areas: Vancouver, Columbia, Eureka, Monterey, and Conception.

Table 3. Washington, Oregon, and California shoreside commercial groundfish landings[1] (metric tons) and real[2] exvessel value (thousands of 1998 dollars), 1981 - 1998.

	California		Oregon		Washington	
Year	mt	$	mt	$	mt	$
1981	42,394	$36,282	37,502	$25,132	23,080	$15,542
1982	52,672	$44,879	41,023	$32,843	25,216	$18,312
1983	40,583	$34,814	35,158	$28,282	22,916	$17,362
1984	40,593	$34,056	28,209	$22,619	20,891	$15,408
1985	42,734	$37,746	29,023	$24,511	19,112	$17,826
1986	41,629	$40,313	24,931	$23,516	15,957	$15,002
1987	41,358	$41,791	30,530	$32,813	20,120	$22,551
1988	39,761	$37,350	32,114	$31,308	20,353	$20,546
1989	42,510	$37,778	36,832	$31,681	20,044	$17,084
1990	39,168	$34,911	35,505	$27,976	18,331	$13,846
1991	35,766	$31,475	49,751	$34,470	16,951	$16,299
1992	34,787	$32,210	81,915	$34,988	15,737	$12,871
1993	28,058	$26,046	71,191	$31,831	17,019	$11,991
1994	24,744	$26,346	94,097	$34,987	16,682	$11,138
1995	28,489	$35,886	91,645	$39,584	13,905	$15,004
1996	27,954	$34,674	95,816	$35,040	21,189	$14,128
1997	29,009	$31,617	95,879	$34,117	15,994	$14,360
1998	22,420	$21,733	89,809	$22,721	17,428	$7,985

Source: PacFIN data extracted July, 1999.

[1] This report includes only data for PFMC Areas: Vancouver, Columbia, Eureka, Monterey, and Conception.

[2] Real values are current values adjusted to eliminate the effects of inflation. This adjustment has been made by dividing current values by the current year GDP implicit price deflator, with a base year of 1998.

Table 4. Commercial shoreside landings[1] (mt) of individual groundfish species by state, 1997-1998.

Species	California			Oregon			Washington		
	1997	1998	% CHG	1997	1998	% CHG	1997	1998	% CHG
Arrowtooth Flounder	48	37	-23%	1,162	1,591	37%	1,134	1,541	36%
Dover Sole	5,301	3,556	-33%	3,965	3,805	-4%	827	621	-25%
English Sole	649	425	-35%	551	475	-14%	303	238	-21%
Petrale Sole	831	472	-43%	806	683	-15%	308	308	0%
Other Flatfish	1,517	1,065	-30%	711	538	-24%	76	91	20%
Pacific Ocean Perch	15	8	-47%	490	448	-9%	184	171	-7%
Thornyheads	2,768	1,908	-31%	2,326	1,460	-37%	365	162	-56%
Widow Rockfish	1,348	928	-31%	4,105	2,366	-42%	1,000	532	-47%
Unspecified Rockfish	146	386	164%	278	119	-57%	342	348	2%
Other Rockfish	5,953	5,578	-6%	3,573	4,245	19%	931	1,072	15%
Lingcod	502	149	-70%	767	161	-79%	290	38	-87%
Pacific Cod	0	0	0%	52	79	52%	542	335	-38%
Pacific Whiting	6,332	5,723	-10%	73,837	71,625	-3%	7,241	10,513	45%
Sablefish	2,899	1,436	-50%	2,924	1,750	-40%	2,036	1,159	-43%
Other Groundfish	791	749	-5%	332	464	40%	415	299	-28%

Source: PacFIN data extracted July, 1999.

[1] Does not include landings of fish caught in Puget Sound, Alaska, Canada, Mexico, or other waters not in the EEZ off Washington, Oregon, or California.

Table 5. Shoreside landings and real exvessel value [1] (thousands of dollars) of individual groundfish species landed in Washington, Oregon, and California, 1997 - 1998.[2]

	1997		1998		% Change	
Species	mt	1998 $	mt	1998 $	mt	1998 $
Arrowtooth Flounder	2,343	$507	3,168	$702	35%	38%
Dover Sole	10,092	$6,598	7,982	$5,995	-21%	-9%
English Sole	1,503	$1,088	1,138	$873	-24%	-20%
Petrale Sole	1,945	$3,898	1,463	$3,042	-25%	-22%
Other Flatfish	2,304	$1,809	1,694	$1,327	-26%	-27%
Pacific Ocean Perch	689	$485	627	$525	-9%	8%
Widow Rockfish	6,453	$4,574	3,827	$3,131	-41%	-32%
Thornyheads	5,459	$9,516	3,530	$5,588	-35%	-41%
Unspecified Rockfish	766	$982	853	$1,169	11%	19%
Other Rockfish	10,367	$11,222	10,895	$11,344	5%	1%
Lingcod	1,559	$1,664	348	$567	-78%	-66%
Pacific Cod	595	$515	413	$398	-31%	-23%
Pacific Whiting	87,410	$8,201	87,861	$4,751	1%	-42%
Sablefish	7,859	$27,853	4,345	$11,228	-45%	-60%
Other Groundfish	1,538	$1,075	1,513	$1,799	-2%	67%

Source: PacFIN data extracted July, 1999.

[1] Real values are current values adjusted to eliminate the effects of inflation. This adjustment has been made by dividing current values by the current year GDP implicit price deflator, with a base year of 1998.

[2] Does not include landings of fish caught in Puget Sound, Alaska, Canada, Mexico, or other waters not in the EEZ off Washington, Oregon, or California.

Table 6. Percentage contribution of Pacific coast landings to the total ex-vessel value (thousands of dollars) of all Pacific coast commercial fish landings, 1981-98.[1]

Year	Fishery							
	Groundfish	Salmon	Tuna	Crab	Coastal Pelagics[2]	Shrimp	Other	Total Value
1981	12%	17%	45%	5%	7%	5%	9%	$428,941
1982	18%	23%	33%	5%	8%	4%	9%	$381,286
1983	20%	10%	37%	9%	9%	4%	11%	$296,021
1984	22%	17%	29%	9%	5%	3%	15%	$281,714
1985	24%	26%	10%	11%	7%	4%	18%	$270,464
1986	20%	26%	9%	8%	6%	10%	20%	$328,252
1987	19%	29%	8%	7%	5%	11%	21%	$454,543
1988	17%	34%	10%	10%	6%	7%	16%	$460,548
1989	21%	22%	7%	12%	6%	8%	23%	$377,977
1990	21%	21%	5%	14%	7%	8%	24%	$354,709
1991	35%	15%	3%	8%	8%	9%	22%	$308,169
1992	34%	10%	6%	14%	6%	10%	21%	$314,800
1993	28%	11%	7%	15%	6%	6%	27%	$312,725
1994	26%	10%	8%	17%	7%	7%	25%	$349,508
1995	28%	7%	6%	20%	10%	6%	23%	$369,232
1996	25%	5%	10%	21%	13%	6%	20%	$397,299
1997	23%	6%	9%	18%	12%	6%	25%	$370,385
1998	22%	6%	12%	22%	4%	5%	29%	$267,603

Source: PacFIN data extracted July, 1999.

[1] This value exceeds that reported for groundfish in Table 1, because they include fish caught in Puget Sound, outside the U.S. EEZ, and in waters off Alaska.

[2] Coastal Pelagics include chub and jack mackerel, Pacific sardine, northern anchovy, market squid, herring and Pacific Bonito.

Table 7. Washington, Oregon, and California combined landings and real [1] ex-vessel value (thousands of 1998 dollars) of sablefish by gear, and percentages each gear contributed to the total sablefish landed catch and exvessel value, 1997 and 1998.

	1997				1998			
Gear	mt	% Tot mt	1998 $	% Tot $	mt	% Tot mt	1998 $	% Tot $
Hook and Line	3,502	45%	$15,100	54%	1,725	40%	$4,801	43%
Groundfish Trawl	3,734	48%	$10,255	37%	2,141	49%	$5,170	46%
Fish Pot	584	7%	$2,404	9%	448	10%	$1,195	11%
Other Net	27	0%	$66	0%	26	1%	$51	0%
Other	12	0%	$27	0%	5	0%	$11	0%
Total	7,859		$27,852		4,345		$11,228	

Source: PacFIN data extraction July, 1999.

[1] Real values are current values adjusted to eliminate the effects of inflation. This adjustment has been made by dividing current values by the current year GDP implicit price deflator, with a base year of 1998.

Table 8. Washington, Oregon, and California groundfish shoreside landings (metric tons) by gear group, 1981 - 1998.[1]

Year	Trawl	Fish Pot	Hook and Line	Gill/Set Net[2]	Other/Misc.
1981	90,571	2,029	4,689	1,631	4,056
1982	103,154	4,264	5,376	2,098	4,017
1983	83,662	2,965	3,374	2,315	6,341
1984	76,650	2,851	2,725	2,206	5,261
1985	74,906	2,796	5,393	3,916	3,853
1986	61,615	1,472	6,570	4,164	8,695
1987	74,548	1,711	7,748	3,712	4,277
1988	73,785	1,386	6,561	2,788	7,701
1989	84,498	1,078	6,842	2,837	4,119
1990	78,686	884	6,799	2,662	3,945
1991	98,321	711	8,241	1,770	2,433
1992	118,473	406	9,112	1,681	2,762
1993	104,672	652	7,698	1,228	1,992
1994	125,494	1,374	6,720	724	1,221
1995	124,736	1,108	6,563	768	864
1996	135,186	856	7,601	313	924
1997	132,250	655	7,197	277	378
1998	123,568	540	4,730	318	408

Source: PacFIN data extraction July,1999.

1 Does not include landings of fish caught in Puget Sound, Alaska, Canada, Mexico, or other waters not in the EEZ off Washington, Oregon, or California.

2 Includes gill net, set net, and trammel net, but not dip, seine, or miscellaneous nets.

Table 9. Real[1] ex-vessel value (thousands of 1998 dollars) of Washington, Oregon, and California groundfish shoreside landings by gear group, 1981 - 1998.[2]

Year	Trawl	Fish Pot	Hook and Line	Gill/Set Net[3]	Other/Misc.
1981	$62,568	$1,871	$6,928	$2,510	$3,077
1982	$75,269	$4,481	$8,244	$2,801	$5,240
1983	$64,190	$2,790	$4,418	$2,709	$6,352
1984	$57,832	$2,353	$3,769	$2,931	$5,197
1985	$58,923	$3,507	$8,480	$4,829	$4,342
1986	$52,055	$1,793	$10,385	$4,963	$9,637
1987	$70,677	$2,649	$14,009	$4,744	$5,070
1988	$64,550	$2,394	$12,450	$3,452	$6,351
1989	$66,236	$1,618	$11,334	$3,310	$4,036
1990	$57,157	$1,247	$11,382	$3,222	$3,690
1991	$59,558	$1,200	$16,881	$1,971	$2,318
1992	$58,600	$840	$15,991	$1,840	$2,792
1993	$53,095	$1,106	$12,620	$1,415	$1,568
1994	$54,648	$3,092	$12,608	$845	$1,301
1995	$67,003	$3,845	$17,738	$914	$999
1996	$58,911	$3,273	$20,072	$407	$921
1997	$54,039	$2,841	$21,909	$338	$421
1998	$38,374	$1,777	$11,152	$359	$468

Source: PacFIN data extraction July, 1999.

1 Real values are current values adjusted to eliminate the effects of inflation. This adjustment has been made by dividing current values by the current year GDP implicit price deflator, with a base year of 1997.

2 Does not include landings of fish caught in Puget Sound, Alaska, Canada, Mexico, or other waters not in the EEZ off Washington, Oregon, or California.

3 Includes gill net, set net, and trammel net, but not dip, seine, or miscellaneous nets.

Figure 1. Pacific coast shoreside groundfish landings and real exvessel $/LB (1998 $), 1981-98

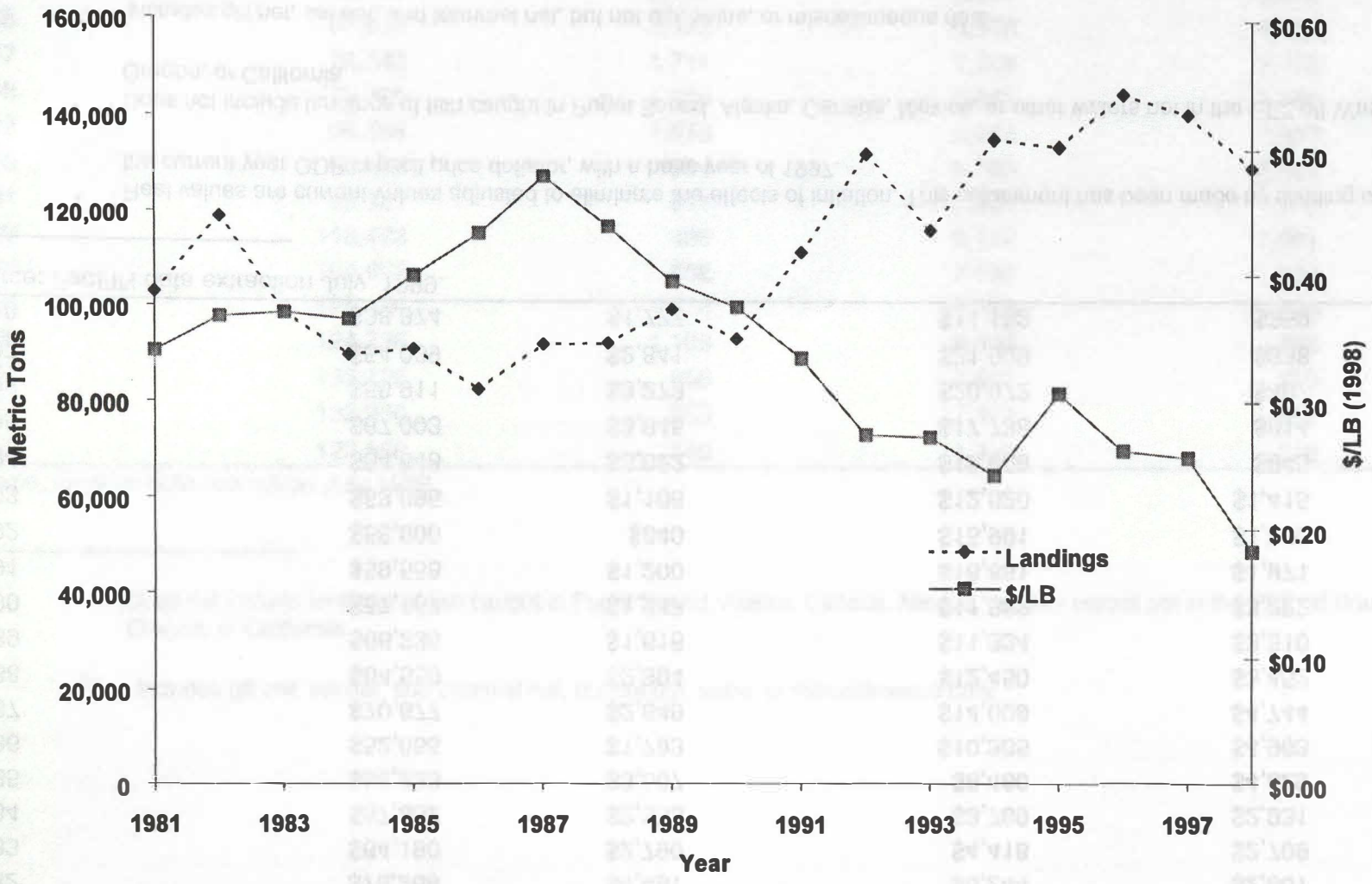


Figure 2. Washington, Oregon and California groundfish landings as a proportion of coastwide groundfish landings, 1981-98.

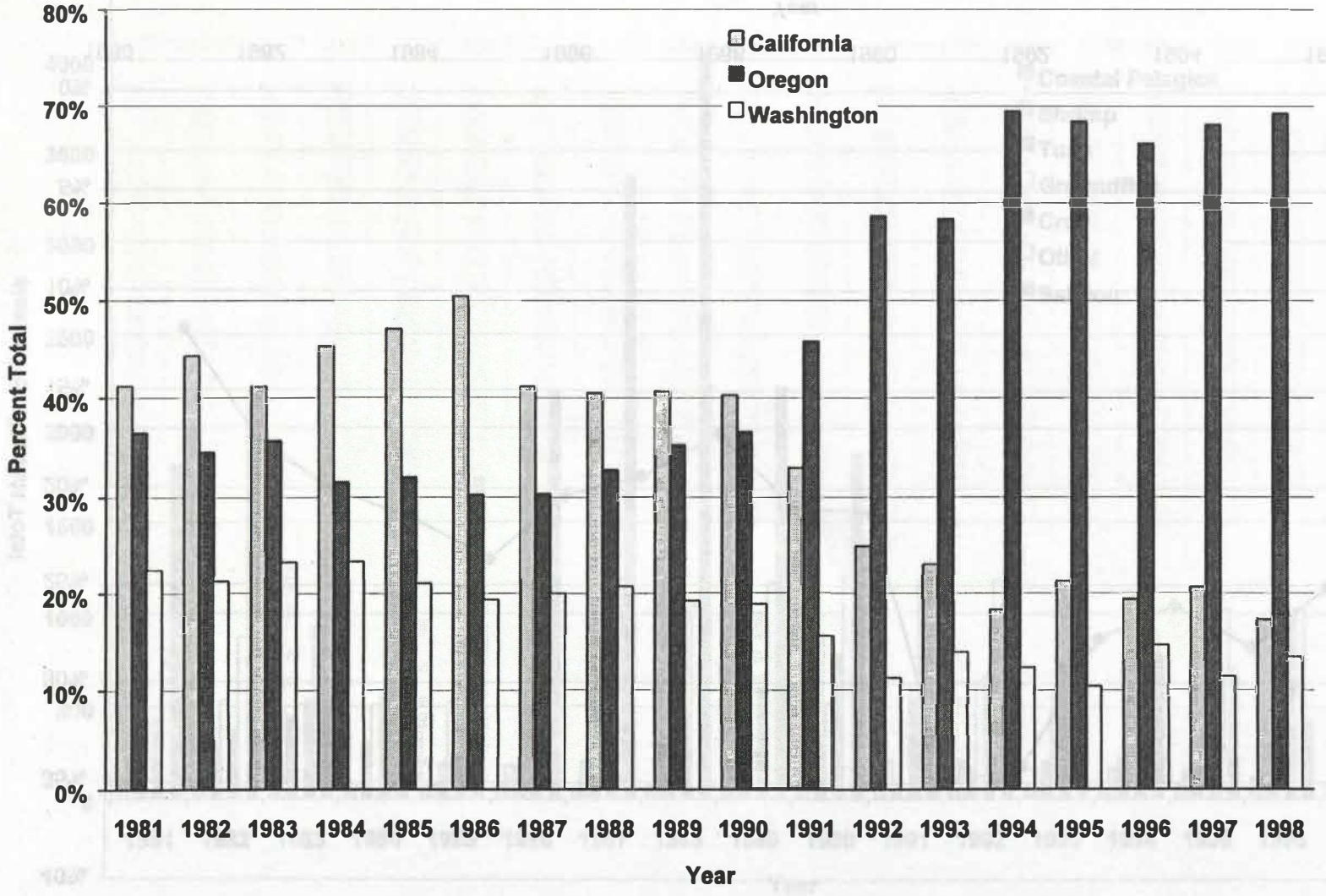


Figure 3. Pacific coast groundfish exvessel revenues as a percentage of exvessel revenues from all species, 1981-98.

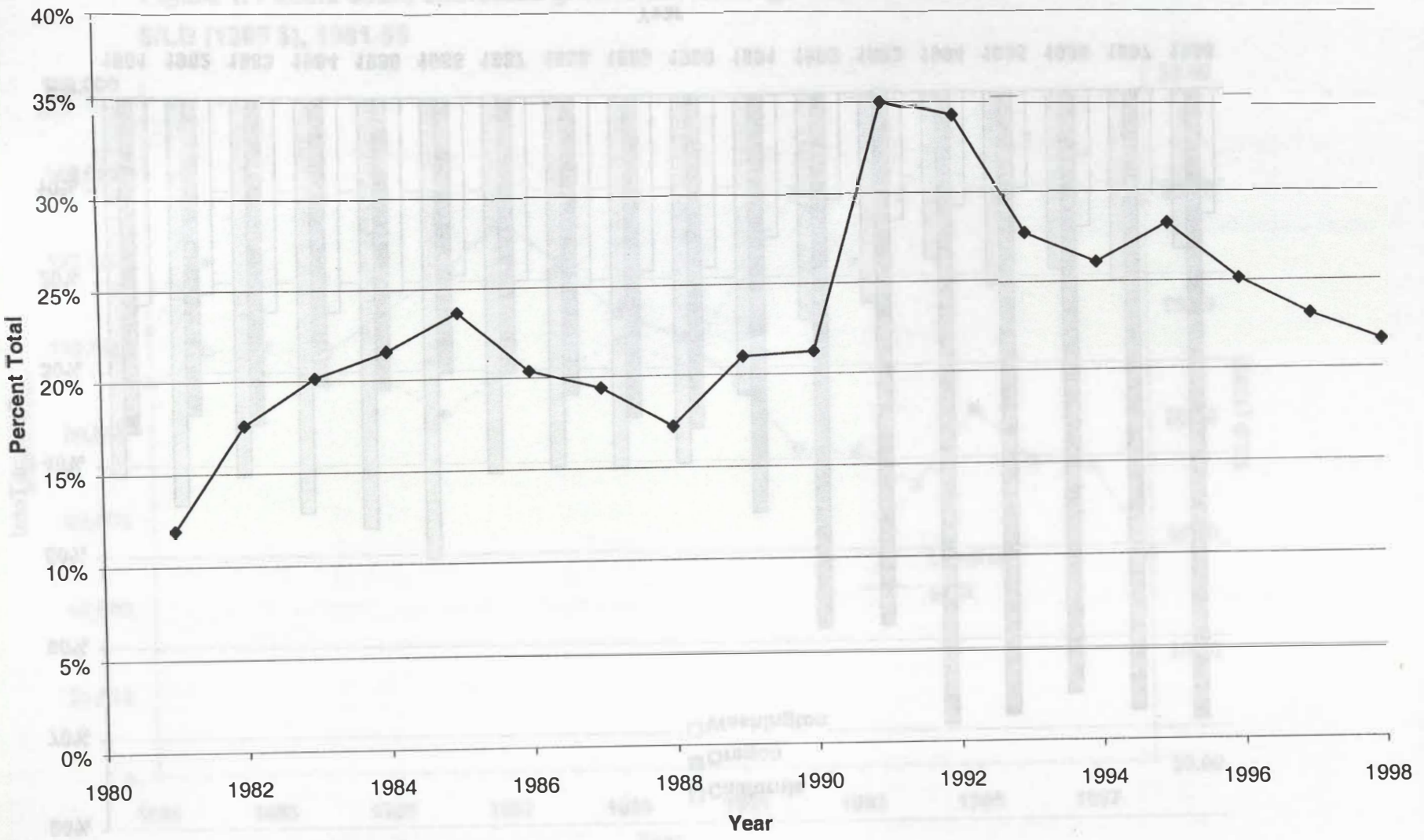
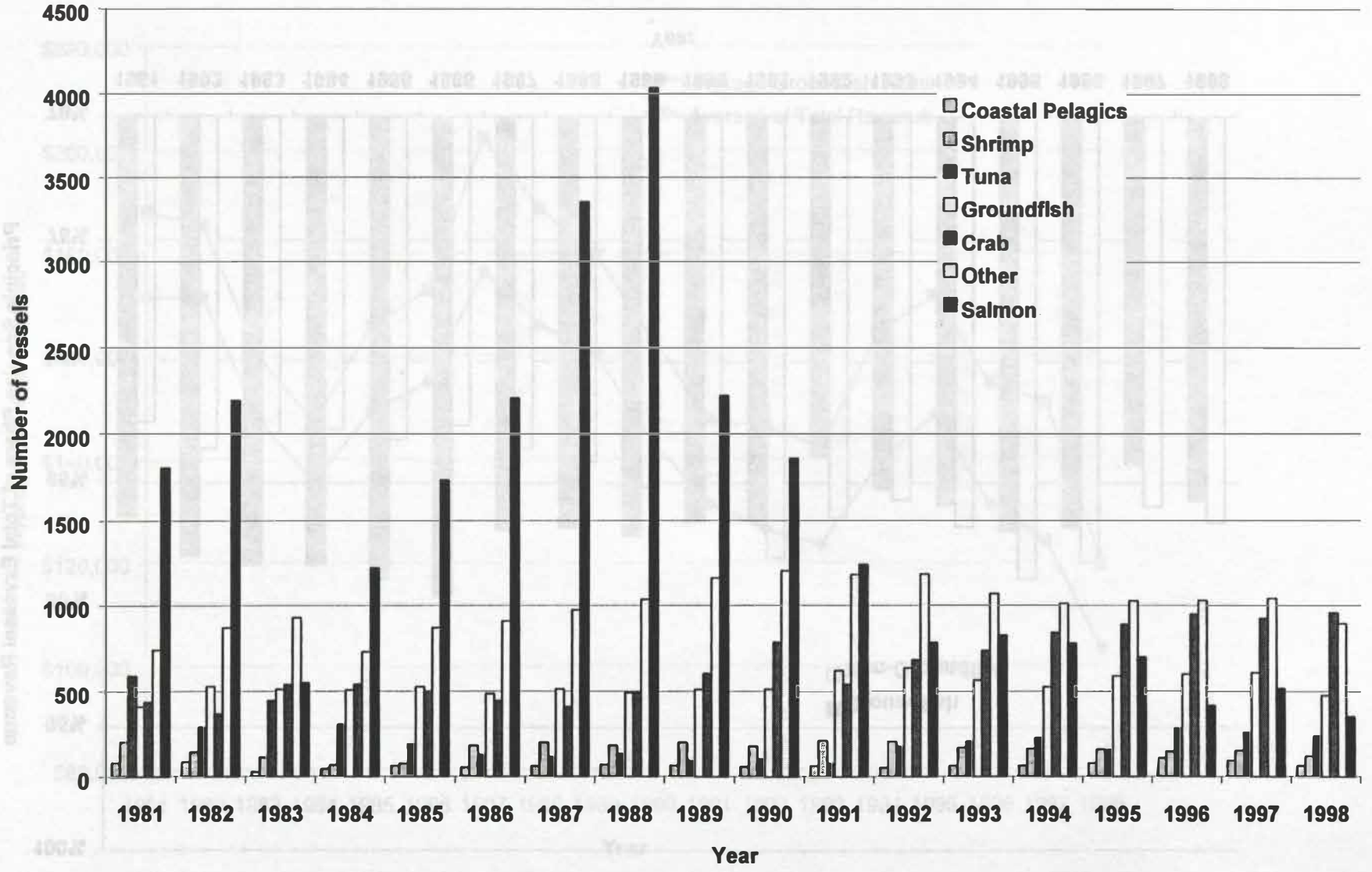
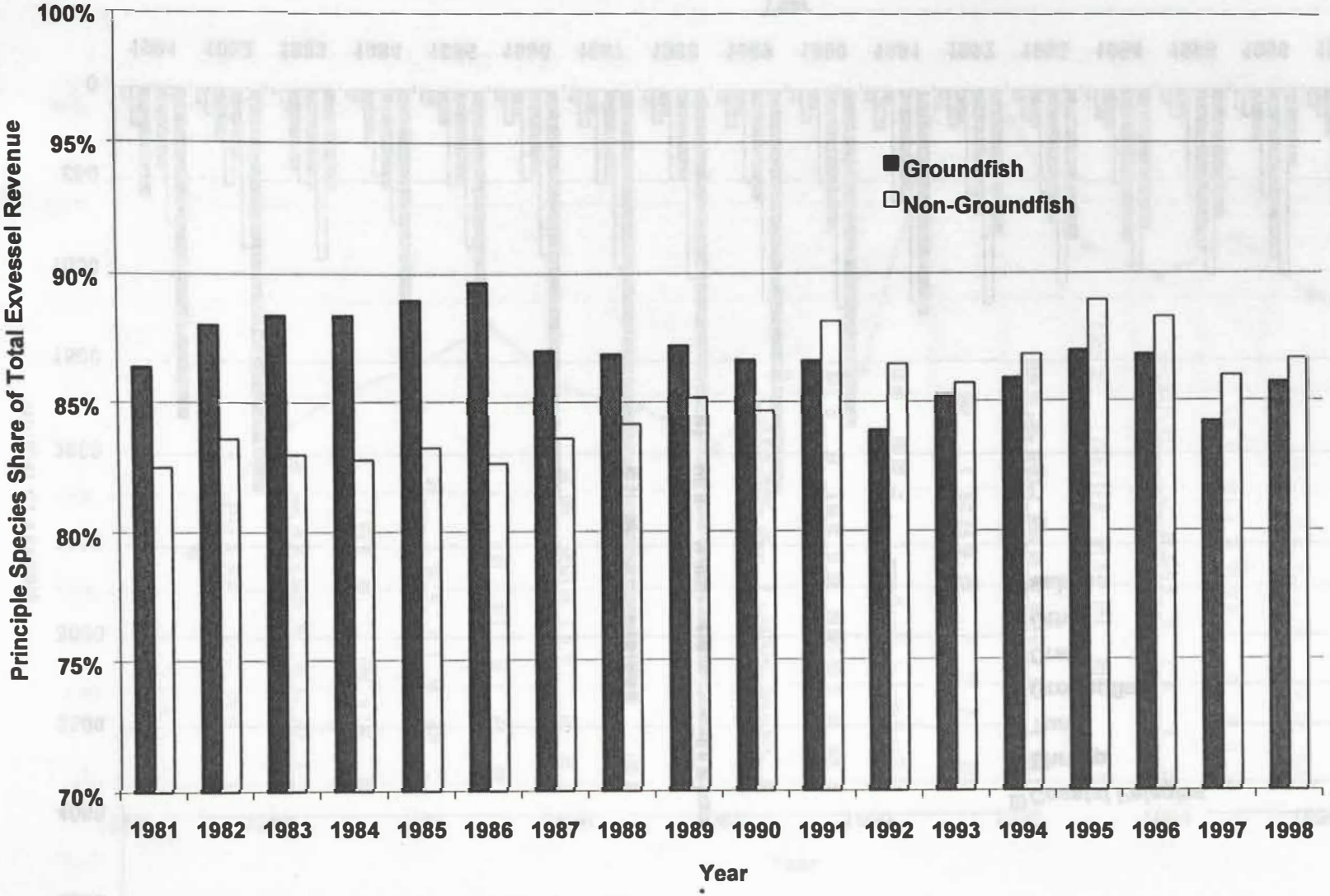


Figure 4. Number of west coast vessels (annual exvessel revenue >$10,000) by principle species[1] category, 1981-98.



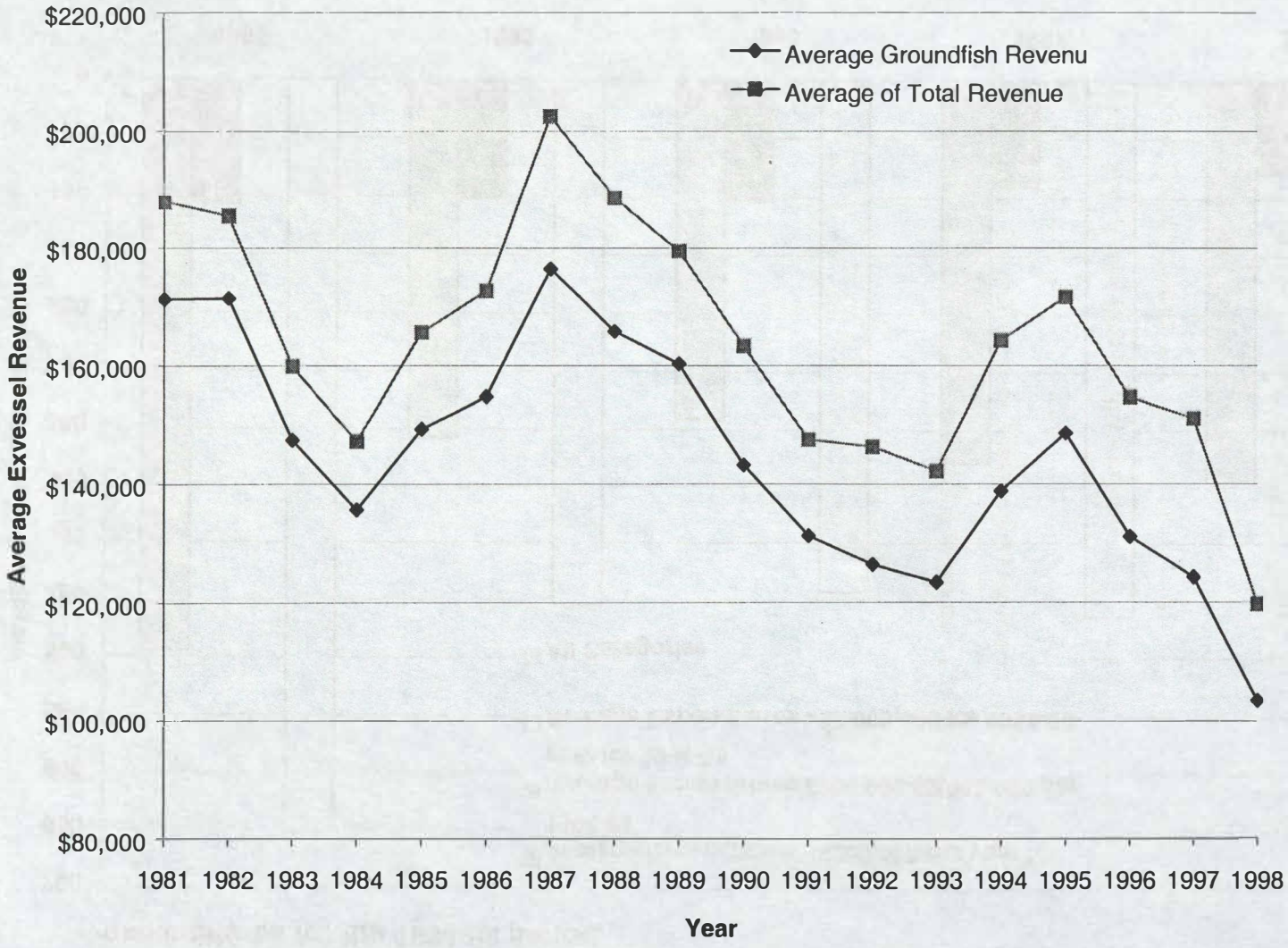
[1]The principle species accounts for the largest share of the vessel's total exvessel revenue.

Figure 5. Average share of principle species[1] exvessel revenue of total exvessel revenue for "groundfish" and all other west coast vessels (annual exvessel revenue >$10,000), 1981-98.



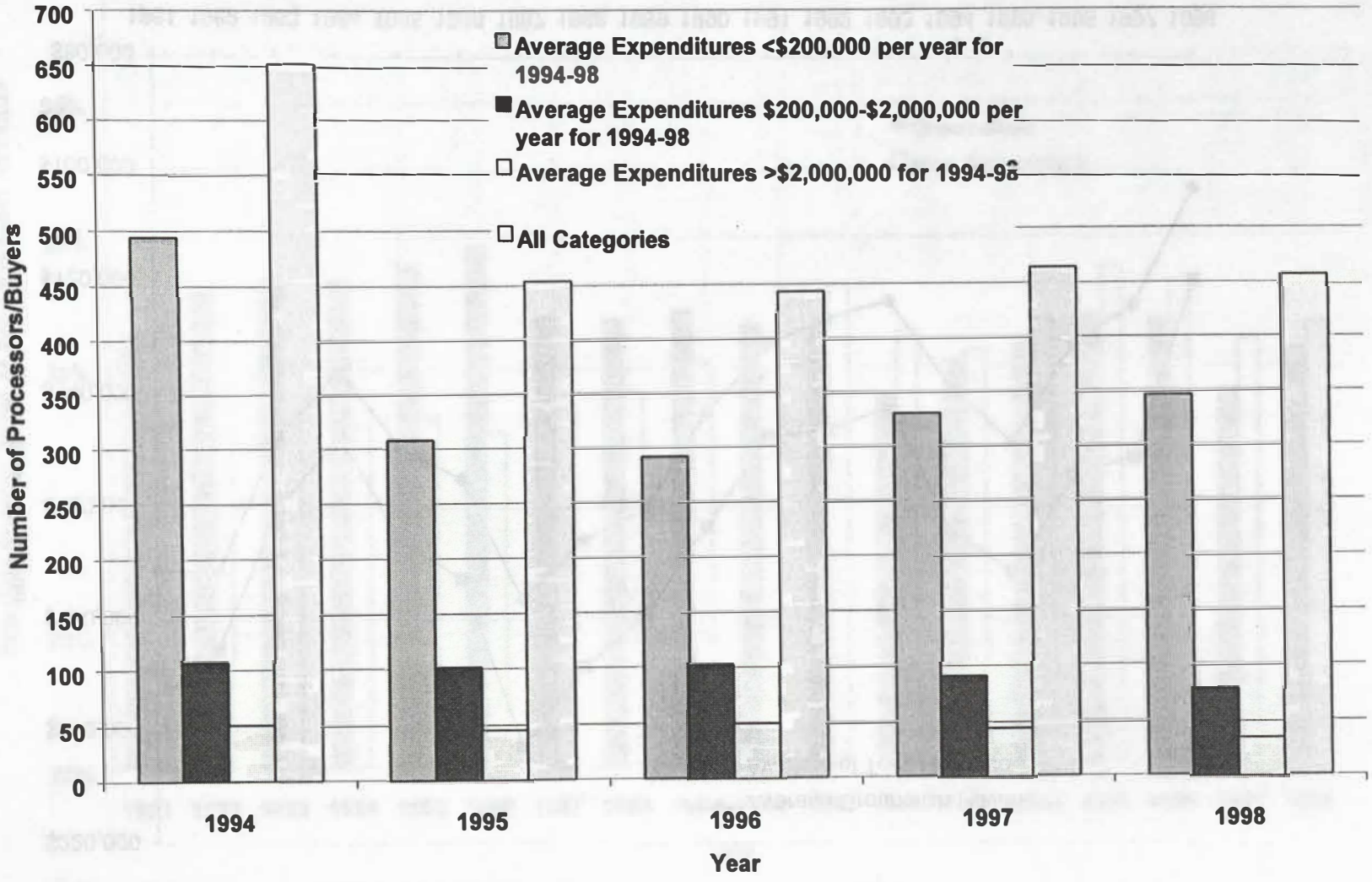
[1]The principle species accounts for the largest share of the vessel's total exvessel revenue.

Figure 6. Average real (1998 $) groundfish and total exvessel revenues for west coast vessels (annual exvessel revenue >$10,000) whose principle species[1] is groundfish, 1981-98.



[1]The principle species accounts for the largest share of the vessel's total exvessel revenue.

Figure 7. Number of west coast processors/buyers with the greatest share of their total exvessel expenditures on groundfish for the 1994-98 period, categorized by average annual expenditures for the 1994-98 period.



GROUNDFISH STOCK ASSESSMENT AND REVIEW PROCESS DURING 1999

Goals and Objectives

The goals and objectives for the 1999 groundfish assessment and review process* are:

a) Ensure that groundfish stock assessments provide the kinds and quality of information required by all members of the Council family.

b) Satisfy the MSFCMA and other legal requirements.

c) Provide a well defined Council oriented process that helps make groundfish stock assessments the "best available" scientific information and facilitates use of the information by the Council. In this context, "well defined" means with a detailed calendar, explicit responsibilities for all participants, and specified outcomes and reports.

d) Emphasize external, independent review of groundfish stock assessment work.

e) Increase understanding and acceptance of groundfish stock assessment and review work by all members of the Council family.

f) Identify research needed to improve assessments, reviews and fishery management in the future.

g) Use assessment and review resources effectively and efficiently.

* In this document, the term "stock assessment" includes activities, analyses and management recommendations, beginning with data collection and continuing through to the development of management recommendations by the Groundfish Management Team (GMT) and information presented to the Council as a basis for management decisions.

Shared Responsibilities

The purpose of this discussion document is to help planners and the Council family understand responsibilities for the groundfish stock assessment review process during 1999. Parties involved are the National Marine Fisheries Service (NMFS), state agencies, the Council and its advisors which include the Scientific and Statistical Committee (SSC), GMT, Groundfish Advisory Panel (GAP), Council staff and interested persons. Background information and a statement of shared responsibilities are given below.

Leadership, in the context of the stock assessment review process for groundfish, means consulting with all interested parties to plan, prepare terms of reference, and develop a calendar of events and a list of deliverables. Coordination means organizing and carrying out review meetings, distributing documents in a timely fashion, and making sure that assessments and reviews are completed according to plan. Leadership and coordination both involve costs, both monetary and time, which have not been calculated but are likely substantial.

All parties have a stake in assuring adequate technical review. The NMFS must determine that the best scientific advice has been used when it approves fishery management recommendations made by the Council. The Council uses advice from its SSC to determine whether the information on which it will base its recommendation is technically sound. Agencies and scientists providing technical documents to the Council for use in management need to assure that the work is technically correct. Program reviews, in-depth external reviews, and peer-reviewed scientific publications are used by the agencies to provide quality assurance for the basic scientific methods used to produce stock assessments. However, the time-frame for this sort of review is not suited to the routine examination of assessments that will shortly become the primary basis for a harvest recommendation. Review of current stock assessments requires a routine, dedicated effort that simultaneously meets the needs of NMFS, the Council, and others.

History

In 1995 and earlier years, stock assessments were examined at a very early stage during ad-hoc stock assessment review meetings (one per year). SSC and GMT members often participated in the ad-hoc review meetings and provided additional review of completed stock assessments during regular Council meetings. There were no terms of reference or meeting reports from the informal ad-hoc review meetings. NMFS provided leadership and coordination by setting up meetings. Each agency or Council paid their own travel costs. Council staff distributed meeting announcements and some background documents. Council paid for publication of assessments as appendices to the annual SAFE document.

A key event occurred in July 1995 when NMFS convened an independent external review of west coast groundfish assessments.[1] The review report included advice that: 1) uncertainties associated with assessment advice were understated; 2) technical review of groundfish assessments should be more structured and involve more outside peers; and 3) the distinction between scientific advice and management decisions was blurred. Work to develop a process for reviewing groundfish stock assessments was aimed at resolving these problems.

For 1996, the groundfish stock assessment review process was expanded to include: 1) terms of reference for the review meeting; 2) an outline for the contents of stock assessments; 3) external anonymous reviews of previous assessments; and 4) a review meeting report.[2] Plans were drawn up during March and April Council meetings and NMFS convened a week long review meeting in Newport, OR where preliminary groundfish stock assessments were discussed. The expanded process itself was reviewed by the Council family at a special "post-mortem" meeting at the end of the year. Leadership and planning at this stage was probably distributed among the SSC Groundfish Subcommittee, NMFS, GMT and persons who participated in planning discussions during the March and April Council meetings. There was no formal coordination except for the review meeting terms of reference, organization of the review meeting by NMFS, and as provided by Council staff for publication of documents. Costs were shared as in previous years.

The review process for 1997 was further expanded based on a planning meeting in December, 1996.[3] It was agreed that agencies, including NMFS and state agencies, conducting stock assessments had responsibility to make sure assessments were technically sound and adequately reviewed. A *Council-oriented* review process was developed that included agencies, the GMT, GAP and other interested members in the Council family. The process was jointly funded by the Council and NMFS, with NMFS hosting the STAR Panel meetings and paying the travel expenses of the external reviewers, and the Council paying for travel expenses of the GAP and non-federal GMT and SSC members.

The expanded process for 1997 included: 1) goals and objectives; 2) three Stock Assessment Review (STAR) Panels that included external membership; 3) terms of reference for STAR Panels; 4) terms of reference for Stock Assessment (STAT) Teams; 5) a refined outline for stock assessments; 6) external anonymous reviews; 7) a clearer distinction between science and management; and 8) a calendar of events with clear deliverables, dates and well defined responsibilities. For the first time, STAR Panels and STAT Teams were asked to provide "decision table" analyses of the effects of uncertain management actions and to provide information required by the GMT in choosing harvest strategies. In addition, STAR Panels were asked to prepare "Stock Summaries" that described the essential elements of stock assessment results in a concise, simple format.

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[1]Anon. 1995. West coast groundfish assessments review, August 4, 1995. Pacific Fishery Management Council. Portland, OR.

[2] Brodziak, J., R. Conser, L. Jacobson, T. Jagielo, and G. Sylvia. 1996. Groundfish stock assessment review meeting - June 3-7, 1996 in Newport, Oregon. *In*: Status of the Pacific coast groundfish fishery through 1996 and recommended acceptable biological catches for 1997. Pacific Fisheries Management Council. Portland, OR.

[3]Meeting Report, Proposals and Plans for Groundfish Stock Assessment and Reviews During 1997 (May 8, 1997). Pacific Fishery Management Council, 2130 SW Fifth Avenue, Suite 224, Portland, OR 97201.

At the end of 1997, a post-mortem review meeting was convened to discuss events and to make recommendations for 1998.[4] Discussants concluded that objectives were, to varying degrees, achieved during 1997. Least progress was made in the area of "increasing acceptance and understanding by all members of the Council family." The most significant issues seemed to be the nature of the STAR Panels' responsibilities, communicating uncertainty to decision makers, workload and inexperience in conducting the review process.

In retrospect, there was no formal coordination and leadership except for the terms of reference and the calendar. As in previous years, Council staff coordinated distribution of meeting announcements and distribution of documents. Costs increased substantially due to travel for external experts, increased number of review meetings (three instead of one), and distribution of larger and additional reports. NMFS paid travel and other costs for external members of STAR Panels. Other costs were distributed as in 1996. It was not possible for Council to copy and distribute all of the stock assessments because of limited funds.

FACA

Sponsorship of the review process will remain with the Council in 1999 because the Federal Advisory Committee Act (FACA) controls NMFS' ability to set up new advisory committees. FACA specifies a process and constraints for setting up advisory committees, particularly when the committee will provide *consensus* recommendations to the federal government. Under FACA, advisory committees must be chartered by the Department of Commerce through a process which is difficult and slow. The intent of FACA was to limit the number of advisory committees, ensure that advisory committees fairly represent affected parties, and insure that advisory committee meetings, discussions and reports are carried out and prepared in full public view.

Under the Magnuson-Stevens Act the Council is exempt from FACA, however the Act provides protections similar to those under FACA in its requirements for public notice and open meetings.

Draft Statement of Shared Responsibilities

All parties share responsibilities in the stock assessment and review process for 1999. The Council will continue to sponsor the process and involve its standing advisory committees, but it has little additional resources to contribute to coordination or costs. Funding will be shared by NMFS and the Council.

The Council has responsibility to make decisions and make policy choices about groundfish management based on the Fishery Management Plan for Pacific Coast Groundfish, the Magnuson-Stevens Act and other applicable law.

The Pacific Fishery Management Council will sponsor a review of groundfish stock assessments prepared in 1999 according to the interim protocols identified below. Sponsorship will involve consulting with all interested parties to plan, prepare terms of reference, and develop a calendar of events and a list of deliverables. NMFS and the Council will share fiscal and logistical responsibilities.

NMFS will work with the Council, other agencies, groups or interested persons that carry out assessment work to organize STAT Teams and STAR Panels, and make sure that work is carried out in a timely fashion according to the calendar and terms of reference. NMFS will provide a senior scientist to coordinate these tasks with assistance from the PFMC staff. NMFS will convene a pre-assessment meeting where STAT Teams, GAP representatives, and interested parties meet to discuss upcoming stock assessments, external reviews, and data.

The SA coordinator, in consultation with the SSC, will select STAR Panel chairs, and will coordinate the selection of external reviewers with panel chairs following criteria for reviewer qualifications, nomination and selection. The public is welcome to nominate qualified reviewers.

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[4]Jacobson, L.D. (ed.). 1997. Comments, issues and suggestions arising from the groundfish stock assessment and review process during 1997. Report to the Pacific Fishery Management Council (Revised Supplemental Attachment B.9.b, November 1997).

NMFS, state agencies or others that carry out assessments or technical work in connection with groundfish assessments have the responsibility to ensure that they are technically sound and complete. The Council's review process is the principal means for review of complete stock assessments, although additional in-depth technical review of methods and data is desirable.

Council staff will publish and distribute meeting notices, stock assessment documents, stock summaries, meeting minutes and other appropriate documents. Council staff will help NMFS and agencies coordinate meetings and events.

The Council's Statistical and Scientific Committee (SSC) will participate in the stock assessment review process and provide the Council with technical advice related to the stock assessments and the review process.

The Council's Groundfish Management Team (GMT) will appoint representatives to track each stock assessment, who will attend STAR Panel meetings, and participate in review discussions. The GMT will provide the Council with advice on management of groundfish stocks based on stock assessments and other available information.

The Council's Groundfish Advisory Subpanel (GAP) will appoint representatives to track each stock assessment, who will attend STAR Panel meetings and participate in review discussions

Stock Assessment Priorities

Periodic stock assessments for west coast groundfish are conducted to determine appropriate harvest levels. Assessments rely upon a combination of NMFS survey data and state fishery monitoring data. To the extent possible, other fishery dependent data are also used.

Under the new stock assessment process begun in 1997, the time involved in soliciting data and preparing and reviewing stock assessments has increased substantially. Using STAT Teams and STAR Panels has also required participation by a larger number of people. In order to provide more thorough assessments and more complete reviews, the Council needs to establish priorities for conducting stock assessments. These priorities should be discussed at the Council's June meeting in order to allow sufficient time to begin data gathering for the species to be assessed. The following general principles will be used in setting priorities each year:

1) At the November Council meeting, the number and species of stock assessments will be finalized to allow adequate time for panel arrangements. Any assessment identified after that time may not be reviewed in this process.
2) No more than 2 assessments will be reviewed by a STAR Panel;
3) Until more fiscal and personnel support is obtained, assessments (except for Pacific whiting) normally will be conducted only once every three years;
4) Assessments will be scheduled to take advantage of new data, including especially survey data;
5) Assessments may be conducted more frequently than once every three years if --
   A) new data, including fishery dependent and anecdotal data, which indicate unforseen increases or decreases in stock size, are brought to the attention of the Council,
   B) the Council believes that the results of a stock assessment are sufficiently in dispute to warrant a re-assessment the following year, or
   C) A fishery for a species, stock, or stock complex has rapidly developed and that species, stock, or stock complex has not been assessed recently;
6) An update or report that falls short of a full assessment may be prepared for a species, stock, or stock complex to provide information helpful to the Council in making management decisions.
7) Any stock assessment submitted by the public should be submitted through the normal Council channels and reviewed at Stock Assessment Review (STAR) Panel meetings.

Based on these general principles, and taking into account testimony presented at the June, September and November, 1998 Council meetings, the following list of stock assessments are planned for 1999:

1999 Stock Assessments

Lingcod (southern area)
Petrale sole
Bocaccio
Canary rockfish
Nearshore rockfish
Pacific whiting
Black rockfish

Terms of Reference for Groundfish STAR Panels and Review Meetings

Composition: STAR Panels normally include a chair, at least one "external" member (outside the Council family and not involved in management or assessment of west coast groundfish), and one SSC member. The total number of STAR members should be at least "n+2" where n is the number of stock assessments and "2" counts the chair and external reviewer. In addition to official members, STAR meetings will include GMT and GAP advisory with responsibilities laid out in their terms of reference. STAR Panels normally meet for one week. The number of assessments reviewed should not exceed two.

The STAR Panel and chair's main responsibility is to carry out these terms of reference according to the calendar for groundfish assessments.

The goal of the STAR Panel meeting is to review assessments for stocks according to these terms of reference. This work (described in detail below) includes reviewing draft stock assessment documents and any other pertinent information (e.g.; external anonymous reviews of the previous assessment, STAR Panel reviews of previous assessments and previous assessments, if available), working with STAT Teams to make sure necessary revisions are made to stock assessment documents, documenting meeting discussions, and reviewing summaries of stock status (prepared by STAT Teams) for inclusion in the SAFE document.

Most groundfish stocks are assessed infrequently (every three years) and each assessment and review should result in useful advice to the Council. It is the STAR Panel's responsibility to identify assessments that cannot be reviewed or completed for any reason.

The STAR Panel's terms of reference concern technical aspects of stock assessment work. The STAR Panel should strive for a risk neutral approach in its reports and deliberations. The full range of uncertainty should be reflected in complete stock assessments and the reports prepared by STAR Panels. The STAR Panel should identify scenarios that are unlikely or have a flawed technical basis.

The STAR Panel, STAT Team and all interested parties are legitimate meeting participants that must be accommodated in discussions. It is the STAR Panel chair's responsibility to manage discussions and public comment so that work can be completed.

Panel members are responsible for determining if a stock assessment document is sufficiently complete according to the "Outline for Groundfish Stock Assessments."

A STAT Team and STAR Panel may disagree on technical issues. If the STAR Panel and STAT Team disagree, the STAR Panel must document the areas of disagreement in its report. The STAR Panel may request additional analysis based on alternative approaches. It is expected that the STAT Team will make a good faith effort to complete these analyses.

The STAR Panel's decision that a stock assessment is complete should be made by consensus. If panel cannot reach agreement, then the nature of the disagreement must be described in the panel's report. Recommendations and requests to the STAT Team for additional or revised analyses must be clear, explicit and in writing. All recommendations and requests to the STAT Team should be preserved in the meeting report.

A written summary of discussion on significant technical points and a lists of all STAR Panel recommendations and requests to the STAT panel are required in the STAR Panel's report. This should be completed (at least in draft form) prior to the end of the meeting. It is the chair and panel's responsibility to carry out any follow-up review work that is required.

Additional analyses required in the stock assessment should be completed during the STAR Panel meeting. If follow-up work by the STAT Team is required after the review meeting, then it is the chair and panel's responsibility to track the STAT Team's progress. In particular, the chair is responsible for meeting with all panel members (by phone, e-mail or any convenient means) to determine if the revised stock assessment and documents are complete and ready to be used by managers in the Council family. If stock assessments and reviews are not complete at the end of the STAR Panel meeting, then the work must be completed prior to the GMT meeting where the assessments and preliminary ABC levels are discussed.

The SSC representative on the STAR panel is expected to attend GMT and Council meetings where stock assessments and harvest projections are discussed to explain the reviews and provide other technical information and advice.

The chair is responsible for providing Council staff with a camera ready and suitable electronic version of the panel's report for inclusion in the annual "Status of the Pacific Coast Groundfish Fishery" report.

The STAT Team and the STAR Panel may disagree on technical issues regarding an assessment, but a complete stock assessment must include a point by point response by the STAT Team to each of the STAR Panel recommendations. Estimates and projections representing all sides of the disagreement need to be presented, reviewed, and commented on by the SSC.

Suggested Template for STAR Panel Report

Minutes of the STAR Panel meting containing:

Name and affiliation of STAR Panel members

List of analyses requested by the STAR Panel

Comments on the technical merits or deficiencies in the assessment and recommendations for remedies

Explanation of areas of disagreement regarding STAR Panel recommendations (1 among STAR Panel members (majority and minority reports), 2) between the STAR Panel and STAT Team

Unresolved problems and major uncertainties: (Any special issues that complicate scientific assessment, questions about the best model scenario, etc.)

Prioritized recommendations for future research and data collection

Terms of Reference for Groundfish STAT Teams

The STAT Team will carry out its work according to these terms of reference and the calendar for groundfish stock assessments.

Each STAT Team will appoint a representative who will attend the pre-assessment planning meeting if one

is held. STAT Teams are encouraged to also organize independent meetings with industry and interested parties to discuss issues, questions and data.

Each STAT Team will appoint a representative to coordinate work with Stock Assessment Review (STAR) panel and attend the STAR Panel meeting.

Each STAT Team will appoint a representative who will attend the GMT meeting (usually in August) and Council meeting (usually in September) where preliminary ABC and HG levels are discussed. In addition, a representative of the STAT Team should attend the GMT (usually September or October) and Council meeting (usually November) where final ABC and HG levels are discussed, if requested or necessary. At these meetings, the STAT team member shall be available to answer questions about the STAT team report.

The STAT Team is responsible for preparing three versions of the stock assessment document: 1) a "draft" for discussion at the stock assessment review meeting; 2) a revised "complete draft" for distribution to the GMT, SSC, GAP and Council for discussions about preliminary ABC and HG levels; 3) a "final" version published in the "Status of the Groundfish Fishery" report. Other than authorized changes, only editorial and other minor changes should be made between the "complete draft" and "final" versions. The STAT Team will distribute "draft" assessment documents to the STAR Panel, Council, GMT and GAP advisors at least two weeks prior to the STAR Panel meeting.

The STAT Team is responsible for bringing computerized data and working assessment models to the review meeting in a form that can be analyzed on site. STAT Teams should take the initiative in building and selecting candidate models. If possible, the STAT Team should have several complete models and be prepared to justify model recommendations.

The STAT Team is responsible for producing the complete draft by the end of the STAR Panel meeting. In the event that the complete draft is not completed, the team is responsible for completing the work as soon as possible and to the satisfaction of the STAR Panel at least one week before the GMT meeting.

The STAT Team and the STAR Panel may disagree on technical issues regarding an assessment, but a complete stock assessment must include a point by point response by the STAT Team to each of the STAR Panel recommendations. Estimates and projections representing all sides of the disagreement need to be presented, reviewed, and commented on by the SSC.

GMT Responsibilities

The GMT is responsible for identifying and evaluating potential management actions based on the best available scientific information. In particular, the GMT makes ABC recommendations to the Council based on estimated stock status, uncertainty about stock status and socioeconomic and ecological factors. The GMT will use stock assessments, STAR Panel reports, and other information in making their ABC recommendation. The GMT's preliminary ABC recommendation will be developed at a meeting that includes representatives from the SSC, STAT Teams, STAR Panels, and GAP. A representative(s) of the GMT will serve as a liaison to each STAR Panel, but will not serve as a member of the panel. The GMT will not seek revision or additional review of the stock assessments after they have been reviewed by the STAR Panel. The GMT chair will communicate any unresolved issues to the SSC for consideration at its September meeting. Successful separation of scientific (STAT Team and STAR Panels) from management (GMT) work depends on stock assessment documents and STAR reviews being completed by the time the GMT meets to discuss preliminary ABC and HG levels. However, the GMT can request additional model projections, based on reviewed model scenarios, in order to develop a full evaluation of potential management actions.

GAP Responsibilities

The Chair of the Groundfish Advisory Subpanel (GAP) will appoint a representative to track each stock assessment. GAP representatives will be appointed at the GAP meeting in March.

The GAP representative will attend the STAR Panel meeting where the assessment of his / her species is reviewed. The GAP representative will participate in review discussions as an advisor to the STAR Panel, in the same capacity as the Groundfish Management Team (GMT) advisor.

The GAP representative will attend the August GMT meeting along with STAR, STAT, and SSC representatives and will attend subsequent GMT, Council, and other necessary meetings where the assessment of his / her species is discussed.

The GAP representative will provide appropriate data and advice to the STAR panel and GMT and will report to the GAP on STAR Panel and GMT meeting proceedings.

SSC and Council Staff Responsibilities

Scientific and Statistical Committee

The Council's Scientific and Statistical Committee (SSC) will participate in the stock assessment review process and provide the Groundfish Management Team (GMT) and Council with technical advice related to the stock assessments and the review process. As in the past, the SSC may solicit anonymous external reviews of the previous stock assessments. These external anonymous reviews should be completed in time for discussion at the pre-assessment planning meetings identified in the calendar for the 1999 review process. The SSC will assign one member from its Groundfish Subcommittee to each STAR Panel. This member is expected to attend the assigned STAR Panel meeting, the August and October GMT meeting, and the September and November Council meetings when groundfish stock assessment agenda items are discussed. As in 1998, the SSC representative on the STAR panel will present the STAR panel report at GMT and Council meetings. The SSC representative will also present the STAR panel report to the SSC at its September meeting and communicate SSC comments or questions to the GMT and STAR panel chair. The SSC, during their normally scheduled meetings, will also serve as arbitrator to resolve any disagreements that may arise between the STAT Team, STAR Panel, or GMT. The SSC will provide review of any additional analytical work on any of the stock assessments required or carried out by the GMT after the stock assessments have been reviewed by the STAR Panels. In addition, the SSC will review and advise the GMT and Council on projected ABCs and Harvest Guidelines.

The STAT Team and the STAR Panel may disagree on technical issues regarding an assessment, but a complete stock assessment must include a point by point response by the STAT Team to each of the STAR Panel recommendations. Estimates and projections representing all sides of the disagreement need to be presented, reviewed, and commented on by the SSC

Council Staff

Council Staff will prepare meeting notices and distribute stock assessment documents, stock summaries, meeting minutes, and other appropriate documents. Council Staff will help NMFS and the State Agencies in coordinating stock assessment meetings and events. The Staff will also publish or maintain file copies of reports from each STAR Panel (containing items specified in the STAR Panel's term of reference), the outline for groundfish stock assessment documents, comments from external reviewers, SSC, GMT, and GAP, letters from the public, and any other relevant information. At a minimum, the stock assessments (STAT Team reports, "STAR Panel reports, and stock summaries) should be published and distributed in the Council's annual "Status of the Groundfish Fishery" SAFE document. Once the Council's final ABCs, HGs, and management measures have been implemented, the Staff will publish an addendum to the SAFE documenting these final values.

1999 Stock Assessment Review Calendar[5]

Feb 5	Council staff and STAR panel members receive draft assessment for Pacific whiting.[6]
Feb 8-9	Staff distributes draft whiting assessment to interested persons *who have requested it.*[7].
Feb 17-18	Whiting STAR panel meeting (British Columbia).
Feb 10	Council staff and GMT members receive documents for harvest policy workshop.
Feb 12	SSC may send previous stock assessments out for external anonymous review.
Feb 12-15	Council staff distributes draft harvest policy documents to interested persons *who have requested them.*
Feb 22-24	GMT Meeting (Newport): GMT appoints representatives to STAR panels; GMT and stock assessment coordinator develop preliminary list of assessments for 2000.
Feb 24-26	Stage I of Harvest Policy Workshop (Newport).
Mar 8-12	Council meeting at Columbia River Doubletree Hotel in Portland.
Mar 19	SSC sends completed external anonymous reviews (if any) to STAT Teams.
Mar 23-24	NMFS Pre-Assessment Meeting (Monterey).
Mar 25-26	Stage II of Harvest Policy Workshop (Monterey).
Apr 5-9	Council meeting at Sacramento Red Lion. GAP appoints representatives to STAR panels.
May 12	Council staff and STAR Panel members (including GMT and GAP advisers) receive draft assessments for cowcod and black rockfish.
May 14-17	Staff distributes draft cowcod and black rockfish assessments to interested persons *who have requested them.*
May 24-28	STAR panel meeting for cowcod and black rockfish (Southern California).
Jun 2	Council staff and STAR Panel members (including GMT and GAP advisers) receive draft assessments for canary rockfish, petrale sole, and nearshore rockfish.

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[5] Dates and locations of meetings are subject to change. All meetings will be confirmed through announcement in the *Federal Register* and a meeting announcement.

[6] Since time between receipt of documents and STAR meetings is limited, Council staff can only fulfill distribution responsibilities if documents are received by the deadlines specified in this calendar. If documents are late, the Council staff will simply provide mailing labels to the authors so the documents may be distributed directly from the source.

[7] At the beginning of the year, Council staff will circulate an advance notice of availability to Council family and public to determine which drafts of which stock assessment documents they wish to receive. *Note: This year, Council members, GMT, SSC, and GAP members will NOT automatically receive draft stock assessments this year.* This notice of availability must be returned in order to receive stock assessment documents throughout the process.

Jun 4-8	Staff distributes draft canary, petrale, and nearshore rockfish assessments to interested persons *who have requested them.*
Jun 7-11	GMT meeting (Seattle?).
Jun 14-18	STAR panel meeting - canary rockfish, petrale sole, and nearshore rockfish (Newport?).
Jun 21-25	Council meeting at Sheraton Portland Airport.
Jun 30	Council staff and STAR Panel members (including GMT and GAP advisers) receive draft bocaccio, southern lingcod, and preliminary coastwide lingcod assessments from STAT Teams.
Jul 2-6	Council staff distributes draft bocaccio, southern lingcod, and preliminary coastwide lingcod assessments to interested persons *who have requested them.*
Jul 12-16	STAR Panel meeting - bocaccio, southern lingcod, and preliminary coastwide lingcod (southern California).
Jul 28	Complete assessments, stock summaries, STAR Panel reports, and other documents used during the STAR Panel meeting arrive at Council office.
Aug 2-4	Council staff distributes complete assessments and STAR Panel reports to interested persons *who have requested them.*
Aug 9-13	GMT meeting to review stock assessment results attended by STAR Panel chairs or designees, SSC members of STAR Panels, STAT Team representatives, and GAP advisers to STAR Panels.
Sep 2	Council staff distributes briefing book for September meeting.
Sep 13-17	Council/SSC/GMT/GAP meeting at Columbia River Doubletree in Portland. Council adopts preliminary ABCs and harvest guidelines. STAR Panel and STAT Team representatives attend.
Sept 27-Oct 1	GMT meeting attended by STAR Panel chairs or designees, SSC members of STAR Panels, STAT Team representatives, and GAP advisers to STAR Panels.
Oct 4	Final stock assessments, stock summaries, and STAR Panel reports arrive at Council office (camera-ready hard copy) for SAFE report.
Oct 21	Council staff distributes briefing book for November meeting (with SAFE document).
Oct 25-26	Council staff mails SAFE report and appendices to Council family and public who have requested them.
Nov 1-5	Council/SSC/GMT/GAP meeting at Sacramento Red Lion. Final harvest levels for 2000 adopted. Post-mortem on 1999 assessment and review process.

Outline for Groundfish Stock Assessment Documents

This is an outline of items that should be present in all stock assessment and fishery evaluation (SAFE) reports for groundfish managed by the Pacific Fishery Management Council. The outline is a working document meant to provide assessment authors with flexible guidelines about how to organize and communicate their work. All items listed in the outline may not be appropriate or available for each assessment. In the interest of clarity and uniformity of presentation, stock assessment authors and reviewers are encouraged (but not required) to use the same organization and section names as in the outline.

This outline for 1999 includes suggestions from many parties and is based on a similar outline used during the 1997 and 1998 groundfish stock assessment cycles.

OUTLINE FOR GROUNDFISH STOCK ASSESSMENT DOCUMENTS

1) Title page and list of preparers-the names and affiliations of the stock assessment team (STAT) either alphabetically or as first and junior authors

2) Executive Summary (see attached template)

3) Introduction

   A) Scientific name, distribution, stock structure, management units

   B) Important features of life history that affect management (e.g.; migration, sexual dimorphism, bathymetric demography, etc.)

   C) Important features of current fishery and relevant history of fishery

   D) Management history (e.g. changes in mesh sizes, trip limits, harvest guidelines, etc.)

   E) Management performance-a table or tables comparing ABC, harvest guidelines, landings and catch (landings plus discard) for each area and year

4) Assessment

   A) Data

      i) Landings by year and fishery, discards (generally specified as a percentage of total catch in weight and in units of mt), catch-at-age, weight-at-age, survey and CPUE data, data used to estimate biological parameters such as growth rates, maturity schedules and natural mortality with CV's or variances if available.

      - Include complete tables and figures if practical

      - Sample size information for length and age composition data by area, year, gear, market category, etc.

   B) History of modeling approaches used for this stock

      i) Changes between current and previous assessment models

C) Model description

i) Assessment program with last revision date (i.e.; date the executable program file was compiled).

ii) List and description of all likelihood components in the model.

iii) Constraints on parameters, selectivity assumptions, natural mortality, assumed level of age reader agreement or assumed ageing error (if applicable), and other assumed parameters

iv) Description of stock-recruitment constraint or components

v) Critical assumptions and consequences of assumption failures

vi) Convergence criteria

vii) Treatment of discards (generally specified as a percentage of total catch in weight and in units of mt)

viii) Complete description of any new modeling approaches.

D) Model selection and evaluation

ii) Evidence of search for balance between realistic (but possibly over-parameterized) and simpler (but not realistic) models

- Use hierarchical approach where possible (e.g. asymptotic vs. domed selectivities, constant vs. time varying selectivities, etc.)

ii) Residual analysis (e.g.; residual plots, time series plots of observed and predicted values, or other approach)

iii) Convergence status and convergence criteria for "base-run(s)"

-Randomization run results or other evidence of search for global best estimates

iv) Do parameter estimates make sense, are they credible?

v) Table listing all parameters in the stock assessment model used for base runs, their purpose (e.g.; recruitment parameter, selectivity parameter, etc.) and whether or not the parameter was actually estimated in the stock assessment model.

E) Base-run(s) results

i) Time series of total and spawning biomass, recruitment and fishing mortality or exploitation rate estimates (table and figures)

ii) Selectivity estimates (if not included elsewhere)

iii) Stock-recruitment relationship

F) Uncertainty and sensitivity analyses

i) Sensitivity analyses (tables or figures) that show ending biomass levels or likelihood component values obtained while systematically varying emphasis factors for each type of data in the model. Likelihood profiles for parameters or biomass levels may also be used.

ii) The best approach for describing uncertainty and the range of probable biomass estimates in groundfish assessments may depend on the situation. Approaches used in the past are listed below.

- CV's for biomass estimated by bootstrap, implicit autodifferentiation, or the delta method

- Subjective appraisal of magnitude and sources of uncertainty

- Comparison of alternate models

- Comparison of alternate assumptions about recent recruitment

iii) If a range of model runs (e.g.; based on CV's or alternate assumptions about model structure or recruitment) is used to depict uncertainty, then it is important that some qualitative or quantitative information about relative probability be included. If no statements about relative probability can be made, then it is important to state that all scenarios (or all scenarios between the bounds depicted by the runs) are equally likely.

iv) If possible, ranges depicting uncertainty should include at least three runs: one judged most probable; at least one that depicts the range of uncertainty in the direction of lower current biomass levels; and one that depicts the range of uncertainty in the direction of higher current biomass levels. The entire range of uncertainty should be carried through stock projections and decision table analyses.

v) Retrospective analysis (information about retrospective bias in base model or models for each area)

vi) Historical analysis (plot showing actual estimates from current and previous assessments for each area)

vii) Simulation results (if available)

5) Target fishing mortality rates (if changes are proposed)

6) Harvest projections and decision tables

1) Harvest projections and decision tables should cover the full range of uncertainty about current biomass and the full range of candidate fishing mortality targets used for the stock or requested by the GMT

ii) Information presented should include three year biomass and yield projections

7) Management recommendations

8) Research needs (prioritized)

9) Acknowledgments-include STAR Panel members and affiliations as well as names and affiliations of persons who contributed data, advice or information but were not part of the assessment team

10) Literature cited

11) Tables and figures

12) Brief response to all points raised by external anonymous reviewers. Respond to each point (e.g.; "suggestion carried out", "suggestion not carried out because . . ." or "good idea for future research but I didn't do it this time because . . .").

13) Complete parameter files for base runs.

Template for Summary of Stock Status Prepared by Stat Teams

Stock: (Species/area)

Catches: (Trends and current levels-include table for last ten years and graph with long term data)

Data and assessment: (Date of last assessment, type of assessment model, data available, new information, and information lacking.)

Unresolved problems and major uncertainties: (Any special issues that complicate scientific assessment, questions about the best model scenario, etc.)

Reference points: (Management targets and definition of overfishing.)

Stock biomass: (Trends and current levels relative to virgin or historical levels, description of uncertainty-include table for last ten years and graph with long term estimates)

Recruitment: (Trends and current levels relative to virgin or historical levels-include table for last ten years and graph with long term estimates)

Exploitation status: (Exploitation rates-include table for last ten years and graph with long term estimates. Exploitation rates are total catch divided by exploitable biomass.)

Management performance: (original ABC estimates, original HG specifications, overfishing levels, actual catch including discard, and discard).

Forecasts: (normally three-year forecasts of catch and biomass)

Decision table: (if available)

Recommendations for future research and data collection:

Sources of additional information: (Cite STAR Panel report, assessment documents and other useful or non-technical sources).

PFMC
01/26/99

1999 STAR PANEL/STAT TEAM REPORTS

- Black Rockfish STAR Panel Report
- Black Rockfish STAT Team Report
- Lingcod and Bocaccio STAR Panel Report
- Canary Rockfish STAR Panel Report
- Canary Rockfish STAT Team Report
- Cowcod Rockfish STAR Panel Report
- Petrale Sole STAR Panel Report
- Report of the Joint Canada - USA Review Group on the Stock Assessment of the Coastal Pacific Hake/Whiting Stock off the West Coast of North America (Pacific Whiting Star Panel Report)

BLACK ROCKFISH

STAR Panel Report

Southwest Fisheries Science Center
LaJolla, CA
May 24-28, 1999

STAR Panel Members:

Richard Methot, NMFS Northwest Fisheries Science Center, STAR Chair
Robert Mohn, Fisheries and Oceans, Canada
Ray Conser, NMFS Northwest Fisheries Science Center, SSC Representative

Sam Herrick, Groundfish Management Team Representative
Tom Ghio, Groundfish Advisory Panel Representative

STAT Team Members Present:
Farron Wallace, Washington Department of Fish and Wildlife
Annette Hoffman, Washington Department of Fish and Wildlife

Overview

The STAR Panel reviewed the assessment for black rockfish, which is a recreationally important species along the coast of northern Oregon and Washington. The review took place during the week of May 24-28, 1999 at the Southwest Fisheries Science Center in LaJolla, California. The STAT Team provided substantial draft documents to the STAR Panel members and prepared an excellent presentation in the review meeting. The consensus of the STAR Panel is that the black rockfish assessment is sufficient for determining the relative status of black rockfish in the northern area and can serve as a basis for adjusting harvest management for 2000 by the Groundfish Management Team. The STAR Panel commends the STAT Team for the quality of their draft documents and their cooperative spirit and willingness to respond to the Panel's comments and requests for additional analyses.

General

The report and presentation given to the panel was overall considered to constitute a very comprehensive treatment of the data and the modeling exercise was considered to encapsulate most of the biological concerns, although several issues were raised during the meeting. The panel agrees with the findings in the report.

As described below, several issues were handled during the meeting whereas other concerns deal with longer-term research issues, which need to be addressed in a longer time frame.

Questions and requests made during the meeting

The following issues were raised with the intent to resolve them during the meeting. All the issues were handled to the panel's satisfaction.

1. The estimated catch variances within the model should be compared to variances calculated outside the model, and be constrained to be similar to those externally calculated variances.

2. The effect of reporting rate on model performance needs to be fully evaluated.

3. The estimated population biomass by SS and AD needs to be presented in a manner that facilitates comparison.

4. The table of catch-at-age needs to be made available so that exploratory calculations can be made.

5. Residual plots for the tag recovery data need to be presented.

6. There should be a likelihood profile covering a plausible range of female natural mortality.

Comments on the Technical Merits and/or Deficiencies of the Document

Stock ID and data area

The tagging data used in tuning the model were taken from a tagging study based in central Washington. A genetic study was also carried out which showed that there were two populations, one off Washington's coast and a second to the south mostly along the Oregon coast. The catch and aging data comprise the entire coast, but it was reported that 75-80% of the catch was from the area that produced the tagging estimates. So although the tuning data do not match the catch data the model should fit the bulk of the fishery fairly well but there is increased uncertainty in the areas to the north and south. The triennial survey showed no fish north of Washington. The STAR panel accepted this view of the stock structure but suggested that the implications of tuning to the central area be examined.

Model choice (software)

Three models were presented. The first was an updated version of the 1994 stock synthesis model in which was presented only as a link to the last assessment. It is called the '1994' configuration. The second model (called 1998) was also SS and used the tagging data as a relative effort measure. The third model used AD model Builder and fit the number of returns in the tagging data. The different manner in which the tagging data were used was reflected in the response of each model to the tagging reporting rate. In the SS model higher reporting rate led to lower biomass; the opposite was seen in the AD model. The models will be denoted by SS and AD hereafter.

Calibration of tagging analysis -

Although both models tuned to the tagging data, they handled it in different ways.
The AD model fit the number of returns directly. Because tag returns were dominated by the first year or two after release the model was heavily influenced by the 1989-1991 period. The SS model used an F estimated from tag returns but treated it as a relative index of effort. The trend in the tagging index is strongly influenced by the unknown tag reporting rate which scales the 1988-94 data, but not the 1998. The 1998 tagging study was of a different design and had a known reporting rate. Tag loss and initial tagging mortality were estimated and included in the model.

Natural mortality and catch curve estimates

A catch curve analysis was done on the sport, line and trawl fishery data. The data for each gear was combined for sexes and a regression was fit to the log of the catch at age. The first 2 ages were dropped from the sport and line fishery and the first 3 ages from the trawl fishery. Also, data were accumulated into 4 year blocks to smooth the estimates. This analysis was done to suggest bounds for levels of natural mortality. The estimates showed an increasing trend with time and a higher total mortality for females. In the longest data set, sport fishing, the females ranged from .25 to .4 while the males from .2 to .3. This analysis assumes stable age distributions and constant recruitement.

The 20^{th}, 50^{th} and 80^{th} percentiles by age were plotted for the catch for the various fisheries. In all cases there was a trend to younger fish in the catch with the oldest percentile falling the fastest. The youngest percentile was flat suggesting no strong recruitment events over the 1986-98

period.

Retrospective analysis

A retrospective analysis of the 1994 model showed a trend that over-estimated biomass with the shorter data series. When the 1994 configuration using data to 1994 was compared with the 1994 assessment, the estimated populations were virtually identical. The AD model was run for the relatively short period 1986 to 1998 and a retrospective analysis was not presented.

Indices not considered

The authors rejected the triennial survey data as the number of captures as low (27 positive tows containing 233 fish to date). Sport fishery effort or CPUE data were not used, as was done in the 1994 assessment, chiefly because of a shift to live bait in the mid-90s which would affect catchability, and the lack of logbook data which would allow a spatial stratification of the data. Both of these indices were used in the 1994 assessment.

Noisy selectivity

Both the AD and SS models had 6 selectivities to be estimated (3 gear x 2 sexes). The SS used a double logistic and asymptotic models while the AD assumed an asymptote but the younger ages were not constrained. The selectivities in the AD runs were very noisy leading to more constrained models being developed during the meeting. From an analysis in which the log of the catch at age was compared to regression of the fully recruited ages, selectivities of 0.5 and 0.8 at ages 6 and 7 were imposed for sport and line fisheries and 0.1, 0.3 and 0.65 for ages 6-8 in the trawl fishery. These are consistent with the selectivities from the SS logistic curve. The STAR panel asked that this constraint be imposed on both sexes in the AD model, which was done.

Biological reference points

The target fishing mortality was defined from a yield per recruit analysis using the AD model formulation. A target of $F_{45\%}$ was chosen as was previously used. For tag reporting rates of 50 and 95% this is equivalent to a fully recruited F of 0.14 and 0.15 respectively.

Model variance (quantifiable and qualitative)

The level of reporting rate from the external tags used in 1988-1990 was estimated from a single study interviewing sport fishermen to be 95%. The level affected all the estimates from the models but was not estimable within them. Thus a range was chosen from 20 to 95 % which was later restricted to 50-95%. 50% was chosen as a base case. The SS model tended to show similar dynamics as a function but the magnitude was quite sensitive. In AD runs when M was not fixed were insensitive to the reporting level, while those with constrained M were sensitive but in the opposite direction of the SS runs.

Decision table

The reporting rate was used to define alternative scenarios for a decision table with a target of $F_{45\%}$. Reporting rates of 0.5, 0.75, and 0 .95 were considered.

Areas of Disagreement

There were no major outstanding disagreements among the members STAR Panel and the STAT Team representatives at the conclusion of the review.

Recommendations

There were benefits to the multiple model descriptions which were presented and continuation of the practice is recommended. These models should include simpler models and analyses, e.g. catch curve, production models, size frequency information.

The black rockfish is recruited to the fishery before the 50% maturity age. Yield and SSB isopleths should be examined to assess the effect of changing size of capture.

The tagging study should be expanded to better define the stock and to produce better abundance estimates.

The STAR panel was concerned about the high M estimates, especially on females, and recommends that both model configurations and independent data be investigated.

Stock status data, either abundance or effort, which were not used in tuning, should be compared to model outputs in order to integrate this information.

The implications of using tagging data only from the central area (near Westport) to assess the population throughout the stock unit needs to be investigated.

STATUS OF THE BLACK ROCKFISH RESOURCE IN 1999
STAT EXECUTIVE SUMMARY

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July 25, 1999

BLACK ROCKFISH RESOURCE IN 1999
STAT EXECUTIVE SUMMARY

Introduction

The status of stocks for black rockfish was last determined in 1994 (Wallace and Tagart, 1994). The population was assessed using the age-structured version of the stock synthesis model. The population was regarded as healthy, stock abundance was estimated to be either increasing after passing through a low in the late 1980s or in a gentle decline showing relative stability from 1990 to 1994. The recommended allowable annual yield was 517 mt based on an F45% exploitation strategy. The current analysis reprises estimates based on the 1994 stock synthesis model, introduces a new parameterization of stock synthesis (1998 configuration) and presents a completely new model written in AD Model Builder.

Stock

Tagging data collected by the Washington Department of Fish and Wildlife, suggested that Cape Flattery and Cape Falcon bound a single coastal Washington-northern Oregon black rockfish stock. This hypothesis was corroborated by a recent genetic study that evaluated a set of samples organized into three geographical clusters from California to northern Washington. The northern cluster, encompassing northern Oregon to northern Washington, was found to be significantly different from the southern clusters. We assumed that black rockfish distributed in this area represented a unit stock. All biological parameters, data analysis and yield projections presented in this assessment are intended to describe this portion of black rockfish coast-wide distribution.

Model Inputs:

The stock synthesis model used catch data from 1970 to 1998 for each of three fisheries (trawl, commercial line and sport). The AD model used trawl catch data from 1986 to 1993, line catch data from 1986 to 1995, and sport catch data from 1986 to 1998. The catch data interval corresponds to the period of an active black rockfish fishery for each gear. In addition, AD model also used gear specific estimates of catch variance. For the commercial gears (trawl and line), catch variance was available for each year of catch data. Catch variance for the sport fishery was available for 1990 to 1998.

Age specific inputs included catch-at-age (by numbers or weight), proportion-at-age (by numbers), and proportion-at-age (by weight). The stock synthesis model utilized proportion-at-age in numbers for each fishery weighted by sample size. AD model incorporates proportion-at-age by number for the sport fishery, and proportion-at-age by weight for the trawl and line fishery. Additional AD model inputs were the associated variances for the estimated proportions-at-age.

Revised estimates of weight-at-age and maturity-at-age were generated for the current analysis. We determined that a single weight-at-age vector effectively represented the line and sport fishery, and a separate vector was estimated for the trawl fishery. Inspection of the 1994 stock assessment report revealed that we had inadvertently used the raw proportion mature-at-age data rather than the estimated proportion-at-age from the regression fit to the logistic. Predicted values from the regression were used in this analysis.

Auxiliary data

From 1988 to 1990 and beginning anew in 1998, black rockfish from known areas of high densities were tagged such that the tags were distributed in proportion to perceived relative abundance. Tag release data

from 1988 to 1990 and in 1998 and recovery information collected between 1988 and 1994 and in 1998 where used as auxiliary data.

For the "1994" stock synthesis model configuration, two auxiliary data sets were used as black rockfish abundance indicators: tagging CPUE and recreational bottomfish effort (Wallace and Tagart, 1994). Estimates of fishing mortality derived from tag data were used as an effort index to tune the "1998" stock syntheses model configuration. Fishing mortality rates were estimated from the ratio of tags recovered to tags released and adjusted for the fraction of catch that occurred before the tagging study.

In the AD model configuration, tag recovery was modeled explicitly. Auxiliary data inputs were the annual number of tags released, the number of tags recovered stratified by year of release, instantaneous tag loss rate, and tag reporting/recovery rates. Tag reporting rates for the 1988-94 recoveries were unknown. Analyses were conducted to evaluate the sensitivity of estimated abundance to those reporting rates.

Model Description

We used the AD model to assess current black rockfish abundance because the model explicitly included data uncertainty and provided the most statistically rigorous model with the fewest set of assumptions. The two stock synthesis model configurations were provided as a basis for comparison; one as a comparison to the previous assessment ("1994" configuration) and one as a "parallel" to the AD model ("1998" configuration). Neither stock synthesis configuration is presented in detail here.

The two key features of the AD model were (1) the parameterization of the expected catches at age and (2) the definitions of the sampling unit for the different types of data input. The parameterization chosen mostly affected parameter bias whereas the sampling unit designation mostly affected estimator variance. Both bias and variance were components of overall parameter uncertainty. The parameterization and the sampling unit definitions were both designed to conform to the actual sampling protocol used, thereby propagating sampling uncertainty through to the final biomass estimates.

The first key feature, parameterization, was designed to minimize assumptions on the population dynamics. A fully parameterized model included (a) yearly fishing mortalities, (b) initial numbers at sex/age, (c) selectivity by fishery/sex/age and (d) natural mortality by sex/age. In a fully parameterized model the fishing mortalities, initial numbers and selectivities were not constrained. Natural mortality was constrained to fit a four-parameter logistic function where two of the parameters were estimated. Simulation studies conducted on fully parameterized models provided empirical evidence that the estimators and estimator variances were approximately unbiased. Additionally, they showed the estimators were approximately normally distributed.

The model for the black rockfish data included constraints on selectivity and natural mortality. When the black rockfish data were introduced into a fully parameterized model, the estimated selectivity parameters showed no discernible patterns by sex or age. Since there was not enough information in these data to estimate selectivity well, we assumed a selectivity pattern and fixed selectivity parameters at a fully selected rate for all but the youngest ages. Based on the assumptions made for the 1994 assessment (Wallace and Tagart, 1994), a constant rate of natural mortality was assumed for males and age specific rate for females. However those rates were estimated internally in the model. The remaining population's dynamics parameters were freely estimated.

The second key feature, sampling unit definition, affected both catch age data as well as tagging data. For the catch age data, the sampling unit was defined as the "basket" or boat rather than the individual fish to mimic the port sampling procedure. The collection of "baskets" yielded empirical estimates of variance

among the proportion at age vectors. Those variances were explicitly fixed into the likelihood functions describing catch at age.

For the tagging data, the sampling unit was the individual tag. This designation yielded a multinomial likelihood function where the tag recovery probabilities were calculated from the catch at age population dynamics parameters and an independently estimated tag loss rate. The recovery probabilities were also a function of a tag-reporting rate. However, the reporting rate was unknown in 1988-1994. Because of changes to the tag sampling protocol, the reporting rate in 1998 was equal to the proportion of the catch that was sampled and thus was treated as known.

Testing demonstrated that the final model converged reliably to the same solution. Initial parameter seeds were forced away from the maximum likelihood estimates by randomly generated deviations up to 10% of the original estimate. With this level of perturbation, virtually 100% of runs converged at the original maximum likelihood estimates. With a 50% perturbation approximately two-thirds of the runs converged to the original maximum likelihood estimates.

Results

We conducted a test to evaluate tag-reporting rate in 1988, 1989 and 1990. Port samplers interviewed charter skippers, deckhands and fishers and recorded observed tags at the dock. Approximately 95% of the tags observed dockside were subsequently redeemed for reward. Personal information indicated that some portion of the charter and private fleet regarded the tag study as an avenue to further restrict the fishery and did not provide accurate information nor return tags. We consider the tag-reporting rate as an unknown parameter that cannot be estimated, but believe that reporting rates may range from a highly optimistic level of 95% to a pessimistic 25%. We use these values to bracket our projections of the stock abundance and use the 50% tag reporting rate model to illustrate outcomes.

The main sources of uncertainty in the final model were sampling uncertainty and the 1988-1994 tag-reporting rate. The sampling uncertainty is represented by 95% confidence bounds on the final biomass estimates. The uncertainty due to the unknown tag-reporting rate is shown by the differences in biomass estimates at different levels of reporting rate. The results showed that initial biomass was far more sensitive to the choice of reporting rate than the final biomass. Estimates of initial biomass increased with increasing reporting rate whereas estimates of final biomass remained largely unchanged. The estimated ratio of final to initial biomass varied from 0.24 for a reporting rate of 75% to 0.82 for a reporting rate of 25%. With a reporting rate set at 50%, the biomass was assessed to be at 0.37 of the initial level.

All projections indicate that the current black rockfish stock is healthy and above target biomass levels (Table 1). Trend in biomass was similar for all tag reporting rates. Projections indicate decreasing biomass over the next 4 years (Figure 1). Table 2 provides a decision table illustrating alternative outcomes. Current catch biomass (300 mt) falls within the range of estimated equilibrium catch.

Table 1. AD model biomass projections based on a range of tag-reporting rates and +/- 2CV's.

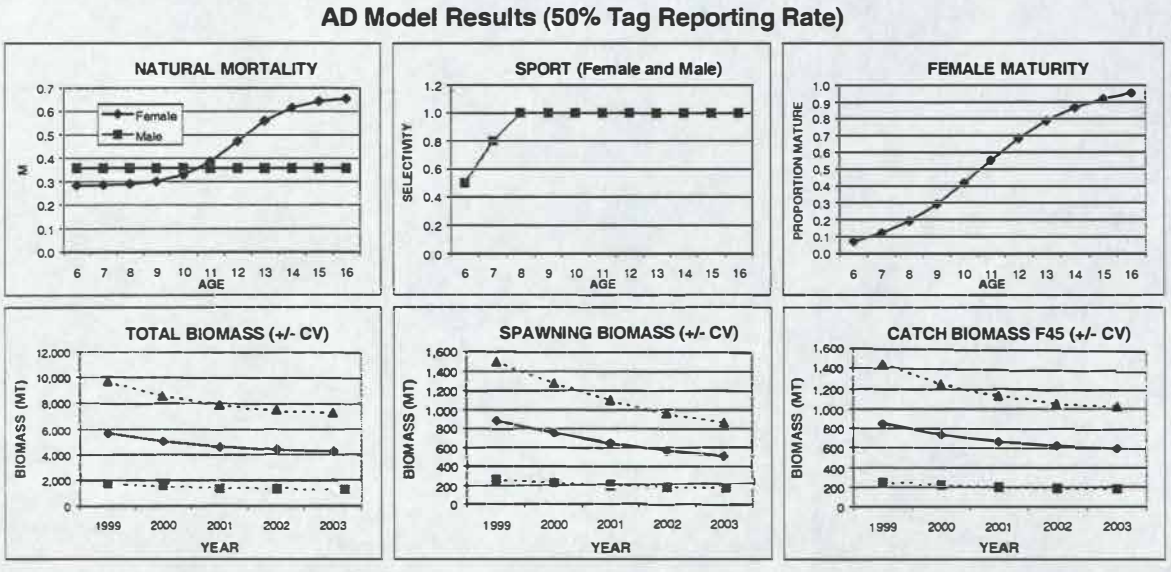
		Tag Reporting Rate			
Model	**Quantity**	**95%**	**75%**	**50%**	**25%**
+ 2CV	Total Biomass 1998	10,424	10,136	9,747	9,511
	Spawning Biomass 1998	1,684	1,615	1,522	1,463
	SPB(1998)/SPB(EQ)	199%	201%	199%	178%
	Total Biomass 2001	9,681	8,857	7,886	7,543
	Spawning Biomass 2001	1,034	1,040	1,097	1,435
	Mean Catch (1999-2001)	1,604	1,459	1,274	1,118
	SPB(2001)/SPB(EQ)	122%	129%	143%	175%
	EQ Recruitment	4,165,718	3,508,523	2,608,723	1,510,771
	EQ Spawning Biomass	845	804	765	822
	EQ Fishing Mortality	0.252	0.237	0.211	0.166
	EQ Catch	1,435	1,239	980	699
Mean	Sport Catch Biomass 1998	254			
	Total Biomass 1998	6,195	6,004	5,741	5,575
	Spawning Biomass 1998	1,001	957	897	858
	SPB(1998)/SPB(EQ)	199%	201%	199%	178%
	Total Biomass 2001	5,753	5,246	4,645	4,421
	Spawning Biomass 2001	615	616	646	841
	Mean Catch (1999-2001)	953	864	750	655
	SPB(2001)/SPB(EQ)	122%	129%	143%	175%
	EQ Recruitment	2,475,616	2,078,174	1,536,473	885,582
	EQ Spawning Biomass	502	476	451	482
	EQ Fishing Mortality	0.252	0.237	0.211	0.166
	EQ Catch	853	734	577	410
- 2CV	Total Biomass 1998	1,966	1,871	1,735	1,639
	Spawning Biomass 1998	317	298	271	252
	SPB(1998)/SPB(EQ)	199%	201%	199%	178%
	Total Biomass 2001	1,826	1,635	1,403	1,300
	Spawning Biomass 2001	195	192	195	247
	Mean Catch (1999-2001)	302	269	227	193
	SPB(2001)/SPB(EQ)	122%	129%	143%	175%
	EQ Recruitment	785,515	647,824	464,223	260,392
	EQ Spawning Biomass	159	148	136	142
	EQ Fishing Mortality	0.252	0.237	0.211	0.166
	EQ Catch	271	229	174	121

Table 2. Biomass trend based on a range of tag-reporting rates and +/- 2CV's.

1999 Black Rockfish Decision Table

YEAR	+ 2CV Total Biomass	+ 2CV Spawning Biomass	+ 2CV Catch Biomass	Mean Total Biomass	Mean Spawning Biomass	Mean Catch Biomass	- 2CV Total Biomass	- 2CV Spawning Biomass	- 2CV Catch Biomass
	95% Tag Reporting Rate								
1999	10,928	1,542	1,757	6,495	916	1,044	2,061	291	331
2000	10,087	1,237	1,565	5,995	735	930	1,902	233	295
2001	9,681	1,034	1,488	5,753	615	884	1,826	195	281
2002	9,494	919	1,454	5,642	546	864	1,790	173	274
2003	9,418	865	1,441	5,597	514	856	1,776	163	272
	75% Tag Reporting Rate								
1999	10,354	1,513	1,622	6,133	896	961	1,912	279	300
2000	9,384	1,239	1,426	5,559	734	844	1,733	229	263
2001	8,857	1,040	1,328	5,246	616	787	1,635	192	245
2002	8,588	914	1,279	5,087	542	758	1,586	169	236
2003	8,457	847	1,257	5,009	501	744	1,562	156	232
	50% Tag Reporting Rate								
1999	9,675	1,494	1,439	5,698	880	848	1,722	266	256
2000	8,581	1,283	1,252	5,054	755	737	1,527	228	223
2001	7,886	1,097	1,131	4,645	646	666	1,403	195	201
2002	7,479	959	1,062	4,405	565	625	1,331	171	189
2003	7,245	866	1,023	4,267	510	602	1,289	154	182
	25% Tag Reporting Rate								
1999	9,441	1,604	1,248	5,534	940	732	1,627	277	215
2000	8,402	1,548	1,118	4,925	907	655	1,448	267	193
2001	7,543	1,435	988	4,421	841	579	1,300	247	170
2002	6,915	1,301	894	4,053	763	524	1,192	224	154
2003	6,445	1,161	825	3,778	681	484	1,111	200	142

Figure 1. Biomass trend based on a 50% tag-reporting rate.



Lingcod and Boccacio STAR Panel Report
July 12 – 16, 1999
Davis, CA

Introduction

The STAR and STAT panels met July 12-15, 1999 on the U.C. Davis campus to discuss the 1999 lingcod *Ophiodon elongatus* and boccacio rockfish *Sebastes paucispinus* assessments. STAT panel members presented a lingcod assessment for the INPFC Eureka, Monterey, and Conception areas and a boccacio rockfish assessment for the INPFC Monterey and Conception areas. The attached agenda (Appendix 1) was reviewed and adopted. STAR panel objectives and the outline for stock assessments referred to in the PFMC terms of reference were reviewed. The review of the stock assessments was an iterative process which began by having authors review draft documents and results. STAR panel members discussed the assessment and then asked the STAT panel to conduct additional analysis. These analyses were then reviewed and, when necessary, additional analysis was conducted. Both STAR and STAT panels arrived at a consensus on these assessments.

The following individuals participated in the STAR panel review of STAT panel assessments:

STAR Panel		
Jerry Ault	U.Miami	ault@shark.rsmas.miami.edu
Jim Golden	ODFW	Jim.Golden@hmsc.orst.edu
Joe Hightower	N.C. State Univ.	jhightower@ncsu.edu
Peter Leipzig	GAP	ppl2@axe.humboldt.edu
Gilbert Sylvia	SSC	gil.sylvia@hmsc.orst.edu
Dave Thomas	GMT	dthomas@dfg2.cagov

STAT Panel		
Peter Adams	STAT Lingcod NMFS	Pete.Adams@noaa.gov
Alec McCall	STAT Boccacio NMFS	Alec.MacCall@noaa.gov
Steve Ralston	STAT/Boccacio NMFS	Steve.Ralston@noaa.gov
Erik Williams	STAT Lingcod NMFS	erik.williams@noaa.gov

In addition to members of the STAR and STAT panels, the following interested public were present:

Other Attendees:		
Jennifer Bloeser	PMCC	jbloeser@pacifier.com
Frank Henry	CDFG	fhenry@dfg2.ca.gov
Pete Kalvass	CDFG	

Lingcod

Technical Evaluation of Assessment

The southern lingcod assessment was presented by STAT panelists Pete Adams and Erik Williams. Pete provided an overview of the fishery and data used in the model. Erik presented a description of the model and results.

The previous assessment of lingcod was conducted in the northern area in 1997 for INPFC Columbia and Vancouver areas. Due to an inadequate time series of data, those authors did not include southern area. The present STAT team expressed concern with conducting this assessment with only two more years of information, particularly when a coastwide assessment is planned for 2000. Notwithstanding this concern, STAT and STAR panelists recognized the need for a southern assessment to ensure that recent actions reducing northern and southern ABC's were justified, and to provide information for a lingcod rebuilding plan which must be completed in 1999.

The first draft of the lingcod assessment was incomplete according to the Outline for Groundfish Stock Assessment Documents. A checklist of missing elements was provided to the authors. Most of these elements were completed as the review progressed during the week.

STAR and STAT panel members discussed MRFSS data and asked STAT Panel members why California recreational data were not used. MRFSS data were used as they include private boat as well as charter boat catch and effort. CDFG data is restricted to measuring party boat catch and effort. STAR and STAT panel discussed, but did not resolve, the high data points in MRFSS data series for years 1980-81.

Dave Thomas, GMT STAR panel member indicated additional recreational catch data were recently made available but noted the data were not included in the lingcod assessment. The STAT panel agreed to make use of the new data and incorporate it into the assessment.

Generally, recreational and trawl CPUE data, and triennial trawl survey data all consistently indicated a downward trend in stock size.

In order to account for fishery size selection for rapidly growing fish, this assessment used a novel length-based approach, which calculated individual trajectories for growth to characterize length at age in the population. Bivariate distributions of $L\infty$ and K were used to create a transition array of length, age and a probability distribution of possible growth increments. These were done external to the model and then supplied to the AD model builder model to estimate length distributions.

The primary concerns with the assessment were the short time series of data and what appeared to be a mis-specification of the growth and possibly selectivity parameters. The

residuals, or differences in estimated and observed length and age, showed consistent patterns in lack of fit, indicating a systematic bias.

Another concern was with the method the model used to remove fish from the population. The traditional Baranov catch equations were not used to allow for size-selective removals. Removals were done once a year at mid-year. Some STAR panel members felt this may be unrealistic and may cause problems with the way data really present themselves (eg continuously throughout the year). STAT panel could not model different time periods for fish removals as it would have consumed too much time to alter the model.

Analysis Requested by STAR Panel

1. STAR panel asked for STAT panel to develop an alternative growth model. The new model to characterize female growth uses Jagielo's estimates from the 1997 assessment and a user supplied K based on observed length at age data in southern assessment. Males used an adjusted $L\infty$ and K modified to conform to older ages.
2. In addition to the changes in the growth function, the STAR panel asked STAT panel to partition trawl selectivities into two time periods 92-94 and 95-97. This request was an additional analysis to account for the size limit change which was implemented in 1995. The STAR panel believed that a time-variant selectivity might also result in a better fit to length and age data.
3. After the changes in growth function and time-variant selectivities were explored, the STAR panel asked for additional changes. A new base model was selected, utilizing the new growth function but retaining original selectivities.
4. The STAR panel requested a sensitivity analysis of non-trawl and triennial survey selectivities by varying inflection point parameters $\pm$ 25%. The STAR panel also requested a final run using the base run modified by alternative M's ranging from 0.1 to 0.35 in increments of 0.05. These runs were used as a basis of expressing the range of uncertainty in the assessment.
5. The STAR panel requested STAT panel to also sample recruitments assuming a lognormal distribution using at least 500 replicate random selections using the base run with M=0.25. CV's from sampled recruitments were examined to determine stability vs sample size. Recruitment data will be used to express range of recruitments and form the basis for calculating unfished spawning potential by calculating the product of recruitment times SPR.
6. Finally, the STAR panel requested that the STAT panel use the randomly sampled recruitments to project forward projected yields based on F100%, F35%, F40%, and F45%

Results and Discussion

Anomalies in fit to length distributions were addressed by re-specification of the growth function and re-estimation of transition arrays. While the new growth model resulted in an improvement in fit, little improvement was seen with time specific selectivities In addition, runs using time-specific selectivities caused recruitment estimates to be strongly

perturbed and there was no evidence that the new pattern was correct. In addition, the ratio of spawning biomass between 1973 to 1998 seemed unrealistic given trends in fishery. Thus, the STAR and STAT panels agreed to retain the new growth function but not the time variant selectivities.

Exercise of inflection points ± 25% of non-trawl selectivites did not improve the fit. Similar changes in the inflection points of triennial trawl survey selectivity parameters had virtually no effect. All of these runs used time variant selectivities for the commercial trawl fishery.

The STAR and STAT panels were in agreement with final model results and concluded recent actions to reduce ABC were consistent with apparent stock status. Furthermore, both panels were in agreement that the southern stock of lingcod appears to be overfished. Trawl catch per unit effort, the MRFSS data, and triennial trawl surveys consistently pointed to a downward trend in stock size. In addition, exercise of base model parameters reflecting uncertainty did not result in estimates of biomass more optimistic than that of a stock in an overfished condition.

Recommendations for Future Research and Data Collection

1. The STAR panel had questions regarding existing sampling levels and data quality. With the current low level of spawning biomass, sampling opportunities are likely to be reduced along with reduced catches. If nearhore initiatives allow increased sampling in California – the STAR panel recommends that some funds be used to review and improve sample design for lingcod. The Council, state and federal managers may need to consider alternative management approaches if data are inadequate to provide a clear picture of stock status.
2. The STAR panel recommends improving estimates of growth parameters by additional sampling of younger, and perhaps older fish. The STAR panel also recommended developing methods to estimate growth parameters and associated transition array within the model.
3. If nearshore management and research initiatives increase sampling opportunities, the STAR and STAT panels recommend development of fishery independent surveys for lingcod.
4. The STAR panel recommended that STAT panels evaluate data more formally including a spatial analysis of fishery and fishery independent data. Such analysis should focus on at least two products. First, the statistical structure of the data should be examined with the goal of improving sampling design. Second, models should be reviewed and modified to more accurately reflect distribution of the resource, and the distribution of the fishery in time and space. For lingcod, areas of particular concern is sexual dimorphism, separation of sexes and sizes by area and impacts these population features

may have on sampling and interpretation of sampling products in the modeling process.

5. STAT panel should include recommendations for additional approaches to modeling that might improve assessments. In particular, exploration of alternative model variance structures [multinomial vs multivariate] was identified as one possible area of fruitful research.

Boccacio

Technical Evaluation of Assessment

The southern boccacio assessment was prepared by STAT panelists Alec MacCall, Steve Ralston, Don Pearson [not present] and Erik Williams. Alec provided an overview of the fishery and data used in the model as well as a description of the model and results.

The first draft of the boccacio assessment was incomplete according to the Outline for Groundfish Stock Assessment Documents. A checklist of missing elements was provided to the authors. Most of these elements were completed as the review progressed during the week.

The previous assessments of boccacio was conducted in the southern area by Ralston et al. 1996, Bence and Rogers 1992, and Bence and Hightower 1990. The present assessment and all previous assessments indicate boccacio stocks have been declining since 1969. Only the INPFC Monterey and Conception areas were included in the present assessment. The authors intent to provide an only an update of the 1996 assessment was expressed at the pre-assessment workshop and re-iterated at the STAR panel review. On the basis of the 1996 assessment, boccacio was declared overfished and a rebuilding plan is being prepared. The rebuilding plan will make use of the population projections estimated by the current assessment.

One of the main differences between the two assessments was a re-estimation of the catch history. Improvements were made in use of sampling data to fill in for missing estimates of rockfish species compositions used to estimate the historical catch of boccacio in the commercial fishery. In addition, more recent estimates from MRFSS databases were used to estimate recreational catch. Estimated catch from the commercial fishery increased over the time series while the recreational catch estimates were lower compared to those used in the previous assessment.

A length based stock synthesis model was used. Authors cited conflicts with age and length data. Age data were only used to establish initial growth parameters in the pre-review model.

Model components included the NMFS triennial trawl survey and recruitment survey index, MRRFS based recreational fishery CPUE, and trawl fishery CPUE. CalCOFI larval recruitment data were not used as it is currently undergoing review.

Length data from the commercial trawl, set net, hook and line fisheries and the recreational fisheries were used along and incorporated modeling of the effective sample sizes for each data set.

A Bayesian approach was used to estimate M using a prior of M =0.15 and standard deviation of 0.03.

The base run resulted in a posterior M of 0.2. Fits to triennial trawl survey data were poor due to high variability in survey estimates. Fits to recruitment surveys, recreational CPUE and trawl fishery CPUE were generally good. Recruitment trends based on survey observations were consistent with the previous assessment. The authors cited problems with the model "crashing" due to numerically running out of fish. Initially this was solved by use of artificially high lower bounds on recruitment that produced an upward bias in ending biomass estimates. During the review, changes in the estimation procedure allowed the lower bounds on recruitment to be much smaller, improving the likelihoods of the fits and the accuracy of the results.

Observed vs estimated length compositions indicated a poorer fit and several alternative selectivity patterns were tried with only marginal improvements in fit.

The STAR panel had concern with the Baysian approach toward estimating M . Some STAR panel members felt that an M of 0.2, while improving overall fit, may not reflect biological reality given the longevity of bocaccio rockfish (arguing for a lower M), while other members felt that the strong improvement in log-likelihood argued for a higher natural mortality rate.

STAR and STAT panel members discussed the lack of fit to length data. The STAR panel felt that size at age might be mis-specified in the model. Author Alec MacCall indicated growth was not estimated by the model. The STAR panel also felt that some of the problems may have been associated with strong year-classes moving through the fishery. STAR panel members also expressed concern over differences in fisheries during higher abundance and stronger recruitments vs periods of low abundance and poor recruitment, suggesting some of the lack of fit may be due to changes in growth and / or selectivity between different time periods. Finally, the STAR panel thought that estimates of unfished biomass might be unreliable as the model uses a longer time series of catches, but tunes to more recent trend data (surveys, etc.).

Analysis Requested by STAR Panel

1. The STAR Panel requested plots of residuals of observed vs. estimated length distributions.
2. The STAR panel asked the STAT panel to examine growth curve assumptions and to conduct a base run allowing the model to estimate the growth parameters.
3. The STAR panel asked the STAT panel to model effects of cutting off the time series of catch data so that the model uses a shorter time series (1976-98) assuming an average catch equal to the 10 year average catch between 1967-77, prior to1976.

4. The STAT panel was asked to conduct a sensitivity analysis on M ranging from 0.05 to 0.25 in increments of 0.05.
5. For purposes of projecting future harvests, it was recommended recruitments be sampled to generate a recruitment range and estimates of unfished biomass via product of SPR and recruitment. Harvest modeling was to be estimated by projecting catch and harvest for policy F's of F40%, F45%, F50%, and F100%.

Results and Discussion

Improvements were seen in base run results when growth was allowed to be fit by the model. New parameter estimates were incorporated into the model. Fits to length were somewhat improved and some effects of strong year-classes were still noted. The STAR panel felt fits were reasonable and, excepting effects of strong year-classes, residuals did not indicate systematic bias.

Running the model with the alternate time series from 1976-98 had no effect on results.

The cap on F in the model was set at 0.4 and was responsible for crashes when R was set at low levels. Model stability was achieved by resetting the cap to 1.0, thus allowing the exploration of lower recruitment levels. Population values stabilized with R set to 0.001. Using the new growth parameters and new minimum value for R, natural mortality rate was varied between M = 0.15 and 0.25 and model runs were compared to the previous base model over the same range of natural mortalities. The model runs produced similar results, although the latest modifications resulted in improved likelihood values and reduced spawning out.

The STAR and STAT panels discussed the consequences of having spawning output reduced to less than 4% of the spawning potential under unfished conditions. Current stock status would indicate exploitation rates have exceeded policy F40% since the late 1970's and that a sustainable fishery could only be achieved with a harvest policy that would result in more than 74% of unfished biomass remaining (F74%). Extremely low or exploitation rates or a 0 fishing mortality rate required for rebuilding do not seem feasible without precluding fisheries altogether.

STAR and STAT panels also discussed the difficulty of estimating meaningful unfished biomass and stock productivity levels given the high variability in recruitment. As one panel member put it 'for bocaccio, recruitment is everything'. It was suggested that boccacio may have strong community interactions during periods when biomass was higher and during good environmental conditions that may lead to lower than average recruitments. In later years, with poor environmental conditions and low population sizes, recruitment may be reduced as well. Some suggested partitioning recruitments into a box type model that accounts for stock size and environmental conditions.

STAR and STAT panel members also discussed ways of effectively help the resource through a meaningful rebuilding plan. Concern was expressed over the effects of present fishery harvest policies which treat areas of high and low productivity as homogenous units. If recruitment comes out of a few productive areas, one way to reduce stock impacts and encourage rebuilding would be to selectively reduce F in areas of high spawning population abundance.

On the brighter side, there appears to be a strong incoming year-class in 1999 along the California coastline. Recruitment to the fishery is not expected to take place for 2 or three years and would not likely result in rebuilding plans in the short term. It was also pointed out that the fishery has been in existence for at least two decades prior to the beginning of the time series used in this model. Bocaccio have not continued to produce strong year classes and the 1990s have produced a long string of failures. Previous to that, even the strong year classes have been simply proportional to the spawning output. The 1999 spawning, which we cannot yet calibrate is the only exception. It appears that the stock has not lost the capability to produce a strong year class.

Recommendations for Future Research and Data Collection

1. STAR panel member Dave Thomas (CDFG) indicated that more length data for earlier years may be available and should be included in future assessments.
2. STAR panel and STAT panel members agreed that it would be important to look at the long time series of power plant larval fish impingement data to see if a pre-recruitment index could be developed.
3. STAR panel members felt that environmental data and recruitment patterns should be examined for trends. Research should include exploring the possibility of community interactions along with environmental coupling in an effort to develop alternative models that more accurately affect the population dynamics of this species.
4. STAR and STAT panels recommend continuation of fishery independent methods of monitoring the boccacio resource, and development of additional fishery independent methods of sampling. Anticipated low future harvest levels under a rebuilding plan may reduce or eliminate sampling opportunities needed to track recovery of the stocks.
5. STAR and STAT panel members agreed that it would be important to look at the CalCofi to look at the CalCOFI data set when it becomes available. By extending the model back into the 1950s and 1960s, it may be possible to calibrate stock productivity to the colder conditions during those years as opposed to the warm conditions that have prevailed since the mid-1970s.

Lingcod and Boccacio STAR Panel Review
July 12-16, 1999
U.C. Davis, California

Agenda

1. Introductions and sign-in.
2. Review Goals and Objectives.
3. Review STAR Panel Objectives (terms of reference)
   - Review draft stock assessment documents and other pertinent information including previous assessments – determine if documents are sufficiently complete according to outline of assessments – using consensus of STAR panel members.
   - Work with STAT Panel to ensure necessary revisions are made. Provide instructions to STAT that are clear and in writing.
   - STAR Panel instructed on using a risk neutral approach in deliberations and in report. This was taken to mean represent uncertainty in assessments either through statistical uncertainty from model outputs or through differences in alternative models.
   - Towards end – review summaries of stock status prepared by STAT team.
   - Accommodate discussions and input by all interested parties, and document discussions. Document areas of disagreement between STAR and STAT Panels.
   -
4. Review Outline for Completed Groundfish Stock Assessment.
5. Review Lingcod Assessment
   - Presentation by Lingcod STAT
   - STAR Review of Groundfish Stock Assessment (Checklist)
   - STAR Comments on Assessment.
   - Public Comment Period
   - Instructions to STAT Team by STAR Panel
6. Review Boccacio Assessment
   - Presentation by Lingcod STAT
   - STAR Review of Groundfish Stock Assessment (Checklist)
   - STAR Comments on Assessment.
   - Public Comment Period
   - Instructions to STAT Team by STAR Panel
7. Review of STAR/STAT work on Lingcod.
   - Response by Lingcod STAT
   - STAR Comments on revisions.
   - Public Comment Period.
8. Review of STAR/STAT work on Boccacio

- Response by Boccacio STAT
- STAR Comments on revisions.
- Public Comment Period.

9. Summary of Stock Assessments
   - STAR Panel Summary – consensus and/or minority views,
     Final instructions to STAR Panel (Review Assessment Checklist)
     Review Summaries of Stock Status for SAFE Document
   - STAT Panel Response
   - Public Comment Period

10. Final Instructions to STAR Panel and or STAT Team
- Draft STAR report by end of meeting.
- Follow-up (Chair) if work not completed during meeting.

CANARY ROCKFISH

STAR Panel Meeting Report

Hatfield Marine Science Center
Newport, Oregon
June 14-18, 1999

STAR Panel Members:

Tom Barnes, California Department of Fish and Game, STAR Chair
Gary Stauffer, NMFS Alaska Fisheries Science Center, SSC Representative, Rapporteur
Gunnar Stefansson, Marine Research Institute, Iceland
Mark Saelens, Groundfish Management Team Representative
Rod Moore, Groundfish Advisory Panel Representative

STAT Team Members Present:

Northern Canary Rockfish Team:
Paul Crone
Kevin Piner
Ray Conser
Tonya Builder

Southern Canary Rockfish Team:
Erik Williams

Final STAR Report, July 2, 1999

Overview

The STAR Panel reviewed the two separate assessments by the northern and southern STAT Teams for the canary rockfish fisheries. The Panel's reviews are merged into a single report to the Council. The review took place during the week of June 14-18, 1999 at the Hatfield Marine Science Center in Newport, Oregon. The STAT Teams provided substantial draft documents to the STAR Panel members a week or more in advance of the STAR review. The two STAT Team leaders summarized their documents with the Panel sequentially on the first day, but the follow-up discussions addressed both assessments together to encourage comparisons and consistency with assumptions, base models, and results. The Panel requested a number of additional analyses from both teams which were addressed during the meeting by both Teams and will be incorporated into final assessment documents. Both assessments suffer from limited and sparse data sources, which translates into significant uncertainty in the assessments; however, all modeling scenarios indicate the current state of the canary rockfish resource is quite depressed, particularly for the northern area. The consensus of the STAR Panel is that both the northern and southern canary rockfish STAT assessments are sufficient for determining the relative status of the canary rockfish resource given the available data to develop recommended harvest levels for 2000 fisheries. The STAR Panel commends both STAT Teams for the quality of their draft documents and their cooperative spirit and willingness to respond to the Panel's comments and requests for additional analyses.

List of Requested Analyses

The STAR Panel, during the course of the review, requested the Team leaders to conduct additional analyses. In general, requests were similar for both teams. In most cases, the Team leaders made the changes and/or provided the additional analyses to the Panel's satisfaction. Most of the requests were directed at making the two assessments consistent with each other. These requests included the following:

1. Add a summary table of triennial survey index values of biomass and c.v. for the combined Columbia and U.S. Vancouver areas.

2. Examine the annual percentage of canary rockfish reported for California rockfish landings in the CalCom data base for years 1980 to 1986 that was used to estimate canary rockfish catches from Fish Bulletin rockfish landings for years prior to 1980. The percent composition of canary rockfish in CalCom for the 7 years was relatively stable and about 3%.

3. Examine the time series of the estimated age at 50% selectivity for the northern commercial fishery to assess whether a change in selectivity occurred over time. The age at 50% was stable and showed no trend.

4. Show the F40% replacement line on plots of stock/recruitment relationships.

5. Overlay length-at-age growth models for the southern and northern assessments on the same plot for comparative purposes. A single length-at-age model was used in the southern assessment, whereas the northern assessment utilized data source-specific (fishery dependent and fishery independent) length-at-age models. The length-at-age models developed from fishery-independent data were generally similar between the northern and southern assessments, particularly for the exploitable ages. In the northern assessment, the length-at-age models developed from fishery-dependent data indicated faster growing fish, particularly at the young ages (say less than 5 years), than that observed in the fishery-independent data.

6. For the southern assessment model, conduct a sensitivity analysis of natural mortality scenarios for female canary rockfish (state of nature alternatives) as was done in the northern assessment.

7. Project stock biomass and yields for years 2000, 2001, and 2002 using model estimates of year class strength for 1995 through 1997 for the southern assessment and northern assessment. Make an alternative set of projections for the northern assessment using one half of the values of the year class estimates, which are based on the size composition from just the 1998 triennial survey. Use the average of the values in the recruitment for 1980 to 1995 to estimate the magnitude of 1998 and 1999 year classes.

8. Set proxy values of unfished biomass using equilibrium stock biomass at F=0 and average recruitment for a period of high biomass (i.e., recruitment estimates associated with stock biomass at the beginning of the time series).

9. Compute and tabulate annual exploitation fraction or total fishing mortalities for the harvest time series.

Comments on the Technical Merits and/or Deficiencies of the Document

The STAR Panel was satisfied that the stock assessment scientists configured their simulation models properly given the available data. The northern assessment is based on an age-structured Stock Synthesis Model, while the southern assessment model was a length-based model built using AD Model Builder software. No apparent discrepancies in model results between the northern and southern assessments could be attributed to the use of the two different modeling approaches and both model applications appeared to be properly configured. Both assessments are greatly hampered by the lack of consistent information on the size and age composition from the fisheries and surveys. The northern assessment may benefit from a comparison of the assessment information for the portion of the canary resource off Canada's Vancouver Island. Currently, the geographic boundary between the two assessments is rather arbitrary and not based

on any clear differentiation of stocks. The boundary was determined more by the standard management boundaries and the differences in data sources.

Areas of Disagreement

There were no major outstanding disagreements among the members of the STAR Panel and the STAT Team representatives at the conclusion of the review.

Unresolved Problems and Major Uncertainties

The stock structure and any potential stock boundaries for the canary rockfish resource are unknown. Although the growth rates appear to be similar for the northern and southern areas, the modeling results seem to indicate that the portion of the resource in the southern area is more productive and has had a lower rate of decline for similar fishing mortality rates. Recruitment estimates for the southern assessment do not show the same declining trend estimated for the northern area. A comparison with recruitment estimates off Canada could be instructive.

The typical problem of an apparent lack of older female rockfish in the commercial fisheries is evident in the canary rockfish fisheries and survey results. The modeling is unable to identify which scenario is the most likely; increasing natural mortality for older females (potentially resulting from spawning stress) with asymptotic age-specific selectivity in the trawl fishery versus constant mortality with decreasing selectivity for older females. Consequently, the results from two states of nature are modeled and presented. Neither the STAT Team nor the STAR Panel could provide a strong rationale to reject one scenario or the other. The modeling results for the southern assessment tended to fit the data better for values of natural mortality up to M=0.2. Because of the age span of canary rockfish, average values of M greater than 0.1 are not reasonable, particularly for males. The southern Team was asked to run their model for the same two mortality scenarios adopted for the northern assessment by using a prior probability distribution function for M.

The baseline model for the northern assessment estimated relatively large values for the 1995, 1996, and 1997 year classes based on the size composition for the 1998 triennial survey in the northern areas. The STAR Panel was uncomfortable in relying solely on this one observation without other evidence or anecdotal information from the fishery on the strength of these year classes. To demonstrate this uncertainty, the Team for the northern assessment was asked to project the short-term biomass and yield trend using values for these 3 year classes equal to one-half of the estimated values from the model, which would be more similar to recruitment levels estimated since 1985.

Evaluating the current level of the canary rockfish resource relative to a virgin (unfished) state is inherently difficult, given the problem of estimating unfished biomass. The STAR Panel

recommended to the Teams that they use a proxy for unfished biomass as discussed in item 8 above. These proxies are estimates of virgin biomass from the baseline assessment runs and stock biomass per recruit for F=0 times average recruitment. The Panel also recommended that stock abundance only be projected out for 3 years rather than the 10 years needed to evaluate potential rebuilding strategies. Projected yields are to be based on harvest levels using a policy of (1) constant F40% and (2) variable F based on F40% with biomass (B10% and B40%) precautionary reduction triggers. Based on the plot of F40% replacement levels mapped on the stock/recruitment time series, a more conservative harvest policy may be warranted, particularly if discard mortalities cannot be prevented or minimized.

Recommendations for Future Research and Data Collection

Future canary rockfish stock assessments could be significantly improved by increased sampling of commercial landings and increased frequency of fishery-independent resource surveys. Currently, port sampling protocols are neither consistent from year to year nor strictly standardized between the three states. Even though the canary rockfish fishery may not be as significant as it once was, the current status of the resource is quite depressed, which will likely affect the fisheries for the dominate species if canary rockfish are deemed overfished. The size and age composition derived from collection of data from all segments of the canary rockfish fishery will be extremely important in tracking its recovery and assessing the productivity of the stock(s). These data must be collected annually over the geographic range of the fisheries to eliminate the current data gaps in size and age data from the fishery. The current frequency of the NMFS bottom trawl survey should be increased from the triennial schedule to an annual basis. Canary rockfish captured in the survey must be sampled to determine length, sex, and age composition. The annual age-composition information from the survey will be very valuable for tracking the magnitude of incoming recruitment, as well as following cohorts through the fishery. The canary rockfish age structures (otoliths) collected from the fisheries and surveys must also be routinely processed. Routine data collection over time will also provide insight into stock structure and natural mortality schedules of the older females. Given that the resource appears to be very depressed, efforts to reduce fishing mortality under the Council's available management measures will likely result in higher discard mortalities. Therefore, improved effort to monitor total fishing mortality, including discard catches, will be important to track stock rebuilding progress.

A major research effort should be undertaken along the U.S. west coast to resolve which modeling scenario is closest to reality, constant female mortality with dome-shaped age-specific selectivity versus age-dependent mortality with asymptotic selectivity. A number of U.S. west coast groundfish stocks appear to have an unusually low number of older female fish given the life span of the male population. The alternative modeling assumptions of age-dependent mortality versus dome-shaped selectivity patterns can both replicate the age structure of the female population as observed in the fishery or summer bottom trawl surveys. This lack of resolution contributes considerable uncertainty in estimates of current stock condition and yield

projections. A major research effort to locate larger females or to examine age-dependent mortality for mature female fish would benefit a number of assessments and stock rebuilding plans.

The Panel discussed potential effects of environmental changes (regime shifts) on stock productivity, and the possible influence on expected recruitments and estimates of future unfished stock size. The increasing trend in sea surface temperatures for the California Current region since the late 1970s has been well documented and is associated with increased productivity of sardines (and decreased zooplankton volumes in CalCOFI time series). Possible environmental effects on productivity are a germane management issue, as demonstrated by its inclusion in the sardine harvest control rule. No clear evidence has been presented for a productivity response to environmental conditions in groundfish stocks, possibly due to life history traits, such as longevity, delayed age at maturity, and the presence of numerous year classes in the spawning biomass. However, it may be a relevant management issue for groundfish, particularly for those stocks in need of formal rebuilding. Sufficient recruitment information may now be available from recent stock assessments to test for regime effects in groundfish stock productivity, and a rigorous analysis would benefit management.

Status of the Canary Rockfish Resource off Oregon and Washington in 1999

Stock Assessment Team (STAT) Summary Report

Prepared by

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Submitted to

Stock Assessment Review (STAR) Panel
Hatfield Marine Science Center
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14-18 June 1999

4 October 1999

Preface

This summary report has been prepared by a stock assessment team (STAT) consisting of Paul R. Crone (Principal Investigator), Kevin R. Piner, Richard D. Methot, Ramon J. Conser, and Tonya L. Builder of the Fishery Resource Analysis and Monitoring Division (FRAMD) of the Northwest Fisheries Science Center (NWFSC) located in Seattle, WA (Montlake Laboratory) and Newport, OR (Hatfield Marine Science Center). The researchers with FRAMD coordinated this assessment and were involved in the preparation of data sets, modeling, and documentation presented here.

The critical evaluation of the methods and results presented in this document was conducted by a stock assessment review (STAR) panel consisting of Tom Barnes (Chairperson, California Department of Fish and Game, LaJolla, CA), Gary Stauffer (Scientific and Statistical Committee representative, NMFS, Alaska Fisheries Science Center, Resource Assessment and Conservation Engineering Division, Sand Point Laboratory, Seattle, WA), and Gunnar Stefansson (Marine Resource Institute, Reykjavik, Iceland). Additionally, Mark R. Saelens (Oregon Department of Fish and Wildlife, Newport, OR) from the Groundfish Management Team and Rod Moore (West Coast Seafood Processors Association, Portland, OR) from the commercial fishing industry served as liaisons in the STAR process. The STAR panel conducted its evaluation at a workshop held at the Hatfield Marine Science Center in Newport, OR from June 14-18, 1999.

This report serves as a summary of the complete assessment document (Crone et al. 1999), which contains detailed information regarding the status of the canary rockfish resource off Oregon and Washington in 1999. The report contains a brief overview of the canary rockfish stock, including the biology of the species, the sample data and analyses used to evaluate the historical and current status of the stock, the pertinent results and management implications from the analyses, and recommendations for future assessments. This report is intended as a complement to the document produced by the STAR panel, which presents discussion on significant technical points and lists of all recommendations and requests made to the STATs during the week-long review (STAR 1999). Readers interested in complete descriptions of data sources and specific details concerning analyses and modeling used in the canary rockfish stock assessment conducted in 1999 should consult Crone et al. (1999).

Overview

The assessment results for 1999 presented here are applicable to the canary rockfish (*Sebastes pinniger*) population within the U.S. Vancouver through Columbia International North Pacific Fisheries Commission (INPFC) areas (commonly referred to as the 'northern' INPFC areas). The age-based version of the Stock Synthesis Model was applied to fishery-dependent data (time series of age distributions from the Oregon and Washington trawl fisheries, 1980-98) and fishery-independent data (time series of age distributions from the triennial, shelf trawl survey conducted by the National Marine Fisheries Service (NMFS), 1977-98). Size-distribution data from both the fisheries and the survey were also used to supplement age-distribution information. Finally, an index of stock abundance developed from the shelf trawl survey was used to 'tune' the catch-at-age analysis in the assessment model.

As was observed in previous assessments (Golden and Wood 1990; Sampson and Stewart 1994; Sampson 1996), a noticeable absence of old females (>20 years of age) was observed in age distributions of canary rockfish from both fishery-dependent and fishery-independent sample data. This result is a primary contribution to overall stock uncertainty currently confronting the assessment of canary rockfish off the U.S. Pacific coast. That is, the sex-specific differences between the age distributions were the basis for alternative modeling scenarios used in past assessments, as well as the current analysis. In general, two different life history strategies ('states of nature') generally provide a reasonable explanation for few old females in the sample data relative to males: (1) the females die at an earlier age than males (e.g., age-dependent natural mortality (M) for females or possibly, constant, but elevated natural mortality rates for females); and (2) the females are less 'vulnerable' to the fishing and sampling gears (e.g., dome-shaped selectivity for females and asymptotic selectivity for males). These two scenarios were used to develop the 'baseline' model configurations in the current assessment presented here (Scenario 1 and Scenario 2, respectively). Alternative assumptions concerning both natural mortality and selectivity (constant vs. time varying and asymptotic vs. dome-shaped) were critically evaluated in efforts to explore model robustness and ultimately, to bound the uncertainty associated with estimates of current stock size and fishing mortality (F) for the canary rockfish resource off Oregon and Washington. Additionally, given the inherent uncertainty associated with estimating recruitment, the STAR Panel recommended that two 'recruitment' hypotheses be evaluated (STAR 1999) for all forecast estimates: (1) a 'high recruitment' hypothesis based on actual estimates of recruitment from the baseline models; and (2) a 'low recruitment' hypothesis based on model estimates of recent recruitment (1996-98) that were reduced by one-half.

The STAR panel supported a final baseline configuration for Model Scenario 1 that was parameterized as follows: (1) $M = 0.06$ for males (all ages) and young females (ages 1-10), and M for females that ramped up from 0.06 at age 11 to 0.20 for fish ≥25 yr; (2) year-specific (1967-80 and annual from 1981-98) selectivity for age-distribution data from the fisheries, with asymptotic functions for both sexes; and (3) constant selectivity for age distributions from the survey, with asymptotic functions for both sexes. The final baseline configuration for Model Scenario 2 was parameterized as follows: (1) $M = 0.06$ for males (all ages) and females (all ages); (2) year-specific (1967-80 and annual from 1981-98) selectivity for age-distribution data from the fisheries, with asymptotic functions for males and dome-shaped for females; and (3) constant selectivity for age distributions from the survey, with asymptotic functions for males and dome-shaped for females.

The consistent decline in stock abundance (biomass) documented in past assessments was also observed in the current assessment, with recent trajectories that are the steepest in the time series, due primarily to the influence of the index of abundance that indicates the canary rockfish population is at critically low levels. Both model scenarios (Scenario 1 and Scenario 2) produced 'pessimistic' results regarding this

species ability to maintain a stable population size over time. For example, the current female spawning biomass (mature females as defined by the age-based maturity schedule) was estimated to be at roughly 7% of its 'virgin' (unfished) state for Scenario 1 and at approximately 23% of its unfished level for Scenario 2. Target fishing mortality rates ($F_{40\%}$) for this stock indicate substantial reductions in yield are necessary, with results from both scenarios suggesting catches should be cut by roughly 70% to 215-350 mt over the next three years. However, given the severity of the decline in stock abundance observed for this species, additional management policies (e.g., '40-10 Default Optimum Yield') may be considered and in effect, reduce Acceptable Biological Catches (ABCs) further than that indicated using strictly F_{MSY}-based management approaches (see Forecasts below). In general, results from Scenario 1 (age-dependent M for females) indicated steeper declines in stock biomass than Scenario 2 (dome-shaped selectivity for females); however, results did vary between the host of model configurations examined in each scenario. Tables are included that present recent time series (Table 1) and forecast estimates (Table 2) of important fishery-related statistics.

Stock Structure

Canary rockfish are distributed in the northeastern Pacific Ocean from the western Gulf of Alaska to northern Baja California; however, the species is generally believed to be most abundant from southeastern Alaska to central California. Canary rockfish are members of a diverse groundfish assemblage that is found off the U.S. Pacific coast, which includes over 60 species of rockfish (*Sebastes*). Adult canary rockfish, like many other species of rockfish in the genus *Sebastes*, are primarily restricted along the continental shelf from 250 fm (457 m) inshore to 25 fm (46 m). In this assessment, we assumed the canary rockfish population that inhabits waters off Oregon and Washington (U.S. Vancouver INPFC area through the Columbia INPFC area) represents a single 'unit stock.' That is, given the limited information available on canary rockfish biology (e.g., spatial and temporal migration habits), we felt it was more appropriate, from theoretical and analytical standpoints, to assume a 'single' stock of canary rockfish, rather than 'multiple' stocks, inhabited the northern INPFC areas (U.S. Vancouver and Columbia).

Catches

From 1967 to 1998, annual catches from the northern INPFC areas ranged from a low of roughly 700 mt in 1995 to a high of nearly 4,400 mt in 1982. Beginning in 1983 and extending through 1994, canary rockfish were monitored as part of the *Sebastes* complex, with various trip limits imposed over this 10-yr span. In 1995, trip limits specific to canary rockfish were imposed and commercial vessels were expected to sort the canary rockfish from the mixed-species categories, such as the *Sebastes* complex. Over the last decade, catches of canary rockfish have been reduced from roughly 2,500 mt to 1,000 mt (Table 1).

Data and Assessment

The following sources of information were used in the current assessment, either directly 'within' the assessment model or indirectly in examinations 'outside' of the model: (1) commercial fishery landings (1967-99); (2) commercial fishery biological data (1980-98); (3) research survey abundance and biological data (1977-98); and (4) independent research studies that addressed canary rockfish growth, maturity, mortality, and fishery-related discard. The age-based version of the Stock Synthesis Model was used to assess the status of the canary rockfish population off Washington and Oregon. Two general life history strategies were treated as alternative 'states of nature' (model scenarios) and were used to

develop the 'baseline' model configurations in the current assessment presented here. Ultimately, a final baseline configuration for each scenario was developed following review and comments generated at the STAR workshop (see Overview above for descriptions of model Scenario 1 and Scenario 2).

Sources of Uncertainty

As stated previously (see Overview above), the absence of old females in the sample data dictated alternative modeling approaches based on issues regarding natural mortality (M) and gear selectivity, which in effect, provided an ad hoc (qualitative) measure of the 'uncertainty' in the overall analyses, i.e., variability associated with estimated model parameters, such as stock biomass, female spawning biomass, exploitation rates, etc. Without additional information, it was not possible to determine, on strict theoretical grounds, which of the two model scenarios provided the most accurate description of the current status of the canary rockfish stock and thus, both sets of results were deemed appropriate for consideration, i.e., results from both scenarios were presented to the Groundfish Management Team of the Pacific Fishery Management Council for consideration. Also, because of the inherent difficulty in estimating recruitment, particularly estimates of future recruits, the STAR Panel recommended that two 'recruitment' hypotheses be evaluated (STAR 1999) for all forecast estimates: (1) a 'high recruitment' hypothesis based on actual estimates of recruitment from the baseline models; and (2) a 'low recruitment' hypothesis based on model estimates of recent recruitment (1996-98) that were reduced by one-half.

Biological Reference Points

The statistic $F_{40\%}$ is the fishing mortality rate (level of exploitation) that would reduce average, lifetime egg production ('spawning biomass') per female entering the stock to 40% of its unfished level (i.e., to 40% of the lifetime egg production for females that are unfished). The $F_{40\%}$ is currently intended as a proxy for the harvest rate that would produce 'Maximum Sustainable Yield' (F_{MSY}) for rockfish species exploited off the U.S. Pacific coast. Fishing mortality rates were apportioned between fisheries based on recent estimates of landed catch, with the Oregon fishery contributing 85% and the Washington fishery 15% to the overall, combined estimate of F. The current $F_{40\%}$ statistics were: (1) for Scenario 1, 0.139 for the Oregon fishery, 0.025 for the Washington fishery, and approximately 0.164 for the combined fisheries; and (2) for Scenario 2, 0.079 for the Oregon fishery, 0.014 for the Washington fishery, and approximately 0.093 for the combined fisheries. For both scenarios and fisheries, particularly the Oregon fishery, the time series of F statistics indicate harvest rates for canary rockfish in recent years (the 1990s) have been considerably higher than the desired $F_{40\%}$ rate.

Stock Biomass

Canary rockfish stock biomass (≥3-yr old fish at the beginning of the year) has declined markedly over the last three decades and is now at historically low levels: for Scenario 1, the current estimate of stock biomass was roughly 4,100 mt; and for Scenario 2, stock biomass was estimated to be approximately 11,700 mt. The two time series of stock biomass for 1988-98 are presented in Table 1.

Female Spawning Biomass

Canary rockfish female spawning biomass (mature females as defined by the age-based maturity schedule) has also declined considerably since the late 1960s and is now at historically low levels: for Scenario 1, the current estimate of female spawning biomass was roughly 1,000 mt; and for Scenario 2,

female spawning biomass was estimated to be approximately 6,700 mt. The two time series of female spawning biomass for 1988-98 are presented in Table 1.

Recruitment

Estimates of canary rockfish recruitment (age-1 fish) have fluctuated widely since the late 1960s, with annual estimates ranging from a low of roughly 100,000 fish in 1995 to a high of nearly 4,000,000 fish in 1969. In general, lower levels of annual recruitment were observed more recently (say after 1980) in the time series than in previous years (during the 1960s and 1970s). The two time series of recruitment for 1988-98 are presented in Table 1.

Exploitation Rates

For both scenarios, exploitation rates [(total catch / stock biomass) • 100] have generally increased from the late 1960s to the present: for Scenario 1, from approximately 5 to 25%; and (2) for Scenario 2, a more gradual increase from roughly 5 to 10%. Over the last five years, exploitation rates averaged roughly 20% for Scenario 1 and 7% for Scenario 2 (Table 1).

Management Performance

Indicators of management performance, such as Acceptable Biological Catches (ABC) and estimates of discard for the canary rockfish fishery are presented in Table 1. Discard of canary rockfish by commercial trawling vessels was assumed to be minor prior to 1995, when trip limits specific to this species went into effect. Discard was assumed to be approximately 1% of the total trawl catch from 1983 to 1994, which resulted in from 0.01 to 0.03 mt of discarded biomass on an annual basis. From 1995 to the present, discard was assumed to be 15% of the total trawl catch, which reflected roughly 0.10 to 0.14 mt of discarded biomass. The ABC levels have been gradually reduced since the late 1980s from 3,500 mt to the current value of roughly 1,000 mt. Fishery statistics that consider 'overfishing' thresholds are presented in Table 2 (e.g., '40-10 Default Optimum Yield' policy).

Forecasts

Projections of important management-related statistics (e.g., stock biomass, female spawning biomass, and yield) are highly influenced by forecasted levels of recruitment (see Overview and Sources of Uncertainty above). That is, the STAR Panel recommended 'high recruitment' and 'low recruitment' model configurations within each scenario. Recruitment estimates for 1999-2001 were set equal to the mean estimated recruitment for 1980-95 for purposes of estimating projected statistics for 2000-2002. In this assessment, projected estimates of yield (mt) are based on a constant $F_{40\%}$ statistic. Additionally, projected estimates of yield are presented based on decreasing ('ramping down') levels of $F_{\%}$ to meet regulations set forth in the '40-10 Default Optimum Yield' policy (PFMC 1998). For both scenarios and recruitment hypotheses, forecasts based on constant $F_{40\%}$ indicate substantial reductions in current ABCs are necessary: (1) for Scenario 1, ABC estimates ranged from 213 to 270 mt over the next three years; and (2) for Scenario 2, ABC estimates were roughly 283 to 344 mt for 2000-2002 (Table 2). Projected yields based on the '40-10 Default Optimum Yield' policy were: (1) for Scenario 1, no catch, given current female spawning biomass was estimated to be at <10% of the estimated virgin (unfished state) female spawning biomass (PFMC 1998); and (2) for Scenario 2, ABC estimates were from 110 to 147 mt over the next three years (Table 2), given current female spawning biomass was estimated to be <40% of the estimated virgin female spawning biomass. It is important to note that ABC estimates were generally

similar for precautionary reduction 'triggers' (10% and 40%) using reference points based on female spawning biomass (mature females as defined by the age-based maturity schedule) and stock biomass (≥3-yr old fish).

Recommendations

Recommendations for future research that addresses the canary rockfish stock off Oregon and Washington are presented in the complete assessment document (Crone et al. 1999) and the STAR report (STAR 1999).

References

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Table 1. Catch and status table for the canary rockfish stock off Oregon and Washington. Catch values and biomass estimates are in 1,000s of mt and recruitment estimates are in 1,000s of fish (1988-98). Estimates are applicable to northern INPFC areas only (U.S. Vancouver and Columbia), unless otherwise noted.

	Year										
	88	89	90	91	92	93	94	95	96	97	98
Catch											
Commercial landings	2.52	2.75	2.12	2.74	2.35	1.90	0.89	0.70	0.94	0.88	0.96
Discards[a]	0.03	0.03	0.03	0.03	0.03	0.02	0.01	0.10	0.14	0.12	0.13
Recreational catch	0.03	0.04	0.03	0.03	0.06	0.06	0.06	0.06	0.02	0.03	0.03
Total catch	2.58	2.82	2.18	2.80	2.44	1.98	0.96	0.86	1.10	1.03	1.12
Acceptable Biological Catch[b]	3.50	3.50	3.50	2.90	2.90	2.90	2.90	1.25	1.25	1.22	1.05
Status[c]											
Stock biomass											
Scenario 1	17.07	15.25	13.06	11.53	9.25	7.39	5.96	5.59	5.36	4.79	4.47
Scenario 2	26.69	24.52	21.99	20.18	17.63	15.57	13.94	13.41	13.03	12.30	12.01
Female spawning biomass											
Scenario 1	5.01	4.57	3.92	3.47	2.67	2.04	1.53	1.40	1.38	1.26	1.12
Scenario 2	14.76	13.85	12.74	11.84	10.60	9.54	8.62	8.14	7.81	7.42	7.05
Recruitment											
Scenario 1	670	946	681	960	704	540	346	101	1,351	936	1,083
Scenario 2	792	1,178	898	1,286	928	764	500	129	2,240	1,580	1,840
Exploitation rate											
Scenario 1	15%	18%	17%	24%	26%	27%	16%	14%	18%	19%	22%
Scenario 2	10%	12%	10%	14%	14%	13%	7%	6%	7%	7%	8%

[a] Estimated discard was applied only to the trawl fishery.

[b] Acceptable Biological Catch values are for all INPFC areas combined, including both 'northern' areas (U.S. Vancouver and Columbia) and 'southern' areas (Eureka, Monterey, and Conception).

[c] Stock biomass (1,000s of mt) denotes ≥ 3-yr old fish at the beginning of the year, female spawning biomass (1,000s of mt) denotes mature females as defined by the age-based maturity schedule, recruitment (1,000s of fish) denotes age-1 fish; and exploitation rate is calculated as [(total catch / stock biomass) • 100].

Table 2. Important fishery management statistics estimated from the 'baseline' configuration for model Scenario 1 and Scenario 2. All biomass estimates are in mt.

Management statistic	Scenario 1		Scenario 2	
	High recruitment[a]	Low recruitment[a]	High recruitment[a]	Low recruitment[a]
Biomass				
Virgin female spawning biomass[b]	13,998	13,998	29,107	29,107
Current female spawning biomass (1999)[b]	949	949	6,663	6,663
Current stock biomass (1999)[c]	4,057	3,701	11,693	11,099
Ratio of current/virgin fem. spawn. bio.	7%	7%	23%	23%
Projected stock biomass[c]				
2000	3,733	3,096	11,554	10,487
2001	4,312	3,451	12,338	10,741
2002	4,925	3,854	13,083	11,042
Projected female spawning biomass[b]				
2000	750	755	6,271	6,266
2001	868	852	6,200	6,174
2002	979	925	6,163	6,074
Projected yield (constant *F*)[d]				
2000	214	213	284	283
2001	245	242	315	311
2002	270	259	344	330
Projected yield (ramp-down *F*)[e]				
2000	0	0	110	110
2001	0	0	125	124
2002	0	0	147	137

[a] Recruitment levels were estimated as follows (see STAR (1999) and Overview):
High recruitment denotes annual recruitment was freely estimated from 1967-98. The mean recruitment from 1980-95 was applied to years 1999-2001 for purposes of estimating projected statistics for 2000-2002.
Low recruitment denotes annual recruitment was freely estimated from 1967-95 and fixed for 1996-98. The fixed levels of recruitment in each year from 1996-98 were set at 0.5 of the High recruitment estimates for these years. The mean recruitment from 1980-95 was applied to years 1999-2001 for purposes of estimating projected statistics for 2000-2002.

[b] Female spawning biomass represents mature females as defined by the age-based maturity schedule. Note that estimates of virgin female spawning biomass were derived as the product of estimated spawning output per recruit (SPR) in an unfished state ($F_{100\%}$) multiplied by average recruitment during the early periods of the fishery (i.e., recruitment associated with high spawning biomass) (see STAR 1999).

[c] Stock biomass represents ≥3-yr old fish.

[d] Projected estimates of yield are based on a 'constant' F (i.e., $F_{40\%}$).

[e] Projected estimates of yield (mt) are based on decreasing ('ramping down') levels of $F_{\%}$ to meet regulations set forth in the '40-10 default OY' policy (PFMC 1998).

COWCOD ROCKFISH

STAR Panel Report

Southwest Fisheries Science Center
LaJolla, CA
May 24-28, 1999

STAR Panel Members:

Richard Methot, NMFS Northwest Fisheries Science Center, STAR Chair
Robert Mohn, Fisheries and Oceans, Canada
Ray Conser, NMFS Northwest Fisheries Science Center, SSC Representative

Sam Herrick, Groundfish Management Team Representative
Tom Ghio, Groundfish Advisory Panel Representative

STAT Team Members Present:
John Butler, NMFS Southwest Fisheries Science Center
Larry Jacobson, NMFS Southwest Fisheries Science Center
H. Geoffrey Moser, NMFS Southwest Fisheries Science Center

Overview

The STAR Panel reviewed the first assessment for cowcod, a rockfish which has been important to both commercial and recreational fisheries off southern California. The review took place during the week of May 24-28, 1999 at the Southwest Fisheries Science Center in LaJolla, California.

The panel agrees with the findings in the report, although several technical issues noted below were raised during the meeting. Many of these issues were handled during the meeting, whereas others are research issues which need to be addressed in a longer time frame.

The consensus of the STAR Panel is that the assessment is sufficient for determining the relative status of this species in the Conception INPFC area and can serve as a basis for adjusting harvest management. In this regard, there is no doubt that this stock has experienced an extreme decline in abundance in this area. This decline is evident in a spawning biomass index developed from larval catch in the CalCOFI plankton survey, a fishable biomass index developed from catch per angler data in the recreational charter boat fishery, a recruitment index developed from the catch of juvenile cowcod in nearshore bottom trawl surveys, and from the decline in the percentage of large cowcod. Analysis of these trends indicate that fishing mortality rates were quite high during the 1970s, although it is likely that the decline in recruitment and abundance has been exacerbated by the warmer and less productive ocean conditions that have been prevalent since about 1977.

The report and presentation given to the panel was overall considered to constitute a comprehensive treatment of the data, and the modeling exercise was considered to encapsulate most of the biological concerns. The STAR Panel commends the STAT Team, composed of scientists from the NMFS Southwest Fisheries Science Center and the California Department of Fish and Game, for the quality of their work, especially because this was the first assessment for cowcod, and their cooperative spirit and willingness to respond to the Panel's comments and requests for additional analyses.

Questions and requests made during the meeting

The following issues were raised during the meeting and were handled to the panel's satisfaction.

1. The catch data and the analysis should be restricted to the Conception INPFC area. Although some cowcod catch comes from north of this area, the surveys and fishery CPUE are only relevant for the Conception area.

2. The depth distribution of cowcod should be reexamined on the basis of fishery and survey data to better determine the primary adult habitat of this species. The amount of the each statistical block that is within this depth range habitat should be calculated and used to weight the recreational logbook data from that statistical block.

3. The age at recruitment in the population model should be adjusted to age 10 to more closely match the age at which the fish attain the minimum size prevalent in the fishery. This adjustment affects the timelag for inclusion of the LA and Orange County trawl survey data, which is an index of age 3 recruits.

4. The NMFS triennial trawl survey data should be examined for evidence of trends in cowcod abundance in the area north of the Conception INPFC area.

5. The population model should be extended from 1950 back to the early 1900s. This will allow a fuller examination of the consistency between model's estimate of initial biomass, the recruitment level necessary to produce that biomass, and the level of recruitment estimated during the 1950s.

6. The LA&Orange County trawl survey data should be used directly in the model as an index of recruitment.

Comments on the Technical Merits and/or Deficiencies of the Document

Unlike most assessments, the time series of total catch for cowcod is not known with high accuracy in all years, especially because the time series must extend back to the early 1950s to account for major fishery impacts on this species. The STAT team made innovative use of various data sources to derive a reasonable database to use in the assessment, including a long time series of reported catch published in the LA Times. Some further refinement of this catch time series occurred after the STAR panel meeting so was not closely reviewed by the panel. The panel is confident that a sufficiently accurate catch time series has been used in the analysis. However, because of the complications in this catch analysis, the STAR panel recommends that this portion of the assessment be closely examined in any future review.

The CalCOFI larval abundance data has been used to develop an index of the abundance of spawners that produced these larvae. Because cowcod larvae are rare, this index is based on the percentage of positive tows. The STAT team is commended for their work in developing this index.

The STAT team is also commended for their careful work in developing an index of cowcod abundance from the recreational charter boat logbook data. The availability of this long-term logbook database allowed the analysis of catch per angler hour to account for the shift in effort from nearshore to offshore statistical areas over time.

Unresolved problems and major uncertainties

The geographic structure of the cowcod stock is not well known. Although larval data from the 1950s show that spawning was strongly concentrated in the Southern California Bight, it is also clear from catch data and the NMFS triennial trawl survey data that cowcod occur off central and northern California in the 1980s to present. The restriction of the current analysis to the

Conception INPFC area is reasonable given the available data, but collection of genetic stock identification data should be a high priority.

The CalCOFI larval data are properly used as an index of adult spawner abundance, as noted above. However, as the index has declined substantially, there is an implication that future recruitment from these larvae also will decline. A fuller comparison of the trends in larval abundance (lagged to indicate recruitment), the LA and Orange County trawl survey indices of recruitment, and the model estimates of recruitment should be considered.

Model scenario - Three types of data (CalCOFI larval data, recreational catch per angler hour, and trawl survey for recruits) and several model constraints contribute to the calibration of the assessment model and selection of the best model fit. As the weighting on different model components was varied, two model scenarios emerged as reasonable representations of the stock's history. In one scenario, the initial biomass was quite high and subsequent recruitment was low. In the other case, the initial biomass was moderate and the degree of decline in recruitment was less than in the first scenario. In both cases the decline in the population during the late 1970s is extreme, but it is difficult to determine the "best" of these two scenarios strictly on the basis of goodness of fit to available data. Examination of additional ancillary data may be necessary in order to better understand the detailed history of the stock.

Recommendations for research and data collection

The analysis of the recreational logbook data made excellent use of available information. An improvement in the precision of this analysis may be possible by using spatially contiguous statistical blocks for determination of habitat areas and aggregation of the data.

The extreme decline in recruitment and abundance of cowcod is probably due to a combination of a climate shift (increasing water temperature and decreased ocean productivity begiunning in 1977) and the high levels of catch. In order to better distinguish the relative contribution from these two causes and to predict time frames for rebuilding, further research is needed on the effect of the ocean climate on the distribution and recruitment of cowcod.

An assessment for cowcod in the areas north of the Conception INPFC area should be conducted, especially to improve understanding of the possible climate effects on cowcod in the southern area.

Cowcod occur in a mixed species fishery, and are rare components of this fishery. In order to better determine the current level of fishery impacts on this stock, there should be improved species differentiation in the catch, either through increased sampling for species proportions, or by requiring more complete sorting of the catch.

PETRALE SOLE

STAR Panel Meeting Report

Hatfield Marine Science Center
Newport, Oregon
June 14-18, 1999

STAR Panel Members:

Tom Barnes, California Department of Fish and Game, STAR Chair
Gary Stauffer, NMFS Alaska Fisheries Science Center, SSC Representative
Gunnar Stefansson, Marine Research Institute, Iceland, Rapporteur
Mark Saelens, Groundfish Management Team Representative
Rod Moore, Groundfish Advisory Panel Representative

STAT Team Members Present:

Petrale Sole Team:
David B. Sampson, Oregon State University
Yong-Woo Lee, Oregon State University

Final STAR Report, July 2, 1999

Overview

The STAR Panel reviewed the assessment by the STAT Team for the petrale sole fisheries. The Panel's reviews are merged into a single report to the Council. The review took place during the week of June 14-18, 1999 at the Hatfield Marine Science Center in Newport, Oregon. The STAT Team provided substantial draft documents to the STAR Panel members. The STAT Team leader summarized his documents with the Panel, but the follow-up discussions addressed comparisons and consistency with assumptions, base models, and results. The Panel requested a number of additional analyses which were addressed during the meeting and will be incorporated into final assessment documents. The assessment suffers from limited and sparse data sources which translates into significant uncertainty in the assessments, but on the other hand some overall conclusions can be drawn and these are emphasized in this report. The consensus of the STAR Panel is that the petrale sole STAT assessment is sufficient for determining the relative status of the petrale sole resource in the northern area and can serve as a basis for setting harvest levels for 2000 by the Groundfish Management Team. Results for the central and southern areas provide qualitative information on the relative status of the resource in those areas and can serve as information for setting harvest levels for 2000 by the Groundfish Management Team. The STAR Panel commends the STAT Team for the quality of their draft documents and their cooperative spirit and willingness to respond to the Panel's comments and requests for additional analyses.

Petrale sole

The report and presentation given to the panel was overall considered to constitute a very comprehensive treatment of the data and the modeling exercise was considered to encapsulate most of the biological concerns, although several issues were raised during the meeting. The panel agrees with the findings in the report.

As described below, several issues were handled during the meeting whereas other concerns deal with longer-term research issues, which need to be addressed in a longer time frame.

General

The assessment report considers 3 areas separately, with a full assessment of the "northern" area and "partial assessments" of the "central" and "southern" areas. Data limitations imply that assessment models can not be as comprehensive for the latter two areas (see below).

Questions and requests made during the meeting

The following issues were raised with the intent to resolve them during the meeting. All the issues were handled to the panel's satisfaction.

Most of the panel's questions relate to apparent inconsistencies between some of the data sets.

Q1: Estimate total mortality, Z, from a catch curve.
Answer: The catch curve for available years implies a very low M. This may be due to a recruitment trend or a number of other causes. There appears to be an inconsistency between apparent mortality from the catch curves and the outputs from the model. In addition, the selection pattern is increasing but very gradually for the ages which need to be included in a catch curve analysis, and hence the slope of the catch curve can not easily be used to estimate Z. This was not explored further during the meeting but needs to be considered through the use of alternative models (see below).

Q2: Determine different temporal growth rates and explore the effect of not assuming constant growth (these appear to have changed in time after 1982, cf fig. 5).
Answer: It does not make much difference in terms of stock trends, and still leaves a problem in the fit to the length distributions.

Q3: "Sensitivity" of initial abundance should be explored through "prospective" analysis, i.e. by dropping off early years, since the definition of virgin biomass is somewhat dubious within stock synthesis, particularly for the petrale sole due to the handling of the initial age distribution.
Answer: This is solved by obtaining initial biomass through a different route (Q11).

Q4: Landings of smaller fish for the mink food fishery - consider breaking them out with relation to latter discards?
Answer: These were considered and found to be negligible.

Q5: Provide estimates of annual F by age.
Answer: Selectivity by age was made available.

Q6: Iteratively fit discard rates and try to use 10% and 5% historical discard rates.
Answer: It does not have any major impact on any results, but gives a slight difference in initial spawning stock biomass.

Q7: A request was made to plot the trend in Y/B, yield over total biomass, or alternative measure of total mortality.
Answer: Available tables include the yield over exploitable biomass and a table of total fishing mortality (updated table 13).

Q8: Central stock (Eureka). Keep Q fixed at different rates and compare likelihoods. Initially, Q was fixed at the northern level and the northern selection pattern used since the model could not estimate selection.
Answer: Reducing discard L50 indicates that it is now possible to estimate selection L50, but also the results still indicate that Q should be very low.

Q9: South (Monterey). Keep Q fixed at different rates and compare likelihoods. Initially, Q was fixed at the northern level and the northern selection pattern used since the model could not estimate selection.
Answer: Reducing discard L50 indicates that it is now possible to estimate selection L50, but only with difficulty. The results still indicate that Q should be very low.

Q10: Rerun with Q=0.1 for central and southern areas.
Answer: Q=0.1 implies discard inflection length=27. Note that the fit to survey can not pick up the initial increasing biomass in Eureka but attempts to make the trend U-shaped, although much better than when Q=0.3 was assumed.

Q11: Since Q=0.1 seems much better for central and southern "stocks", extra runs are required to investigate Q=0.1 in northern.
Answer: These runs were conducted and it was found that they provide a much worse fit. In particular, this assumption gives a worse fit to the survey abundance

index. Further, the total biomass in the northern area becomes unrealistically large.

Q12: Redo the computations of virgin biomass based on the product of average recruitment and biomass-per recruit, rather than Bvirgin from synthesis.
Answer: The resulting numbers will be included in the final document.

Q13: Add a column in Table 1 of total US landings for petrale sole.
Answer: The resulting numbers will be included in the final document.

Areas of Disagreement

There were no major outstanding disagreements among the members STAR Panel and the STAT Team representatives at the conclusion of the review.

Comments on the Technical Merits and/or Deficiencies of the Document

Convergence problems appear for some scenarios and in particular an assumption of M=0.24 did not provide a reasonable initial biomass estimate consistent with the historical catches for the northern region. When several simulated starting points are considered, it becomes clear that the global maximum is not always found with great accuracy but the algorithm does appear to have found an approximate global maximum when it indicates apparent convergence.

The panel agreed that there are clearly some major problems in the assessments for the central and southern areas, and these therefore do not provide reliable estimates of abundance. The assessment results are nevertheless useful for elucidating certain aspects of the resource in these areas. Assessment assumptions in these areas can be set to constant Q, equal to the northern area but the fit to the survey is not acceptable. This would be almost equivalent to assuming the survey gives an absolute biomass estimate after scaling, and omitting any modeling. On the other hand, the model fit improves considerably if a lower catchability is assumed for the central and southern areas.

The models can explain the trends in the survey indices providing Q is assumed significantly lower than in the northern area. Further, the survey indices clearly do not have very high variability. Thus, the overall trend in the survey index (and the assessment) appears to be a reasonable assessment of the trends in biomass, although the absolute level is highly uncertain. These different estimates of Q between the northern area and the other areas are not easily explained and may be due to other inconsistencies between data sources, not captured by the assessment model used.

The panel therefore agreed that the appropriate interpretation of the data at hand is that

the biomass in the central and southern areas is not declining and thus appears to sustain the recent harvests. The data for these areas should probably not be interpreted in much greater detail than this.

Long-term research considerations

For petrale sole, the emphasis has been on setting up data sets for a very comprehensive assessment of the resource. This has been done extensively and considerable data analysis has preceded the preparation of each data set. Further, the assessment has been very elaborate, using highly developed models taking into account all biological factors believed to be of importance for each stock and also making use of all available data and taking into account all aspects of the uncertainty behind each data source. Although this approach is very complete when viewed in isolation, there are some serious concerns that need to be raised when the assessment process is viewed as a whole.

The first concern must be with regard to the data themselves. The approaches taken during the modeling exercises have in all cases been to account for the high degree of uncertainty in the various data sources. Thus, there are conflicting age readings from the same populations, conflicting indications on changes in growth, lack of knowledge on the age structure of the catches and populations, *etc*. Further, there are years with missing data, years-area combinations with no biological information at all and areas for which biological sampling has been poor for decades. As a result, several apparent inconsistencies in the data set can be due to a number of reasons and can not be easily explained without much enhanced data collection. These problems will never be resolved through modeling exercises alone, no matter how elaborate they are. There is an urgent need to improve the data collection for all stocks in all areas, with an emphasis on obtaining consistent sets of age readings accurate enough to monitor the development of individual cohorts in surveys and catches.

The second concern must be that in spite of the extremely high level of detail given to modeling the internal processes in each population, and in spite of accounting for uncertainty in the data sets, the fact remains that many of the data sources give apparently misleading indications, i.e. can not all be explained at the same time, given the present models. This concern is all the more serious due to the complexity of the models used and hence the difficulty in extracting precisely the reasons for the conflicts in the data sets. There is a need to step back from the currently employed all-encompassing single-model assessment approach and to consider instead several models, each of which may be a model of an individual process, to be better able to form an opinion of the likely trends in individual components. Thus, the likely historical development of population numbers alone can be determined from simple aggregate virtual population analyses through transparent assumptions such as through the use of single age-length keys, based on aggregate age samples. In order to more formally model the error structure, it is possible

to move to slightly more complex models with time series components for the catch in numbers at age table. If the highly complex models currently used (which still tend to be based on the assumption of constant growth) lead to different historical trends in population numbers, then this is an indication of a problem which can be attacked in isolation, likely separated from issues such as trying to adequately model catch length distributions and survey indices in a single sweep.

The third concern is the lack of coordination between regions. In particular there is little coordination in assessment efforts on the Canadian and US sides of the border and a sore lack of coordination in sampling efforts between states. For the petrale sole considered at the present meeting, there are stock structure concerns which need to be considered and in particular it would be useful to have some outside information about migration and related biological parameters.

Logbook data have great potential due to their sheer volume, but inherent biases need to be removed and it is not always clear how this can be done. Despite a thorough analysis of available logbook data, these were not found to provide useful additional input to the assessment models. In particular the trends in these data are in contradiction to the assessment model.

The logbook design might usefully be enhanced, e.g. through the incorporation of the captain's name along with the starting and ending location and depth of tows and the characteristics of the fishing gear, but it is not obvious that this would change the utility of the information in the context of the present assessment.

Improved age determinations would clearly provide useful additional information for petrale sole. Unfortunately it is not clear how to improve age determinations since there are more than one problem area. In particular, there seem to be internal inconsistencies in how annulii are interpreted, or at least there are considerable differences in many cases in counts obtained by different techniques used by different otolith readers. Although it is not at all clear whether it is possible to obtain reliable age reading e.g. for petrale sole males, it would certainly be a step in the right direction to have internally consistent methods for determining annulii, not to mention sampling strategies and break-and-burn versus surface counts.

Recommendations

For juvenile petrale sole it is clear that it is not possible to obtain size at age or abundance indices except through surveys. Need increased survey data, both coverage in terms of increased age sampling and annual surveys. In particular in all surveys should collect age, length and sex samples.

There is an urgent need for a consistent long-term strategy for sampling for ageing and

length measurements from commercial catches. In particular age and length samples are needed from all regions and all years and techniques for age reading should be standardized.

Report of the Joint Canada – USA Review Group on the Stock Assessment of the Coastal Pacific Hake/Whiting Stock Off the West Coast of North America

Best Western Pacific Inn

White Rock, British Columbia

Canada

17 – 18 February 1999

Introduction

The first joint meeting of the Canadian PSARC's Groundfish Subcommittee on Pacific Hake and the USA Pacific Fishery Management Council's STAR Panel for Pacific Whiting was held at the Best Western Pacific Inn, White Rock, British Columbia, Canada during 17-18 February 1999. The list of attendees is given as Appendix 1.

The joint PSARC Subcommittee – PFMC STAR Panel, hereafter referenced as the Review Group, received the primary draft assessment document during the week prior to the Review Group meeting:

Dorn, M.W., M.W. Saunders, C.D. Wilson, M.A. Guttormsen, K. Cooke, R. Kieser, and M.E. Wilkins. 1999. Status of the coastal pacific hake/whiting stock in U.S. and Canada in 1998. 89p.

A supplementary document, "Summary of Stock Status," was distributed at the beginning of the Review Group meeting. D. Welch (Canada) and R. Conser (USA) served as co-chairmen. Following welcome and introduction of attendees, the Review Group heard the following presentations:

Overview of the Assessment	M. Dorn (NMFS -- Seattle)
Results of the 1998 NMFS Shelf Survey	M. Wilkins (NMFS -- Seattle)
Results of the 1998 NMFS Acoustic Survey	C. Wilson (NMFS -- Seattle)
Results of the 1998 Canadian Acoustic Survey	M. Saunders (DFO – Nanaimo)

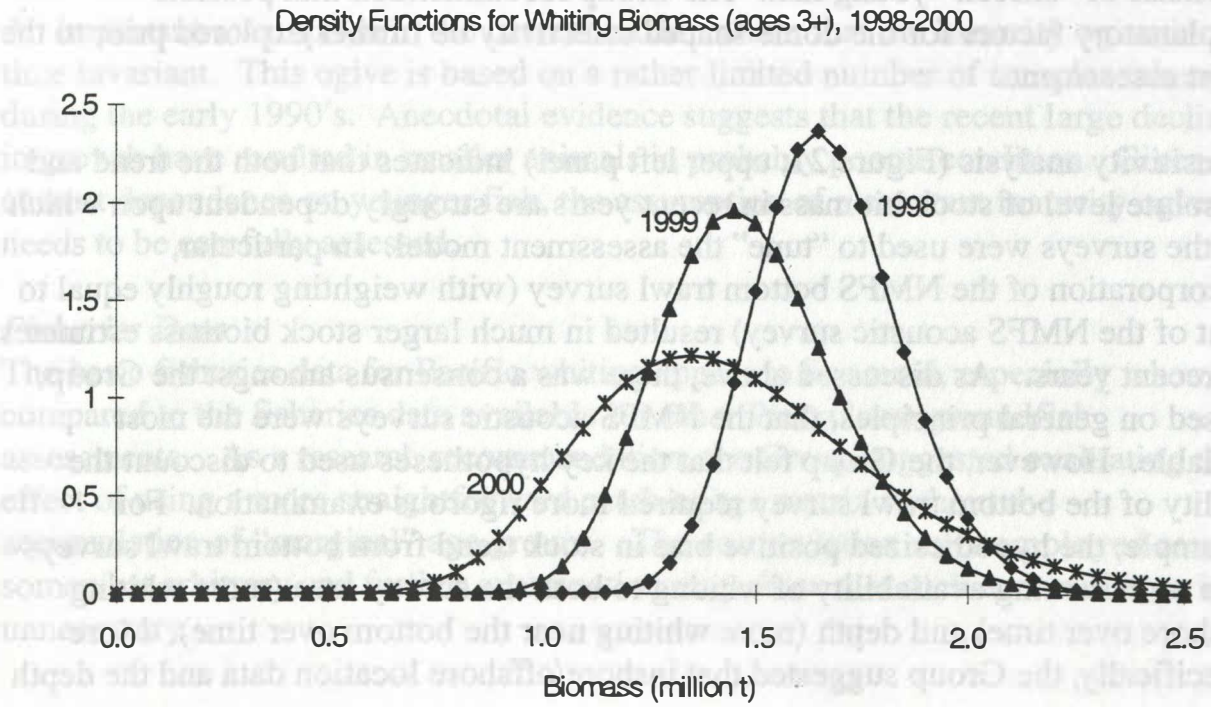
During their presentations and over the course of the 2-day review, the assessment authors provided additional information and data that greatly assisted the Review Group in carrying out its work.

A summary of the draft assessment document (prepared by the authors) is given as Appendix 2.

Summary of Stock Status

The Group agreed with the Dorn et al. (1999) assessment that the best estimate of 1998 stock abundance is 1.7 million metric tonnes, with uncertainty as indicated from the approximate probability density functions (Figure 31 of Dorn et al.; reproduced below). The Group concurred with the assessment methods used in the analysis, and the approximate density functions for the stock projections in the years 1999 and 2000, also shown in the summary figure below.

- Catches have been fairly stable in recent years. The average catch over the last five years was 310,000 t. The 1998 catch was 319,000 t.
- The assessment of the Pacific whiting stock is based on acoustic surveys as the primary measure of stock abundance. These surveys are thought to provide relatively good estimates of stock biomass, especially in the most recent years.
- While spawning biomass has been declining, it is now thought to be at or near management target levels.
- Harvests are projected to decline modestly over the next few years. The absence of any strong year-classes this decade has resulted in recruitment for the 1990-98 period to be only 65% of the long-term average. Projected recruitment levels for the next two years are below average.



Detailed Comments from the Review

Surveys

It was generally agreed that the current approach of relying primarily on the results from the NMFS acoustic survey was appropriate for abundance estimation. The NMFS bottom trawl survey and the DFO acoustic survey do not cover the full geographical range of Pacific whiting, and abundance trends derived from them may be biased due to changes in local availability. Further, the bottom trawl survey may not accurately sample the whiting size/age distribution found in the entire water column. The last three NMFS acoustic surveys (1992, 1995, and 1998) have been the most reliable, in the sense that these surveys have unambiguously covered the entire area of the whiting distribution, extending out into regions to the north and the offshore that were clearly beyond the current distribution of whiting.

The Group examined the strong selectivity at age evident in the model results for the NMFS acoustic surveys. This dome-shaped pattern results in lower apparent availability for younger and older age groups. Such a selectivity pattern was thought to be somewhat unusual for an acoustic survey, but may occur due to age-specific differences in density or availability to the sampling net. Further in order to obtain reasonable results, the authors found it necessary to impose a strong constraint on the initial slope parameter of the selectivity curve. Otherwise peak selectivity would have shifted over to older ages, resulting in an unreasonably large biomass of "unseen" young fish. The Group recommended that possible explanatory factors for the dome-shaped selectivity be further explored prior to the next assessment.

Sensitivity analysis (Figure 21; upper left panel) indicates that both the trend and absolute level of stock biomass in recent years are strongly dependent upon which of the surveys were used to "tune" the assessment model. In particular, incorporation of the NMFS bottom trawl survey (with weighting roughly equal to that of the NMFS acoustic survey) resulted in much larger stock biomass estimates in recent years. As discussed above, there was a consensus amongst the Group, based on general principles, that the NMFS acoustic surveys were the most reliable. However, the Group felt that the key hypotheses used to discount the utility of the bottom trawl survey required more rigorous examination. For example, the hypothesized positive bias in stock trend from bottom trawl surveys due to increasing availability of whiting to both the survey area (more whiting inshore over time) and depth (more whiting near the bottom over time). More specifically, the Group suggested that inshore/offshore location data and the depth

data from the NMFS acoustic survey database may be amenable to testing these hypotheses in future assessments.

The possibility of double-counting (or under-counting) whiting because of their movement over the duration of the survey was also discussed. Surveys take about two months to complete, but are generally set in the summer because it appears that the whiting seem to have stopped their active north-south migrations and have reached their feeding grounds. Any movement at that point appears to be basically inshore/offshore, so it is unlikely that there is significant double-counting (or under-counting) of fish because of their migratory movements.

Biological Assumptions

A significant decline in mean weight-at-age was evident in the data. Anecdotal evidence indicates that this is a rather widespread phenomenon for West Coast groundfish, starting around 1990. Stock biomass estimates presented in the whiting assessment account for the change in annual mean weights. However, the effect of a biomass consisting of a larger number of smaller individuals on true spawning potential is not well understood. Further the spawning biomass appears to have become progressively more heavily dependent on the contribution of 3, 4, and 5 yr old females. There is a growing dependence on a few younger age classes. Particularly with the changes to lower weight at age that appear to be occurring, the restriction of spawning to a few age classes makes the population more vulnerable to periods of poor recruitment.

An important assumption in the current model runs is that the maturity ogive is time invariant. This ogive is based on a rather limited number of samples taken during the early 1990's. Anecdotal evidence suggests that the recent large declines in growth have resulted in smaller animals in probably poorer condition. Given the current dependence on younger fish, the assumption of a constant maturity ogive needs to be carefully assessed.

Fisheries Data

The basic fisheries data for Pacific whiting appear to be sound, especially when compared to the fisheries data available for other West Coast groundfish assessments. As a research recommendation, the Group suggested evaluating the effect of using a more straightforward catch-at-age matrix without the accumulation of "marginal" age groups. The accumulation rules employed are somewhat arbitrary and further examination may show that such accumulation is unnecessary.

Model Assumptions

The Group agreed that the assumptions used in the model were reasonable and that the paper provided a very clear summary of what was involved in the analysis.

Harvest Projections

The use of the NMFS Tiburon Lab's larval survey indices and recruitment indices from the NMFS bottom trawl survey for the prediction of whiting recruitment (in 1999 and 2000) is a departure from past whiting assessments, in which mean (median?) historical recruitment was used for future recruitment. The Group did not discuss at length the merits of the Tiburon larval survey as a predictor of coastwide whiting recruitment, other than noting the limited geographic range of the larval survey. However it was noted that the incorporation of this larval survey resulted in the prediction of relatively poor recruitment in 1999 and 2000. The effect of incorporating of the bottom trawl survey recruitment indices was negligible.

The current projections are based on mean recruitment plus recruitment indices, inversely weighted by their variances. Depending on which index is used, rather large differences in future recruitment are forecast. All of these components have high associated variance in forecasting recruitment. Caution in the use of the projections for forecasting future biomass levels may be prudent.

Stock Status

The Group agreed with the assessment that the best estimate of 1998 stock abundance is 1.7 million metric tonnes, with uncertainty as indicated from the approximate probability density functions (Figure 31 of Dorn et al. – also shown above). The Group concurred with the assessment methods used in the analysis, and the approximate density functions for the stock projections in the years 1999 and 2000, also shown in the summary figure above.

Other summary attributes of stock status are given above in the *Summary of Stock Status* section, above, and also in *Appendix 2*. Overall, the current stock status appears to be at or near the desired level given the reference harvest rates that have been used for whiting management (Table 14 and Appendix Table 2 of Dorn et al.) However, all such conclusions regarding stock status should be taken with the several caveats foremost in mind. Unusual juvenile and adult distribution patterns have been seen in the Pacific whiting population in recent years. Frequent reports of large numbers of juveniles from Oregon to British Columbia suggest that spawning and juvenile settlement has spread northwards. It is not yet clear whether these changes will be a benefit or a detriment to stock productivity and

stability. More importantly, whiting eggs and larvae may be subject to unfavorable transport, and juveniles to increased predation and to increased vulnerability to fishing mortality.

Virgin Biomass Estimation

The Group discussed the reliability of virgin biomass (B_0) estimates only briefly. It was noted that ratios of current biomass to virgin biomass (e.g. as in Table 15) should be used with caution since the errors associated with B_0 estimates (both bias and variance) may be large and are difficult to quantify.

Harvest Recommendations

There have been significant changes since 1990 in the growth, distribution of the overall stock, and a change in spawning biology, with spawning occurring at least as far north as northern Oregon and probably off the west coast of Vancouver Island. Although the mechanisms for these changes are poorly understood, they nevertheless suggest that managers may want to be precautionary when selecting quota levels for 1999, particularly if a risk-averse management strategy is desired.

It was noted that in Table 14, the first row represented an inappropriate fishing mortality rate ($F_{35\%}$) in that it exceeds F_{MSY}. Consequently, the link needed to be clearly drawn for managers between Table 14 and Appendix Table 2 when making decisions on appropriate harvest ranges. The authors indicated that they would re-write the section of Dorn et al. on $F_{40\%}$ to make it clear that this level was a legitimate proxy for F_{MSY}, based on the meta-analysis detailed in the paper. It was the consensus of the Group that this was a reasonable approach. Catches resulting from the $F_{40\%}$ harvest policy would therefore not be "safely" below the F_{MSY} policy, but at or near the maximum level.

Management Goals and Objectives

Several management strategies based on varying fishing rates with biomass were presented in the document and provided a useful description of alternative control policies. There are some potential problems with the hybrid F policy and the consensus of the Group was that additional work should be done on quantitatively evaluating alternative control laws that might provide improvements over the hybrid policy.

Appendix 1. List of Attendees

DFO/PSARC:
B. Ackerman
J. Fargo
M. Joyce
S. McFarlane
M. Saunders (author)
M. Stocker (PSARC Chair)
R. Stanley (reviewer)
D. Welch (Review Group Co-Chair & Chair, Groundfish PSARC Committee)
N. Wiliscroft (DFO International)

NMFS/PFMC:
W. Clark (IPHC; reviewer)
R. Conser (Review Group Co-Chair & PFMC SSC Representative)
M. Dorn (author)
J. Hastie (PFMC GMT Representative)
D. Myer (PFMC GAP Representative)
C. Schmitt (Stock Assessment Coordinator)
M. Wilkins (author)
C. Wilson (author)

TRIBES
S. Joner (Makah Tribe)

INDUSTRY/PUBLIC:
V. Wespestad (Pacific Whiting Cooperative)
E. Zyblut (DSTA)
D. March (CGRCS)
B. Turris (CGRCS)
K. Kurita (The Minato Shimbum)
S. Anthonson (Fisherman)
M. Antonson (Hake Processor)
A. Laing (Hake Consortium)
J. Radil (Association of Hake Fishermen)
A. Radil (Fisherman)
J. Salisbury (Supreme Alaska Seafood)
H. McBride (Fisherman)
J. Roach (Fisherman)

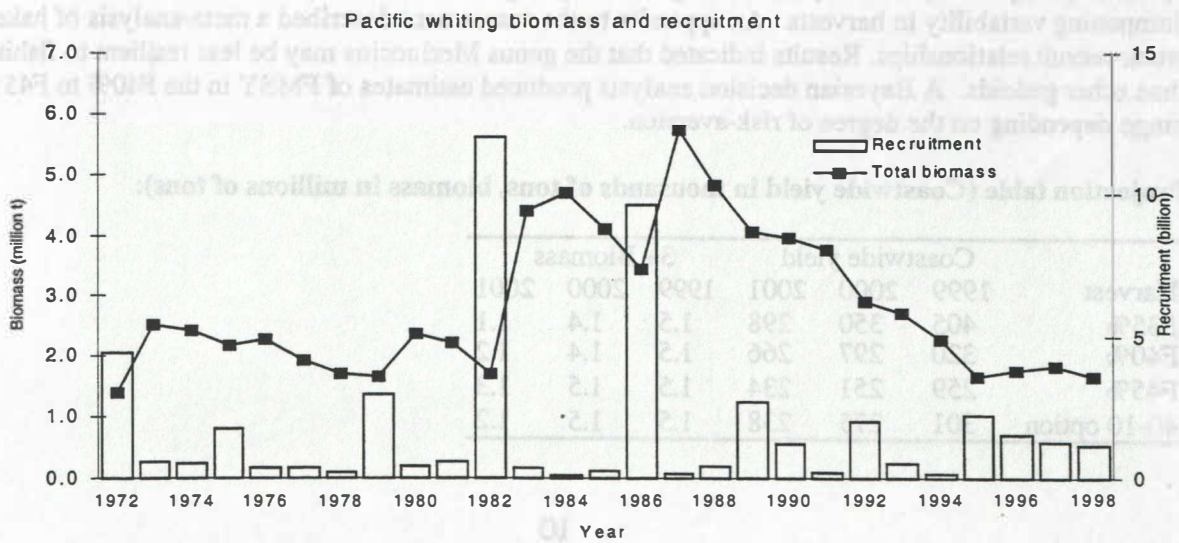
Appendix 2. Summary of Stock Status

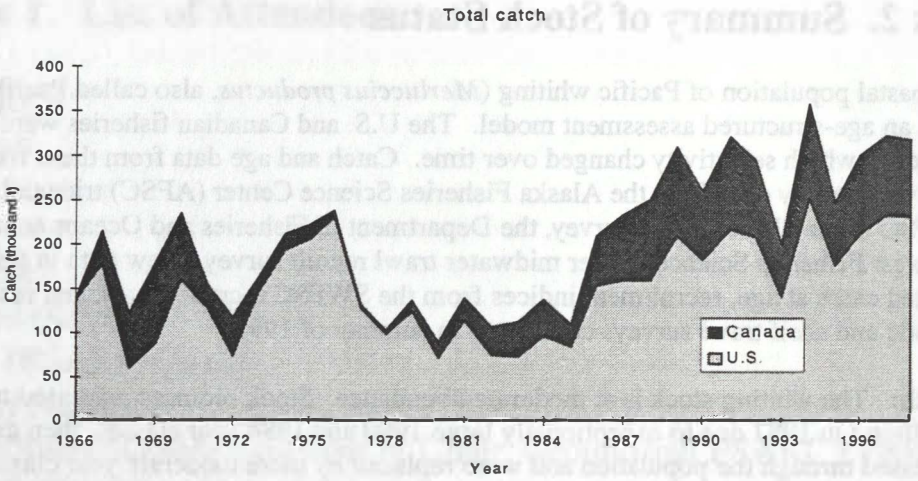
The coastal population of Pacific whiting (*Merluccius productus*, also called Pacific hake) was assessed using an age-structured assessment model. The U.S. and Canadian fisheries were treated as distinct fisheries in which selectivity changed over time. Catch and age data from these fisheries were supplemented with survey data from the Alaska Fisheries Science Center (AFSC) triennial acoustic survey, the AFSC triennial shelf trawl survey, the Department of Fisheries and Oceans acoustic survey, and the Southwest Fisheries Science Center midwater trawl recruit survey. New data in this assessment included updated catch at age, recruitment indices from the SWFSC recruit survey, and results from the triennial acoustic and shelf trawl surveys conducted in summer of 1998.

Status of Stock: The whiting stock is at moderate abundance. Stock biomass increased to a historical high of 5.7 million t in 1987 due to exceptionally large 1980 and 1984 year classes, then declined as these year classes passed through the population and were replaced by more moderate year classes. Stock size has been stable over the past four years at 1.7-1.8 million t. The mature female biomass in 1998 is estimated to be 37% of an unfished stock. Although 1998 stock size is near a historical low, it is close to average stock size under current harvest policies. The exploitation rate was below 10% prior to 1993, then increased to 17% during 1994-98. Total U.S. and Canadian catches have exceeded the ABC by an average of 12% since 1993 due to disagreement on the allocation between U.S. and Canadian fisheries.

Pacific whiting (hake) catch and stock status table (catches in thousands of metric tons and biomass in millions of metric tons):

Year	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
U.S. landings	161	211	184	218	209	141	253	178	213	233	233
Canadian landings	90	100	77	105	86	59	106	70	88	91	87
Total	251	311	260	322	295	200	359	248	301	324	319
ABC	327	323	245	253	232	178	325	223	265	290	290
Age 3+ stock	4.8	4.1	4.0	3.8	2.9	2.7	2.3	1.7	1.8	1.8	1.7
Female mature	2.4	2.1	2.0	1.9	1.5	1.4	1.2	0.9	0.9	0.9	0.8
Exploitation rate	5%	8%	7%	9%	10%	7%	16%	15%	17%	18%	19%





Data and Assessment: An age-structured assessment model was developed using AD model builder, a modeling environment for developing and fitting multi-parameter non-linear models. Earlier assessments of whiting used the stock synthesis program. Comparison of models showed that nearly identical results could be obtained under the same statistical assumptions. The treatment of fishery and survey data was similar to previous assessments, except that a new approach to modeling changes in fishery selectivity was introduced.

Major Uncertainties: The whiting assessment is highly dependent on survey estimates of abundance. Since 1993, the assessment has relied primarily on an absolute biomass estimate from the AFSC acoustic survey. The acoustic target strength of Pacific whiting, used to scale acoustic data to biomass, is based on a small number of *in situ* observations. The fit to the entire acoustic survey time series is relatively poor. The AFSC shelf trawl survey biomass shows an increasing trend, conflicting with the decreasing trend in the acoustic survey.

Target Fishing Mortality Rates: An evaluation of whiting harvest policy led to the recommendation that the 40-10 option be considered for whiting. The 40-10 option results in similar harvest rates as the hybrid F policy used previously for whiting, and may improve economic performance of the fishery by dampening variability in harvests. An appendix to the assessment described a meta-analysis of hake stock-recruit relationships. Results indicated that the genus Merluccius may be less resilient to fishing than other gadoids. A Bayesian decision analysis produced estimates of FMSY in the F40% to F45% range depending on the degree of risk-aversion.

Projection table (Coastwide yield in thousands of tons, biomass in millions of tons):

	Coastwide yield			3+ Biomass		
Harvest	1999	2000	2001	1999	2000	2001
F35%	405	350	298	1.5	1.4	1.1
F40%	320	297	266	1.5	1.4	1.2
F45%	259	251	234	1.5	1.5	1.3
40-10 option	301	275	238	1.5	1.5	1.2

Other considerations: Unusual juvenile and adult distribution patterns have been seen in Pacific whiting population in recent years. Frequent reports of large numbers of juveniles from Oregon to British Columbia suggest that spawning and juvenile settlement has spread northwards. It is not yet clear whether these changes will be a benefit or a detriment to stock productivity and stability. From an assessment perspective, the strength of recruiting year classes may be overestimated--although the use of time-varying fishery selectivity in the assessment model should counteract this tendency. More importantly, whiting eggs and larvae may be subject to unfavorable transport, and juveniles to increased predation from cannibalism and to increased vulnerability to fishing mortality.