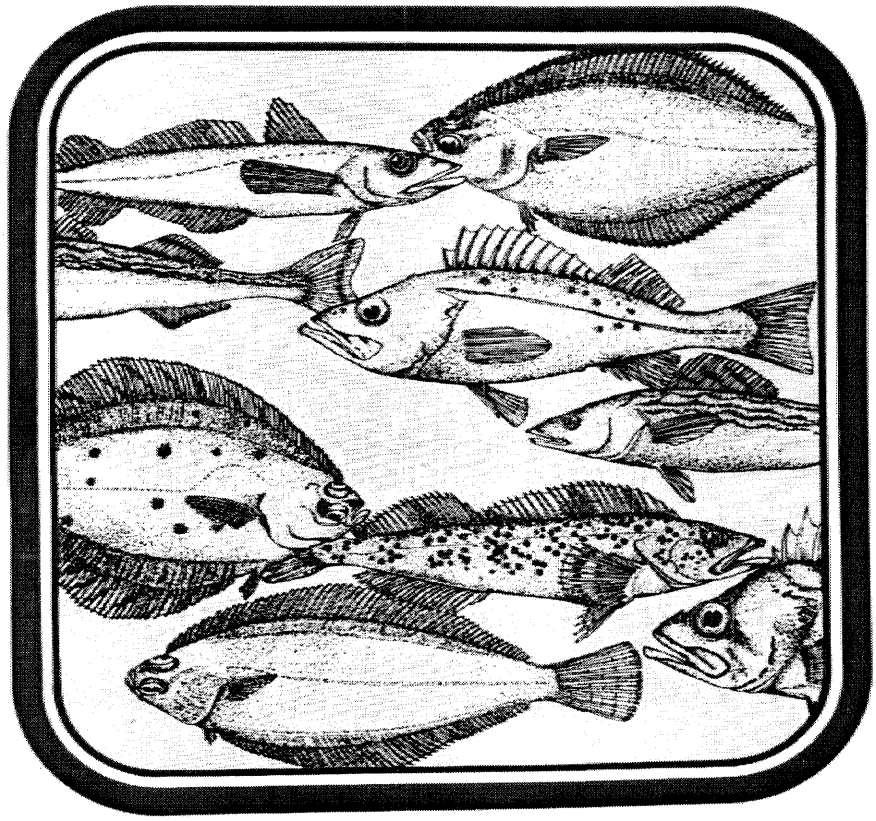
STATUS OF THE PACIFIC COAST GROUNDFISH FISHERY THROUGH 1996 AND RECOMMENDED ACCEPTABLE BIOLGOCIAL CATCHES FOR 1997

Stock Assessment and Fishery Evaluation



Pacific Fishery Management Council
2130 SW Fifth Avenue, Suite 224
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September 1996

ACKNOWLEDGEMENTS

This is the thirteenth 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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CHAIRMAN
Robert C. Fletcher

EXECUTIVE DIRECTOR
Lawrence D. Six

October 2, 1996

Dear Reviewer:

At its October 22-25, 1996 meeting, the Pacific Fishery Management Council will establish 1997 catch limits for several groundfish species managed under the Pacific coast groundfish fishery management plan (FMP). The Council's Groundfish Management Team has prepared a document entitled Status of the Pacific Coast Groundfish Fishery Through 1996 and Recommended Acceptable Biological Catches for 1997: Stock Assessment and Fishery Evaluation, or SAFE document, for the Council to use in establishing these harvest limits. The Council is distributing the enclosed summary of this document to the groundfish industry and other interested persons. The Council may establish an acceptable biological catch (ABC) for any groundfish species or species group for which there is stock condition information. In addition the Council may establish a harvest guideline for species that need individual management attention and catch restrictions.

The SAFE is divided into three documents. The enclosed summary provides historical catch, economic and management information, along with ABC and harvest guideline changes recommended by the Council's Groundfish Management Team. Appendix Volume I provides a summary of the new stock assessment process and new stock assessments for whiting, bocaccio, and canary rockfish. Appendix Volume II provides the new stock assessments of yellowtail rockfish and the offshore Sebastes complex.

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 for establishing allocations for the limited entry and open access fisheries. The FMP also authorizes establishment of management measures to assure that harvest targets are achieved. Every vessel using trawl, longline, or fishpot gear must have a limited entry permit in order to participate in the limited entry fishery. Vessels without limited entry permits may participate in the open access fishery using any legal groundfish gear except groundfish trawls, subject to specified catch limits. Specific management proposals and allocations between the two fisheries for 1997 are not addressed in this document. However, current and previous management measures are listed and discussed.

Written comments on the SAFE document and proposed harvest levels may be sent to the Council office and should arrive no later than **4:30 p.m. October 16, 1996**. In addition, the Council will accept public comments on the document and harvest recommendations immediately before taking final action at its October meeting. Copies of the appendices are available on request from the Council office, 2130 SW Fifth Avenue, Suite 224, Portland, Oregon 97201; telephone (503) 326-6352. A fee will be charged to cover postage costs. The documents are available at no cost when picked up at the Council office or at any Council meeting.

Sincerely,

Lawrence D. Six
Executive Director

JWG:sjk

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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	experimental fishing permit
F	fishing mortality rate
FMP	fishery management plan
GMT	Groundfish Management Team
GNP	gross national product
GSG	Groundfish Select Group
INPFC	International North Pacific Fishery Commission
IQ	individual quota
M	natural mortality
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	Secretary of Commerce
SSC	Scientific and Statistical Committee
WDFW	Washington Department of Fish and Wildlife

INTRODUCTION

This is the thirteenth 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 Fishery Conservation and Management Act (MFCMA) in 1976.

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 1983–1994, as well as those proposed for 1995.

HISTORY OF THE FISHERY

PRIOR TO 1990

Domestic groundfish landings in the Pacific region (Washington, Oregon, and California) are reported by International North Pacific Fishery Commission statistical areas (Figure 1). Landings were relatively stable until the early 1970s, averaging about 30,000 metric tons (mt) per year. Pacific ocean perch stocks were depleted in the late 1960s by foreign fishing, but other groundfish stocks were apparently healthy. By 1977, when work on the FMP was initiated, domestic landings had increased to 60,000 mt and by 1982 they peaked at 116,000 mt.

During the 1980s, there were major changes in the fishery. The fishery matured and landings of several species reached or exceeded maximum sustainable production levels. Although landings increased in several management areas, the greatest and most rapid growth occurred in the large Columbia area (Figure 1 and Tables 1 through 6). Annual domestic landings of groundfish in the Columbia area were approximately 14,000 mt in 1977 and by 1982 had increased to about 47,000 mt, an increase of 33,000 mt. Subsequent landings have remained in the 27,000 to 42,000 mt range.

During this growth period, the species composition of landings changed notably. Rockfish landings increased from 42 percent of total landings to 70 percent; flatfish landings increased, but decreased as a percentage of total landings; and roundfish (e.g., lingcod, Pacific cod, sablefish) landings doubled, although they too decreased as a percentage of the total.

While the rockfish group provided most of the increased landings, widow, canary and yellowtail rockfishes were the major contributors. By 1982, widow and yellowtail rockfishes appeared to be overharvested in some areas, and the Groundfish Management Team (GMT) declared these species biologically stressed.[1/] The GMT predicted continued biological stress in 1983 and recommended that landings of these species be reduced. An analysis by the GMT indicated canary rockfish landings also should be reduced in 1983 as the annual catch exceeded the ABC in the Columbia area.

1/ GMT report to the Groundfish Task Group. January 1983.

Fishing fleet harvesting capacity that far exceeded the sustainable production capacity of the groundfish resource taken in traditional fisheries contributed to increased total groundfish landings. As early as 1980, the draft FMP contained the following statements.

> . . . recently a series of events have occurred which are creating dramatic changes and are threatening the efficacy of the existing management regime. Regulatory and economic displacement of vessels from other fisheries and new vessels entering the fishery during the past years have resulted in substantial increases in fishing effort in the Washington, Oregon, and California groundfish fisheries. . . . New technology, improved electronic navigating, and fish-finding equipment have tended to increase harvesting ability . . . .

In addition, a 1982 report on the development potential of the West Coast groundfish industry[2/] concluded that:

> . . . the groundfish resources in the West Coast region, with exception of Pacific whiting and shortbelly rockfish, are already heavily utilized and there is little room for expansion . . . .

In summary, during the 1980s the Pacific coast groundfish fishery expanded from a relatively small fishery harvesting surplus production from generally healthy or underharvested stocks of fish to one with excessive effort with limited room for long-term expansion of the traditional fisheries.

1990 TO PRESENT

In response to the conditions of excessive effort that developed during the 1980s, members of the fishing industry asked the Council to develop a plan for limiting access to the groundfish resource, i.e., a limited entry program. After several years of development, a license limitation plan was approved and became effective on January 1, 1994. Details of the program are provided in Amendment 6 to the FMP.

In the late 1980s, joint venture operations for Pacific whiting expanded, leading to elimination of all foreign harvesting in 1989. Beginning late in 1990, U.S. catcher-processor (factory trawler) vessels conducted exploratory fisheries to determine if whiting might provide a viable fishery for U.S. at-sea processing. This at-sea fishery by American vessels immediately preempted the joint venture fishery; in 1991, for the first time in roughly 30 years, the entire groundfish fishery was conducted by American operations. At the same time, shore-based processing of Pacific whiting expanded as processors of more traditional groundfish species rushed to carve out their portion of the market. Thus, West Coast groundfish landings reached a new peak in 1991, more than doubling the previous high established in 1982. Landings in 1992 and 1993 declined as the whiting harvest guideline was reduced, and landings in 1994 increased as the whiting harvest guidelines was increased (Figure 2).

2/ West Coast Ports and Development of the Groundfish Fishery. July 1982. A consultant's report prepared by Kramer, Chin and Mayo, Inc., Seattle, Washington.

HISTORY OF MANAGEMENT

PRIOR TO FISHERY MANAGEMENT PLAN IMPLEMENTATION

Prior to implementation of the FMP in September 1982, management of domestic groundfish fisheries was under the jurisdiction of the states of Washington, Oregon and California. State regulations have been in effect on the domestic fishery for about 80 years and each state acted independently in both management and enforcement. However, many fisheries overlapped state boundaries and were participated in by citizens of two or more states. Management and uniformity of regulation became a difficult problem which stimulated the formation of the Pacific States Marine Fisheries Commission (PSMFC) in 1947. PSMFC had no regulatory power but acted as a coordinating entity with authority to submit specific recommendations to states for their adoption.

Early regulations took the form of area closures (e.g., San Francisco Bay was closed to trawling in 1906) because of concerns about stock depletion. Minimum trawl mesh sizes were adopted in the early 1930s in California as the production of flatfish decreased. During 1935–1940, voluntary mesh size limits were adopted by the trawl industry after markets imposed minimum size limits on certain flatfishes and gear-saving studies demonstrated that a larger mesh size (5 inches) caught fewer unmarketable fish. Shortly thereafter, mandatory minimum mesh sizes were adopted by California. Since this time, mesh regulations have been in effect in all three coastal states.

Between the implementation of the MFCMA in 1977 and the implementation of the FMP in 1982, state agencies worked with the Council to address conservation issues. Specifically, in 1981, the Council proposed a rebuilding program for Pacific ocean perch. To implement this program, the states of Oregon and Washington established landing limits for Pacific ocean perch in the Vancouver and Columbia areas. These limits were revised in January 1982, prior to enactment of the FMP in September, but the 20-year rebuilding program remained unchanged.

UNDER FISHERY MANAGEMENT PLAN JURISDICTION

The FMP became effective September 30, 1982. On January 1, 1991, Amendment 4 to the FMP was implemented, updating the descriptive portions of the document and substantially increasing management flexibility to respond to a wide variety of changing fishery and resource conditions. The six specified numerical optimum yields (OY) were replaced by a single non-numerical OY for all species and a procedure to establish harvest guidelines or quotas for any species in need of management attention. The amendment established a procedure for setting and adjusting management measures to achieve the specified harvest targets, including classification of certain measures as "routine" so they may be adjusted as needed at any single Council meeting.

Management actions recommended by the Council and implemented by the National Marine Fisheries Service (NMFS) from September 1982 through October 1993 are summarized in Table 7. Those management actions included establishing final OYs for the six species originally designated for numerical OY management (1982–1990), which are listed in Table 8.

1983 Fishery

For all practical purposes, full-time active management of the Pacific coast groundfish fishery under the FMP began in 1983. The Council approved ABCs (Table 9); established regulatory management regimes for widow rockfish and sablefish for the entire region, as well as the Sebastes complex and rockfish in the Vancouver and Columbia areas; and continued the rebuilding program for Pacific ocean perch.

A coastwide OY of 10,500 mt was set for widow rockfish and a vessel trip limit of 30,000 pounds was imposed in an attempt to prevent an early closure of the fishery. A harvest guideline of 14,000 mt was established for the Sebastes complex in the combined Vancouver and Columbia areas. The Council set an ABC of 9,500 mt as the GMT recommended. The Sebastes landings in this area in 1982 were 18,500 mt. In choosing a 14,000 mt harvest guideline, halfway between the 1982 landings and the 1983 ABC, the Council acted to bring production down gradually without creating undue economic hardship. In an attempt to spread the landings over the entire year, coastwide vessel trip limits of 40,000 pounds were imposed.

The fishery for the Sebastes complex in the Vancouver and Columbia areas and for widow rockfish in the entire region quickly adjusted to the new trip limits by changing traditional fishing patterns. In June, the GMT projected that the Sebastes complex landings would reach the 14,000 mt harvest guideline by early August unless action was taken. The Council increased the harvest guideline to 18,500 mt (almost twice the 9,500 mt ABC) and limited vessels to one trip per week, effective June 13. Landings declined somewhat, but not to levels that would allow the fishery to continue for the entire year. In September, the Council recommended the trip limit be reduced to 3,000 pounds, effectively eliminating the directed fishery, and announced that all landings of Sebastes complex caught in the Vancouver and Columbia areas would be prohibited if the 18,500 mt harvest guideline was reached. This action drastically reduced the rate of landings; total 1983 Sebastes complex landings in the Vancouver and Columbia areas were nearly 18,000 mt.

Widow rockfish landings also proceeded at a rapid pace. The directed (target) fishery was closed on September 10 but a 1,000 pound incidental catch per trip was permitted. Total 1983 widow rockfish landings were over 10,300 mt, about 1 percent below the OY.

Pacific ocean perch landings in the Columbia area exceeded the 950 mt OY level in November and the fishery was closed beginning December 6. Total 1983 Pacific ocean perch landings in the Columbia area were 1,205 mt.

Because it was feared that excessive amounts of juvenile sablefish were being landed, a 22-inch minimum size limit was imposed on sablefish caught north of Point Conception (except Monterey Bay). About 14,500 mt of sablefish were harvested in 1983, about 1,100 mt above the 13,400 mt ABC and 2,900 mt below the 17,400 mt OY. A much reduced market in Japan during 1983 helped to reduce the 1983 catch below the 1982 catch.

1984 Fishery

The ABCs for the 1984 fishery were approved by the Council at its November 1983 meeting (Table 10). Management actions in 1984 (Table 7) involved widow rockfish, the Sebastes complex (rockfish) and Pacific ocean perch. The size and trip limits set for sablefish in 1983 continued throughout 1984.

The OY for widow rockfish was reduced from 10,500 mt in 1983 to 9,300 mt in 1984. On January 1, 1984, the trip limit was set at 50,000 pounds. In addition, a trip frequency limit was set allowing only one landing of widow rockfish above 3,000 pounds in a week. In early May, the trip limit for widow rockfish was reduced to 40,000 pounds and the trip frequency restriction (one landing per week above 3,000 pounds) was maintained. The Council announced in July that when 9,200 mt of widow rockfish were landed, a trip limit of 1,000 pounds would be imposed (with no frequency restriction) for the remaining 100 mt of the quota. In early September, the 1,000 pound trip limit was imposed, and all landings of widow rockfish were prohibited on November 28 when the quota was expected to be reached.

After having been closed the last two months of 1983 in the Columbia area, the Pacific ocean perch fishery resumed January 1, 1984 in both the Vancouver and Columbia areas under the 5,000 pounds or 10 percent by weight (whichever is greater) trip limit established in the FMP. Projections made in July indicated landings under this limit would exceed the 950 mt Columbia area OY by the first week of August if current landing rates continued.

On July 16, the states of Oregon and Washington changed the Pacific ocean perch trip limits to 20 percent of all fish on board (by weight), not to exceed 5,000 pounds. Despite these restrictions, landings were not adequately slowed. The Columbia area was closed for Pacific ocean perch on August 16 when OY was reached. The Vancouver area OY, however, was not reached before year end.

Management of the Sebastes complex of rockfish was the most complicated groundfish issue facing the Council in 1984. South of the Columbia area, the species' ABCs were unchanged from 1983 and the 40,000 pound trip limit (with no trip frequency restriction), the same as in 1983, remained constant throughout 1984. However, in the Vancouver and Columbia areas, the summed ABCs were lower in 1984 and trip limit and trip frequency restrictions changed twice during the year. The way these limits were applied changed three times.

The sum of the ABCs for the Sebastes complex in the Vancouver and Columbia areas was set at 9,200 mt. The Council acknowledged the industry's difficulty in adjusting to such a sharp decline (from 1983) and set a harvest guideline of 10,100 mt as the goal for 1984 landings from the Vancouver and Columbia areas. On January 1, 1984, a trip limit of 30,000 pounds was imposed and allowed only one landing per week above 3,000 pounds for the Sebastes complex in the Vancouver and Columbia areas. The trip limit was reduced by half in May and again in August in an attempt to keep landings from exceeding the harvest guideline in 1984. To soften the impact of these severe restrictions, fishers were given the choice of reducing either the size or the frequency of their Sebastes landings. (Throughout the year, landings less than 3,000 pounds were not counted toward trip frequency limits to minimize discards of rockfish caught incidentally while targeting other species.) No further regulations were promulgated for the Sebastes complex in the Vancouver and Columbia areas.

1985 Fishery

The ABCs for the 1985 fishery were approved by the Council at the November 28–29, 1984 meeting in Seattle, Washington (Table 11). OY levels were set equal to ABC for all species except widow rockfish and sablefish. The coastwide widow rockfish OY was set at 9,300 mt, compared with an ABC of 7,400 mt, and the sablefish OY was set at 13,600 mt, or approximately 10 percent above the 12,300 mt ABC.

Vessel trip limits were once again the basic regulatory mechanism preferred by fishing industry representatives advising the Council. Accordingly, the Council adopted trip limits (Table 7) in an effort to extend the fishery throughout the year without exceeding quotas or harvest guidelines.

Coastwide widow rockfish trip limits were set at 30,000 pounds once per week with an option to land 60,000 pounds once every two consecutive weeks (biweekly). The biweekly trip limit option was rescinded by the Council effective April 28, 1985 in an attempt to reduce the rate of landings. Effective July 21, 1985, the trip limit for widow rockfish was reduced to 3,000 pounds, with no limit on the frequency of landings. The trip limit was imposed to discourage directed fishing while permitting retention and sale of fish caught incidental to fishing for other species. Total landings of widow rockfish for 1985 were 9,087 mt, slightly below the 9,300 mt quota.

In 1985, management of the Sebastes complex was again the most complicated groundfish management issue. In the Vancouver and Columbia areas, more restrictive trip limits were implemented to reduce yellowtail rockfish landings and encourage landings of "remaining rockfish." A Sebastes complex trip limit of 30,000 pounds once per week was imposed, of which no more than 10,000 pounds could be yellowtail rockfish. An option of one landing every two consecutive weeks of double the amount also was adopted, but the fishers were required to notify the state in which landings would occur in writing seven days prior to fishing.

Effective April 28, 1985, the Council reduced the weekly trip limit to 15,000 pounds, of which no more than 5,000 pounds could be yellowtail rockfish. The biweekly landing option of double the amount was again adopted, as was a third option to land 7,500 pounds twice each week (semiweekly) of which no more than 3,000 pounds in each landing could be yellowtail rockfish.

By early September, GMT projections indicated that yellowtail rockfish landings would approximate the ABC and that Sebastes complex landings as a whole would fall about 1,000 mt below the harvest guideline. Effective October 6, the Sebastes complex trip limits were increased to 20,000 pounds per trip with respective biweekly and semiweekly adjustments. Yellowtail rockfish trip limits were not changed.

The size and trip limits specified for sablefish in 1984 continued until November 25. At that time, it was determined that 90 percent OY had been reached by October 21. As specified in the FMP, the remaining portion of the OY was allocated on a 50:50 basis to the fixed gear and trawl fleets (680 mt to each gear type). The trawl fleet was put on a trip limit of 13 percent total round weight on board. By December 6, the OY had been reached and all landings of sablefish were prohibited.

Pacific ocean perch landings in the Columbia area exceeded the 950 mt quota in 1983 and 1984 under a trip limit of 5,000 pounds or 10 percent of the total weight of fish on board, whichever was greater. Landings of Pacific ocean perch were prohibited during the latter part of both years. Beginning in 1985, the trip limits were changed to a maximum of 20 percent of the total weight of the fish on board in an effort to discourage targeting and thus reduce landings. The regulation was effective in the Columbia area, but not in the Vancouver area. Effective April 28, 1985, the Council modified the Pacific ocean perch trip limit regulation to 5,000 pounds or 20 percent of the total weight of the fish on board, whichever was less, thus prohibiting large landings of these species. This regulation was effective in reducing landings, and total landings of Pacific ocean perch were 424 mt in the Vancouver area and 886 mt in the Columbia area. The 1985 landings of Pacific ocean perch were below OY in both areas.

On September 1, 1985, the management boundary line separating northern and southern trip limits for the Sebastes complex was shifted approximately 30 miles northward to the jetty on the north side of Coos Bay, Oregon. The move was approved by the Council to minimize management and catch reporting problems which arose earlier when the management line was moved to Cape Blanco, Oregon. Coos Bay fishers testified that moving the line to the north jetty of Coos Bay would simplify and enhance the operations of fishers who were required to contend with two different trip limits and trip frequencies adjacent to their port of landing.

In March 1985, the Council provisionally approved issuance of up to 18 experimental setnet permits for sablefish. Two permits were issued by NMFS in 1983 and three in 1984 despite recommended denial by the Council. The expanded experimental fishery was intended to evaluate gear conflicts and the effects of the setnet fishery on fully utilized stocks of fish. Twelve vessels actually fished in 1985 with most of the effort centered off northern Washington.

1986 Fishery

The ABCs for the 1986 fishery were approved by the Council at the November 13–14, 1985 meeting in Seattle, Washington (Table 12). As in previous years, the OY was set equal to ABC except for widow rockfish and sablefish. The coastwide widow rockfish OY was set at 10,200 mt compared with an ABC of 9,300 mt. The coastwide OY for sablefish was set at 13,600 mt, about 30 percent above the 10,600 mt ABC.

Management measures established by the Council (Table 7) were similar to those of the past three years. Industry advisors to the Council reaffirmed their support of vessel trip limits for the few species which required regulations to prevent overexploitation. It was their view that vessel trip limits are more likely to achieve the objective of extending the fishery throughout the year without exceeding quotas or harvest guidelines.

Coastwide domestic commercial groundfish landings were projected to be down slightly from 1985. A decline in Dover sole landings accounted for the majority of the decrease, but rockfish and lingcod landings also were down. The decrease in rockfish landings was attributed to regulatory actions. Directed effort for Dover sole decreased in 1986 as many trawlers shifted to the rapidly improving coastal pink shrimp fishery. Lack of availability was a factor in the Vancouver area with many fishers reporting poor success for Dover sole.

A coastwide widow rockfish trip limit was set at 30,000 pounds once per week. The option to permit one 60,000 pound landing every two consecutive weeks was rejected because industry advisors and the Council concluded this option would increase landings early in the season and result in a premature closure of the fishery. Good fishing during the early part of the year precluded the intent to extend the fishery throughout the year. GMT landing projections in early April indicated that ABC would be reached by late summer or early fall. After hearing industry testimony that smaller trip limits were not practicable, the Council opted to retain the 30,000 pound trip limit until ABC was reached. At that time, the trip limit would be reduced to 3,000 pounds per trip without a limit on the frequency of landings. The Council reaffirmed the regulation at its September 17-18 meeting, and the 3,000 pound trip limit was imposed on September 28.

In contrast to previous years, management of the Sebastes complex presented no major problems. Trip limits south of the Columbia area were set at 40,000 pounds for the third consecutive year, with no limit on the frequency of trips. The Vancouver and Columbia areas harvest guideline was set at 10,200 mt. Weekly trip limits were set at 25,000 pounds of which no more than 10,000 pounds could be yellowtail rockfish. Biweekly and semiweekly options in the same proportions also were set to provide fishers with additional options. From the start of the year, landing rates were down from previous years. Reasons included a more normal weather pattern than the excellent weather encountered early in 1985, poorer availability of rockfish early in the year and less directed rockfish effort later in the spring because many vessels converted to shrimp fishing or entered the joint venture fishery for whiting. On August 31, after the GMT reported the harvest guideline would not be achieved with the lower trip limits, the Council increased trip limits to 30,000 pounds once per week of which no more than 12,500 pounds could be yellowtail rockfish. Similar adjustments were made to biweekly and semiweekly options.

Several different management measures had been tried for Pacific ocean perch since 1983. The regulations implemented during the past few years had either resulted in exceeding the OY and closing one area while taking less than the OY in the other, or underharvesting in both areas. The 1986 Pacific ocean perch trip limit was set at 10,000 pounds per trip or 20 percent of the weight on board, whichever was less. This regulation apparently resulted in landings less than the OY in the Columbia area. In the Vancouver area, where large landings of other species of groundfish are common, many vessels targeted Pacific ocean perch to bring their catches up to the maximum allowed under the regulation. As a result, the OY was expected to be reached in mid-November and landings of Pacific ocean perch from the Vancouver area were prohibited for the remainder of the year. It was apparent from the experiences of the past four years that a single trip limit regulation for both the Vancouver and Columbia areas cannot meet conservation and harvest goals for each area. Conversely, regulations which differ between areas may meet the desired objective for each area but cannot be effectively enforced because some vessels commonly fish both areas on a single trip.

The initial 1986 sablefish regulations were unchanged from the past three years. The fishery was unrestricted except that landings of fish less than 22 inches were limited to 5,000 pounds per trip. During the early part of the year, landings were similar to 1985 and it was evident that the 13,600 mt quota could be reached before the end of the year. In early April, both trawl and fixed gear fishers expressed an interest in revising the management regime in the FMP, which required that the catch be allocated between fixed and trawl gear when 90 percent of the quota was reached and established trip limits for trawlers by a predetermined formula. There was a common desire to establish shares earlier in the year to permit fixed gear fishers adequate time to plan vessel operations and to set trip limit regulations for trawlers that would be significantly greater than those set under the FMP scenario. In July, the Groundfish Select Group (GSG) recommended to the Council that the remaining unharvested balance of the 1986 OY be allocated

between trawl and fixed gear based on the share of total sablefish landings for a five-year (1981-1985) average. The GSG further proposed that fixed gear landings continue without restriction until the fixed gear allocation was reached, and that trawl trip limits be set at levels which would allow trawl fishers to continue to land sablefish for the remainder of the year without exceeding the trawl allocation. Either gear would be prohibited from further sablefish landings after the gear allocation was reached, and all landings would be prohibited when the OY was reached. The rationale for the proposals was that fixed gear fishers landed only sablefish, had no alternative fishery and could not operate economically under trip limits. Conversely, sablefish are primarily an incidental species in the multispecies trawl fishery, and wastage would occur if landings were prohibited and catches were discarded at sea.

The allocation proposal was adopted by the Council and implemented on August 22. GMT landing projections developed in early October indicated that trawl landing rates were at a level which might not reach the trawl allocation by the end of the year. The fixed gear allocation, however, was projected to be reached by late October, at which time landings of sablefish by this gear would be prohibited for the remainder of the year.

The FMP prohibits the use of setnet gear for groundfish north of 38° N latitude. In an effort to evaluate the impacts and success of a setnet fishery, the director of NMFS Northwest Region issued experimental permits to harvest groundfish with setnets in the exclusive economic zone (EEZ) adjacent to Washington, Oregon and California each year from 1982-1985. In March 1986, the Council reviewed the results of the experimental fishery and the implications of legalizing setnet gear in the prohibited area. The Council reaffirmed its position that setnets should be prohibited north of 38° N latitude and recommended that no experimental permits be issues in 1986. NMFS concurred with the recommendation and the experimental fishery was terminated.

1987 Fishery

For each species managed by a numerical OY, the 1987 OY was set equal to the estimated ABC (Table 13). An interim coastwide ABC/OY for sablefish was set at 12,000 mt until a review of all stock assessment data could be completed by an ad hoc stock assessment work group.

Management measures established by the Council were similar to those of the past four years (Table 7). Industry advisors to the Council reaffirmed their support of vessel trip limits for species that required regulation to prevent overexploitation. It was their view that vessel trip limits were likely to achieve the objective of extending the fishery throughout the year without exceeding quotas or harvest guidelines. No abnormal or extreme environmental conditions were encountered in 1987, and fishing patterns, fluctuations in landings and fleet size were well within expectations.

The increased Pacific cod landings in the northern areas and reports of small cod as far south as northern California were encouraging and indicated that cod abundance might be increasing after several years of apparent low abundance.

The decline in Dover sole landings for the second year in a row could be attributed primarily to decreased directed effort, but a lack of availability in the northern areas also impacted the total landings. The reasons for decreases in the other species were less clear, but were probably a result of decreased abundance.

Increased widow rockfish landings were directly related to the 3,200 mt increase in OY for 1987. Trip limits were once again set at 30,000 pounds once per week. Fishing was good coastwide and many vessels consistently landed limits each week until early May when widow rockfish became less available to trawls. At the September Council meeting, the GMT projected the 12,500 mt OY would be reached in late November. The Council approved a 5,000 pound weekly trip limit when 95 percent of the OY (11,875 mt) was landed. The lower trip limit was not effective and landings were prohibited on November 25.

Management of the Sebastes complex was similar to 1986. South of the Columbia area, trip limits were set at 40,000 pounds for the fourth consecutive year, with no limit on the frequency of trips. The Vancouver and Columbia areas harvest guideline was set at 10,200 mt. Weekly trip limits were set at 25,000 pounds of which no more than 10,000 pounds could be yellowtail rockfish. Biweekly and semiweekly options in the same proportions also were set to provide fishers with an option that best fit into their overall fishing operations.

Fishing success for the Sebastes complex in 1987 was improved over 1986. It was reported that, because of good catch rates, some fishers targeted the Sebastes complex early in the year rather than fishing for widow rockfish. The greatest improvement was noted early in the year in the Vancouver area where fishers reported excellent availability of yellowtail rockfish and complained that they discarded fish to prevent exceeding the landing limit. In late July, the Council reduced the weekly yellowtail rockfish landing limit from 10,000 to 7,500 pounds in an attempt to prevent landings from exceeding the ABC for this species in the Vancouver and Columbia areas.

The 1987 ABC for Pacific ocean perch in the Vancouver and Columbia areas was set at 0 mt because stocks were stressed and had not recovered since being overexploited in the late 1960s. The OYs were set at 500 mt for the Vancouver area and 800 mt for the Columbia area to permit retention of fish harvested incidentally while fishing for other species. To discourage directed fishing, the Council established a trip limit of 20 percent of the total weight of legal fish on board, not to exceed 5,000 pounds per trip. Landings of Pacific ocean perch were well below the OY.

Difficulties with sablefish stock assessment and management continued to plague the Council in 1987. Efforts to develop scientifically credible estimates of coastwide sablefish abundance and ABC were unsuccessful, primarily because of the lack of an adequate and comprehensive historical data base. The Council established an interim 1987 ABC/OY of 12,000 mt based on the best information available. Despite several efforts by the GMT and an ad hoc stock assessment work group, no better estimate was developed and the 12,000 mt OY was not revised during the year. Trawl gear was allocated 52 percent of the OY and nontrawl gear 48 percent to assure historical and equitable sharing of the harvest. Landing by both gear types lagged behind 1986. Decreased effort early in the year by nontrawl gear and decreased trawl effort were undoubtedly major factors in decreased landings. Nontrawl fishers, however, reported fewer large sablefish and indicated that fishing success was generally poorer than in previous years. Although landings were lower, both gear types were projected to achieve their allocation before the end of the year. A trip limit of 6,000 pounds or 20 percent of the total weight of legal fish on board was implemented for trawl gear on October 2 in an attempt to extend the fishery and to prevent discards. In October, the nontrawl fishery was projected to reach its allocation in mid-October, at which time sablefish landings by nontrawl gear would be prohibited for the remainder of 1987. The trawl fishery for sablefish was closed October 22.

1988 Fishery

The ABCs and numerical OYs for the 1988 fishery were approved by the Council at the November 18-19, 1987 meeting in Portland, Oregon (Table 14). Most management measures established by the Council (Table 7) were similar to those of recent years. Nonetheless, for the first time, trawl trip limits for sablefish were implemented on January 1 in order to prevent the trawl fleet from exceeding its allocation quota. Industry advisors to the Council reaffirmed their support of vessel trip limits for the few species that require additional regulation to prevent overexploitation. Vessel trip limits were implemented with the objective of extending the fishery throughout the year without exceeding quotas or harvest guidelines. No abnormal or extreme environmental conditions were encountered in 1988. Nonetheless, unsteady fishing patterns and landings fluctuations resulted from erratic market conditions. Fleet size was well within expectations.

One major management problem in 1988 was the temporary loss of Pacific Coast Fisheries Information Network (PacFIN) funding for port samplers and data processors, impairing the accuracy of landings projections and future stock assessments which rely on biological sampling.

The continued increase in Pacific cod landings in the northern areas and reports of cod as far south as northern California were encouraging and indicated that cod abundance may have increased after several years of apparent low abundance.

Widow rockfish landing rates varied greatly through the season as a result of unstable market factors. Trip limits were once again set at 30,000 pounds once per week. Fishing was good coastwide and many vessels consistently landed limits. At the July 13-14 Council meeting, the GMT projected the 12,100 mt OY would be reached in early October. The Council approved a 3,000 pound trip limit to go into effect when just enough of the OY remained to allow this trip limit to remain in effect until December 31. The intent of the Council was achieved.

Management of the Sebastes complex presented no major problems in 1988. South of Coos Bay, trip limits were set at 40,000 pounds for the fifth consecutive year, with no limit on the frequency of trips. North of Coos Bay, the harvest guideline was set at 10,200 mt. Weekly trip limits were set at 25,000 pounds of which no more than 10,000 pounds could be yellowtail rockfish. Biweekly and semiweekly options in the same proportions also were set to provide fishers with an option that best fit into their overall fishing operations.

Fishing success for the Sebastes complex was similar to 1987. Increased landings were noted primarily in the Vancouver area where fishers reported excellent availability of yellowtail rockfish and complained that they discarded fish to prevent exceeding the landing limit. GMT projections in July indicated the ABC would be reached in mid-August unless effort was reduced. Preliminary assessment results indicated the ABC could increase significantly and management action was postponed pending review and approval of the new stock assessment. However, the completed assessment indicated the ABC should be increased by only 300 mt. Subsequent to receiving the assessment, the Council reduced the weekly yellowtail rockfish landing limit from 10,000 to 7,500 pounds. The Council's intent was to reduce targeted fishing on yellowtail rockfish in the Vancouver and Columbia areas without forcing a significant increase in discards. Despite trip limit reductions, yellowtail rockfish landings exceeded ABC.

The 1988 ABC for Pacific ocean perch in the Vancouver and Columbia areas was set at 0 mt because stocks were stressed and had not recovered since being overexploited in the late 1960s. As in 1987, the OYs were set at 500 mt for the Vancouver area and 800 mt for the Columbia area to permit retention of fish harvested while fishing for other species. To discourage directed fishing, the Council established a trip limit of 20 percent of the total weight of fish on board, not to exceed 5,000 pounds per trip. Landings of Pacific ocean perch were again below OY.

Difficulties with sablefish stock assessment and management continued to plague the Council in 1988. Efforts to develop scientifically credible estimates of coastwide sablefish abundance and ABC were unsuccessful until late in the year, primarily because of lack of an adequate model to analyze the diverse historical data base. The Council established an ABC of 10,000 mt and an OY range of 9,200 to 10,800 mt based on the best information available. Trawl gear was allocated 5,200 mt and nontrawl gear was allocated 4,800 mt in an attempt to maintain an equitable sharing of the harvest. An additional 800 mt was held in reserve in case the trawl fishery unavoidably exceeded its allocation. To achieve the 5,200 mt allocation, a trawl trip limit of 6,000 pounds or 20 percent of the fish on board, whichever was greater, was implemented on January 1. Because of a lack of PacFIN data, landings were difficult to monitor. Early in the year, trawl landings were high in spite of the trip limit. The trip limit was reduced to 2,000 pounds once per week on August 3 and the 800 mt reserve was released to the trawl quota to extend the fishery throughout the year. While this trip limit substantially impacted the landing rate, fishers reported that discards also increased significantly. Projections by the GMT in September indicated that the 2,000 pound weekly trip limit had slowed landings to the extent that the original 5,200 mt allocation would not be achieved. The Council removed the trip frequency restriction in early October in an attempt to reduce the amount of forced discarding. Nontrawl landings also were substantially above the 1987 rate and the fishery was closed on August 25.

1989 Fishery

The ABCs and numerical OYs for the 1989 fishery were approved by the Council at the November 16–18, 1988 meeting in Portland (Table 15). For those species requiring a numerical OY, levels were set at the estimated ABC, except for Pacific ocean perch and sablefish. Most management measures established by the Council were similar to those of recent years (Table 7). Industry advisors to the Council reaffirmed their support of vessel trip limits for the few species which require additional regulation to prevent overexploitation. Vessel trip limits were implemented with the objective of extending the fishery throughout the year without exceeding quotas or harvest guidelines.

No abnormal or extreme environmental conditions were encountered in 1989. Nonetheless, there were some periods of landing fluctuations caused by erratic market conditions. Fleet size was within expectations.

Coastwide domestic commercial groundfish landings were 88,282 mt, down slightly from 1988. Landings of Dover sole decreased in 1989, 17,123 mt as opposed to 18,000 mt in 1988, but in the Columbia area a new catch record was established at 8,226 mt (based on logbook adjusted data). Landings of arrowtooth flounder also increased in 1989 to 3,540 mt, even though regulations inhibited some activity on this species. Thornyhead landings increased in 1989 as the deepwater fishery for longspine thornyheads continued to increase. Landings in 1989 were 6,244 mt for both species as opposed to 5,591 mt in 1988. Again in 1989, there was no foreign fishery allocation for Pacific whiting. Joint venture requests exceeded the available supply, thus no total allowable level of foreign fishing was granted.

Widow rockfish landing rates varied somewhat through the season as a result of erratic market factors. At the beginning of the fishing year, trip limits were again set at 30,000 pounds per week. Fishing was good coastwide, especially in January and February. The GMT projected in March that a 51 percent reduction in the rate of landings would be required to extend the fishery to the end of the year. On the advice of the GSG, the Council approved a reduction in the trawl trip limit to 10,000 pounds per week or 20,000 pounds per two weeks, effective April 26. On October 11, 1989, the trawl trip limit was further reduced to 3,000 pounds per week to avoid a fishery closure. Subsequently, the GMT projected that the quota would be reached on December 13, and beginning on that date no further landings of widow rockfish were allowed. Final landings were 12,523 mt, 101 percent of the OY.

Management of the Sebastes complex was similar to previous years. South of Coos Bay, trip limits were set at 40,000 pounds per trip. North of Coos Bay, trip limits were set at 25,000 pounds once per week of which no more than 7,500 pounds could be yellowtail rockfish. There were biweekly and semiweekly options available upon written notification. At the July 12–13 Council meeting, the GSG recommended the trip limit on yellowtail rockfish be reduced to 3,000 pounds or 20 percent of the Sebastes complex on board, whichever was greater, to keep the annual harvest near the ABC of 4,300 mt for the Vancouver and Columbia areas. This restriction became effective on July 26.

Management of Pacific ocean perch in 1989 presented the Council with a challenge. The ABCs were set at 0 mt but the OYs were set at 500 mt for the Vancouver area and 800 mt for the Columbia area to allow for incidental catch. In July, the GMT alerted the Council that the Columbia area OY would be met July 31 at the current landing rate. The Council recommended the trip limit be reduced to 2,000 pounds or 20 percent (by weight) of all legal fish on board, whichever was less, from 5,000 pounds or 20 percent (by weight) of all legal fish on board, whichever was less. Concurrently, the OY in the Columbia area was increased by 30 percent with the intent of preventing a fishery closure. The intent of the revised trip limit, which went into effect on July 26, was to accommodate incidental catches of Pacific ocean perch. The reduction in the trip limit was insufficient to keep landings within the OY of 1,040 mt in the Columbia area and the fishery closed on November 13. Landings for the year in the Vancouver and Columbia areas were 1,443 mt, 94 percent of the sum of the two OYs.

Sablefish presented the Council with its greatest groundfish challenge in 1989. The stock assessment indicated the ABC should be 9,000 mt. Because the stock was still above its maximum sustainable yield (MSY), the OY was set at 10,400 to 11,000 mt. The intent was to gradually fish the stock down to the level that produces MSY by managing for the low end of the OY, but if landings exceeded 11,000 mt, further landings would be prohibited for all gear types.

The initial allocations, excluding 22 mt for the Makah Indian Tribe, were 5,397 mt (52 percent) for trawl gear and 4,981 mt (48 percent) for nontrawl gear. A 600 mt reserve was established for uncertainties in landing projections, incidental catches and continuation of small nontrawl fisheries that operate later in the year. The trawl fishery began the fishing year with a trip limit of 1,000 pounds or 45 percent, whichever was greater, of the deepwater complex. The deepwater complex was defined as sablefish, Dover sole, arrowtooth flounder and thornyheads. At its April 4-7 meeting, the Council was informed that sablefish landing rates were such that an early fishery closure would occur June 27 for nontrawl and September 21 for trawl. To minimize discards of sablefish in the trawl fishery and avoid large-scale disruption of the fishery, the Council recommended the trawl quota be increased by 1,000 mt (400 mt from nontrawl plus the 600 mt reserve) and altered the trawl trip limit. The new trip limit placed a once per week 30,000 pound limit on the deepwater complex of which no more than 1,000 pounds or 25 percent, whichever was greater, could be sablefish. There were also biweekly and twice weekly options available. The deepwater complex limit and trip frequency restriction were removed October 4, but the separate limit on sablefish remained in place. Directed fishing by nontrawl gear ended on July 17, when an incidental trip limit of 100 pounds per trip was implemented. On October 4, this limit was relaxed to 2,000 pounds or 20 percent of all groundfish on board, whichever was less. By year end, trawl landings were 5,697 mt, 89 percent of the revised trawl allocation. The nontrawl fishery landed 4,417 mt, 96 percent of the nontrawl allocation.

1990 Fishery

The Council approved the ABCs and OYs for the 1990 fishery at the November 15-17, 1989 meeting in Portland, Oregon (Table 16). For those species requiring a numerical OY, landing limits were set equal to the estimated ABC with the exception of Pacific ocean perch and widow rockfish.

The initial and subsequent changes in management measures are shown in Table 7. Most management measures were similar to the previous two years. Trip limits were again used as the primary means of limiting landings of managed species. At present levels of fishing effort, trip limits offered the most viable method of meeting the Council objective of a year-long groundfish fishery.

Landings in 1990 may have been reduced in part to adverse weather conditions which prevailed for much of January and February. Lower landings were anticipated for Dover sole, which set record landings in the Columbia area in 1989. The coastwide landing was 15,795 mt. Landings of thornyheads were nearly 7,000 mt through August and were 10,126 mt by year end, a substantial increase over previous years.

Fleet size was similar to that of 1989 except that substantial effort from the shrimp fishery entered the groundfish fishery in August and September. This caused an increase in the deepwater complex fishery where effort targeted thornyheads. However, the landings of trawl-caught sablefish also increased, and in September the GMT informed the Council that sablefish would become a prohibited species as early as November 8 if sablefish landings were not reduced by 50 percent during the last quarter. The Council responded by changing the definition of the deepwater complex (removing arrowtooth flounder) and placing a 15,000 pound trip limit on the deepwater complex while retaining the sablefish restriction. Removing arrowtooth flounder from the complex was justified by an analysis performed by Washington Department of Fish and Wildlife (WDFW) on Washington and Oregon trawl logbook data.

Nontrawl sablefish management also underwent several changes in 1990. In November 1989, the Council recommended the trawl:nontrawl allocation be revised from 58:42 to 62:38 and the nontrawl season opening date be delayed until April 1. NMFS did not approve the Council's recommended management measures before the fishery opened on January 1. Therefore, the nontrawl trip limit in effect at the end of 1989 (the greater of 2,000 pounds or 20 percent of all fish on board) remained in effect until NMFS

formally disapproved the Council's management recommendations. On January 31, the trip limit was rescinded and nontrawl fishing was unrestricted. NMFS stated that the anticipated Indian tribal catch (300 mt) would be subtracted from OY, and reaffirmed that the remaining 8,600 mt would be allocated according to the 58:42 ratio established in 1989. On March 21, the nontrawl restriction on sablefish less than 22 inches (the greater of 1,500 pounds or 3 percent), which had been inadvertently dropped in the NMFS disapproval, was reinstated. The GMT projected that only 300 mt of the nontrawl quota would remain on June 24, and a 500 pound trip limit went into effect on that date. Further adjustments were made in July and again in September (Table 7). The September action, which increased the trip limit to 2,000 pounds per trip, was taken so the nontrawl allocation could be fully utilized.

In November 1989, the GMT advised the Council that widow rockfish landings should be reduced substantially in 1990. The GMT recommended the 1990 ABC be set at 7,900 mt, down from the 12,400 mt ABC for 1989. The Council set ABC at 8,900 mt and OY at 9,800 to 10,000 mt, with the intention of managing for 9,800 mt. Landings of widow rockfish were projected to reach nearly 9,800 mt by year end. Trip limits in 1990 were the most restrictive ever, 10,000 pounds per week or 25,000 pounds per two weeks. The quota was reached and the fishery was closed on December 12.

Management of the Sebastes complex south of Coos Bay, Oregon in 1990 was unchanged from 1989 with a limit of 40,000 pounds per trip and no trip frequency restrictions. North of Coos Bay, the trip limits were 25,000 per week of which no more than 7,500 pounds could be yellowtail rockfish. The GMT projected in July that additional restrictions for yellowtail rockfish would be necessary to stay within the harvest guideline. Subsequently, the Council recommended a reduction in the trip limit on yellowtail rockfish to 3,000 pounds per week or 20 percent of all Sebastes on board, whichever was greater. At the meeting in September, the Council was advised by the GMT that landings of yellowtail rockfish would exceed the harvest guideline. Because of a new stock assessment on yellowtail rockfish, the GMT advised the Council that an overage of 575 mt would not cause stress and no additional action was taken. The Columbia and Vancouver (U.S.) area landings were 4,026 mt.

Management of Pacific ocean perch was not a problem in 1990. The trip limit implemented at the beginning of the year (3,000 pounds per trip or 20 percent of all fish on board, whichever was less) kept landings well within the quotas for both the Columbia and Vancouver areas.

1991 Fishery

The ABCs for 1991 were approved by the Council at the November 14-16, 1990 meeting held in Seattle, Washington (Table 17). Three species were designated as quota species in 1991: Pacific whiting, shortbelly rockfish and jack mackerel. Quotas were set equal to the respective ABCs. For all other species, the Council adopted the harvest guideline approach recommended by the GMT. Harvest guidelines were set equal to ABCs except for the species discussed in the following sections.

Effort levels in 1991 were higher than in 1990, but quantitative estimates are not available. The largest increase in effort occurred in the trawl fishery when thirteen factory trawlers and three motherships from Alaska arrived to fish for whiting. There was also a large influx of displaced salmon trollers that fished for groundfish in 1991 because of shortened salmon seasons.

Shoreside landings of Pacific whiting increased substantially in 1991, reaching a new high of 20,600 mt. This brought shoreside total groundfish landings to 102,740 mt, roughly 10 percent greater than in 1990. At-sea processing of whiting added another 196,905 mt to the landings (including discards). Overall, domestic landings in 1991 set a record of 286,400 mt.

An allocation scheme for Pacific whiting was approved for the three entities (factory trawlers, motherships and shoreside processing) prior to the arrival of the at-sea processing fleet. It was implemented on August 29, at which time further fishing by catcher-processors was prohibited because they had already exceeded their quota. All at-sea processing in federal waters was prohibited on September 6 and the remaining portion of the harvest guideline was available for deliveries to shore-based processors only.

Incidental catch by the offshore fleet was of special concern to the Council because of severe cut-backs to salmon fisheries off southern Oregon and northern California. The number of salmon tallied was 6,280 fish for an incidence rate of 0.032 fish per mt of whiting. On the average, this was less than the agreed to rate of 0.05. The incidental catch of rockfish was 1,536 mt, nearly all of which was discarded.

Sablefish management in 1991 was similar to 1990. The tribal set aside of 300 mt was taken from the harvest guideline of 8,900 mt. Landings during the January through March period were 423 fish. The remaining 8,600 mt was allocated between trawl (58 percent) and nontrawl (42 percent). The nontrawl season opened January 1 with a 1,500 pound trip limit and on April 1 unrestricted fishing commenced. The April 1 opening was meant to coincide with the season opening in Alaska, but the Alaska season opened on May 15. Nontrawl landings in April were four times the average April landings. This pulse shortened the season substantially, and the nontrawl season was closed on July 1. At its July meeting, the Council recommended an emergency action to allow incidental and low level catch to continue under a 300 pound daily trip limit which was implemented on September 30.

Sebastes management north of Coos Bay, Oregon was via trip poundage and frequency limits and was unchanged from 1990. The fishery year began with a weekly trip limit of 5,000 pounds on yellowtail rockfish. In April, the trip limit was reduced to 5,000 pounds every two weeks. Landings of yellowtail rockfish under 3,000 pounds were exempt from frequency restrictions. Because of the lower trip limit and expected increased discard that would occur, the GMT recommended a discard factor of 16 percent be applied to the landed weight to account for the catch at sea. The offshore processing fleet caught 314 mt of yellowtail rockfish.

South of Coos Bay, the Council recommended a 25,000 pound trip limit with no trip frequency restriction. The Council also recommended a trip limit of 5,000 pounds on bocaccio because of declining recruitment. The ABC for bocaccio was set at 800 mt, but the Council recommended a harvest guideline of 1,100 mt after hearing public testimony. The harvest guideline is within the range of estimates of equilibrium yield and less than the fishing rate that would trigger an overfishing review.

Widow rockfish trip limits in 1991 were 10,000 pounds per trip per week or 20,000 pounds per two weeks. On September 25, a 3,000 pound trip limit was implemented. This amount was intended to discourage directed fishing but allow for incidental catch.

Landings of Pacific ocean perch were projected to be 1,438 mt, 30 percent greater than the harvest guideline. The ABC for Pacific ocean perch was set at 0 mt, but to allow for incidental catch a harvest guideline of 1,000 mt was set for 1991. Even at the lower trip limit in 1991, 3,000 pounds or 20 percent of all fish on board, whichever was less, some fishers still targeted for the trip limit.

The deepwater complex in 1991 was managed by trip poundage and frequency limits. The deepwater complex is defined as Dover sole, sablefish and thornyhead. The GMT recommended a thornyhead ABC of 5,900 mt based on a first-time assessment of Sebastolobus species. The Council set the ABC at 7,900 mt and proposed a weekly trip limit of 7,500 pounds which was low enough to substantially reduce landings. At its July meeting, the Council recommended an increase in the trip limit to 12,500 pounds, but even at this rate the projected landings were less than the original ABC of 5,900 mt recommended by the GMT.

The sablefish component of the deepwater complex was managed by a trip limit of 1,000 pounds or 25 percent of the deepwater complex, whichever was greater. Projected landings were expected to be 4,820 mt, about 3 percent less than the trawl allocation.

1992 Fishery

The ABCs for 1992 were approved by the Council at the November 20-22, 1991 meeting in Millbrae, California (Table 18). A harvest guideline or quota may be established for any species needing attention under the framework procedures established by Amendment 4. For 1992, the Council set harvest

guidelines for sablefish, Pacific ocean perch, widow rockfish, bocaccio, yellowtail rockfish, the Sebastes complex, thornyheads, Dover sole, Pacific whiting, shortbelly rockfish and jack mackerel. Harvest guidelines were adopted for the last three species because only U.S. companies were to be involved during 1992. Harvest guidelines were set equal to the respective ABCs in most cases. For yellowtail rockfish, a 4,300 mt harvest guideline was applied only to the Columbia and Vancouver areas. This ABC was later increased to 4,700 mt to correct a rounding error which occurred during 1991.

Harvest guidelines were not set equal to the respective ABCs for jack mackerel, Pacific ocean perch, bocaccio, thornyheads and yellowtail rockfish. The jack mackerel harvest guideline was less than the ABC of 52,600 mt and equal to the 1991 quota of 46,500 mt. That quota was set based on anticipated harvest outside of the management area (i.e., south of 39° N latitude and outside 200 miles). To account for the unavoidable bycatch of Pacific ocean perch, the coastwide harvest guideline was set at 1,550 mt. The Council recognized that even severe management restrictions would not keep bocaccio fishing mortality within the ABC of 800 mt. Accordingly, the harvest guideline was set at 1,000 mt (ABC = 0 mt). Because the two species of thornyheads (longspine and shortspine) are difficult to distinguish, a harvest guideline was set for both species combined. In many landings, these two species occur in roughly equal proportions, so a harvest guideline was determined that would exceed the ABC for shortspine thornyhead but remain below the overfishing level. The Council set the harvest guideline for yellowtail rockfish at 5,400 mt for the Vancouver, Columbia and Eureka areas. In a related action, the subarea boundary was moved from the north jetty at Coos Bay to Cape Lookout. The subarea harvest guideline for the area south of Cape Lookout was set at 1,400 mt, and the remaining 4,000 mt was set for the subarea north of Cape Lookout. The Sebastes complex harvest guideline for the area north of Cape Lookout was set at 8,000 mt to account for the increase in the yellowtail rockfish harvest guideline.

The 1992 Pacific whiting harvest guideline was set at 208,800 mt, 90 percent of the coastwide (U.S. plus Canada) ABC. An allocation among U.S. participants was again established which

- put an initial limit of 98,000 mt on at-sea processing,
- provided an 80,000 mt allocation for shoreside processing,
- put 30,000 mt into a reserve with priority given for shoreside processing,
- required shoreside processors to have taken 48,000 mt (60 percent of initial allocation) by September 1, 1992 or the reserve would be made available to the at-sea processor fleet and
- required any amount of whiting not needed by shoreside processors to be released to the at-sea processor fleet on October 1, 1992.

The Council also recommended that the opening of the whiting season be delayed until April 15, 1992 to reduce the bycatch of salmon and rockfish (particularly in the Monterey area). To further reduce bycatch in the whiting fishery, the Council recommended the following regulations:

- No processing at sea south of 42° N latitude
- No fishing between 0001 hours and one-half hour after official sunrise
- No fishing in the Klamath River salmon conservation zone
- No fishing in the Columbia River salmon conservation zone
- In the Eureka area, a 2,000 pound trip limit inside of 100 fathoms

The Pacific whiting allocation, season opening date and fishing restrictions were all approved by NMFS via emergency regulation.

Sablefish management in 1992 was similar to 1991, but with greater attention to the level of trip limits that could be set given the large increase in vessels participating in the nontrawl fishery. The Council adopted a framework which allowed the unrestricted sablefish fishery to begin three days prior to the opening of the Alaska sablefish fishery. The West Coast fishery opened May 12, 1992.

Beginning January 1, 1992, a 500 pound daily trip limit (no more than one landing per day) was allowed for incidental and small directed sablefish fisheries. The trip limit was set to increase to a 1,500 pound daily trip limit beginning March 1, which would run until the opening of the unrestricted fishery or until 440 mt of the nontrawl sablefish harvest guideline had been taken. By March 21, 1992, the 440 mt limit was reached and the trip limit was reduced to 500 pounds. A much higher than anticipated level of effort stayed in the fishery after the 1,500 pound trip limit was reduced to a 500 pound trip limit, and as a result, the trip limit was further reduced to 250 pounds on April 17, 1992. The unrestricted fishery began May 12, 1992 following hold inspections by the states. To insure enough sablefish to continue with a 250 pound trip limit through the remainder of the year (300 mt), the unrestricted season was closed at 0001 hours May 27, 1992 and the 250 pound trip limit was re-implemented.

The Washington coastal treaty Indian sablefish fishery was managed by tribes to a quota of 300 mt. The fishery opened January 1, 1992 and closed July 10, 1992, with a total harvest of 337 mt. Most of the weekly trawl trip limits (biweekly, weekly and twice weekly) were changed to cumulative vessel limits on January 1, 1992 in an attempt to reduce discards and lower the occurrence of trip limit violations. Cumulative two-week limits were enacted for the Sebastes complex (including bocaccio and yellowtail rockfish) and the deepwater complex (Dover sole, sablefish and thornyheads). The fishery began with a 50,000 pound two-week cumulative limit for Sebastes complex, of which no more than 8,000 pounds could be yellowtail rockfish caught north of Cape Lookout and no more than 10,000 pounds could be bocaccio caught south of Cape Mendocino. For the deepwater complex, the two-week cumulative limit began at 55,000 pounds of which no more than 25,000 pounds could be thornyheads, and no more than 25 percent or 1,000 pounds per trip (whichever is greater) could be sablefish. A cumulative four-week limit was set at 30,000 pounds for widow rockfish. In general, these cumulative limits significantly reduced violations. However, by mid-season, thornyheads, yellowtail rockfish and widow rockfish all required inseason adjustment.

The Sebastes subarea boundary line was moved south to Cape Lookout in an attempt to make more yellowtail rockfish available (the trip limit was the same as the Sebastes limit south of the line) in areas where it was believed that targeting would not occur and discards would be reduced. By July, it was clear that this approach allowed too much harvest early in the season and the 1,400 mt harvest guideline would be exceeded. Accordingly, on July 29, 1992, the line was moved back to the north jetty at Coos Bay and the trip limit north of the line was reduced to 6,000 pounds.

Thornyheads and widow rockfish also were identified as needing trip limit reductions. The cumulative two-week thornyhead trip limit was reduced to 20,000 pounds on July 29, 1992, and the widow rockfish trip limit was reduced to 3,000 pounds per trip on August 12, 1992. During the September Council meeting, it was determined that further curtailment of the thornyhead trip limit was needed. On October 7, 1992, the thornyhead limit was reduced again to 15,000 pounds, and the deepwater complex limit was reduced to 50,000 pounds.

Shoreside landings in 1992 reached 132,457 mt, about 30 percent greater than landings in 1991. Expansion of shoreside processing of Pacific whiting was the primary reason for this increase. Shoreside landings of Pacific whiting reached 56,127 mt, and total at-sea processing landings were 152,943 mt. Continued influx of displaced salmon trollers and other interested fishers continued to increase effort in the line gear fisheries.

1993 Fishery

The ABCs for 1993 were approved by the Council at the November 17-20, 1992 meeting held in Seattle, Washington (Table 19). A harvest guideline or quota may be established for any species needing attention under the framework procedures established by Amendment 4. For 1993, the Council set harvest guidelines for bocaccio, Dover sole, jack mackerel, Pacific ocean perch, sablefish, Sebastes complex, shortbelly rockfish, thornyheads, widow rockfish, yellowtail rockfish and Pacific whiting.

Harvest guidelines were set equal to the respective ABCs and applied coastwide with the following exceptions: (1) the 1,540 mt harvest guideline for bocaccio applied only to the Eureka, Monterey and Conception areas; (2) the 17,900 mt coastwide harvest guideline and 6,000 mt Columbia area harvest guideline for Dover sole were both set 2,000 mt above the respective ABCs with the intent to "step down" from the recent catch level of approximately 8,000 mt to the 4,000 mt ABC in the Columbia area; (3) the jack mackerel harvest guideline was raised from 46,500 to 52,600 mt to match the ABC (during 1992, it was set lower than the ABC to account for anticipated catches outside the management area, i.e., south of 39° N latitude or outside 200 miles); (4) as in 1992, a 1,550 mt harvest guideline was set for Pacific ocean perch to account for bycatch even though the ABC continued to be 0 mt; (5) the 7,000 mt sablefish harvest guideline was set at the upper end of the 5,000 to 7,000 mt ABC range to soften the impact of the reduction from the previous 8,900 mt ABC; in addition, an ABC of 425 mt was established for the Conception area; (6) the Sebastes complex harvest guideline of 11,200 mt applied only to the Columbia and Vancouver areas; (7) the thornyhead harvest guideline applied only to the Monterey, Eureka, and Columbia areas; (8) the yellowtail rockfish harvest guideline of 4,400 mt applied to the Vancouver and Columbia areas and the remaining 300 mt of the 4,700 mt ABC was intended to accommodate yellowtail rockfish catch in the Eureka area; and (9) the 142,000 mt harvest guideline for Pacific whiting represented 80 percent of the 177,000 mt coastwide ABC which includes the Canadian area.

Cumulative two-week and four-week (for widow rockfish only) trip limits, which worked well to reduce discards during 1992, were supported by industry as a more flexible means to operate under and reduced the frequency of observed violations. The Council chose to utilize cumulative landing limits again during 1993 with the following coastwide cumulative limits per specified period in effect beginning January 1, 1993: (1) the coastwide cumulative two-week limit for the Sebastes complex (including bocaccio and yellowtail rockfish) was set at 50,000 pounds of which no more than 8,000 pounds could be yellowtail rockfish caught north of the north jetty at Coos Bay, Oregon (43°21'34" N latitude), and no more than 10,000 pounds could be bocaccio caught south of Cape Mendocino, California (40°30'00" N latitude); (2) the cumulative two-week limit for the deepwater complex (defined as including Dover sole, sablefish and thornyheads) was set at 45,000 pounds coastwide of which no more than 20,000 pounds could be thornyhead; in any deepwater complex landing, no more than 25 percent of the deepwater complex or 1,000 pounds, whichever was greater, could be sablefish and no more than 5,000 pounds of sablefish could be smaller than 22 inches (total length); and (3) the cumulative four-week limit for widow rockfish was set at 30,000 pounds, to be replaced by a 3,000 pound per trip limit when only enough of the widow rockfish harvest guideline remained to cover bycatch needs for the remainder of the year.

The specified two-week and four-week periods were set as follows:

Two-week Periods			
1/1-1/12	4/7-4/20	7/14-7/27	10/20-11/2
1/13-1/26	4/21-5/4	7/28-8/10	11/3-11/16
1/27-2/9	5/5-5/18	8/11-8/24	11/17-11/30
2/10-2/23	5/19-6/1	8/25-9/7	12/1-12/14
2/24-3/9	6/2-6/15	9/8-9/21	12/15-12/31
3/10-3/23	6/16-6/29	9/22-10/5	
Four-week Periods			
1/1-1/26	4/21-5/18	8/11-9/7	12/1-12/31
1/27-2/23	5/19-6/15	9/8-10/5	
2/24-3/23	6/16-7/13	10/6-11/2	
3/24-4/20	7/14-8/10	11/3-11/30	

Other trips limits which became effective January 1, 1993 were (1) the per trip limit for Pacific ocean perch was again set at the lesser of 20 percent of all the legal fish on board (by weight) or 3,000 pounds; (2) the per trip limit for the nontrawl sablefish fishery was 250 pounds until six days before the first 1993 Alaska longline fishery opened or until March 31, if the new opening date in May was not approved in time; (3) the per trip limit for Pacific whiting was set at 10,000 pounds to accommodate bycatch and bait fishing before and after the large scale directed fishery; and (4) the black rockfish trip limit was set at 100 pounds or 30 percent by weight of all fish on board (including salmon), whichever was greater, for commercial fishing vessels using hook-and-line gear in Washington between the U.S. border and Cape Alava, and between Destruction Island and Leadbetter Point.

In addition to accepting recommended ABCs for 1993 and setting appropriate harvest guidelines and trip limits, the Council reviewed (and forwarded recommendations to NMFS) five other preseason management actions at the November 1992 meeting. These actions were as follows.

1. The Council recommended that NMFS adopt a Pacific whiting trip limit of 10,000 pounds from January 1 until the fishery opened April 15, for catches inside the 100 fathom contour in the Eureka area, and at the end of the season when just enough of the harvest guideline remained to allow for bycatch the remainder of the year (effective February 26, 1993).

2. Northern California fishers requested an experimental fishing permit (EFP) to harvest Pacific whiting in 1993 before the season opened April 15, including exemption from the closed area in the Eureka and Monterey areas inside of 100 fathoms. They offered to maintain 100 percent observer coverage during all fishing operations. However, the Council recommended that NMFS not grant the permit because of the potential for impact on stressed salmon stocks.

3. A preferred "sliding scale" Pacific whiting allocation option was forwarded to the Department of Commerce for approval. The preferred option was to

    a. allocate the first 50,000 mt of whiting to vessels delivering to shore-based processors;
    b. hold the next 30,000 mt in a reserve with shore-based priority;
    c. allocate the next 30,000 mt to the at-sea processing sector;
    d. allocate whiting at harvest guidelines levels between 110,000 and 210,000 mt between shorebased and at-sea processing sectors using a sliding scale: The first 10,000 mt beyond 110,000 mt harvest guideline would be allocated 90 percent shoreside and 10 percent at sea (90:10) and the next 10,000 mt would be allocated 80:20, then 70:30, etc., until 210,000 mt; and
    e. allocate 100 percent of the harvest guideline above 210,000 mt to the at-sea processing sector.

    On April 15, 1993, the Secretary of Commerce (Secretary) partially disapproved the Council's whiting allocation proposal and replaced it with regulations intended to provide roughly the same harvest shares as in 1992. This rule provided 112,000 mt to vessels regardless of where they delivered their catch (i.e., an Olympic fishery), and a 30,000 mt reserve for vessels delivering to onshore processing plants. On May 4, the Secretary issued an emergency interim rule prohibiting further at-sea processing of Pacific whiting when 100,000 mt was projected to have been caught by that sector. This action had the effect of making 42,000 mt available to the shoreside processing sector. During June through August, shoreside processing continued at a rate of about 11,000 mt per month leading to a closure of the large-scale fishery September 3. The 10,000 pounds per trip limit was reimposed September 4.

4. The Council approved Amendment 7 to the groundfish FMP which gives the Council and NMFS the authority to establish management measures to control bycatch of salmon and other non-groundfish species. Regulations developed to implement these management measures may be applied to any portion of the groundfish fishery or the entire fishery. For the 1993 Pacific whiting fishery, the Council approved the following salmon bycatch restrictions (effective April 15):

a. No processing at sea south of 42°00' N latitude
b. No fishing for whiting at night (midnight to one-half hour after official sunrise) south of 42°00' N latitude
c. No fishing for whiting shoreward of 100 fathoms in the Eureka area (43°00' to 40°30' N latitude) except for a small 10,000 pound trip limit to accommodate bycatch and bait fisheries
d. No fishing for whiting in the Columbia River and Klamath River salmon conservation zones
e. Starting in 1994, the large scale target season for whiting off northern California would begin March 1 for vessels delivering whiting to shore-based processors

5. On March 25, NMFS approved a framework regulation to set the season opening date for the unrestricted sablefish season as three days prior to the opening of the first Alaska longline season, with a three-day closed season immediately before and after the unrestricted season. The preseason closed period was May 8 to May 11, and the unrestricted fishery ran from May 12 to June 1. After the postseason three day closed period, the fishery resumed under a 250 pound daily trip limit on June 5.

Sablefish management during 1993 was similar to 1992, with the trawl and nontrawl allocation shares remaining at 58 percent and 42 percent, respectively. Unlike 1992, the Council set a single nontrawl trip limit of 250 pounds and did not adjust it prior to the unrestricted season. (Trip limits of 500 and 1,500 pounds in 1992 attracted too much target fishing, leaving insufficient harvest guideline to accommodate a reasonably long unrestricted season.) Landings under the 250 pound trip limit totalled 74 mt. Of the 2,740 mt nontribal/nontrawl sablefish harvest guideline remaining, 250 mt were reserved for the small-scale 250 pound trip limit fishery after the regular season. Washington and Oregon conducted hold inspections on May 11, the day before the unrestricted season opening. The remaining 2,490 mt allowed the unrestricted fishery to last until June 1, 1993 when it was projected that at least 2,414 mt had been caught. After the three-day closed period, the fishery resumed on June 5 under a 250 pound trip limit.

As in 1992, the 1993 Washington coastal treaty Indian sablefish fishery was managed by the tribes to a quota of 300 mt. The tribal fishery opened January 1 and ran continuously through July 6. The fishery was then reopened with trip limits July 8 to July 11 and July 15 to July 18. Three tribes participated in the fishery, taking a total of 312.8 mt. Approximately 209 mt was taken by the Makah Tribe, 33 mt by the Quileute Tribe, and 71 mt by the Quinault Tribe.

On April 21, the deepwater complex trawl trip limit was reduced to 60,000 pounds per specified four-week interval in an attempt to reduce the catch of sablefish without increasing the potential for discard (a reduction in the 25 percent sablefish rule could increase discards). This reduced trip limit had little effect on the rate of sablefish landings. In mid-August, the GMT projected that the trawl catch would reach 4,367 mt and exceed the trawl harvest guideline by 481 mt (12.4 percent). The NMFS northwest regional director reviewed several options to reduce the landings rate and, after consulting with the Council, imposed a 3,000 pound per trip cap for trawl sablefish effective September 8. The trawl allocation was reached about October 12. Harvest rate of thornyheads during early 1993 was about the same as during 1992. In spite of tighter landing restrictions imposed on April 21, the landings rate increased substantially, however, fueled by increasing prices, and the harvest guideline was reached about November 9. Because the trawl sablefish harvest guideline was also exceeded, the Council imposed a trip limit of 5,000 pounds for the Dover sole/thornyhead/trawl-caught sablefish (DTS) complex, with no more than one trip per week.

In 1993, as in 1992, an EFP was approved to establish an observation program to monitor salmon bycatch in the shoreside whiting fishery. The observation program and EFP were expanded to include observation of unrestricted catches of other species (e.g., widow and yellowtail rockfishes), specifying that bycatch exceeding cumulative groundfish trip limits would be forfeited to the states.

Bocaccio catch through early September was 78 percent of the catch-to-date in 1992, and the harvest was projected to be 88 percent of the harvest guideline. The Council increased the bocaccio trip limit within the Sebastes trip limit from 10,000 to 15,000 pounds per specified two-week interval effective October 6, 1993.

The yellowtail rockfish trip limit was reduced from 8,000 to 6,000 pounds cumulative per specified two-week period on April 21, but the catch rate continued at a higher rate than 1991 and 1992 when similar to more liberal trip limits were in place. Fishers reported high encounter rates and a new stock assessment indicated a much higher ABC for 1994. No additional management action was taken. In April, southern Oregon fishers requested the Council change the rule prohibiting any fishing north of the Coos Bay management line once a given vessel has achieved the northern yellowtail rockfish limit for a given cumulative period because it restricted their ability to pursue other fishing strategies (e.g., deepwater complex) north of the line. The change from a two-week to four-week cumulative period for the deepwater complex eased the situation for these fishers somewhat. The Council chose not to take action in April to change the current yellowtail rockfish regulation language, but agreed to include yellowtail rockfish line management as an agenda item for managing the 1994 trawl fishery.

Widow rockfish harvest reached the 7,000 mt harvest guideline about November 6. Although the Council stated its intention in September to allow the fishery to continue, it responded to the unanticipated surge in landings by imposing a 3,000 pound trip limit beginning December 1.

On September 4, 1992, NMFS approved Amendment 6 (license limitation) to the FMP. It was announced that beginning in January 1994 only vessels acquiring limited entry permits would continue to be allowed to fish groundfish trawl, longline and fishpot gear under the limited entry quota and regulation system. Longline and fishpot vessels without permits, along with all other gears (except trawl), would be allowed to continue fishing in an open access fishery. NMFS set up an administration office and announced that applications for limited entry would need to be received by June 30, 1993. Because of unavoidable delays in setting up an administrative office and distributing applications, NMFS extended the application period (through an announcement on September 20) to October 15, 1993 to be consistent with the six-month application period specified in the amendment. At its April and September meetings, the Council reviewed a NMFS proposal for a fishing power formula that would govern the combining of smaller vessel permits into single permits for larger vessels. There was substantial discussion regarding the potential impact on catcher-processors larger than 200 feet.

1994 Fishery

The ABCs for 1994 were approved by the Council at the November 15-19, 1993 meeting held in Millbrae, California (Table 20). A harvest guideline or quota may be established for any species needing attention under the framework procedures established by Amendment 4. For 1994, the Council set harvest guidelines for bocaccio, Dover sole, jack mackerel, lingcod, Pacific ocean perch, sablefish, Sebastes complex (northern area), Sebastes complex (southern area), shortbelly rockfish, thornyheads, widow rockfish, yellowtail rockfish (north of Cape Lookout), yellowtail rockfish (south of Cape Lookout) and Pacific whiting.

Harvest guidelines were set equal to the respective ABCs and applied coastwide with the following exceptions: (1) the 1,540 mt harvest guideline for bocaccio applied only to the Eureka, Monterey and Conception areas; (2) the 16,900 mt coastwide harvest guideline and 5,000 mt Columbia area harvest guideline for Dover sole were both set 1,000 mt above the respective ABCs with the intent to "step down" from the recent catch level of approximately 8,000 mt to the 4,000 mt ABC for the Columbia area; (3) as in 1992-1993, a 1,550 mt harvest guideline was set for Pacific ocean perch to account for bycatch even though the ABC continued to be zero; (4) the 7,000 mt sablefish harvest guideline was applied only to the Vancouver through Monterey areas; an additional ABC of 425 mt was applied to the Conception area but no harvest guideline was set; (5) northern and southern Sebastes complex harvest guidelines were created with 13,240 mt applied to the Columbia and Vancouver areas (northern harvest guideline), and 13,440 mt applied to the Eureka through Conception areas (southern harvest guideline); (6) the thornyhead combined

species harvest guideline of 6,440 mt was set lower than the 7,000 mt 1993 harvest guideline to account for an 8 percent discard factor and applied only to the Monterey, Eureka and Columbia areas; (7) northern and southern yellowtail rockfish harvest guidelines were created with 4,160 mt applied to the Vancouver area and Columbia area north of Cape Lookout (northern harvest guideline), and 2,580 mt applied to Columbia area south of Cape Lookout and Eureka areas (southern harvest guideline); and (8) the 260,000 mt harvest guideline for Pacific whiting represented 80 percent of the 325,000 mt coastwide ABC which included the Canadian area.

Implementation of the license limitation program on January 1 began substantial changes in the groundfish fishery. Annual harvest guidelines were allocated between the limited entry fleet and the open access fleet (Table 21), and separate trip limits were established for each sector. Because the permit combination criteria (for upgrading to larger vessels) were not yet in effect, the size endorsement requirement was delayed until mid-April, just in time for the at-sea whiting fishery. No factory trawl vessels initially qualified for "A" permits, but seven vessels purchased and combined enough smaller permits so they could fish during the 1994 whiting season. This reduced the total number of trawl permits to about 300, not enough to cause a significant improvement to the trawl trip limits. The Council expanded the use of cumulative landing limits by eliminating biweekly options and applying the limits to calendar months for 1994.

The following trip limits for the limited entry fishery were in effect during 1994:

1. Pacific ocean perch continued with a per trip limit of 3,000 pounds or 20 percent of the legal groundfish on board, whichever was less.

2. On January 1, the cumulative limit per calendar month for Sebastes complex (including bocaccio and yellowtail rockfish) was set at 80,000 pounds coastwide, of which no more than 14,000 pounds could be yellowtail rockfish north of Cape Lookout, Oregon (45°20'15" N latitude); no more than 30,000 pounds could be yellowtail rockfish south of Cape Lookout; and no more than 30,000 pounds could be bocaccio south of Cape Mendocino, California (40°30'00" N latitude).

   State fishery agencies implemented a Cape Lookout declaration procedure endorsed by the Council to accommodate vessels that fished both north and south of Cape Lookout. Declarations identified trips that involved fishing or transiting the area both north and south of Cape Lookout, and all such trips for a given vessel were restricted to the 14,000 pound northern yellowtail rockfish cumulative limit. On September 1, the cumulative limit south of Cape Mendocino was increased to 100,000 pounds per month.

3. Beginning January 1, the cumulative calendar month DTS complex (previously called the deepwater complex and defined as including Dover sole, sablefish and thornyheads) limit was 50,000 pounds coastwide of which no more than 12,000 pounds could be trawl-caught sablefish and no more than 30,000 pounds could be thornyheads. In any landing, no more than 5,000 pounds of sablefish could be smaller than 22 inches (total length). High thornyhead prices attracted much greater effort than anticipated, and on July 1, the DTS limit was reduced to 30,000 pounds, of which no more than 6,000 pounds could be trawl-caught sablefish and 8,000 pounds could be thornyheads. Landings of both species are expected to reach the harvest guideline near the end of the year.

4. The cumulative calendar month widow rockfish limit was set at 30,000 pounds. A 3,000 pound trip limit was anticipated to take effect November 1.

5. A Pacific whiting per trip limit of 10,000 pounds for shore-based vessels was applied prior to the regular season and is intended to apply following the close of the season.

6. A nontrawl sablefish daily per trip limit of 250 pounds was in effect before and after the open season which began May 15.

7. The black rockfish per trip limit for commercial fishing vessels using hook-and-line gear in Washington between the U.S. border and Cape Alava, and between Destruction Island and Leadbetter Point, was 100 pounds or 30 percent by weight of all fish on board (including salmon), whichever was greater.

   The Council approved a regulatory amendment to establish a black rockfish per trip limit of 200 pounds or 65 fish, whichever was greater, for all commercial fishing vessels (except trawl) fishing for any species in specified zones off Oregon. Although the federal regulation was not implemented, the Oregon Fish and Wildlife Commission made this limit effective inside state waters beginning August 1, 1994.

   The restricted black rockfish zones in Oregon state waters were:

   a. Tillamook Head (45°56'45" N latitude) to Cape Lookout (45°20'15" N latitude)

   b. Cascade Head (45°03'50" N latitude) to Cape Perpetua (44°18' N latitude)

   c. 43°30' N latitude to 43°10' N latitude

   d. Mack Arch (42°13'40" N latitude) to the Oregon-California border (42°00' N latitude)

      Beginning January 1, the recreational bag limit for rockfish in Oregon was changed to create a sub-bag limit of 10 black rockfish. The new limit is 15 rockfish of which no more than 10 may be black rockfish.

Open access trip limits were established for rockfish (including Sebastes complex, bocaccio, Pacific ocean perch, shortbelly rockfish, thornyheads, yellowtail rockfish and widow rockfish), sablefish, and, in certain cases, "all groundfish." Separate trip limits were established for pink shrimp trawl gear, spot and ridgeback prawn fisheries, and California halibut and sea cucumber trawl fisheries. No open access trip limit may exceed a limited entry trip limit. The open access trip limits established were:

1. For rockfish (all gears except shrimp trawl and all fisheries except spot and ridgeback prawn, California halibut and sea cucumber), the per trip limit was set at 10,000 pounds and the cumulative calendar month limit was set at 40,000 pounds. On May 1, the 10,000 pound per trip rockfish limit was removed from the California setnet fishery. This action was taken in an effort to reduce discard in that fishery.

2. For sablefish (all gears except shrimp trawl and all fisheries except spot and ridgeback prawn, California halibut and sea cucumber), the daily per trip limit was set at 250 pounds for the Vancouver through Monterey areas and 350 pounds for the Conception area.

3. For pink shrimp gear, the per trip limit for all groundfish species was set at 1,500 pounds per day of fishing.

4. For the spot and ridgeback prawn fisheries, the per trip limit for all groundfish was set at 1,000 pounds per trip.

5. For the California halibut and sea cucumber trawl fisheries, which were classified as non-groundfish trawl fisheries (exempt), an all groundfish bycatch trip limit was set at 500 pounds.

The Cape Lookout declaration procedures proved to be unnecessary in some situations and overly burdensome in others. Accordingly, the Council endorsed several changes recommended by the states which did not jeopardize the intent of requiring declarations. These changes were: (1) vessels originating trips north of Cape Lookout no longer were required to file declarations as long as the cumulative monthly yellowtail rockfish catch did not exceed the cumulative northern yellowtail rockfish limit of 14,000 pounds;

(2) vessels operating in the pink shrimp fishery, and vessels operating in the shore-based Pacific whiting fishery under an experimental fishing permit, were exempt from declaration requirements as long as they did not exceed the northern cumulative yellowtail rockfish limit was not exceeded; and (3) the 12-hour waiting period was removed and filing declarations via mail or facsimile was allowed.

Pacific whiting fishery salmon bycatch restrictions were implemented as emergency regulations during 1992 and as permanent regulations during 1993; therefore, they applied during 1994. These restrictions were:

a. No processing at sea south of 42°00' N latitude.

b. No fishing for whiting at night (midnight to one-half hour after official sunrise) south of 42°00' N latitude.

c. No fishing for whiting shoreward of 100 fathoms in the Eureka area (43°00' to 40°30' N latitude) except for a small 10,000 pound trip limit to accommodate bycatch and bait fisheries.

d. No fishing for whiting in the Columbia River and Klamath River salmon conservation zones.

On April 8, NMFS approved the Council's proposal to allocate Pacific whiting between onshore and offshore processors during 1994-1996. Under this allocation framework, all vessels would compete for the first 60 percent of each year's Pacific whiting harvest guideline. When this amount was taken, further at-sea processing would be suspended and the remaining 40 percent reserved for catcher vessels delivering to shore-based processors. Any unused portion of the shore-based reserve would be made available for at-sea processing later in the year.

The shore-based Pacific whiting season began March 1 off California and opened April 15 for at-sea processing and shore-based processing (north of California). At-sea processing was suspended on May 13, when 60 percent of the harvest guideline (156,000 mt) was projected to have been reached. A decision to release a portion of the remaining shore-based harvest guideline was delayed from mid-August until October 1 due to uncertainty about how much shore-based processors would utilize. On October 1, NMFS released 16,000 mt for at-sea processing, leaving 22,000 mt for shore-based operations.

For a third year, an observation program to monitor salmon bycatch in the shore-based whiting fishery was conducted under an EFP. The observation program and EFP included provisions to deliver unrestricted catches of other species (e.g., widow and yellowtail rockfish), specifying that bycatch exceeding cumulative groundfish trip limits would be forfeited to the states. Preliminary results from this year's program are the generally consistent with results from the previous two years. Initial salmon bycatch rates during April and May approached the 0.5 salmon per mt of whiting catch level, but by the end of the season all three years (1992-1994) cumulative salmon bycatch rates were approximately 0.1 salmon per mt of whiting. Another notable result is the occurrence of fairly high yellowtail rockfish bycatch in the northern portion of the fishery (Astoria north) during the later part of the season (August and September). Cumulative yellowtail rockfish bycatch rates have ranged from 1.7 to 11.8 pounds of yellowtail rockfish per mt of whiting.

During 1992 and 1993, the nontrawl unrestricted sablefish season opened on May 12 and lasted 15 and 21 days respectively. With the implementation of groundfish limited entry, there were high expectations for a longer season (perhaps an additional week) because vessels without fishpot or longline endorsements could not participate in the unrestricted season. Rumors of vessels purchasing additional gear appear to have been confirmed by a shorter season of only 20 days. The season opened May 15 and closed at 0001 hours June 4 with the nontrawl harvest guideline exceeded by about 500 mt.

Agency scientists and managers met with industry members at a series of workshops held during late January through April.

Participants discussed ways of improving communications, ways to collect and utilize additional information from the fleet, and developed recommendations for four pilot projects to implement the ideas as quickly as possible:

1. Conduct a "mini" observer program of the deepwater bottom trawl fishery with a focus on trip limit inducted discard and discard mortality.

2. Implement industry port sampling. For example, processors voluntarily conduct yellowtail rockfish species composition sampling which then creates time for agency port samplers to pursue other sampling tasks.

3. Design an enhanced logbook which could be used in conjunction with observer information to calculate bycatch and discard rates. Information such as average weight by species, fishing strategy, gear deployment etc. would also provide valuable information. Implement use of this logbook on a voluntary basis first.

4. Create an informal state-level groundfish advisory board which concentrates on moving fishery information in both directions. The views and observations of a larger segment of industry could be facilitated, results of scientific or management analysis could be presented and critiqued by industry, and overall the process could foster a sense of working together. Each state "board" would be attended by the state's GMT representative and at least one Groundfish Advisory Subpanel representative to provide an official avenue into the Council process.

1995 Fishery

The acceptable biological catches (ABCs) and harvest guidelines for 1995 were approved by the Council at the October 24-28, 1994 meeting held in Millbrae, California (Table 22). For 1995, 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), and Dover sole (coastwide and the Columbia area). In addition, the Council established a harvest guideline for canary rockfish and separate harvest guidelines for shortspine thornyhead and longspine thornyhead. Open access allocations are shown in Table 23.

Harvest guidelines for Dover sole, Sebastes complex, yellowtail rockfish, canary rockfish and sablefish were set below their ABCs to account for anticipated discard resulting from trip limit management. For Pacific whiting, the Council set the U.S. harvest guideline at 80 percent of the total ABC that includes Canada. For sablefish, the ABC was increased slightly to 8,700 mt north of the Conception area. The Council initially set the harvest guideline at 7,100 mt, equal to the ABC north of the Conception area, minus 900 mt for discard, minus 700 mt projected to be taken in excess of the 1994 ABC. However, after the October Council meeting it was recognized that landings would not exceed the ABC by the expected amount, so the Council revised the harvest guideline upward to 7,800 mt, effective May 1, 1995. The Pacific ocean perch harvest guideline was again set above the ABC, which remained at zero. The harvest guideline was reduced from 1,500 mt to 1,300 mt to account for anticipated discard. For the two thornyhead species, the Council decided to establish separate harvest guidelines. In the past this was considered impractical due to the difficulty in distinguishing the two species, which are very similar in appearance. However, preliminary efforts by the trawl industry and processors in late 1994 indicated that most fishers are able to distinguish the species fairly easily with a minimum of training. This provided an opportunity to protect the less abundant shortspine thornyhead without overly restricting longspine thornyhead landings. The Council set the shortspine thornyhead harvest guideline at 1,500 mt, which is 50 percent above the ABC but below the overfishing level of about 1,700 mt. This was done in part due to uncertainties in the stock assessment and in part to allow greater harvest of longspine thornyhead. The longspine thornyhead harvest guideline was set at 6,000 mt, below the 7,000 mt ABC to protect shortspines which are often unavoidable bycatch of longspines.

The license limitation program that took effect in 1994 continued in 1995. The initial and revised 1995 trip limits for the limited entry and open access sectors of the industry are provided in Table 7. One particular problem for the Council and industry was management of the Dover sole, thornyheads, and trawl-caught sablefish (DTS) complex. The rate of thornyhead landings increased substantially in 1993 and 1994 due to increased exvessel value of the two species and reduced opportunities for other species. Sablefish prices remained high also, making Dover sole the least valuable component of the complex. Different cumulative monthly limits for the complex were set north and south of Cape Mendocino, California (35,000 pounds north and 50,000 pounds south), and separate coastwide limits for the two thornyhead species were established. Therefore, for the first time regulations required sorting of all four species. Beginning in January, trawl-caught sablefish was managed under a monthly cumulative limit of 6,000 pounds (with a per trip limit of 1,000 pound or 1/3 of the Dover sole and thornyheads, whichever is greater). At the April meeting, the Council increased the trawl-caught sablefish monthly limit to 7,000 pounds cumulative in conjunction with increasing the harvest guideline to 7,800 mt, effective May 1. On July 14, 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 was removed. The thornyhead limits in effect January 1 (20,000 pounds per month total, of which not more than 4,000 pounds could be shortspine) were set to encourage vessels to fish deeper, where shortspine thornyhead are relatively less abundant than longspine thornyhead. (Best sources of species composition information indicated that vessels fishing deeper than 500 fathoms encounter much higher ratios of longspine thornyhead relative to shortspine along some areas of the coast. Taking this into consideration, it was believed that the catch of shortspine thornyhead could be reduced to 20 percent of the thornyhead catch coastwide.) Landings of thornyheads escalated rapidly in February, and in March the Council took action to slow the fishery by advising the northwest region of the NMFS to adjust the trip limits downward. Rather than proposing specific amounts, the Council advised the agency to consult with the GMT, Groundfish Advisory Subpanel members, and others in the groundfish industry. A conference call was conducted March 14, resulting in a reduction in the trip limits for the two species effective April 1. The new limit was 15,000 pounds cumulative, of which not more than 3,000 pounds could be shortspine thornyhead. The ratio of shortspines in the landings remained about 21-25 percent through July, but the total landings were about 150 to 200 mt per month, above the 120 mt per month required for a year round fishery. In June, the GMT projected that both the harvest guideline and the overfishing level would be exceeded unless landings were slowed substantially. However, the Council declined to reduce the trip limit because they believed a cumulative limit below 3,000 pounds would only increase discard with little reduction in actual catch of shortspine thornyhead. Instead, they encouraged the industry to try to avoid shortspine thornyhead. At the August meeting the GMT reported the landings rate was unchanged and the overfishing level would be hit by late October. The Council responded by reducing the cumulative monthly limit for the two thornyheads to 8,000 pounds, of which not more than 1,500 pounds could be shortspine thornyhead. They also advised the industry that closure of the fishery late in the year was likely. Concerns over increased shortspine thornyhead discard were expressed. At the October meeting, the GMT reported the shortspine thornyhead harvest guideline had been reached about September 20 and the overfishing level was likely reached in October. In addition, the GMt noted the sablefish harvest guideline was projected to be reached at the end of November and the longspine thornyhead harvest guideline in mid-December. After a lengthy debate and substantial public testimony, the Council decided to allow the fishery to continue through the end of November, at which time further landings of thornyheads and trawl-caught sablefish were prohibited for the remainder of the year. Dover sole landings were limited to no more than 3,000 pounds per vessel for December, and the Council announced that thornyhead limits would be reduced substantially in 1996 to avoid a repeat of the situation. However, the Council noted the 1996 fishery would likely not last longer than 10 months.

Canary rockfish was identified as a species of concern when trawlers reported substantially lower encounter rates in 1993 and 1994. The 1994 stock assessment confirmed the decline and the Council reduced the ABC 65 percent, from 2,400 mt in 1994 to 1,000 mt in 1995. A restrictive harvest guideline of 850 mt and a cumulative monthly trip limit of 6,000 pounds were established in January, 1995. Landing rates were lower than expected throughout the first half of the year and the cumulative limit was increased to 9,000 pounds on August 1. Landings rates of other rockfish species were lower than previous years, and monthly limits were increased during the season: May 1 for yellowtail rockfish, and July 14 for widow rockfish. Landings rates of these species remained relatively low through September.

Lingcod was added to the list of species with trip and size limits in 1995 in order to keep landings from exceeding the reduced harvest guideline. In the areas south of Cape Falcon, Oregon, the GMT recommended and the Council adopted ABCs that were 63 percent of the average catch during 1989-1993. This 63 percent is the proportional reduction in catch (from 1989-1993 average levels) for the area north of Cape Falcon. A coastwide harvest guideline was established equal to the sum of the ABCs, and a cumulative monthly limit of 20,000 pounds for all commercial gears was established. The Council also adopted a 22-inch minimum size limit for all commercial and recreational gears. On May 1, conversion factors were established for lingcod landed head off or headed-and-gutted. On August 1, a 100 pound trip limit of lingcod smaller than 22 inches was established for trawl gear, intended to reduce discard of small dead fish.

Management of the limited entry fixed gear sablefish fishery was substantially different from previous years. In previous years, the Council had attempted to start the season concurrent with Alaska fisheries in order to reduce effort and thus stretch the season length. However, in 1995 Alaska went to an individual quota (IQ) fishery with a longer season. Thus vessels no longer had to choose between the two fisheries and effort in the West Coast "derby" fishery was expected to increase dramatically. The IQ season was scheduled to open March 1, and the West Coast fishery, which was set to precede that by 3 days, would have opened in late February. The fixed gear industry recommended the Council delay the West Coast opening date to August, a time when larger fish are more available, quality is better, and wind patterns along the entire coast are more uniformly calm. To help keep landings within the harvest guideline and as a compromise between large and small producers, the Council intended that the derby fishery be managed to take no more than 70 percent of the allocation. Because the season was expected to be the shortest ever, the GMT was instructed to estimate the number of days needed to reach the 70 percent limit. At the June meeting, the GMT presented data indicating that the 70 percent would likely be taken in 6 to 8 days; the Council recommended NMFS announce the fishery would last only 7 days, running from August 6-13. Another compromise was also implemented regarding fair start provisions. In recent years, the fishery was preceded by a three day closure, except that pot gear could be stored at sea during that period. Longline fishers claimed this allowed pot gear to preempt the best grounds and to get a head start. The new regulations required all groundfish fixed gear, including open access pot and longline gear, to be out of the water 72 hours prior to the opening, but allowed pots to be set 24 hours early. The season ending was also changed to noon, with the requirement that all vessels begin offloading by that time. The plan held the remaining 30 percent of the allocation in reserve for a mop up fishery to occur about 3 weeks later, using an equal cumulative monthly limit for all limited entry fixed gear vessels. The derby fishery took about 78 percent of the allocation, and the monthly limit for the mop up fishery was set at 5,500 pounds.

The Pacific whiting fishery was conducted under the 3-year allocation initiated in 1994. The most notable problem in 1995 was the unexpectedly large bycatch of salmon, primarily chinook. Shore-based vessels and those delivering to mothership processors had higher bycatch rates than factory trawlers, especially during the first 2 weeks of the season. As the season progressed, and after the at-sea fishery was closed, salmon bycatch declined to well-below the 0.05 chinook per metric ton of whiting guideline. In August, shore-based whiting fishers and processors, factory trawlers, and mothership representatives met with the agencies to discuss procedures to avoid salmon bycatch. There was a consensus that delaying the opening date to May 15 might help. The industry also agreed to hold a workshop prior to the 1996 season to develop communication protocols and a voluntary "code of conduct" for the fleet. (For more information on the 1995 season and salmon bycatch, see "Americanization of the Pacific Whiting Fishery".)

The Oregon Trawl Commission and ODFW began development of an at-sea data collection program to be conducted over three years in Oregon waters. Details of the program, which will include a federal experimental fishing permit (EFP), were developed throughout the spring and summer, and the program was expected to begin in the fall.

One major issue was related to data collection and assessment of the deepwater species (primarily Dover sole, sablefish and thornyheads). During the 1993 NMFS slope survey, a commercial trawl fisher was aboard to observe survey operations and raised concerns about function of the trawl gear, particularly the presence of mud and other bottom debris in the net, and questioned the validity of the survey methodology

and results. The NMFS survey experts conducted a series of gear and procedure tests during the 1994 survey to address those concerns. Additional concerns were raised about the validity of the stock assessments of the deepwater species, and the Council asked for an independent review of the stock assessment process, including use of slope survey data. In July of 1995, an international scientific panel evaluated the Council's stock assessment process, NMFS survey methodology, and the stock assessment model (the "stock synthesis" model) used to evaluate the condition of several important groundfish stocks. The panel endorsed the model but criticized the slope survey and assessments that relied heavily on data from those surveys. Several recommendations were forwarded to the Council in the panel's August report.

In the recreational fishery, focus continued on black rockfish. On May 1 Washington reduced the recreational bag limit to 10 rockfish. The federal bag limit was changed to match the limit in state waters.

1996 Fishery

The acceptable biological catches (ABCs) and harvest guidelines for 1996 were approved by the Council at the October 1995 meeting held in Portland, Oregon (Table 24), with the exception of Pacific whiting, for which the final ABC and harvest guideline were adopted at the March 1996 meeting. For 1996, 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 allocations were nearly identical to 1995, with the exception that the Council added shortspine thornyhead to the list of allocated species (Table 25). 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 in this category include Dover sole, Sebastes complex, yellowtail rockfish, canary rockfish, sablefish, and shortspine thornyhead. With the exception of POP, Dover sole, yellowtail rockfish north of Cape Falcon, Oregon, and the Sebastes complex in the Vancouver and Columbia management areas, each of the final harvest guidelines was the same as in 1995.

For the limited entry fishery, the Council established 2-month cumulative vessel limits for all species managed with "trip limits," with the target harvest level per month being 50 percent of the 2-month limit. However, the groundfish industry asked the Council to provide an overage allowance in cases when a vessel might inadvertently exceed the specified monthly limit. To accomplish this, limited entry vessels could land as much as 60 percent of the 2-month limit during either of the two month periods, so long as the total for the two months did not exceed the specified limit. (Open access vessels were limited to 50 percent per month.) The Council believed the combination of 2-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. The specified 2-month periods were January-February, March-April, May-June, July-August, September-October, and November-December.

Pacific ocean perch The POP harvest guideline was reduced to 750 mt, about 40 mt below the projected 1995 landed catch level and below the overfishing level. This reduced harvest guideline was intended to provide for unavoidable incidental catch while also acting for an incentive to continue to follow the pattern of reduced POP catch each year. The new stock assessment for POP indicated landings exceeded the overfishing level in recent years and contributed to keeping the stock at a low but steady size. The Council added Pacific ocean perch to the list of species managed with cumulative trip limits, setting the limit at 10,000 pounds per 2 months. The combination of reduced harvest guideline and 2-month cumulative vessel limit contributed to a rate of landings that would cause early closure, and at the June Council meeting, the GMT projected the harvest guideline would be reached about September 28. The Council reduced the cumulative limit to 8,000 pounds.

Sebastes Complex The yellowtail rockfish harvest guideline in the northern area was reduced to 3,600 mt by subtracting 570 mt for anticipated discards. This reduction also applied to the harvest guideline for the Sebastes complex in the northern area, which was reduced from 11,800 mt to 11,200 mt. For management

of the Sebastes complex north of Cape Lookout, Oregon (42°20'15" N latitude), the limit was 70,000 pounds per 2 months, including not more than 32,000 pounds of yellowtail rockfish and 18,000 pounds of canary rockfish. Between Cape Lookout and Cape Mendocino, California (40°30' N latitude), the Sebastes complex limit was 100,000 pounds, including not more than 70,000 pounds of yellowtail rockfish and 18,000 pounds of canary rockfish. South of Cape Mendocino, the Sebastes complex limit was 200,000 pounds, including not more than 18,000 pounds of canary rockfish and 60,000 pounds of bocaccio. At the June Council meeting, the GMT reported that yellowtail rockfish landings were projected to reach the harvest guideline north of Cape Lookout, Oregon by about October 26. The Council responded by reducing the 2-month cumulative limit in that area from 32,000 pounds to 20,000 pounds, effective September 1. The Sebastes complex limit remained unchanged during the September-October period. The Council also recommended that beginning November 1, monthly cumulative limits be established again for the Sebastes complex, canary rockfish, and yellowtail rockfish north of Cape Mendocino, California. The one-month cumulative were tentatively set at half the September-October levels, that is 35,000 pounds for the Sebastes complex, with not more than 10,000 pounds of yellowtail rockfish and not more than 9,000 pounds of canary rockfish. This change was intended to facilitate further adjustments for the months of November and/or December.

Pacific Whiting The Council delayed its final decision on the whiting ABC and harvest guideline pending results of the 1995 survey and completion of an addendum to the 1995 assessment. At the March 1996 meeting in Portland, Oregon, the Council recommended the final ABC be set at 265,000 mt, more than double the preliminary recommendation made the previous October. The 1995 NMFS survey generally confirmed the results of the 1992 survey. However, questions had been raised about the acoustic target strength factor used to convert relative abundance to a total biomass estimate. The assessment author reported there is some evidence that the conversion factor used in past years might result in a 42 percent overestimate of the biomass. Therefore, the Council decided to stay with the conservative exploitation policy (referred to as the "hybrid F, low exploitation rate" strategy) rather than returning to the moderate exploitation policy used in previous years. The harvest guideline was set at 212,000 mt, which was 80 percent of the ABC. Although the final harvest guideline was not be in effect until April, the shore-based fishery between the Oregon-California border and 40°30' N latitude was unaffected by the delay. That fishery opened as scheduled on March 1. The whiting trip limit for fishing before or after the regular season, and for fishing inside the 100 fathom contour in the Eureka area (40°30' - 43°00' N latitude), remained at 10,000 pounds.

In July 1995, the Makah Tribe of northwest Washington announced its intention to enter the Pacific whiting fishery in 1996, requesting a Council endorsement of 25,000 mt. However, the Council recommended that NMFS make no whiting allocation for treaty Indian fishing until a federal court has determined a treaty right to this and other groundfish species. NMFS announced the federal government believes the northwest Washington treaty tribes have fishing rights to all groundfish and established a process for determining a tribal entitlement. As part of the process, NMFS established a treaty Indian harvest guideline of 15,000 mt for 1996 only, leaving 197,000 mt for non-Indian fishers. Under the whiting allocation regulation, 118,000 mt was provided for the open fishery, which included both at-sea and shore-based activities, and 78,800 mt for vessels delivering to shore-based processors. The Council also adopted an industry proposal to delay the season opening date for the main whiting fishery to May 15 as a step towards avoiding high salmon bycatch.

The 60 percent allocation for the open fishery was projected to be reached June 1, at which time further at-sea processing was prohibited. Shore-based activities continued somewhat sporadically, inhibited by an abundance of small whiting mixed with large whiting in schools off Oregon and southern Washington. (The industry viewed this as an indication of strong recruitment of the 1994 year-class.) Price was reported to be low, further contributing to a lackluster season. The harvest guideline was projected to be reached September 11, at which time the 10,000 pound trip limit took effect for the remainder of the year.

Dover sole, thornyheads, and trawl-caught sablefish (DTS) complex The coastwide Dover sole harvest guideline was reduced from 13,600 mt to 11,050 mt, near the projected total 1995 landed harvest of 10,378 mt. The harvest guideline was calculated by adding the recent average landed catch levels for the

Vancouver and Monterey areas to the ABCs for the other areas and deducting 5 percent for anticipated discard. The Columbia area harvest guideline remained at 2,850 mt. The two thornyhead species were again managed under separate harvest guidelines in 1996. For shortspine thornyheads north of Point Conception the harvest guideline remained at 1,500 mt (1,320 mt when anticipated discard was subtracted), which is 50 percent above the ABC but below the overfishing level in order to allow greater harvest of longspine thornyheads (both species are usually caught together, but in varying proportions). The longspine harvest guideline remained at 6,000 mt, 1,000 mt below its ABC, to help prevent overharvest of shortspines. The sablefish ABC and harvest guideline were the same as 1995. Harvest by Washington treaty Indian tribes was set at 780 mt, 10 percent of the harvest guideline. This amount was taken "off the top" before any nontreaty allocations were established. All tribal harvest inside and outside the tribes' usual and accustomed fishing area north of Point Chehalis apply to this allocation.

Management of the DTS complex was similar to 1995; the Council continued the policy of separating the two thornyhead species, with a separate sublimit for sablefish also. The DTS cumulative limit was set at 70,000 pounds north of Cape Mendocino and 100,000 pounds south of Cape Mendocino, with not more than 12,000 pounds of sablefish, and not more than 20,000 pounds of thornyheads, of which not more than 4,000 pounds may be shortspines. Not more than 500 pounds of sablefish per trip may be smaller than 22 inches. When the Council set these limits at the October 1995 meeting, it noted that the proposed shortspine thornyhead and sablefish trip limits would probably not slow landings enough for a year-round fishery, and a closure during November-December, and possibly earlier, in 1996 would be likely. The GMT calculated the 2-month limit for shortspine thornyhead would need to be about 3,000 pounds to achieve even an 11-month fishery. To achieve the 1,500 mt harvest guideline in 12 months, landings (including estimated discards) would have to average 125 mt per month; under the 1995 monthly trip limit of 1,500 pounds, landings in September 1995 were about 122 mt, not including discards. However, it was Dover sole in the Columbia area that triggered inseason adjustment; at the June meeting, the GMT projected the harvest guideline would be reached about October 25, while thornyhead and sablefish were tracking well towards achieving a year-round fishery. The Council endorsed a GAP proposal that was intended to slow Dover sole landings without impacting the other species: a Dover sole sublimit of 38,000 pounds per two months was established. This was determined by subtracting the sablefish and thornyhead limits from the complex limit (i.e., 70,000 pounds minus 12,000 pounds of sablefish minus 20,000 pounds of thornyheads).

Widow rockfish The Council set the harvest guideline at 6,500 mt, the same as 1995. This was determined by subtracting 1,200 mt from the ABC to account for anticipated discards (this is a 16 percent discard factor). The cumulative vessel limit was set at 70,000 pounds per 2 months, with a recommended target of 35,000 pounds per month. This continued into effect until September 1, when the limit was reduced to 50,000 pounds. The reduction was implemented in response to the GMT projection that the harvest guideline would be reached about November 13. As with the Sebastes complex, the Council re-established one-month cumulative limits beginning November 1 with the monthly limit tentatively set at 25,000 pounds.

Lingcod The trip limit was again set at 40,000 pounds per 2 months, none smaller than 22 inches, except that trawl vessels could land up to 100 pounds of small lingcod per trip.

Nontrawl Sablefish The nontrawl sablefish fishery was again managed under a daily limit of 300 pounds north of 36° N latitude and 350 pounds south of 36° N latitude outside the derby and mop-up fisheries. The limit of sablefish smaller than 22 inches in length that may be landed during the derby and mop-up fisheries was revised slightly; in previous years, the limit was the greater of 1,500 pounds or 3 percent of the weight of all sablefish on board. For 1996, the limit on small fish was the greater of 1,500 pounds or 3 percent of the weight of all sablefish over 22 inches in length. This change was intended to simplify calculation and application of the 3 percent limit.

The limited entry fixed gear sablefish derby was set similar to 1995, except the opening date was delayed to September 1. The fishery was only 5 days, from noon September 1 through noon September 6. At the end of the derby, the GMT estimated that 86 percent (2,381 mt) of the limited entry nontrawl allocation

(2,754 mt) had been taken, exceeding the Council's target of 70 percent. Of the 373 mt remaining, the GMT expected 90-120 mt to be taken during the remainder of the year when the daily trip limit was in effect, leaving about 253-283 mt for a mop-up fishery. The mop-up fishery was scheduled for October 1-15, with a cumulative vessel limit of 3,400 pounds. During that period, open access vessels operating in the Conception area were also restricted to the limited entry limit (in the northern areas, open access vessels were constrained by the 2,100 pound monthly limit).

ECONOMIC STATUS OF THE WASHINGTON, OREGON, AND CALIFORNIA COMMERCIAL GROUNDFISH FISHERY IN 1995

This section briefly summarizes economic data presented in Appendix EC at the end of this document. Shoreside landings of groundfish decreased in 1995 by 1,474 mt to 134,038 mt, a decrease of 1.1 percent from 1994. At-sea whiting processors of whiting (factory trawlers and mothership processors) processed 99,803 mt, a decrease of 75,402 mt from 1994. As a result, the total commercial landings of groundfish taken from waters under federal jurisdiction decreased by 24.7 percent from 310,716 mt in 1994 to 233,840 mt in 1995. The value of shoreside landings, after adjusting for inflation, rose by 24.8 percent in 1995 to $86.5 million. The value to domestic mothership processors fell by 43.3 percent to $4.1 million, while the factory trawl value fell by 13.3 percent to $6.2 million, bringing the total value of West Coast landings of groundfish to $96.8 million, an increase of 15.6 percent from 1994. The increase in value despite decreased landings resulted from a general trend toward higher exvessel prices (after adjusting for inflation) and particularly sharp increases in the prices of sablefish, thornyheads, and Pacific whiting. Groundfish continued to be the most valuable commercial fishery on the West Coast, contributing 28.4 percent of the total exvessel value of marine fish species landed.

In the California shore-based fishery, groundfish landings increased by almost 15 percent to 28,390 mt after 5 successive years of decreases. Exvessel value jumped by almost 40 percent in 1995 to $34.1 million (unadjusted for inflation) for a record high value. Oregon landings fell slightly to 91,647 mt in spite of a small increase in whiting landings. Exvessel value in Oregon reached a new high of $37.8 million due to substantial price increases in whiting and other species. In Washington, the groundfish landings declined to 14,001 mt, the lowest point since at least 1979. The exvessel value, however, increased by more than 41 percent to $14.7 million due to price increases.

The number of vessels making groundfish landings declined between 1990 and 1995. The overall decline during that period for both trawlers and hook and line vessels was about 27 percent. Vessels landing groundfish with fishpot gear, on the other hand, increased by 13 percent from 1990 to 1992 and then decreased slightly from 1992 to 1995. The rate of decline in hook and line vessels, and especially in trawl vessels, while fairly steady over the 6-year period, appears to have increased since the inception of the limited entry program in 1994. Since any individual vessel may make landings in several categories, some of the apparent decline may be due to increased specialization rather than to a decrease in the total number of vessels pursuing groundfish.

FOREIGN AND JOINT VENTURE FISHING

Two types of fishing operations involving foreign vessels have been conducted off Washington, Oregon, and northern California since implementation of the Magnuson Fishery Conservation and Management Act (MFCMA) in 1977: the foreign trawl fishery (sometimes called the "directed fishery") in which fish are both caught and processed by foreign vessels, and the joint venture fishery, a domestic fishery in which U.S. trawl vessels deliver their catch to foreign processing vessels at sea. Foreign vessels are 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 have been managed according to the regulations at 50 CFR 663, the same as U.S. vessels delivering shoreside.

Consistent with the intent of the MFCMA to encourage development of domestic fisheries, joint venture and shore-based landings of whiting generally increased after 1978 (Table 26). Although shore-based deliveries of whiting grew during this period, they comprised less than five percent 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 percent 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 percent of the total whiting quota between 1978 and 1990 was landed. However, after 1989, more than 90 percent was taken annually.

Foreign performance is perhaps more meaningful when compared with domestic landings of *all* groundfish species (Figure 2), not just whiting. The last year of foreign domination of groundfish landings was 1979. After 1980, domestic landings (joint venture and U.S.-processed) annually contributed at least two thirds of the total groundfish landings, over 90 percent in 1982, 1983, 1984, and 1988. In 1985, due to the resurgence of the Polish directed fishery and diminished Soviet joint venture, about 70 percent of the total groundfish landings were made by domestic vessels. This percentage was maintained in 1986; although joint venture landings increased in 1986, foreign trawl landings also increased and shore-based landings declined, probably because U.S. fishers turned to the more lucrative shrimp fishery that year. The proportion of domestic landings of groundfish increased to 80 percent in 1987 and 93 percent in 1988. In 1989 and 1990, with no foreign trawl fishery for whiting, the groundfish fishery off Washington, Oregon, and California was 100 percent domestic, as intended by the authors of the MFCMA. 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 previously had concentrated on 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 percent) of the domestic landings of *all* groundfish species. However, in 1985, only 26 percent of the domestic groundfish landings were attributed to joint ventures. This decline occurred from reduced Soviet participation. (When the Soviets were "certified" by the 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 percent, 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 percent in 1983, 1984, and again in 1987. In 1988, the proportion increased to 54 percent, peaked at 68 percent in 1989, and dropped to 64 percent 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 two percent of the annual catch in the foreign trawl fishery, in 1980 when six percent were taken. In the joint venture, less than five percent 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 27). 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 1978–1990 average (one salmon per 9 mt of whiting).

Generally over 90 percent of the salmon taken in these fisheries were chinook. In the joint venture in 1990, 98 percent 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 percent 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 percent 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.

AMERICANIZATION OF THE PACIFIC WHITING FISHERY

The following summarizes activities in the Pacific whiting fishery since 1990, characterized most notably by the shift from foreign processing at sea (joint ventures) to U.S. processing (Figure 3), and the allocation of whiting among domestic user groups.

1990

In 1990, three domestic at-sea processing vessels (all catcher-processors) conducted exploratory fisheries late in the year to determine if Pacific whiting might provide a viable fishery for at-sea processing in the future. (Another at-sea processor operated briefly but was not targeting on whiting.) Approximately 4,713 mt were taken by the at-sea processing fleet, compared with 8,115 mt by shoreside processors, for a total of 12,828 mt processed domestically in 1990. An additional 170,972 mt of whiting were caught by U.S. fishers in joint venture operations (U.S. caught, foreign processed). There was no foreign fishery in 1990. Therefore, as in 1989, the entire whiting harvest was taken by U.S. fishers. About 94 percent of the whiting quota was taken in 1990.

1991

In 1991, interest in Pacific whiting by the domestic at-sea processing fleet (catcher-processors, motherships, and catcher vessels that deliver to motherships) was well established, resulting in elimination of the joint venture fishery and explicit allocation of the 228,000 mt quota among the domestic user groups. Behind the allocations was the fear by shore-based processors that they would be totally preempted by the high-capacity at-sea processing fleet. Shore-based processors also were concerned that they would lose their potential for expansion. The initial allocation in 1991 was: 104,000 mt for fishing vessels that process (catcher-processors), 88,000 mt for fishing vessels that do not process (whether delivering shoreside or to motherships at sea), with 36,000 mt held in reserve for later release. This allocation was adopted for 1991 only.

The whiting fishery started late in March. At-sea processors operated mostly from March to late May, leaving for the pollock "B" season which opened June 1 in Alaska. However, one catcher-processor and one mothership continued in the fishery for whiting off Washington, Oregon, and California. The allocation did not become final until late August, which enabled catcher-processors to exceed their allocation by about 13,000 mt (for a total of almost 117,000 mt) before leaving the fishery in early August. To make sure effort did not resume, further operations by catcher-processors were prohibited on August 28, 1991, immediately after the allocation became effective. Further processing at sea (by motherships) was prohibited on September 6, 1991, after taking almost 78,000 mt, to make sure adequate amounts of whiting remained for shore-based processing needs. Shoreside processors confirmed their intent to use 26,000 mt in 1991 (earlier in the year, they had thought they would need 36,000 mt), and an additional 7,000 mt surplus to shore-based needs was made available to mothership operations on November 17. Only about 4,000 mt was taken. This is in part due to bad weather that coincided with the release, and operational difficulties from catcher-processors trying to adapt to mothership operations by receiving codends from other vessels.

Eighteen at-sea processing vessels operated in the 1991 whiting fishery: 15 catcher-processors (one very briefly) and 3 motherships. In addition, 24 catcher vessels delivered to motherships. Catcher-processors caught 117,102 mt and catcher boats caught 79,803 mt for delivery to motherships, for a total of 196,905 mt of whiting processed at sea. (Over-the-side deliveries by catcher vessels to catcher-processors are counted as "mothership" deliveries.) Approximately 6,330 salmon were taken, resulting in

a ratio of 0.032 salmon per mt of whiting (or one salmon in 31 mt of whiting), well below the recommended level of 0.05. Approximately 2,048 mt (one percent) of all groundfish taken were bycatch, similar to levels seen in the joint venture fishery. NMFS-certified observers were on board all at-sea processing vessels to monitor catches in the whiting fishery.

Catcher vessels delivering to shore-based processors caught approximately 20,600 mt in 1991. Therefore, a total of 217,505 mt (95 percent) of the 228,000 mt quota was caught and processed domestically in 1991.

Note: Catch figures in this section may differ from those found elsewhere in this document. The catch data in this section include approximately 13,000 mt of whiting discarded from at-sea processors in 1991. These discards were counted against the allocations and quota. There is no estimate for discards from catcher vessels delivering shoreside or to at-sea processors.

1992

In 1992 as in 1991, whiting was not made available for foreign or joint venture operations because domestic processors were capable and interested in taking the entire harvest guideline (208,800 mt). Whiting again was allocated between user groups, but the user groups were defined differently. Instead of dividing the resource between vessels that process (catcher-processors) and vessels that don't (catcher vessels delivering to motherships and shore-based processors) as in 1991, the 1992 allocation distinguished between onshore and offshore processing operations (the latter combining motherships with catcher-processors). The 1992 allocation was implemented by an emergency regulation which was in effect from April 15 through October 14. The 1992 allocation initially limited the amount of the 208,800 mt whiting harvest guideline to 98,800 for at-sea processing, 80,000 mt for shoreside processing and the remaining 30,000 mt was set aside as a reserve.

A second emergency regulation (effective April 16 through October 19, 1992) was designed to minimize the bycatch of salmon and rockfish in the whiting fishery. This rule prohibited: (1) fishing for whiting between midnight and one-half hour after official sunrise; (2) fishing for whiting in the Columbia River and Klamath River salmon conservation zones; (3) at-sea processing operations south of 42° N latitude (the Oregon/California border); and (4) large-scale target fishing for whiting shoreward of the 100-fathom contour in the Eureka area, by allowing only small landings of 2,000 pounds per trip.

Twenty-one at-sea processors (12 that acted only as catcher-processors, 3 that acted only as motherships, and 6 that did both) participated in the spring fishery that lasted only 3 weeks, from April 15 through May 5, 1992. During this opening, 98,719 mt were taken by the at-sea processors. During this spring fishery, about 1,359 salmon were taken, for a ratio of 0.014 salmon per mt of whiting (or one salmon in 73 mt of whiting), much lower than in 1991. About 589 mt of groundfish species were taken as bycatch, less than one percent of the total catch, consistent with the rate in 1991 and during the last 7 years (1984-1990) of joint venture operations.

The 30,000 mt reserve was made available for at-sea processing on September 4, 1992 because shoreside processors had not used 48,000 mt (60 percent of their initial allocation) by September 1, 1992, as provided in the emergency rule. This second fishery for at-sea processors was closed on September 12, 1992 when the reserve was projected to have been reached. Seventeen at-sea processing vessels participated (14 that acted only as catcher-processors, 2 that acted only as motherships, and 1 that did both), taking about 28,123 mt of the 30,000 mt reserve.

The third opening for at-sea processors occurred on October 1 for the 24,000 mt determined to be surplus to shore-based processing needs, increasing the limit for at-sea processing to 152,800 mt. Fifteen at-sea processing vessels participated (11 that acted only as catcher-processors, 2 that acted only as motherships, and 2 that did both), and this fishery continued through October 7. During this opening, 25,606 mt was taken by the at-sea processing sector.

The emergency rule allocating whiting in 1992 expired on October 15. Nonetheless, fishing continued after the allocation limits expired. One catcher-processor and one mothership continued until October 21 when the 152,800 mt at-sea allocation was projected to be reached. Even though the emergency rule had expired and the at-sea fleet legally could have continued operating until the harvest guideline was reached, they agreed to stay within the limit announced under the emergency rule. Vessels delivering shoreside continued until October 31 when the harvest guideline was projected to be reached, at which time a 3,000 pound trip limit was imposed to accommodate incidental catches as well as small bait and fresh fish markets for whiting.

By year's end, 152,448 mt had been taken for at-sea processing (116,277 mt by catcher-processors and 36,172 mt by motherships), 73 percent of the whiting harvest guideline and slightly below the 152,800 mt limit for at-sea processing. Approximately 5,071 salmon were taken, resulting in a ratio of 0.033 salmon per mt of whiting (or one salmon in 30 mt of whiting), well below the recommended level of 0.05. Approximately 2,844 mt (1.8 percent) of all groundfish taken were bycatch, higher than the one percent level seen in 1991 and during the last seven years of the joint venture fishery. However, 855 mt were jack mackerel which is an underutilized species and usually much less prevalent. If jack mackerel were excluded, the bycatch of groundfish would have been much closer to historical levels. NMFS-certified observers were on board all at-sea processing vessels to monitor catches in the fishery.

Catcher vessels delivering shoreside caught approximately 56,127 mt in 1992, 27 percent of the whiting harvest guideline, and slightly above the final shoreside allocation of 56,000 mt. Bycatch of salmon in the shoreside fishery (covered under the experimental fishing permit that allowed salmon to be landed shoreside) was about 0.014 salmon per mt of whiting (or one salmon in about 70 mt of whiting). For the first time, observers were carried onboard whiting vessels delivering shoreside, primarily for the purpose of monitoring the bycatch of salmon in the shore-based fishery.

A total of 208,575 mt of whiting was harvested in 1992, virtually all of the 208,800 mt harvest guideline.

Note: Catch figures in this section may differ from those found elsewhere in this document. The catch data in this section include approximately 7,873 mt of whiting discarded from at-sea processors in 1992. These discards were counted against the allocations and harvest guideline. There is no 1992 estimate for discards made at sea by catcher vessels delivering shoreside or to at-sea processors.

1993

In 1993, whiting continued to be fully utilized by domestic catcher vessels and processors. As in 1992, the resource was allocated between at-sea and shoreside processing sectors. The season started on April 15. The first 112,000 mt of the 142,000 mt harvest guideline was to be taken in open competition ("olympic fishery"), with the remaining 30,000 mt to be held in reserve for shoreside processing. This assumed that vessels delivering shoreside would harvest about 12,000 mt during the olympic fishery, for a total of 42,000 mt for the year. When it became apparent that shoreside deliveries were substantially lower during the olympic fishery, an emergency rule was filed that prohibited processing at sea when 100,000 mt was taken by that sector. Therefore, 42,000 mt was guaranteed to be available for vessels delivering shoreside in 1993. The regulations also included a provision for releasing any unneeded portion of the shoreside allocation on September 1, to assure the harvest guideline would be fully utilized.

Eighteen at-sea processors (14 that acted as catcher-processors only, 2 that acted only as motherships, and 2 that did both) participated in the "regular" season that started on April 15. The 100,000 mt allocation was projected to be reached, and further at-sea processing was prohibited at noon on May 5. A total of 99,103 mt was taken by the at-sea fleet (84,588 mt by catcher-processors and 14,515 mt by mothership operations). About 8,373 salmon were taken, of which 4,843 were chinook salmon, for a ratio of 0.049 chinook salmon per mt of whiting (or 1 chinook per 20 mt of whiting). This was an unusual year in

that chinook salmon, which usually comprise more than 90 percent of the salmon bycatch, accounted for only 58 percent of the salmon bycatch in 1993. Most of the non-chinook species were pink salmon. About 595 mt of groundfish were taken as bycatch, less than one percent of the total groundfish catch, and similar to the rate in 1991 and during the last 7 years of the joint venture fishery.

Shore-based processors operated until September 4 when the remaining harvest guideline was projected to be reached. Shore-based landings were 42,108 mt in 1993, 30 percent of the total catch and slightly above the 42,000 mt shore-based allocation. Complete data on bycatch of groundfish and prohibited species in the shoreside whiting fishery were not available at the time this document was written.

In total, 141,211 mt of whiting were caught in 1993, over 99 percent of the 142,000 mt harvest guideline. In 1993 as in 1991 and 1992, NMFS-certified observers were on board all at-sea processors. Observers also were carried on board some whiting vessels delivering shoreside to monitor the bycatch of salmon and groundfish. In both the at-sea and experimental shore-based fishery, 40-60 percent of the hauls were observed.

Regulations to minimize bycatch, most notably of salmon, became effective on April 15, 1993. These regulations were much the same as those implemented by emergency rule in 1992 except at-sea processing at night was prohibited only south of 42° N latitude (not coastwide as in 1992) and the whiting fishery between 42° N latitude and 40°30' N latitude was allowed to begin earlier, on March 1, starting in 1994. As in 1992, fishing for whiting was prohibited in the Columbia River and Klamath River salmon conservation zones; at-sea processing of whiting was prohibited south of 42°N latitude (the Oregon-California border); and a small trip limit was imposed on the catch of whiting taken shoreward of the 100 fathom contour in the Eureka area (10,000 pounds per trip in 1993). In addition, whiting trip limits were established before and after the large-scale "regular" season to minimize 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 may differ from those found elsewhere in this document. The catch data in this section are preliminary and include approximately 3,295 mt of whiting discarded from at-sea processors in 1993. These discards were counted against the allocations and harvest guideline. There were virtually no discards from shore-based vessels participating in the 1993 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.

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 percent of the annual harvest guideline for shore-based processing after the first 60 percent 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 percent (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 that 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 1-5, 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 percent) for motherships, and 87,147 mt (49 percent) for catcher-processors). In 1994, deliveries to at-sea processors contained about 4,001 salmon, of which 3,626 (91 percent) were chinook salmon, for a ratio of 0.020 chinook salmon per mt of whiting (or 1 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 1978-1990 (Table 2) and two-thirds the 0.035 average rate for chinook salmon taken by the at-sea processing sector in 1991-1993. About 1,288 mt of groundfish were taken as bycatch by the at-sea processing fleet in 1994, 0.7 percent of the total catch in that fishery. This is about 60 percent of the average percentage in the joint venture (1.15 percent) and in the 1991-1993 at-sea processing fishery (1.22 percent).

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 percent of the 260,000 mt harvest guideline. In 1994 as in 1991-1993, 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 1992–1994, 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 percent of the annual harvest guideline for shore-based processing after the first 60 percent 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 percent (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: 9 catcher-processors and 8 motherships. The at-sea processing fleet took 102,159 mt of whiting: 61,571 mt (60 percent) by catcher-processors and 40,588 mt (40 percent) by the mothership fleet. In 1995, the at-sea processing fleet took about 15,992 salmon, of which 11,578 (72.4 percent) were chinook salmon, for a ratio of 0.113 chinook salmon per mt of whiting (or 1 chinook in 9 mt of whiting). This is similar to the 0.11 average rate for all salmon species taken in the joint venture in 1978–1990 (Table 23) and more than three times the 0.03 average rate for chinook salmon taken by the at-sea processing sector in 1991–1994. About 1,436 mt of groundfish were taken as bycatch by the at-sea processing fleet in 1995, 1.4 percent 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 percent) and in the 1991–1994 at-sea processing fishery (1.1 percent).

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 1991–1994, 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 1992–1995, 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 percent of the commercial harvest guideline (the annual harvest guideline minus the Tribal allocation) for shore-based processing after the first 60 percent 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 percent (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 at-sea processing fleet took 112,776 mt of whiting: 68,359 mt (61 percent) by catcher-processors and 44,416 mt (39 percent) by the mothership fleet. In 1996, the at-sea processing fleet took about 1,725 salmon, of which 1,446 (83.8 percent) were chinook salmon, for a ratio of 0.013 chinook salmon per mt of whiting (or 1 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 1978-1990 (Table 23), and about one-quarter of the 0.04 average rate for chinook salmon taken by the at-sea processing sector in 1991-1995. About 1,114 mt of groundfish were taken as bycatch by the at-sea processing fleet in 1996, 1.0 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 percent) and in the 1991-1995 at-sea processing fishery (1.1 percent).

In 1996, virtually the entire 212,000 mt harvest guideline is expected to be taken: 112,776 mt at sea, approximately 84,000 mt shoreside, and approximately 15,000 mt by the treaty fishery. (Not all data were available at the time this document was written.) In 1996 as in 1991-1995, NMFS-certified observers were on board all at-sea processors. The whiting shoreside fishery was monitored by observing about 12 percent of the vessels during offloading. Regulations in effect in 1993-1995 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.

FINAL GROUNDFISH MANAGEMENT TEAM ABC RECOMMENDATIONS FOR 1997

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, Fisheries Analysis and Monitoring Division of NMFS.

In 1996, the Council adopted an expanded stock assessment review process intended to provide an opportunity for increased and earlier public participation and to expand and formalize scientific peer review. A first step in implementation of this new process was a workshop to review preliminary stock assessment documents, the assessment models and data. Over 20 scientists and several industry representatives attended this week long workshop, which was held in June in Newport, Oregon. An assessment "lead reviewer" and a rapporteur were assigned for each assessment to summarize the discussions, record any conclusions and instructions to the authors, and to develop a consensus statement for the group regarding the best scientific information available. Each lead reviewer worked with the assessment author(s) to ensure the stock assessments would be ready for GMT review at its July meeting. Prior to the GMT meeting, a summary of the review group's findings and suggestions was made available.

The GMT reviewed revised stock assessments at its July 15–18 meeting. A GMT lead reviewer was appointed for each assessment to lead the discussion for developing the preliminary ABC recommendation. Another GMT member was assigned to take notes on the ABC discussion and to lead the harvest guideline discussion. Each lead reviewer reported the status of the assessment and whether the author(s) fully responded to the review group's suggestions. Next, the SSC groundfish subcommittee reported its view regarding whether the document was complete enough to move forward. The author(s) then presented their revised assessment and how they had addressed the review group's comments and concerns. Five assessments were presented for review by the GMT – Pacific whiting, bocaccio, canary rockfish, yellowtail rockfish, and the offshore Sebastes complex. The GMT recommended preliminary ABC and harvest guidelines for each assessment; in most cases the harvest guideline was a range rather than a single point in order to describe the uncertainty of the survey biomass estimates. Harvest guideline were restricted so they would not exceed the overfishing level ($F_{20\%}$); where necessary, the upper end of the range was set at that level. The "preferred" harvest guideline was also identified. In some cases, the preliminary harvest guideline recommendations were for total catch because the GMT could not address anticipated discard levels until trip limit and other management measures have been proposed.

The GMT reviewed the final versions of the stock assessments at its September meeting and developed its final ABC recommendations (Table 28). In addition, comparison of maximum sustainable yield (MSY), ABC, landings, stock conditions and abundance trends for various groundfish stocks are summarized in Table 29. Final ABCs and resultant management measures for 1997 will be adopted by the Council in October of 1996. Following is a synopsis of ABC estimates 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.

GENERAL FEATURES

Assessment Model

Assessments of West Coast groundfish stocks have generally been conducted through use of stock synthesis.[3/] This tool 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 survey data that can be examined. Perhaps more importantly, synthesis provides a bridge between strictly biomass-based models (such as Stock Reduction Analysis) and strictly age-structured models (such as 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 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.

Exploitation Rate

The GMT generally recommends that a fixed fraction of the exploitable stock 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. This standard level of exploitation is labeled $F_{35\%}$, and is the fishing mortality rate that would reduce average egg production per female to 35 percent of its unfished level (Figure 4). This standard was reviewed in the analysis for the overfishing definition (fishery management plan Amendment 5). $F_{35\%}$ is intended as a proxy for the harvest rate that may produce MSY, F_{msy}, and it replaces other standards such as $F_{0.1}$. The shortcoming of $F_{0.1}$ is that it examines only the marginal increase in yield per recruit as fishing mortality is increased and can cause large decreases in spawning biomass if fish recruit to the fishery before they become mature (e.g., trawl-caught sablefish). The problem with F_{msy} is that it is tightly linked to an assumed level of density-dependence in recruitment. For no stock do we have sufficient information to determine the level of density-dependence in recruitment. $F_{35\%}$ strikes a balance between obtaining a large fraction of the MSY if recruitment is highly insensitive to reductions in spawning biomass, and preventing a rapid depletion in stock abundance if recruitment is found to be extremely sensitive to reductions in spawning biomass.

The long-term expected yield under an $F_{35\%}$ policy depends upon the unknown level of density-dependence in recruitment (Figure 5). The recommended level of harvest will reduce the average, lifetime egg production by each female entering the stock to 35 percent of the lifetime egg production for females that are unfished. If this reduction in total egg production causes no reduction in recruitment, the long-term average female spawning stock level will be 35 percent of its unfished level and a large long-term average yield will be obtained. However, if the reduction in total egg production causes some reduction in average recruitment, future female spawning stock levels will be less than 35 percent of the virgin level and future yields will be reduced as well. Thus, the expected, long-term average level of female spawning biomass, relative to the virgin level, is between 35 percent on the upper end and probably no lower than about 25 percent on the lower end. In some cases, MSY is calculated under the assumption that recruitment declines to 90 percent as spawning biomass is fished down to 50 percent of its virgin 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

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3/ 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.

abundance is high (i.e., near its average unfished level), short-term annual yields can be approximately two to three times greater than the expected long-term average annual yield. For many of the long-lived groundfish species common on the West Coast, this "fishing down" transition can take decades. Many of the declines in ABC that occurred during the 1980s were the result of this transition from a lightly exploited, high abundance stock level to a fully exploited, moderately abundant stock level.

Some of the 1996 assessment documents reference $F_{40\%}$ or $F_{45\%}$ harvest rates as alternatives to $F_{35\%}$. Recent scientific literature suggests that long-lived (rockfish) species, especially those with highly variable recruitment, are very likely to fare better under an F strategy in the 40-45 percent range than $F_{35\%}$, the Council's current harvest policy. The GMT considered these alternative harvest strategies when presented, but declined to endorse them at this time. The GMT believes a full review of the potential merits and pitfalls of alternative harvest policies should be conducted before a new policy is adopted and intends to review harvest policy alternatives at its February 1997 meeting

Discard Mortality

Stock assessments must account for total mortality in order to be accurate. The GMT's recommendations on dealing with discard mortality were submitted to the Council in April 1990. Discards of commercial species are usually related to fish size, lack of immediate market (e.g., bycatch in the at-sea whiting fishery), and trip limits. Trip limits cause discard when a fisher catches more than an intended amount when making a targeted tow, and when bycatch occurs after a species' monthly cumulative limit has already been taken. Generally, the recommended harvest guideline is set below the ABC to account for the expected discard. However, discarded bycatch in the whiting fishery is always counted towards the harvest guideline inseason because this source of discard is measured accurately and is variable from year to year. Assumed levels of discard in other fisheries are generally based on field observations[4/] but there is no monitoring to verify the current level of discard. The measured level of discard for widow rockfish was 16 percent of landed catch annually in 1985-1987, and this level is used for all rockfish fisheries constrained by trip limits, except a lower level of 8 percent is used for the deep water fishery for thornyheads. The discard rate in the trawl sablefish fishery is set at 20 percent of the total trawl catch. The discard rate of Dover sole is set at 5 percent of the landed catch.

ROUNDFISH

Pacific Whiting

The GMT reviewed a new stock assessment of Pacific whiting that was based on results of the stock synthesis model applied to data from the U.S. fishery, the Canadian fishery, NMFS acoustic surveys, NMFS triennial bottom trawl surveys, and Canadian Department of Fisheries and Oceans acoustic surveys. Substantive changes in the current assessment model from previous versions include: (1) the implementation of a single area model, (2) modeling the fisheries in the U.S. zone as a single combined fishery that displays time-varying selectivity, (3) the addition of the 1995 NMFS acoustic survey results and catch-at-age data for the U.S. and Canadian fisheries in 1995, and (4) a change in the target strength that is used to calibrate the acoustic surveys.

Biomass estimates from the acoustic survey for the 1977-89 period were re-estimated, due to the limited geographic coverage of these surveys. Deep water and northern expansion factors were used to scale up total acoustic back scatter. The revised acoustic biomass time series during this period averaged 31 percent higher than the original, even though use of the new "20 log L-68" target strength relationship tends to reduce biomass estimates by about 20 percent from previous values.

4/ 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.

Projections for the 1995–1997 period indicate that population biomass will range between 1.4–1.8 million mt. Application of the hybrid fishing mortality (F) harvest strategy to Pacific whiting population biomass was evaluated under low, moderate, and high exploitation rates. The hybrid F harvest strategy uses a constant F strategy when female spawning biomass is above the mean level, and a variable F strategy when female spawning biomass is below the mean. This has been the Council's preferred harvest strategy since 1991. The GMT selected the moderate harvest rate option because deepwater and northern expansion factors were verified by data gathered during the 1995 acoustic survey. This represents a change from the last few years, when the low harvest rate option was adopted due to uncertainty associated with the 1992 acoustic survey results. Additional data were presented by the assessment author that the 1994 year class is large, which was strongly supported by statements from industry representatives. Consequently, yield projections were calculated based on the assumption that the 1994 year class is equal to the median recruitment of recent years, as well as the more favorable supposition that it is equal to the 75th percentile of recruitment over the 1972–1995 period. To further bracket model uncertainty, the GMT requested that the author prepare a projection based on a highly optimistic view of the 1994 year class. An analysis was subsequently conducted that assumed the 1994 year class is equal to the 87.5 percentile of historical recruitment.

The GMT reviewed the projected ABCs resulting from these three scenarios, which amounted to 241,000 mt for a median 1994 recruitment, 336,000 mt for a 75th percentile recruitment, and 400,000 mt for an 87.5 percentile recruitment. The GMT discussed a number of factors that argue in favor of a conservative approach to selecting a final ABC for Pacific whiting. These included: (1) waiting an additional year to verify the strength of the 1994 year class will not result in an appreciable lost opportunity to harvest this cohort, as it will continue to increase in biomass through 1998, (2) past errors in identifying the strength of partially recruited whiting year classes (e.g., 1993) have required a lowering of ABC, (3) it is possible that the elevated abundance of the 1994 cohort observed in the fishery this year is at least partially due to a northern shift in the distribution of 2-yr-old fish, a position supported by Canadian scientists, (4) stability in landings could be fostered by distributing the harvest of strong year classes over several years, and (5) higher landings of Pacific whiting will increase the overall bycatch of yellowtail rockfish at a time when that fishery is facing a major reduction in ABC.

Given these considerations, the GMT recommends a final ABC of 290,000 mt for the U.S. and Canada combined. This specific recommendation represents a compromise between the first and second recruitment scenarios and amounts to a 25,000 mt increase from the 1996 ABC (265,000 mt).

Sablefish

On the basis of a stock assessment conducted in 1994, the GMT recommended the ABC (for landed catch plus about 900 mt of discard) be increased to 8,700 mt for the Monterey through U.S.–Vancouver management areas. The Conception area was explicitly excluded because of the smaller size-at-age and delayed maturity in that area. An ABC of 425 mt is recommended for the Conception area (including Morro Bay) on the basis of average annual landings since 1985. The GMT continues to support these ABCs.

The sablefish stock in the Monterey through U.S.–Vancouver management areas was assessed in 1994 through application of the synthesis model to fishery size and age composition data from 1986–1993 and trawl and pot survey data. Pot surveys conducted during 1979–1991 indicate a substantial decline in sablefish abundance, especially for medium and large fish in the 225 to 450 fathom depth zone. No pot surveys have been conducted since 1991. Slope trawl surveys during 1990–1993 have measured the biomass in the 100 to 700 fathom depth zone between Pt. Conception and the U.S.–Canada border to be 61,409 mt, which represents approximately the age-2+ biomass with a reduced availability for the larger females. Survey biomass in the Monterey through Vancouver areas was estimated to be about 51,000 mt. The triennial shelf trawl survey in 1992 measured a record high 55,021 mt of young sablefish in the 30 to 200 fathom depth zone of the Monterey through Vancouver management areas.

The synthesis model was configured to explore tradeoffs in fitting the biomass levels measured in the slope trawl surveys, the trend in numbers of sablefish in the pot survey, and the trend in recruitments from the shelf trawl surveys. No conventional model scenario could be found that fit all well. The slope trawl surveys indicate that about 30 percent of the biomass is in waters deeper than 500 fathoms, and all sources of information indicate that sablefish in these deep waters are old. A preliminary model with an emigration rate of about 3 percent per year, beginning at about age-4, from the <500 fathom depth zone to the >500 fathom depth zone can explain this pattern. When this emigration rate is incorporated as an extra amount of natural mortality in a model of only the <500 fathom portion of the stock, the model can achieve a reasonable fit to the decline in the pot survey while estimating that the catchability coefficient for the slope trawl survey (Q) is near 1.0 for 50 cm sablefish (medium and large sablefish would have a Q that is only 30 percent of this level). This result substantially narrows the range of plausible model results. Previously, values of slope Q near 2.0 were necessary to fit the trend in the pot survey.

An optimistic model scenario indicated that the slope trawl survey has a Q of 0.53 (relative to the Monterey through Vancouver biomass of 51,000 mt), fit trends in the shelf trawl surveys and the fishery size and age-composition data well, but provided a degraded fit to the trend in the pot survey, even in the shallow zone model with enhanced mortality. This scenario indicated that fishing mortality over the past eight years was close to the target level of $F_{35\%}$ (7.5 percent exploitation rate on the age-2+ biomass) and that the female spawning biomass recently increased to slightly above its long-term target level. Under this scenario, the annual catch plus discard could be 11,107 mt during 1995-1998, and long-term average catch may be 8,535 mt. A pessimistic model scenario had a slope survey Q of 0.94 and provided a reasonable fit to the trend of the pot survey if migration to deep water is accounted for. This scenario indicated that harvests during 1986-1992 were nearly at the overfishing level, that spawning biomass during 1990-1993 was nearly stable at a level below the target, and that annual catch plus discard at $F_{35\%}$ should decline to 6,281 mt during 1995-1998 and MSY may be 7,216 mt. Under an intermediate scenario (Q=0.68) the annual total catch could be 8,689 mt during 1995-1998 and long-term average catch may be 7,831 mt.

A 1995 external review of stock assessments for slope species was critical of the gear performance in the slope trawl survey and concerned over the low quantity of survey data. The review committee recommended an investigation into the utility of fishery logbook data, continuation of the sablefish pot survey, improved characterization of uncertainty in the stock assessments, and a precautionary approach to management until more definitive stock assessments can be performed. The GMT noted that the sablefish assessment already makes use of the trend in the pot survey and it discounts the slope trawl survey by concluding that the catchability for that survey is less than 1.0. Therefore, the GMT does not recommend any change in the sablefish ABC for 1997. Under the three-year assessment cycle, the GMT has scheduled the next assessment of the sablefish stock in 1997.

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 at the highest catch of record. The coastwide catch reported by the Pacific Coast Fisheries Information Network (PacFIN) shows a steady decline each year since then to only 505 mt in 1995. 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 1994, the GMT recommended a reduction in the lingcod ABC on the basis of new stock assessments conducted in 1994. In the area between Cape Falcon, Oregon and 49° N latitude off Vancouver Island, Canada, a comprehensive assessment based on fishery and survey data from 1979-1993 indicated that this stock has been heavily exploited by the U.S. and Canadian fisheries. The population biomass in this area was estimated to be 13,765 mt based on the synthesis model fit to trends in fishery effort, relative

abundance in a nearshore tagging survey, and relative abundance in the NMFS triennial trawl survey. The average yield of 2,736 mt during 1989–1993 is just below the overfishing level. Application of an $F_{35\%}$ fishing mortality rate in 1995–1997 indicates that total U.S. plus Canada catch should be reduced to 1,800 mt in the assessment area.

The GMT recommended that the potential yield for the U.S. portion of the assessment area be set at 900 mt based on 50 percent of the calculated $F_{35\%}$ yield (52 percent of 1989–1993 landings in this area were from U.S.). Canadian catch has averaged 1,320 mt during 1989–1993 and we understand that their ABC has been increased to 2,100 mt. Thus, Canadian catch alone could exceed the $F_{35\%}$ yield level for both nations in 1995. International coordination on assessment and management of this species is necessary. In the areas south of Cape Falcon, Oregon, the GMT recommended setting the ABCs at 63 percent of the average catch during 1989–1993 where 63 percent is the proportional reduction in catch (from 1989–1993 average levels) recommended for the area north of Cape Falcon. In the portion of the Columbia area south of Cape Falcon, the ABC contribution would be 288 mt (63 percent of the 457 mt average commercial catch for 1989–1993) plus 142 mt (63 percent of the 226 mt average recreational catch for 1985–1989). Based on the GMT's advice, the Council reduced the ABC for the combined Columbia and U.S.–Vancouver areas from 5,000 mt to 1,330 mt for combined commercial and recreational catch in 1995–1997. The U.S. commercial catch from this area was 1,446 mt in 1993. In addition, approximately 200 mt of recreational catch occurs annually.

Port sampling of lingcod was extended to Oregon and California in 1992 and provides information on the biological characteristics of the catch in 1992 and 1993. In the Monterey through Columbia areas, the commercial catch is dominated by age–2 through age–4 fish and about 50 percent of the females are immature. The size composition is shifted to smaller sizes than were observed in limited samples from the 1978–1983 period. Although the triennial trawl surveys do not exhibit a noticeable decline until 1992, there is concern that the young mean age in the catch indicates a substantial level of fishing mortality. The previous ABC levels in the Eureka, Monterey, and Conception areas were 500, 1,100, and 400 mt, respectively. Commercial catch from 1989–1993 and recreational catch from 1985–1989 have averaged:

Area	Commercial	Recreational	63 percent of total
Eureka	272 mt	196 mt	294 mt
Monterey	635 mt	510 mt	721 mt
Conception	50 mt	150 mt	126 mt

In 1994, the Council adopted the GMT recommendation to reduce the ABCs to 1,300 mt for the Vancouver and Columbia areas combined, 300 mt for the Eureka area, 700 mt for the Monterey area, and 100 mt for the Conception area. The GMT continues to support these ABCs.

Jack Mackerel

The jack mackerel ABC was revised in 1990. Available data indicated that the current, nearly unfished spawning biomass is about 1.4 million mt, the natural mortality rate is in the range of 0.1 to 0.2, a fishery located north of 39° N latitude would harvest fish that are mostly older than age–16, and the long–term potential yield for this age range is 19,000 mt. The GMT recommends continuation of the 52,600 mt ABC on the basis of a constant exploitation rate (equal to natural mortality) applied to estimates of current biomass of ages 16+. Biomass and short–term yield are expected to slowly decline under this level of exploitation. If this level of exploitation reduces long–term biomass to approximately 30 to 50 percent of the current biomass, the long–term average yields for this age range would be near 19,000 mt. The GMT recommends close tracking of this fishery, especially with regard to catches outside the exclusive economic zone (EEZ) and to the age composition of the harvested fish.

ROCKFISH OTHER THAN SEBASTES COMPLEX

Pacific Ocean Perch

The GMT reviewed a new stock assessment in 1995 and recommended the Pacific ocean perch ABC in the Columbia-Vancouver areas remain at zero in order to continue the rebuilding program established in 1981. This stock was depleted by foreign fishing activities during the 1960s and early 1970s. The average 1989-1993 landed catch of 1,246 mt exceeded the level of overfishing and probably has inhibited rebuilding of this stock. The 1994 landed catch was reduced to 953 mt and the catch in 1995 was about 850 mt. The stock's current potential egg production is only about 15 percent of the expected unfished level and less than 50 percent of the target level. Stock projections under random average recruitment scenarios indicate that the current abundance is lower than any expected under a $F_{35\%}$ exploitation rate. The degree to which the low level of spawner abundance inhibits attainment of random average recruitment levels is not known. Maintaining the stock at this low level increases the risk of further stock collapse if a long series of poor recruitments occur. Rebuilding of the Pacific ocean perch stock to its target level of abundance would result in doubling the current biomass. This will be a slow process unless there is a fortuitous sequence of large recruitments. A rebuilt Pacific ocean perch stock will support an average annual harvest of about 1,000 mt. Thus the rebuilding plan might be restated as: a decrease in annual catch to much below the recent 1,200 mt level in order to encourage stock rebuilding, so that a similar level of catch can be obtained in the long-term while fishing at a lower and safer exploitation rate.

The 1996 Sebastes complex assessment included an estimate of the Pacific ocean perch population size in the southern areas. The estimate is based on the assumptions that the NMFS triennial shelf survey for groundfish provides a valid relative index of abundance for this species and that fishing mortality (F) = natural mortality (M) is a reasonable harvest policy for Pacific ocean perch. The assessment suggests that an ABC of 20 mt is appropriate for this stock.

Shortbelly Rockfish

The potential yield of shortbelly rockfish was last examined in 1989. Shortbelly rockfish remains an unexploited stock at present, thus is difficult to quantitatively assess. The extremes of the MSY estimates from two alternative yield calculations were 13,900-47,000 mt, and a value of 23,500 mt is the midpoint of recently revised estimates.[5/] In addition, the short-term yield of an unexploited stock may be about three times as high as the long-term potential yield (MSY). The GMT recommends continuation of the 23,500 mt ABC and the harvest guideline in the 13,000-23,500 mt range until more is known about this stock.

Widow Rockfish

In 1994 the ABC for landed catch of widow rockfish was reduced from 7,000 to 6,500 mt based on the stock assessment conducted in 1993. For 1995, the GMT recommended revising the ABC to 7,700 mt for total catch to account for expected discard with the harvest guideline set lower. This approach was continued in 1996 and the GMT recommends the same ABC for 1997. The GMT has scheduled the next widow rockfish assessment in 1997.

The 1993 assessment used the stock synthesis model to analyze fishery age composition data from 1980-1991. In this assessment, fishery data are stratified into midwater and bottom trawl components, north (Vancouver and Columbia) and south (Eureka through Conception) areas, and male and female data are kept separate. More importantly, the bycatch of widow rockfish in the at-sea Pacific whiting fishery is introduced as an index of widow rockfish abundance. Previous assessments relied solely on trends in the fishery age composition.

5/ Pearson, D.E., J.E. Hightower, and J.T.H. Chan. 1991. Age, growth, and potential yield for shortbelly rockfish *Sebastes jordani*. Fish. Bull., U.S. 402-409.

The model achieved its best fit to the data at essentially the same stock abundance level as the previous assessment. The stock in 1994 was estimated to be at 76,000 mt, about one-third of the stock level in 1980 and near the long-term average level that is expected under the $F_{35\%}$ level of exploitation. If recent recruitments remain near the average level, stock abundance is expected to remain nearly constant under 1994-1996 annual harvests of 8,150 mt (7,000 mt landed). However, a plausible alternative with lower stock abundance and recent recruitments at a lower, median level would support only a 5,000 mt landed catch during 1994-1996.

Thornyhead Rockfish

The GMT recommends no change in the ABCs for the two thornyhead species in 1997. In 1995, the GMT recommended that single species ABC levels be reduced from 1,900 to 1,000 mt for shortspine thornyheads and from 10,100 to 7,000 mt for longspine thornyheads on the basis of the 1994 stock assessment. The GMT continues to endorse these ABC levels, which apply to the entire area between Pt. Conception (34°30' N latitude) in the south and the U.S.-Canada border in the north. In 1993 the landed catch in the Monterey, Eureka, and Columbia areas combined was 7,024 mt and the total West Coast catch was 9,044 mt. Shortspine thornyheads constituted 41 percent of the coastwide landed catch in 1993, following a low of 32 percent in 1991. The 1994 assessment documented two significant changes in the availability of information for thornyheads. First, the set of slope trawl surveys was extended to cover the entire area between Pt. Conception and the U.S.-Canada border. Analysis of these surveys indicated that biomass extrapolations necessary in the previous assessment resulted in an overestimate of coastwide biomass, especially for shortspine thornyheads. The estimate for shortspines declined from 97,000 mt survey biomass for the Monterey, Eureka, and Columbia areas combined to 28,000 mt in 1993. The estimate for longspines declined from 128,000 mt for the Monterey, Eureka, and Columbia areas to 84,000 mt in 1993. The second major change was in age validation for shortspine thornyheads. Radiometric examination of otoliths with ring counts near 147 indicate an age in the range of 50-100 years. This uncertainty in age determination introduces substantial uncertainty in estimates of natural mortality and growth rate.

The assessment used the synthesis model to examine the time series of fishery and survey data under a broad range of possible values for the important biological parameters. The great uncertainty in biological parameters forced an assumption of survey Q equal to 1.0. For longspine thornyheads, the best model fits occurred at M values near 0.10. The $F_{35\%}$ rate is 0.247 because only larger individuals are targeted, and the stock is still being fished down. The average yield during 1995-1997 can be approximately 7,000 mt while long-term yield may be closer to 5,000 mt. For shortspine thornyheads, examination of the data under a range of values for maximum size, growth rate, and natural mortality indicates that M probably is at least 0.07, but values above 0.10 would be inconsistent with the radiometric estimate of longevity. At M=0.07, the estimated $F_{35\%}$ rate is only 0.056 because this species continues to grow after it enters the fishery. This species is fully exploited and the female spawning biomass in 1994 is estimated to be at 27 percent of its initial level. Average yield during 1995-1997 can be 1,000 mt at the $F_{35\%}$ rate.

An external review of stock assessments for slope species was critical of the gear performance in the slope trawl survey and concerned over the low quantity of survey data. They recommended an investigation into the utility of fishery logbook data, improved characterization of uncertainty in the stock assessments, and a precautionary approach to management until more definitive stock assessments can be performed. They were particularly concerned about use of trend information obtained from the slope surveys and used in the thornyhead assessment. The 1995-1996 harvest guideline for shortspine thornyheads was set 50 percent higher than the ABC largely in acknowledgement of the uncertainty in the stock assessment. The GMT recommends continuation of this approach in 1997. The GMT has scheduled a new assessment of the thornyhead stock in 1997.

SEBASTES COMPLEX

Bocaccio

The 1996 bocaccio assessment utilized a stock synthesis model which had the same basic structure as in the previous assessment. The model was length-based with separate sexes. Consideration of the stock was restricted to the Conception, Monterey, and Eureka statistical areas, and the stock was harvested by four separate fisheries: trawl, set net, hook-and-line, and recreational. Indices used previously included the triennial survey and a recreational effort index.

Several additional sources of information were added to the model in the 1996 assessment. Two new indices of abundance were developed, a CalCOFI larval index of spawning biomass and a midwater trawl survey index of year-class strength. Catches for the four fisheries were reconstructed back to 1950. The 1977 triennial survey biomass index was added to the model after adjusting it to be comparable to the depth range of the later years. All sources of data were made current, with length compositions available to 1994 for the commercial fisheries, and to 1995 for the recreational fishery and triennial survey. The new model was structured to cover the period from 1969-1996.

The data were classified into three tiers based on evaluation of their relative reliability. The primary data used to estimate growth, year-class strength, and population trend included the trawl and recreational size compositions and the four indices. Some year-to-year changes in selectivity for the trawl and recreational fisheries were allowed in fitting the model.

The authors state that it is unlikely that the current stock size is greater than 17 to 20 percent of the 1970 level. The authors of the previous assessment also indicated concern about the stock and suggested a more conservative ABC than was finally adopted. As in the prior assessment, model results suggested a high degree of uncertainty in the absolute value of the current stock size. Several ways of estimating this uncertainty were explored in this assessment, but all methods were thought to underestimate the uncertainty because of model mis-specification issues. The model fitting resulted in low estimates of recruitments in recent years, but estimates in the final years of the model are based on a limited amount of information.

Yield projections were made using the model selected by the authors as providing the best fit to the primary data. It was assumed that future recruitments will have about the same magnitude and variability as estimated for the period 1969-1996. The 1997 estimate of yield at the $F_{35\%}$ level was 270 mt. This level was selected by the GMT and the Council as the preliminary ABC for the three year period 1997-1999. The final GMT ABC recommendation is 265 mt, which is the 1997-1999 average estimate of yields at the $F_{35\%}$ level as presented in the final assessment document.

Canary Rockfish

The canary rockfish resource in the Vancouver and Columbia areas was assessed in 1996 using the same modeling approach and basic data as in the previous 1994 assessment. The assessment treated canary rockfish inhabiting the Columbia and U.S.-Vancouver areas as a single stock harvested by two fisheries. The age-structured version of the stock synthesis model was utilized and the age and length composition data were separated by sex. Data from the previous assessment were revised and recent data were added to the model. The additional data included catch and age compositions for 1994 and 1995 and estimates of biomass and length composition from the 1995 NMFS trawl survey. A 15 percent discard rate was applied to the 1995 landings in recognition of the implementation of a canary rockfish trip limit.

The participants in the Groundfish Stock Assessment Workshop decided that two scenarios were plausible explanations for the absence of older females in the data, and two models were put forward to address these two scenarios. The first scenario assumes old female canary rockfish are alive but not caught by the fishery. Model 1 addresses this scenario by using constant natural mortality and domed selectivity curves. The second scenario is that there are no older females, that natural mortality increases as they age, and all are dead. Model 2 addresses this scenario by using age-dependent natural mortality for females and

asymptotic selectivity curves. For both models, annual recruitment for 1993 to 1995 was forced to conform to the downward linear trend in the recruitment estimates for 1987–1992. The data indicate the possible presence of strong 1993 and 1994 recruitments, but there are not enough years of data to accurately estimate the size of the recruitments in the last years of the model.

Model 2 (that assumes most older females die) produces an estimate of the 1995 spawning biomass which is only 18 percent of the 1967 value. Model 1 estimates that the 1995 spawning biomass is 33 percent of the 1967 value. Both models predict yield and spawning biomass levels will decline during 1997–1999, with Model 1 predicting a greater decline. For both models combined, the average catch projection for the next three years is 1,220 mt when average recruitment is assumed. The GMT recommends 1,220 mt be the 1997 ABC for the U.S. Vancouver and Columbia areas combined.

Chilipepper Rockfish

The GMT recommends no change in 1997. The ABC for chilipepper rockfish was increased from 3,600-4,000 mt in 1994 on the basis of an assessment conducted in 1993. Most catch comes from the Conception, Monterey, and Eureka areas. The catch in 1991 was 3,906 mt. Catch in 1992 fell to 2,895 mt, and in 1993 to 1995 continued to all to a range of about 1,300 mt to 1,800 mt.

The 1993 assessment used synthesis to analyze size composition data from the four fisheries, age composition from the trawl fishery, and trends in relative abundance indicated by CPUE in the triennial bottom trawl survey and in the recreational fishery. Both trend indicators showed an increase in 1988-1989, and the 1992 trawl survey value was double the level observed in 1980, 1983, and 1986. The analysis indicated that this increase was due to a very strong 1984 year class and that the stock is now at a level above that expected under the recommended level of exploitation. With the best-fitting model, the estimated biomass in 1992 is 76,000 mt, the long-term average yield is in the range 4,988-6,516 mt, and the 1994-1996 average yield is 9,709 mt. With a more conservative scenario, the long-term average yield is in the 3,025 to 3,941 mt range and the 1994-1996 average yield is 4,919 mt.

Although even higher levels seem possible from the assessment result, the assessment author recommended caution and higher catches of chilipepper are likely to have increased bycatch of bocaccio which is at a low stock level.

Yellowtail Rockfish

The GMT reviewed a new stock assessment for yellowtail rockfish that included results from the 1995 triennial survey, in addition to new and revised data drawn from the commercial fishery. The assessment used stock synthesis to explore the plausibility of six different stock models. These models focused on different characterizations of fishery selectivity patterns over time, the emphasis factors assigned to trawl survey biomass and numbers-at-length, and constraints placed on recent exploitation rates. Asymptotic selectivity was assumed for the survey and fishery. While this assumption is consistent with the fact that few old female fish have been observed recently in either the fishery or the survey, the implications of an alternative dome-shaped selectivity hypothesis were not explored in the current assessment. The previous 1991 assessment estimated that yields would be 1.2-2 times higher under the assumption of dome-shaped selectivity, although the same increase in yields might not accompany imposing this assumption on the current model.

A retrospective analysis of biomass levels using the current preferred model was conducted, with data available from 1991 to 1996 progressively included in the model. This type of analysis can help us understand the dramatic change in ABC recommendations between this assessment and the assessment conducted in 1993. For the Eureka/South Columbia area, adding additional years of data increased the biomass estimates until 1995. Addition of the 1995 and 1996 data resulted in a substantial reduction in recent years biomass estimates. Recruitment in 1988 (1984 year class), which was previously estimated to be exceptionally strong, was reduced to 20 percent of it's former level when the 1995 data was added to the model. For the North Columbia area, biomass estimates were reduced with the addition of the 1993

and 1994 data, and then further reduced when the 1995 and 1996 data were added to the model. Estimates of the strength of the 1987 and 1988 recruitments, as well as earlier years' above average recruitments, were reduced with the additional data. The South Vancouver area model biomass estimates were not substantially changed with the retrospective analysis. In that area, the 1987 and 1988 recruitments had never been estimated to be higher than average. The previous assessment had indicated uncertainty regarding model selection for this area, and a wide range of ABC levels (250-4,300 mt) was recommended for the period 1994-1996.

The retrospective results from the southern areas underscores a concern that the assessment author expressed in his 1993 document. Yellowtail rockfish are estimated to take many years to be fully selected to the commercial gear, so many years of age composition data are necessary to accurately determine the strength of a year class. It may be advantageous to produce yearly updates of available age compositions to help reevaluate recruitment strength during the period between assessments and surveys.

Review of the fishery age-composition history reveals that, while sizable portions of the catch throughout the 1970s through mid-1980s were comprised of age 25+ fish, this component has all but disappeared from the current fishery. Additionally, there is no evidence of any strong incoming year-classes. Because the current stock structure appears to be comprised almost entirely of relatively young fish, the GMT is very concerned that the age of 50 percent maturity for this species occurs 3-4 years after the fish recruit to the fishery. This means that existing members of the population have a relatively high likelihood of being caught before they have an opportunity to contribute to building future biomass.

The two models (D and F) preferred by the stock assessment author were the basis for the GMT ABC recommendations. The more conservative model (D) in the three areas yielded exploitation rates higher than 20 percent and as high as 37 percent in all three areas from 1992-1993 to the present. These values are in sharp contrast to rates in the 5-10 percent range for most of the 1980s. Estimates of recruitment in 1992 and 1993, which were the last years estimated using actual data, were low in comparison to most other years. In the other model (F), constraints were placed upon exploitation rates during the last three years modeled (1992-1995) because the model calculates them to be abnormally high. This decreased the exploitation rates to a range of 15 to 25 percent during the period from 1993 to the present. Estimated recruitments used in both models for 1994-96 were drawn from the spawner recruit function, which yielded values that were considerably larger than observed values since 1990. Both models were also run including the assumed level of discard (DD and FD). Projections for the years 1997-1999 were based on a geometric mean of recruitments randomly selected from the last 10 years, which included values higher than those estimated in the last five years.

The GMT requested further analysis to assess the influence of the 1995 survey data (biomass estimates as well as biological data) on the sharp decline in biomass estimated in the present assessment. The retrospective analyses did not discriminate between 1995 survey data and 1995 fishery age composition data. In the further analyses , the more conservative model without discard (Model D) was used to explore the effects of removing the 1995 survey biomass estimate 1995 biomass and length compositions and only the 1995 length compositions.

Only the 1995 survey length compositions in the Eureka area were found to have a substantial effect in reducing the 1996 biomass estimates (22,511 to 3,561 mt) even though they were down weighted in the model. Those length compositions indicated a large amount of small fish (19-34 cm) in the survey catches. Since it was assumed that the available data were not sufficient to provide accurate estimates of the most recent year classes, the presence of those small fish could not be explained by estimation of larger than normal year classes. Instead, the trawl survey selectivity was adjusted so that a larger proportion of the young fish were selected by the survey gear. Survey selectivity was assumed to be constant over time, so that change in turn reduced the estimates of the sizes of the earlier year classes (fewer fish, but higher selectivity) and lowered the 1996 biomass estimate. If the recent year class(es) in the Eureka area are larger than predicted, this could change the 1996 biomass estimates.

The ABC recommendations are the range generated using the average (1997–99) $F_{35\%}$ level for the two models in the three independently assessed areas (Eureka and Columbia south of Cape Falcon, Columbia north of Cape Falcon, and Vancouver south of 49° N latitude in Canada) including estimated discard (models DD and FD).

Area	Previous ABC (mt)	1997–1999 ABC (mt) @ $F_{35\%}$	$F_{20\%}$
U.S. Vancouver (60 percent of S. Van. total)	1,190	289–454	449–690
North Columbia	2,970	380–984	610–1,526
Eureka–South Columbia	2,580	156–439	262–708
Total U.S. (north of Monterey)	6,740	825–1,877a/	1,321–2,924
Monterey–Conception	--	155b/	??
South Vancouver total (U.S. plus Canada)	--	481–756	748–1,150

a/ This is greater than the lower end of the overfishing range (1,321 mt).
b/ From Sebastes complex (remaining rockfish) assessment.

The sum of the ABCs north of the Monterey area and including the Canadian portion of the southern Vancouver area would be 1,017–2,179 mt (including discard, any tribal allocation, and 40 percent Canadian allocation in the South Vancouver area) with an associated overfishing range of 1,620–3,384 mt.

For consistency with the Sebastes complex north–south boundary, the GMT divided the yellowtail rockfish ABC for the south Columbia/Eureka area between the Eureka and Columbia areas. In past years, 300 mt of the south Columbia/Eureka ABC was apportioned to the Eureka area; the GMT recommends reducing this amount in proportion to the amount the 1997 ABC is reduced from the 1996 catch level. This apportionment would be 46 mt if the 825 mt ABC is adopted, up to 104 mt, if the 1,877 mt ABC is adopted. This would be combined with the Monterey–Conception ABC (155 mt) to form a new southern region yellowtail rockfish ABC of 201–259 mt.

Remaining Rockfish

Assessment of the Sebastes complex has been identified as a critical need in groundfish management. In the 1995 SAFE document, the GMT presented a methodology for assessing the remaining (unassessed) species in the Sebastes complex. In 1996, the GMT reviewed a stock assessment of selected species from the remaining Sebastes complex which utilized that methodology. The assessment was predicated on two assumptions, i.e., that fishing mortality (F) = natural mortality (M) is a reasonable harvest policy for rockfish, and that NMFS triennial shelf survey for groundfish provides a valid relative index of abundance for the most important rockfish species. Conversion of relative survey statistics to absolute estimates of biomass was conducted by specifying reasonable constraints on the catchability coefficient (Q) for each species. These constraints on Q were based on a variety of considerations, including each species': (1) depth range, (2) latitudinal range, (3) habitat, (4) size, (5) reproductive maturity schedule, and (5) prior assessment work. The assessment partially validated the approach by comparing results with a stock synthesis analysis of darkblotched rockfish. The GMT recognizes that the application of the F = M harvest policy to triennial survey statistics while invoking reasonable constraints on Q involves many untested assumptions, but that at the present time this represents the best available scientific information concerning the potential yields of species in this complex.

The assessment summarized the selected species by northern (Columbia and U.S.–Vancouver areas combined) and southern regions (Conception, Monterey, and Eureka areas combined). Estimates of species ABCs are presented for each region.

In the final Sebastes complex assessment document, the "other rockfish" category was defined as all species which were not specifically assessed. A single ABC for those species is proposed, set at the 1994 landed catch of those species (including those previously in the "unspecified rockfish" category). This differs from the approach proposed by the GMT and adopted by the Council in August, where two separate categories were proposed. The new single category reduces the northern area ABC for these species from 1,884 mt to 1,842 mt, and in the southern area from 4,762 to 3,968 mt. This category is referred to as "other rockfish" in the following tables.

To calculate the northern region total Sebastes complex ABC, the GMT added the ABCs for canary rockfish (Vancouver and Columbia areas), yellowtail rockfish (ranges for the three northern assessment areas), and the northern area ABCs for rockfish species identified in the Sebastes complex assessment, including "other rockfish." For consistency with the Sebastes complex north-south boundary, the GMT divided the yellowtail rockfish ABC for the south Columbia/Eureka area between the Eureka and Columbia areas. In past years, 300 mt of the south Columbia/Eureka ABC was apportioned to the Eureka area; the GMT recommends reducing this amount in proportion to the amount the 1997 ABC is reduced from the 1996 catch level. This apportionment would be 46 mt if the 825 mt ABC is adopted, up to 104 mt, if the 1,877 mt ABC is adopted. This would be combined with the Monterey-Conception ABC (155 mt) to form a new southern region yellowtail rockfish ABC of 201-259 mt.

For the southern region Sebastes ABC, the GMT added the ABCs for bocaccio (from the new southern area assessment), chilipepper (status quo from 1996), the apportionment of yellowtail rockfish from the South Columbia/Eureka area (46 to 104 mt), and the ABCs for rockfish species in the southern areas identified in the Sebastes complex assessment, including "other rockfish."

Calculation table to develop the total 1997 GMT recommendation for the northern Sebastes region.

NORTHERN AREA

Species	ABC (mt)
Darkblotched Rockfish	209
Splitnose Rockfish	274
Yellowmouth Rockfish	132
Redstripe Rockfish	768
Sharpchin Rockfish	398
Silvergray Rockfish	51
Yelloweye Rockfish	39
Bocaccio	424[a/]
Subtotal of assessed species	2,295
Other rockfish	1,842
Sebastes assessment ABC total	4,138
add canary rockfish	1,220
add yellowtail rockfish (Van/Col/Eur)	825-1,877
Subtotal northern Sebastes ABC	6,184-7,235
subtract Eureka yellowtail rockfish	(46-104)
Northern Sebastes ABC total	6,137-7,131

a/ Assumes natural mortality (M) = 0.15

Calculation table to develop the total 1997 GMT recommendation for the southern Sebastes region.

SOUTHERN AREA	
Species	ABC (mt)
Bank Rockfish	81
Darkblotched Rockfish	47
Splitnose Rockfish	868
Pacific Ocean Perch	20
Sharpchin Rockfish	71
Canary Rockfish	85
Yellowtail Rockfish	155[a/]
Subtotal of assessed species	1,327
Other rockfish	3,968
Sebastes assessment ABC total	5,295
add bocaccio	270
add chilipepper	4,000
add Eureka yellowtail rockfish	46-104
Southern Sebastes ABC total	9,611-9,669

a/ Monterey/Conception areas only.

Black Rockfish

An assessment of black rockfish off northern Oregon was conducted in 1993 using age composition and catch per unit of effort (CPUE) data from the recreational fishery during 1984-1991. The data were examined with cohort analysis, CAGEAN, and synthesis. The results indicated that the 1991 fishing mortality rate was half the $F_{35\%}$ level (cohort and synthesis) to near this level (CAGEAN). Although the results cannot be extrapolated to other areas to develop an ABC estimate, the assessment concluded that the fishery is impacting the stock in the northern Oregon area. Controls on fishing effort could reduce future declines in recreational CPUE in this area.

An assessment of black rockfish off Washington was conducted in 1994 using age composition data from the recreational, jig, and trawl fishery during 1980-1993 and CPUE data from the sport fishery (1984-1993) and from a nearshore jigging survey (1987-1990). Recent catch is dominated by the sport fishery (307 mt per year in 1991-1993) followed by the handline jig (80 mt), trawl (54 mt) and salmon troll (47 mt). The synthesis model fit to available data indicates that the biomass in 1994 is 7,460-9,283 mt and that the female potential egg production in 1994 is about 43 percent of its unfished level. The assessment indicates that expected long-term yield under a $F_{45\%}$ strategy would produce about 500 mt per year while a $F_{35\%}$ strategy would produce about 600 mt per year but result in lower biomass and, potentially, lower CPUE for the recreational fishery. The GMT did not recommend establishment of an ABC in the past because catches were slightly below the levels of potential yield calculated in the assessment. However, the 1995 catch reported in the remaining rockfish assessment is approximately 700 mt, which is 200 mt above the $F_{45\%}$ harvest rate. In 1997, the GMT will re-evaluate the need for an ABC and closer management attention.

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 1987-1992 and no trend in triennial bottom trawl survey CPUE during 1977-1992, 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 percent of the U.S. catch in 1992.

Dover Sole

In consideration of the recent review of the stock assessment by the external panel and the SSC, the GMT recommended using the 1995 assessment in conjunction with recent 1991-1994 average catch history to set an appropriate 1996 ABC range. This approach resulted in a recommendation to reduce the Monterey area ABC from 5,000 mt to a range of 3,164 mt-4,363 mt. In the same fashion, the U.S.-Vancouver area ABC was reduced from 2,400 mt to a range of 818 mt-1,565 mt and the coastwide ABC to a range of 10,882 - 12,828 mt. The GMT continues to endorse this approach for 1997.

An external review of stock assessments for slope species was critical of the gear performance in the slope trawl survey and concerned over the low quantity of survey data. They recommended an investigation into the utility of fishery logbook data, improved characterization of uncertainty in the stock assessments, and a precautionary approach to management until more definitive stock assessments can be performed. The GMT has acknowledged the concerns raised by the reviewers, but the GMT has not recommend changing the ABC levels for Dover sole in the Eureka and Columbia areas until an extensive, coastwide examination of Dover sole fishery and survey data can be conducted. That review is scheduled for 1997.

In the 1994 assessment, size and age composition data from the Eureka and Columbia areas were analyzed by stock synthesis. The analyses for each area were conducted independently because tag return data indicate little movement of adult Dover sole between these areas. The fishery data are influenced by changing market conditions and by changing depth distribution of the fishing effort. In each area, separate fishery selectivities were estimated for several time periods to track these changes. In both areas, the model was run at various levels of initial biomass to generate a range of fits to the biomass measured in the slope trawl surveys. Runs with the slope survey catchability (observed slope survey abundance divided by the population biomass after survey selectivities are applied) between 0.5 (high population biomass) and 1.0 (lower population biomass) were taken as a plausible range of biomass levels.

In the Eureka area, the results with survey Q at 0.59 indicated that the biomass has declined to a low level because of declining recruitment. Female spawning biomass was estimated to be only 18 percent of its unfished level. Catch has declined from 5,000-6,000 mt during the early 1980s to only 3,062 mt in 1993. These catches have been near the $F_{35\%}$ exploitation level for this declining stock, and a further reduction to 2,900 mt was recommended for 1995. If recruitments return to historical average levels, then a long-term average yield of 6,000 mt may be possible.

In the Columbia area, the stock appears to have been near equilibrium during the late 1970s at an average annual catch of 2,020 mt. Then the biomass declined as the catch increased to a peak of 9,000 mt in 1989 and declined to 5,600 mt in 1992-1993. The best model fits occurred at a survey Q level of at least 1.0 (survey overestimates biomass). At survey Q = 1.0, the model indicated that harvest during the past 6 years has been at the overfishing level, and that the annual catch needs to decline from 5,600 mt in 1992-1993 to only 1,670 mt in 1995. The GMT recommended a less conservative approach because it is unlikely that the survey Q is greater than 1.0, especially because the survey did not extend nearshore of 100 fathoms. An optimistic, but unlikely, assessment with survey Q = 0.48 and an ABC of 3,700 mt could be considered as a risky, upper end estimate. At an intermediate level (survey Q = 0.59, same as in the Eureka area) the yield in 1995 could be about 3,000 mt and the long-term potential yield may be 3,600 mt. An ABC of 3,000 mt may be a realistic upper end, and 1,700 mt would provide cautious management of Dover sole in the Columbia area. The Council selected the upper end of 3,000 mt for the 1995 Columbia area ABC.

In the 1995 assessment, size and age composition data from the U.S.-Vancouver area and the Monterey area north of 38°55' N latitude were analyzed by stock synthesis. The model configurations were essentially identical to those used in the 1994 analysis of the Eureka and Columbia areas. However, the less complete time series of size and age-composition data lead to use of constant recruitment through the time series. In the northern Monterey area, the best model fits occurred at biomass levels that implied a slope survey Q = 0.49. In the U.S.-Vancouver area, the best fit was at Q = 0.64. Model results were not tightly peaked at these Q values so model runs with Q = 0.6 were used as part of the recommended ABC range in order to be more consistent with results from the Eureka and Columbia areas. With Q = 0.6 in the northern Monterey area, the female spawning biomass is estimated to be 38 percent above its target level and the 1996 ABC would be 2,210 mt at an $F_{35\%}$ exploitation rate. Long-term catch can be 1,450 mt and average 1991-1994 catch was 910 mt. The GMT recommended a range of 3,164 to 4,363 mt for the entire Monterey area. The lower end of this range was established by using the average 1991-1994 Monterey landed catch plus 5 percent to account for anticipated discard. The upper end of the range was established by adding the recent average southern Monterey landed catch (2,050 mt for 1991-1994) plus 5 percent for anticipated discard to the northern area ABC (2,210 mt with Q=0.6). This was a decrease of 600 to 1,800 mt from the current, unattained ABC in the Monterey area. The GMT notes that the southern Monterey area has 53 percent of the entire Monterey bottom area (in 100 to 700 fathoms), but produced 69 percent of the catch in 1991-1994.

With Q = 0.6 in the U.S.-Vancouver area, the female spawning biomass was estimated to be 41 percent below its target level and the 1996 ABC can be 811 mt at an $F_{35\%}$ exploitation rate. Long-term catch can be 1,260 mt if this stock increases in abundance. Average 1991-1994 catch was 1,490 mt and the current ABC is 2,400 mt. This high ABC was only attained in 1982-1985.

The GMT recommends continuation of the 1996 ABC range for the Vancouver area, i.e., 811 to 1,565 mt (1,490 mt plus 5 percent for discard).

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 1983-1991 averaged 2,113 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 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 1977-1992 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-4 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, which allows a high exploitation rate, and the large biomass suggests that a ten-fold increase in short-term yield may be possible in the Columbia and Vancouver areas. The 2,000 mt ABC is equal to a doubling of the average catch (1,145 mt) during 1985-1994.

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

Petrale Sole

Based on the 1993 stock assessment for the Vancouver and Columbia areas, the combined ABC for these areas was reduced from 1,700 mt to 1,200 mt. The GMT recommends continuation of this ABC and 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 1993 assessment in the Columbia and U.S.-Vancouver areas used the size-structured version of stock synthesis to analyze fishery size and age composition and CPUE since 1966, ODFW flatfish trawl surveys conducted in the mid 1970s, and NMFS triennial multispecies bottom trawl surveys conducted during 1977-1992. The assessment tracks a two-fold decline in fishery CPUE from the mid-1970s to the mid-1980s, and also tracks a gradual increase in biomass during 1980-1992 as indicated by the triennial survey. The assessment indicated that the stock in this area is essentially at the expected long-term average level of abundance and recent yields are slightly below the potential. The projected average available yield for 1994-1996 is 1,230 mt under the higher biomass scenario and 1,100 mt under the lower biomass scenario. The long-term expected yield is 1,070-1,390 mt under the higher biomass scenario, and 980-1,280 mt under the lower biomass scenario. The current ABC of 1,200 mt is based on the higher biomass scenario, which achieves a much better fit to the fishery size-composition data, although the lower biomass scenario achieved a better fit to all the trend indicators.

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.

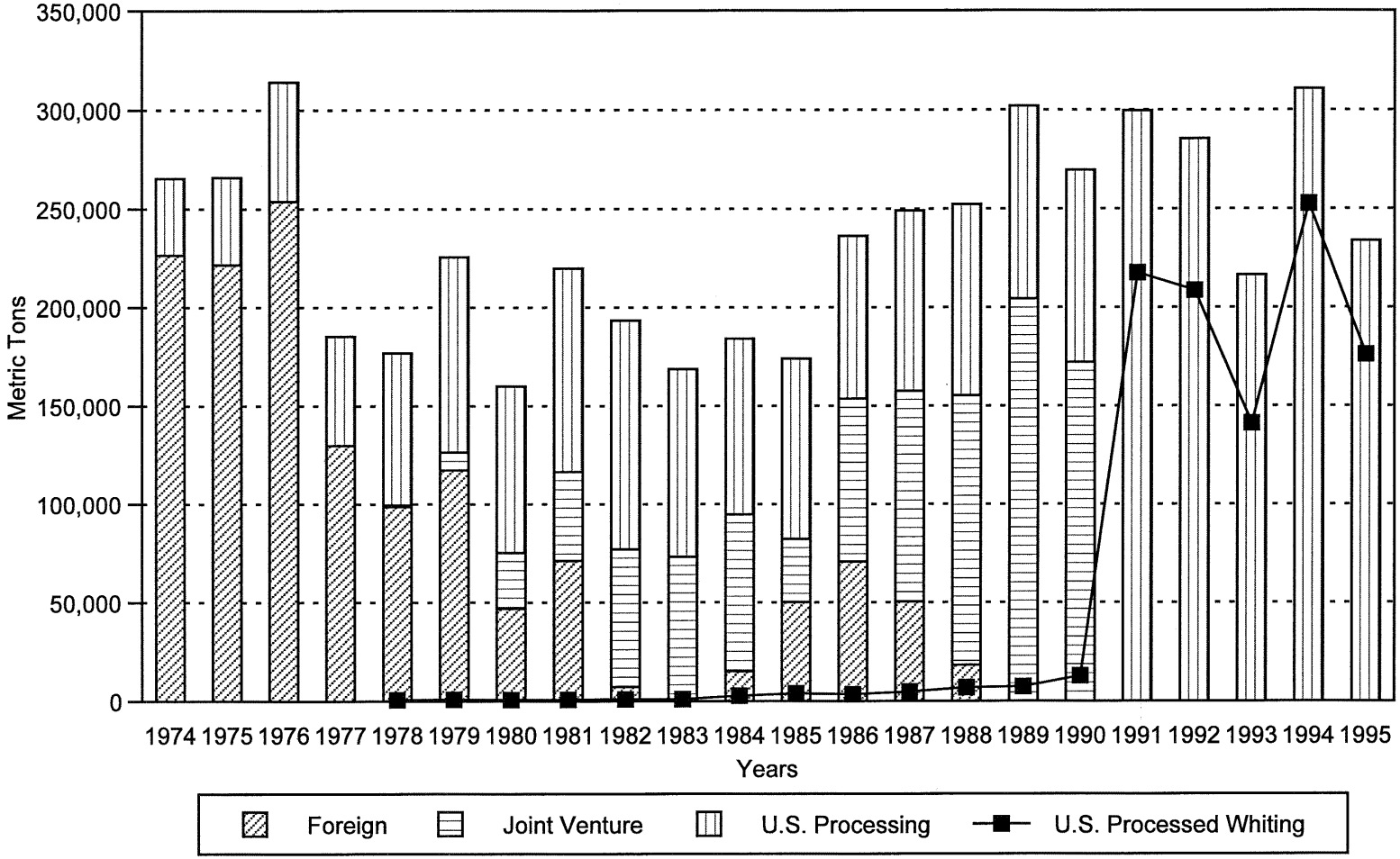

FIGURE 2. Catch of all Pacific coast groundfish in thousands of metric tons, includes discards from foreign, joint venture and U.S. at-sea processors. Source NMFS, NWR, September 1996.

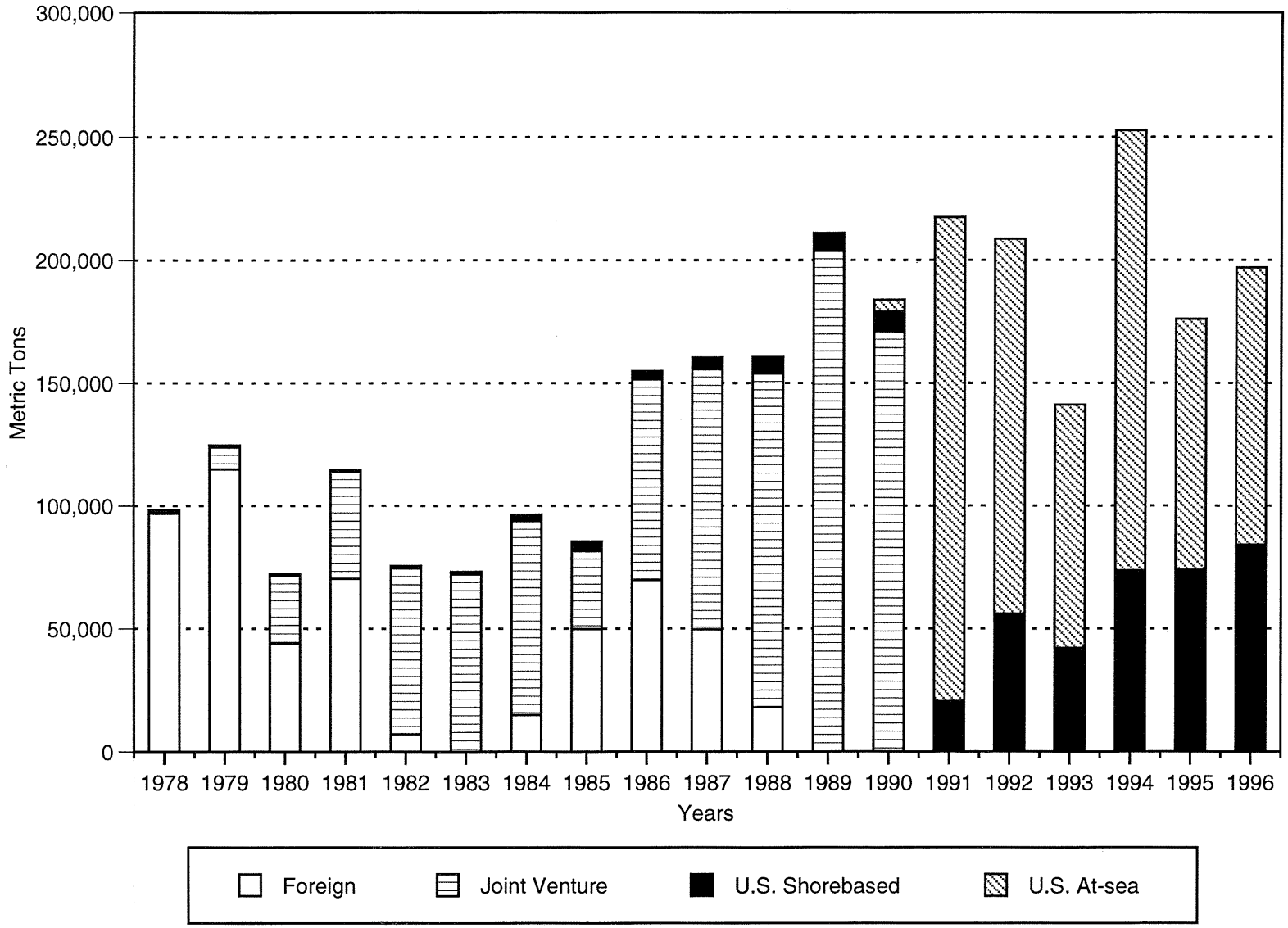

FIGURE 3. Catch of Pacific whiting. Includes discards by foreign, joint venture and U.S. at-sea processors. Source: NMFS, NWR, September 1996. 1995 and 1996 U.S. Shorebased and U.S. at-sea are preliminary.

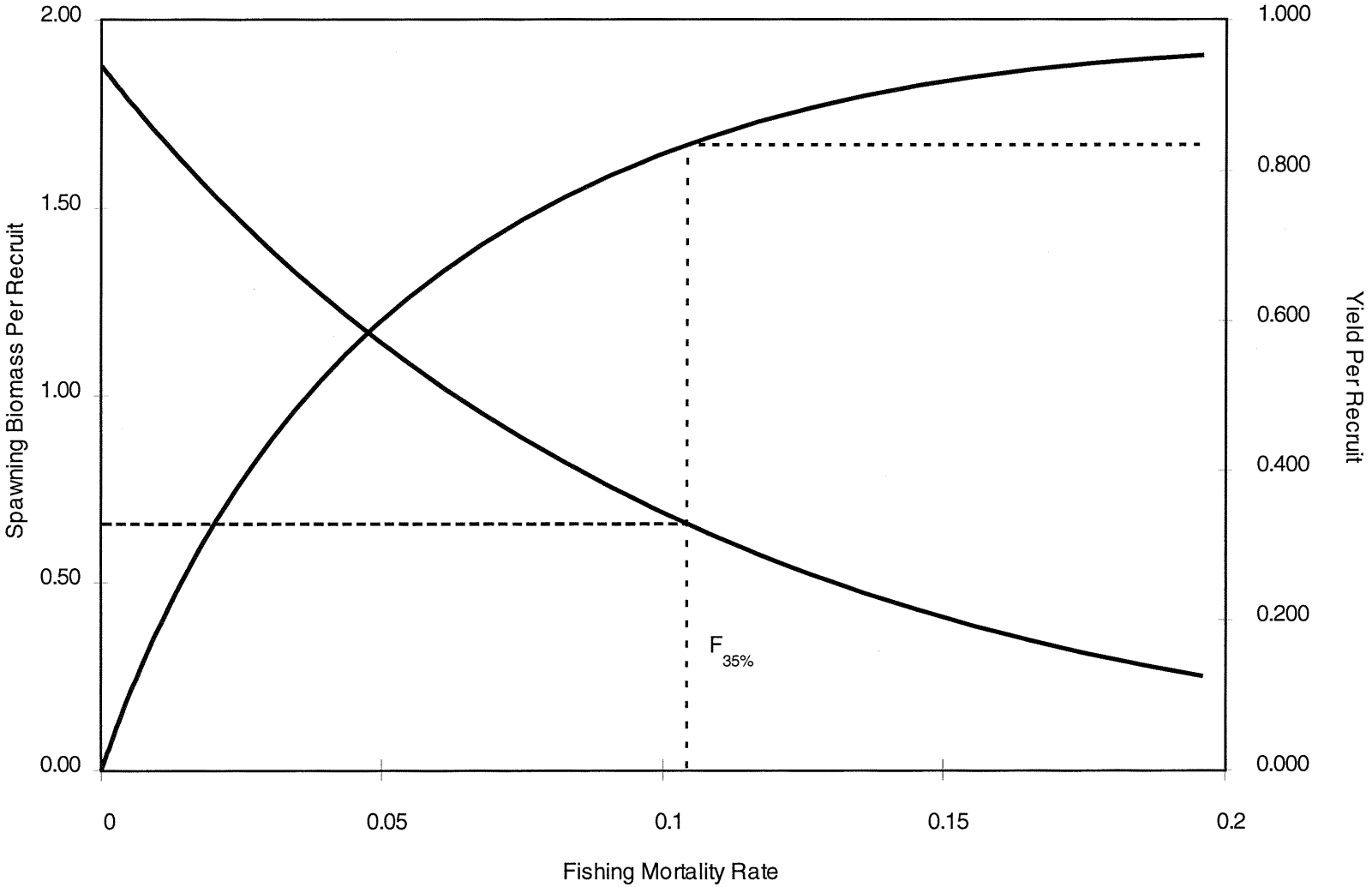

FIGURE 4. Expected relative yield per recruit and spawning biomass per recruit as a function of the rate of fishing mortality. Spawning biomass per recruit is equivalent to the expected lifetime egg production by a female entering the population. The level of fishing mortality indicated by $F_{35\%}$ will reduce spawning biomass per recruit to 35 percent of its unfished level.

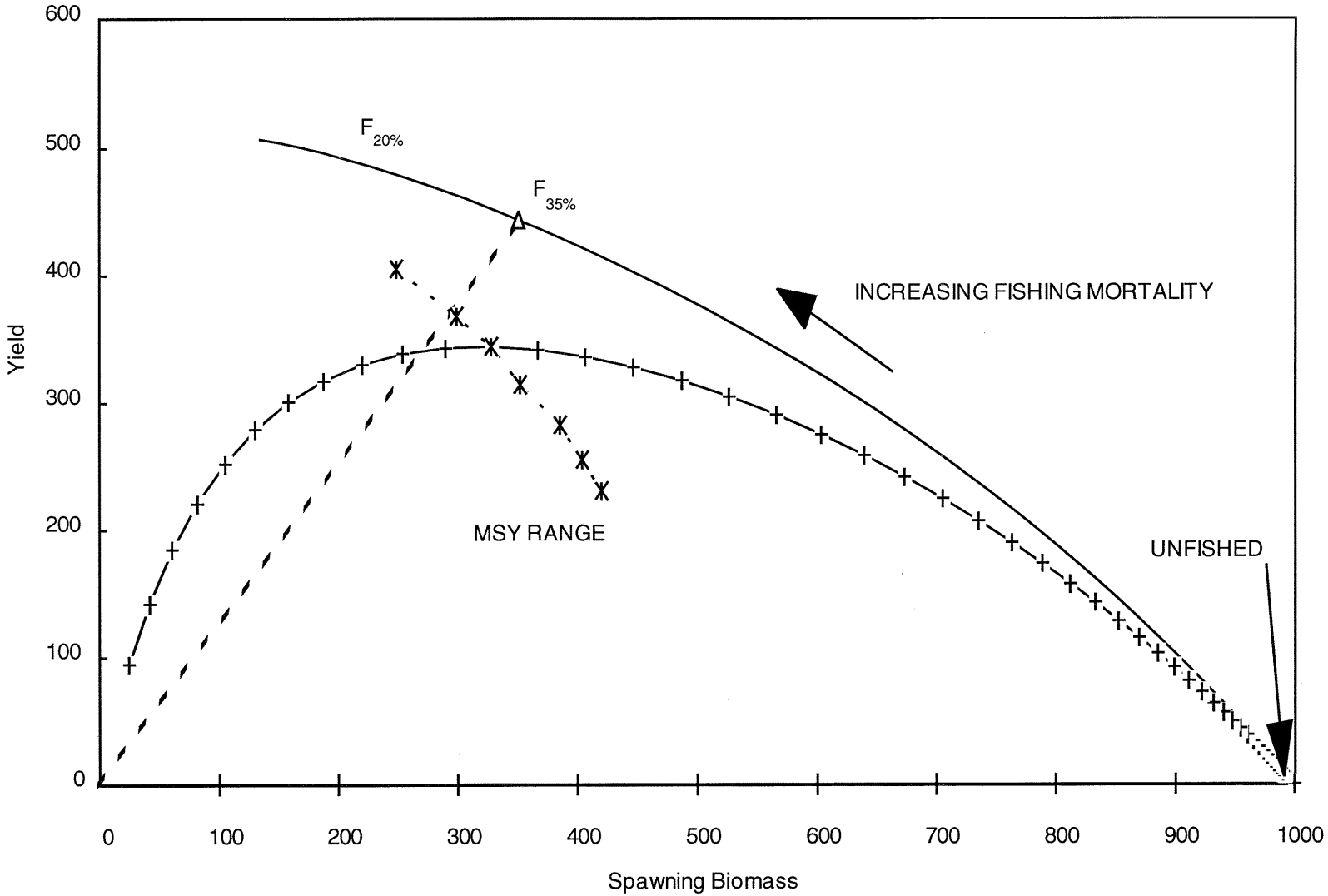

FIGURE 5. Relationship between equilibrium yield and female spawning biomass is displayed by the two curves, with tic marks indicating levels of fishing mortality at which these curves were evaluated.

TABLE 1. Estimated commercial groundfish landings (mt) for all management areas, 1987-1995.[a/] (Excludes joint venture and foreign catches.)

Species	All Areas								
	1987	1988	1989	1990	1991	1992	1993	1994	1995
Roundfish									
Lingcod	2,585	2,628	3,447	2,929	3,182	1,920	2,203	1,904	1,467
Pacific Cod	2,270	3,332	2,184	1,065	1,796	1,779	1,367	866	505
Pacific Whiting[b/]	4,768	6,876	7,418	12,825	204,323	198,856	137,916	248,731	174,628
Sablefish	12,794	10,789	10,255	8,996	9,470	9,298	8,121	7,578	7,963
Total Roundfish	22,417	23,625	23,304	25,815	218,771	211,853	149,606	259,079	184,563
Rockfish									
Pacific Ocean Perch	1,010	803	1,456	984	1,420	1,078	1,297	964	814
Shortbelly	0	0	2	0	4	53	7	53	33
Widow	12,231	10,887	12,722	10,554	6,524	6,063	7,746	6,197	6,688
Thornyheads	3,739	5,592	7,925	10,118	6,374	8,606	9,104	7,922	7,524
Other Rockfish									
Bocaccio	1,264	1,307	868	689	1,723	1,789	1,886	1,056	957
Canary	2,751	1,699	2,230	1,334	2,847	2,802	2,673	1,099	860
Chilipepper	971	1,194	724	732	1,962	1,425	1,434	1,627	1,869
Yellowtail	3,950	4,652	4,217	4,251	3,614	5,962	4,598	5,094	4,941
Remaining Rockfish[c/]	5,446	9,889	4,593	2,983	4,876	4,444	5,036	5,400	3,737
Unspecified Rockfish	9,008	4,571	9,140	11,557	6,258	4,581	4,464	2,211	2,147
Total Rockfish	40,370	40,594	43,877	43,202	35,602	36,803	38,246	31,623	29,570
Flatfish									
Arrowtooth Flounder[d/]	0	0	0	5,824	4,945	3,573	2,713	3,252	2,323
Dover Sole	18,442	18,002	18,797	15,693	18,223	16,014	14,323	9,359	10,511
English Sole	2,472	2,094	2,396	1,913	2,185	1,615	1,602	1,124	1,133
Petrale Sole	2,204	2,131	2,135	1,765	1,927	1,550	1,503	1,375	1,660
Other Flatfish	2,916	2,711	6,513	2,503	3,236	2,006	1,925	2,436	2,561
Total Flatfish	26,034	24,938	29,841	27,698	30,516	24,758	22,066	17,546	18,188
Other Fish									
Jack Mackerel	0	65	0	0	139	525	277	201	16
Others	3,502	2,499	694	906	1,433	1,713	2,390	2,436	1,470
Total Other Fish	3,502	2,564	694	906	1,572	2,238	2,667	2,436	1,470
GRAND TOTAL	92,323	91,721	97,716	97,621	286,461	275,652	212,585	310,885	233,807

Data Source: Data for 1986-1993 were extracted from PacFIN December 19, 1994 with log-adjusted WDFW trawl landings and updated WDFW rockfish species composition. Data for 1994 and 1995 were extracted from PacFIN on September 23, 1996. Data on this table represent the sum of landings reported on Tables 2-6.

a/ The data in Tables 1 through 6 are preliminary. There are minor discrepancies in landings due to deficiencies in data supplied by the three states, difficulties in determining where actual catches were made when the port of landing was in another catch reporting area, adjustments made on the basis of logbook information, inaccuracies in estimates of rockfish species composition, and other factors. Minor corrections may be necessary each year.

b/ Whiting landings in 1991 and later do not include discards by the at-sea fleet.

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

d/ Prior to 1989, arrowtooth flounder landings were recorded under "Other Fish". In 1989, arrowtooth flounder landings were recorded under "Other Flatfish".

TABLE 2. Estimated commercial groundfish landings (mt) for the U.S. portion of the Vancouver management area, 1987-1995. (Excludes joint venture and foreign catches.)

Species	Vancouver Area								
	1987	1988	1989	1990	1991	1992	1993	1994	1995
Roundfish									
Lingcod	713	459	808	846	1,097	577	705	612	367
Pacific Cod	1,384	1,474	917	718	1,165	1,300	905	731	450
Pacific Whiting[a/]	0	0	0	0	5,741	33,311	10,349	43,651	7,884
Sablefish	1,772	1,640	1,653	1,381	1,682	1,494	1,589	1,372	1,902
Total Roundfish	3,869	3,573	3,378	2,945	9,685	36,682	13,547	46,366	10,603
Rockfish									
Pacific Ocean Perch	349	122	338	303	572	523	650	527	439
Shortbelly	0	0	0	0	1	0	0	0	0
Widow	501	304	603	1,193	749	915	1,642	1,228	1,253
Thornyheads	71	66	111	193	315	575	1,233	1,314	1,268
Other Rockfish									
Bocaccio	107	47	162	101	380	178	471	30	86
Canary	934	154	796	373	777	908	913	226	222
Chilipepper	0	0	0	0	8	0	0	0	0
Yellowtail	1,188	1,305	1,077	1,374	831	1,120	1,523	1,801	1,880
Remaining Rockfish[b/]	548	1,353	639	203	975	547	857	1,217	486
Unspecified Rockfish	585	138	297	669	249	353	330	285	305
Total Rockfish	4,283	3,489	4,023	4,409	4,857	5,119	7,620	6,628	5,939
Flatfish									
Arrowtooth Flounder[c/]	0	0	0	3,738	3,082	2,333	1,852	2,677	1,707
Dover Sole	1,305	1,261	1,519	1,647	1,914	1,413	1,795	1,362	1,363
English Sole	398	287	429	432	373	249	318	308	312
Petrale Sole	271	185	183	174	163	156	352	234	312
Other Flatfish	115	102	2,215	84	163	69	65	62	67
Total Flatfish	2,089	1,835	4,346	6,075	5,695	4,220	4,382	4,643	3,761
Other Fish									
Jack Mackerel	0	0	0	0	15	25	0	1	2
Others	2,074	1,351	360	520	931	1,157	1,409	1,315	406
Total Other Fish	2,074	1,351	360	520	946	1,182	1,409	1,315	406
GRAND TOTAL	12,315	10,248	12,107	13,949	21,183	47,203	26,957	58,953	20,711

Data Source: Data for 1986-1993 were extracted from PacFIN December 19, 1994 with log-adjusted WDFW trawl landings and updated WDFW rockfish species composition. Data for 1994 and 1995 were extracted from PacFIN on September 23, 1996.

a/ Whiting landings in 1991 and later do not include discards by the at-sea fleet.
b/ Remaining rockfish are all species of rockfish not specifically listed on this page.
c/ Prior to 1989, arrowtooth flounder landings were recorded under "Other Fish". In 1989, arrowtooth flounder landings were recorded under "Other Flatfish".

TABLE 3. Estimated commercial groundfish landings (mt) for the Columbia management area, 1987-1995. (Excludes joint venture and foreign catches.)

Species	Columbia Area								
	1987	1988	1989	1990	1991	1992	1993	1994	1995
Roundfish									
Lingcod	905	1,183	1,431	900	1,250	691	741	618	495
Pacific Cod	794	1,843	1,267	346	630	478	461	135	55
Pacific Whiting[a/]	250	335	116	6,973	69,706	143,320	124,467	201,466	161,518
Sablefish	6,110	5,153	4,284	3,501	4,022	3,670	3,610	3,359	2,903
Total Roundfish	8,059	8,514	7,098	11,720	75,608	148,159	129,280	205,578	164,971
Rockfish									
Pacific Ocean Perch	559	650	1,104	675	835	534	630	430	366
Shortbelly	0	0	2	TR	2	53	6	49	24
Widow	9,304	8,628	10,250	7,121	4,525	3,903	4,738	3,733	3,467
Thornyheads	578	713	1,661	3,578	2,938	3,447	3,448	2,833	2,135
Other Rockfish									
Bocaccio	234	191	289	142	223	134	152	104	85
Canary	1,475	1,368	1,319	837	1,800	1,512	1,550	652	396
Chilipepper	0	0	4	2	7	17	6	19	11
Yellowtail	2,592	3,182	2,886	2,628	2,380	4,140	2,783	2,943	2,708
Remaining Rockfish[b/]	2,296	2,808	3,145	2,045	2,723	2,118	2,636	2,111	1,281
Unspecified Rockfish	1,712	2,678	943	842	696	694	1,007	137	476
Total Rockfish	18,750	20,218	21,603	17,870	16,129	16,552	16,955	13,011	10,949
Flatfish									
Arrowtooth Flounder[c/]	0	0	0	2,016	1,679	1,127	785	480	488
Dover Sole	5,571	7,953	9,016	6,774	8,148	5,665	5,356	3,054	2,728
English Sole	705	708	907	569	993	795	773	335	308
Petrale Sole	979	1,111	1,085	801	969	819	625	474	697
Other Flatfish	1,058	904	2,566	1,016	1,713	1,066	890	984	993
Total Flatfish	8,313	10,676	13,574	11,176	13,502	9,472	8,429	5,327	5,214
Other Fish									
Jack Mackerel	0	48	0	0	104	499	277	200	14
Others	928	841	49	93	253	219	440	416	415
Total Other Fish	928	889	49	93	357	718	717	416	415
GRAND TOTAL	36,050	40,297	42,324	40,859	105,596	174,901	155,381	224,532	181,563

Data Source: Data for 1986-1993 were extracted from PacFIN December 19, 1994 with log-adjusted WDFW trawl landings and updated WDFW rockfish species composition. Data for 1994 and 1995 were extracted from PacFIN on September 23, 1996.

a/ Whiting landings in 1991 and later do not include discards by the at-sea fleet.
b/ Remaining rockfish are all species of rockfish not specifically listed on this page.
c/ Prior to 1989, arrowtooth flounder landings were recorded under "Other Fish". In 1989, arrowtooth flounder landings were recorded under "Other Flatfish".

TABLE 4. Estimated commercial groundfish landings (mt) for the Eureka management area, 1987-1995. (Excludes joint venture and foreign catches.)

Species	Eureka Area								
	1987	1988	1989	1990	1991	1992	1993	1994	1995
Roundfish									
Lingcod	324	316	378	420	200	155	184	212	225
Pacific Cod	82	15	0	0	TR	0	1	0	0
Pacific Whiting[a/]	4,508	6,527	7,292	5,852	70,839	22,218	3,099	3,610	5,225
Sablefish	1,930	1,558	1,643	1,961	1,731	2,071	1,514	1,625	1,356
Total Roundfish	6,844	8,416	9,313	8,233	72,770	24,444	4,798	5,447	6,806
Rockfish									
Pacific Ocean Perch	101	31	14	5	9	18	16	6	9
Shortbelly	0	0	0	0	0	0	1	1	2
Widow	1,572	1,315	1,299	1,152	572	726	1,042	886	991
Thornyheads	1,659	3,832	4,398	4,142	1,942	2,463	2,544	2,038	1,922
Other Rockfish									
Bocaccio	126	91	52	96	56	61	117	43	59
Canary	195	91	71	83	111	298	154	129	158
Chilipepper	82	81	43	57	248	28	293	60	114
Yellowtail	90	87	125	151	224	303	200	159	186
Remaining Rockfish[b/]	1,820	719	315	267	370	721	626	761	675
Unspecified Rockfish	572	959	928	1,689	873	262	226	255	178
Total Rockfish	6,217	7,206	7,245	7,642	4,405	4,880	5,218	4,338	4,294
Flatfish									
Arrowtooth Flounder[c/]	0	0	0	71	184	113	77	89	127
Dover Sole	5,098	4,545	3,789	3,887	3,403	3,526	3,071	1,851	2,125
English Sole	623	399	304	200	126	95	116	110	103
Petrale Sole	400	322	317	283	280	204	212	354	288
Other Flatfish	755	565	542	368	285	187	268	408	403
Total Flatfish	6,876	5,831	4,952	4,809	4,278	4,125	3,743	2,812	3,046
Other Fish									
Jack Mackerel	0	17	0	0	20	0	0	0	0
Others	324	174	107	118	75	134	283	330	155
Total Other Fish	324	191	107	118	95	134	283	330	155
GRAND TOTAL	20,261	21,644	21,617	20,802	81,548	33,583	14,041	12,927	14,301

Data Source: Data for 1986-1993 were extracted from PacFIN December 19, 1994 with log-adjusted WDFW trawl landings and updated WDFW rockfish species composition. Data for 1994 and 1995 were extracted from PacFIN on September 23, 1996.

a/ Whiting landings in 1991 and later do not include discards by the at-sea fleet.
b/ Remaining rockfish are all species of rockfish not specifically listed on this page.
c/ Prior to 1989, arrowtooth flounder landings were recorded under "Other Fish". In 1989, arrowtooth flounder landings were recorded under "Other Flatfish".

TABLE 5. Estimated commercial groundfish landings (mt) for the Monterey management area, 1987-1995. (Excludes joint venture and foreign catches.)

Species	Monterey Area								
	1987	1988	1989	1990	1991	1992	1993	1994	1995
Roundfish									
Lingcod	625	654	807	742	560	432	501	396	322
Pacific Cod	10	0	0	0	TR	1	0	0	0
Pacific Whiting[a/]	9	14	0	0	58,033	6	0	2	0
Sablefish	2,807	2,428	2,606	2,104	1,641	1,525	1,021	932	1,472
Total Roundfish	3,451	3,096	3,413	2,846	60,234	1,964	1,522	1,330	1,794
Rockfish									
Pacific Ocean Perch	1	0	0	1	3	2	0	1	0
Shortbelly	0	0	0	0	1	0	0	3	7
Widow	849	634	547	1,087	649	515	310	315	907
Thornyheads	1,373	980	1,731	2,199	660	1,049	1,034	1,266	1,541
Other Rockfish									
Bocaccio	761	953	323	350	827	765	616	425	428
Canary	138	81	29	41	147	78	49	90	79
Chilipepper	872	1,096	652	673	1,529	1,257	977	1,295	1,521
Yellowtail	79	75	127	99	164	390	63	181	157
Remaining Rockfish[b/]	573	4,108	320	372	606	752	577	735	749
Unspecified Rockfish	4,200	678	6,002	7,277	2,561	1,720	1,784	807	657
Total Rockfish	8,846	8,605	9,731	12,099	7,147	6,528	5,411	5,118	6,046
Flatfish									
Arrowtooth Flounder[c/]	0	0	0	0	1	0	0	6	1
Dover Sole	6,323	4,239	4,464	3,377	3,285	3,573	2,884	2,124	3,206
English Sole	697	675	741	711	653	456	378	359	398
Petrale Sole	500	506	537	503	452	332	280	259	311
Other Flatfish	930	1,108	1,165	1,019	876	603	545	719	945
Total Flatfish	8,450	6,528	6,907	5,610	5,258	4,964	4,088	3,467	4,861
Other Fish									
Jack Mackerel	0	0	0	0	0	0	0	0	0
Others	79	68	85	97	81	88	173	288	371
Total Other Fish	79	68	85	97	81	88	173	288	371
GRAND TOTAL	20,826	18,297	20,136	20,652	72,720	13,544	11,194	10,203	13,072

Data Source: Data for 1986-1993 were extracted from PacFIN December 19, 1994 with log-adjusted WDFW trawl landings and updated WDFW rockfish species composition. Data for 1994 and 1995 were extracted from PacFIN on September 23, 1996.

a/ Whiting landings in 1991 and later do not include discards by the at-sea fleet.
b/ Remaining rockfish are all species of rockfish not specifically listed on this page.
c/ Prior to 1989, arrowtooth flounder landings were recorded under "Other Fish". In 1989, arrowtooth flounder landings were recorded under "Other Flatfish".

TABLE 6. Estimated commercial groundfish landings (mt) for the Conception management area, 1987-1995. (Excludes joint venture and foreign catches.)

Species	Conception Area								
	1987	1988	1989	1990	1991	1992	1993	1994	1995
Roundfish									
Lingcod	17	16	21	21	72	64	71	66	58
Pacific Cod	0	0	0	TR	TR	0	0	0	0
Pacific Whiting	1	0	8	0	3	1	1	2	1
Sablefish	64	10	29	49	393	536	386	290	330
Total Roundfish	82	26	58	70	468	601	457	358	389
Rockfish									
Pacific Ocean Perch	0	0	0	0	0u	1	0	0	0
Shortbelly	0	0	0	0	0	0	0	0	0
Widow	0	6	14	2	29	4	15	35	70
Thornyheads	44	1	11	6	518	1,068	845	471	658
Other Rockfish									
Bocaccio	34	25	39	0	235	652	529	454	299
Canary	9	5	13	1	13	6	7	2	5
Chilipepper	16	17	24	0	168	123	158	253	223
Yellowtail	0	3	2	1	16	10	29	10	10
Remaining Rockfish[a/]	209	901	164	96	202	309	340	576	546
Unspecified Rockfish	1,909	118	932	1,080	1,857	1,515	1,094	727	531
Total Rockfish	2,221	1,076	1,199	1,186	3,038	3,688	3,017	2,528	2,342
Flatfish									
Arrowtooth Flounder[b/]	0	0	0	0	0	0	0	0	0
Dover Sole	134	4	5	8	1,474	1,834	1,213	968	1,089
English Sole	49	25	15	2	39	21	17	12	12
Petrale Sole	54	7	13	4	64	38	34	54	52
Other Flatfish	57	32	23	16	209	83	156	263	153
Total Flatfish	294	68	56	30	1,786	1,976	1,419	1,297	1,306
Other Fish									
Jack Mackerel	0	0	0	0	0	0	0	0	0
Others	91	65	80	78	93	115	85	87	123
Total Other Fish	91	65	80	78	93	115	85	87	123
GRAND TOTAL	2,688	1,235	1,393	1,364	5,385	6,380	4,978	4,270	4,160

Data Source: Data for 1986-1993 were extracted from PacFIN December 19, 1994 with log-adjusted WDFW trawl landings and updated WDFW rockfish species composition. Data for 1994 and 1995 were extracted from PacFIN on September 23, 1996.

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

b/ Prior to 1989, arrowtooth flounder landings were recorded under "Other Fish". In 1989, arrowtooth flounder landings were recorded under "Other Flatfish".

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 limits to January 31, 1983 (effective January 1, 1983).
- Extended sablefish trip limit of 3,000 pounds for remainder of 1982.
- Increased sablefish OY 30 percent 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 limits 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 percent 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 percent 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 percent 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 percent 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 percent 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' to 42°50' 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 percent 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 2 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 (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), 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 2 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 percent 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 2 weeks.
- The coastwide widow rockfish trip limit will be reduced to 10 percent by weight of all fish on board not to exceed 3,000 pounds if 90 percent 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), 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 2 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 percent 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) northward 30 miles to the north jetty at Coos Bay (43°22'N).

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 percent of sablefish quota had been reached and established a trip limit of 13 percent 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 percent (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 percent 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 percent, 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) 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 percent (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 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), coastwide.
- Established coastwide Pacific ocean perch limit at 20 percent 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 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 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 and 3,600 mt, respectively.

Effective October 2, 1987

- Established trawl trip limit for sablefish at 6,000 pounds or 20 percent 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 to 5,000 pounds when 95 percent 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.
- 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 percent of legal fish on board, whichever is greater, with only 2 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 percent (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; reduce the trawl trip limit to 1 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 percent 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 pound 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 percent) for trawl gear and 4,981 mt (48 percent) for nontrawl (fixed) gear.
- Established a coastwide trawl trip of 1,000 pounds or 45 percent of the deepwater complex (consisting of sablefish, Dover sole, arrowtooth flounder and thornyheads), whichever is greater. Within the 45 percent 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 percent 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 percent (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 percent of the deepwater complex, whichever is greater, may be sablefish. If fishing under the 25 percent 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 percent of the Sebastes complex, whichever is greater.
- Reduced the coastwide trip limit for Pacific ocean perch to 2,000 pounds or 20 percent of all fish on board, whichever is less, with no trip frequency restriction.
- Increased the Columbia area Pacific ocean perch OY from 800 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 percent of the deepwater complex or 1,000 pounds, whichever is greater.
- Increased the nontrawl trip limit to 2,000 pounds or 20 percent 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 percent (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 percent 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 percent 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 percent (4,988 mt) to trawl gear and 42 percent (3,612 mt) to nontrawl gears.
- Continued in effect the coastwide trawl trip of 1,000 pounds or 25 percent of the deepwater complex (consisting of sablefish, Dover sole, arrowtooth flounder and thornyheads), whichever is greater. Within the 25 percent 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 percent 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 percent 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 1 landing per week of the deepwater complex above 1,000 pounds; and maintained the current sablefish trip limit of 1,000 pounds or 25 percent 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 3 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; 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 2 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 pound, 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 percent (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 percent 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 percent 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 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 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 percent (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 percent 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 percent 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 made 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 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.

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 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 hear 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 percent 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 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 Pacific 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 2 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 percent (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 45,000 pounds of which no more than 20,000 pounds may be thornyheads. In any landing, no more than 25 percent 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 hear 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 percent 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 percent 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 percent 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 percent 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 ABCs and harvest guidelines as identified in Table 20

- 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 hear 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 percent 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 percent 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 percent) to trawl gear and 2,550 mt (42 percent) 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 percent 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 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 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 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 percent of the annual harvest guideline is taken, the at-sea whiting fishery will be closed. The remaining 40 percent (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 percent 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 percent 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 percent 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 to 100,000 pounds per calendar month.

Effective October 1, 1994

- Release 16,000 mt of whiting from the shorebase 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 ABCs and harvest guidelines as identified in Table 21, except Pacific whiting, which was delayed until March 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 percent 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 percent) to trawl gear and 2,480 mt (42 percent) 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 percent 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: For 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.
- 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 percent) allocated to trawl gear and 2,754 mt (42 percent) 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 is 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 is 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 percent 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 percent 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 percent of the 2-month limit. However, vessels could land as much as 60 percent 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 2-month period.
  Pacific Ocean Perch: cumulative trip limit of 10,000 pounds per 2-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 percent 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 percent 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: For 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.

- 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 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: bag limit of 3 lingcod, no smaller than 22 inches, and 10 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).

TABLE 8. Final OY and ABC specifications made under the FMP, 1982–1990. (Includes inseason adjustments, if any, in thousands of mt. Beginning in 1991, 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 9. 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
Pacific Cod	2,200	900	a/	a/	a/	3,100
Pacific Whiting	-	-	-	-	-	175,500b/
Sablefish	-	-	-	2,500c/	-	13,400b/
Rockfish						
Pacific Ocean Perch	600	950	a/	a/	a/	1,550
Shortbelly	-	-	-	-	-	10,000b/
Widow	*400*	*N 1,600**	1,500	2,100	d/	10,500
Other Rockfishe/**						
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 Fishf/**						
Jack Mackerel	-	-	-	-	-	12,000g/
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 10. 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 11. 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 12. 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 13. 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	1,100	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 14. 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 15. 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 percent 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 percent 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 16. 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	0
Shortbelly[d/]	1989	-	-	-	-	-	13,000[f/]	10,000
Widow[d/]	1989	-	-	-	-	-	8,900[g/]	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 17. 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
Yellowtail	1,200	3,100[h/]	300	d/	d/	4,600	4,300[f/]
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 percent 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 18. 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[d/]
Whiting	–	–	–	–	–	232.0	
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/	–	–	11.1	11.1
Bocaccio	–	–		f/	f/	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	–	–	–	–	–	–	7.0[g/]
Shortspine	–	f/	f/	f/	–	1.9	–
Longspine	–	f/	f/	f/	–	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 2 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 19. 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/	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	-	-	-	11.2	11.2[h/]
Bocaccio	-	-	i/	i/	i/	1.54	1.54[j/]
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	-	-	-	-	-	-	7.0[k/]
Shortspine	-	i/	i/	i/	-	1.9	-
Longspine	-	i/	i/	i/	-	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 percent 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 20. 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 Guidelinea/
	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 percent 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 20. 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.

g/ The Pacific ocean perch harvest guideline applies to the Vancouver and Columbia areas combined. A discard factor of 16 percent 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 percent 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 (8 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 21. Open access and limited entry allocations for 1994 (in metric tons).

Species		Harvest Guideline	Open Access		Limited Entry	
			Percent	Metric Tons	Percent	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 22. 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	0.0	0.0	c/			0.0	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 22. 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 percent 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 percent of the total ABC. There is a shorebased reserve of 71,400 mt, 40 percent 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 percent.

h/ Total all areas.

i/ For 1995, a 16 percent 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 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 percent 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 percent 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 2 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 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 5 percent discard deduction.

q/ Includes sharks, skates, rays, ratfish, morids, grenadiers and other groundfish species noted above in c/.

TABLE 23. 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 24. 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 24. 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 percent 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 percent 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 percent 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 2 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 5 percent discard inflation.

q/ The coastwide Dover sole harvest guideline (11,050 mt) is the sum of the ABCs minus 5 percent for assumed discard. The harvest guideline recommendation for the Columbia area is 2,850 mt, which also reflects a 5 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 25. 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 percent (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, 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 26. Landings and quotas/harvest guidelines for Pacific whiting (includes discards in the foreign and joint venture fisheries).

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/]			176,571	176,571	178,400	99

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 27. Catch of salmon in joint venture and foreign trawl fisheries for Pacific whiting.

	Salmon (number)	Whiting (mt)	Number of Salmon Per Mt Whiting	Mt Whiting Per Salmon
Joint Venture				
1978	19	856	0.022	45
1979	1,623	8,834	0.184	5
1980	3,602	27,537	0.131	8
1981	6,422	43,557	0.147	7
1982	11,694	67,465	0.173	6
1983	5,143	72,100	0.071	14
1984	10,192	78,889	0.129	8
1985	1,575	31,692	0.050	20
1986	32,051	81,639	0.393	3
1987	8,636	105,997	0.082	12
1988	13,984	135,781	0.103	10
1989	9,199	203,578	0.045	22
1990	9,308	170,972	0.054	18
Average	8,727	79,146	0.110	9
Foreign Trawl				
1977	14,627	127,013	0.115	9
1978	5,905	96,827	0.061	16
1979	7,044	114,910	0.061	16
1980	4,831	44,023	0.110	9
1981	5,052	70,366	0.072	14
1982	104	7,089	0.015	68
1983		No Foreign Fishery In 1983		
1984	63	14,772	0.004	234
1985	713	49,853	0.014	70
1986	11,739	69,861	0.168	6
1987	4,649	49,656	0.094	11
1988	2,185	18,041	0.121	8
Average	5,174	60,219	0.086	12
1989		No Foreign Fishery after 1988		

TABLE 28. GMT final recommendations for 1997 ABCs and harvest guidelines for the Washington, Oregon, and California region by management area (in thousands of metric tons). Page 1 of 2

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[f/]	7.8[f/]	VCEM
Jack mackerel[g/]	52.6					52.6	52.6	WOC +

ROCKFISH OTHER THAN SEBASTES COMPLEX

	Vancouver	Columbia	Eureka	Monterey	Concep	ABC	HG	HG area
POP	0	0				0	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	Col - N	Col - S	Eureka	Monterey	Concep	ABC	HG	HG area
Sebastes-N[m/]	6,137-7,131							5.94-9.171	VC
Sebastes-S[m/]				9,611-9,669				10.509	EMC
bocaccio				0.265			0.265	0.38	EMC
canary	1.22						1.220	1.00	VC
chilipepper	c/			4.0			4.00	none	na
yellowtail	.289-.454	.380-.984[n/]		.156-.439[o/]			.825-1.877	.825-2.924	V+C
remaining rockfish	2.582[p/]			2.802[q/]					
bank	c/			0.081			0.08	none	
bocaccio	0.424								
canary				0.085					
darkblotched	0.209			0.047			0.26	none	
POP				0.02[q/]			0.020		
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				.046-.104o/	0.155		0.155+Eur		E, M+Con
Other rockfish[r/]	1.842			3.968				none	

TABLE 28. GMT final recommendations for 1997 ABCs and harvest guidelines for the Washington, Oregon, and California region by management area (in thousands of metric tons). Page 2 of 2

FLATFISH

	Vancouver	Columbia	Eureka	Monterey	Concep	ABC	HG	HG area
Dover	.82- 1.57[s/]	3	2.9	3.16-4.36[t/]	1	10.88-12.83[u/]	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

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 – 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 percent of the ABC for the assessment area, plus 400 mt for the Columbia area south of Cape Falcon. The GMT's 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. The GMT recommendation 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 GMT assumes the Council will set the harvest guideline, which applies to U.S. waters, at 80 percent 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. For 1997, the harvest guideline is proposed to be reduced by 780 mt for the treaty tribes; 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 percent (3,803 mt) to the trawl fishery and 42 percent (2,754 mt) to the nontrawl fishery.

g/ Jack mackerel – the FMP manages fishing only north of 39°N latitude; however, landings outside the EEZ and south of 39°N are counted towards the ABC and harvest guideline. The DAP is equal to the harvest guideline.

h/ Pacific ocean perch – 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 – the 6,500 mt harvest guideline is derived by subtracting 16 percent (1,200 mt) of the ABC for estimated discards.

j/ Thornyheads – the ABCs and harvest guidelines for the 2 species 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 percent 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 – the harvest guideline is the same as 1996, which is 1,000 mt below the ABC to help prevent overharvest of shortspine thornyhead.

m/ Sebastes complex (north) includes all rockfish species listed below in the Vancouver and Columbia areas combined, including other rockfish and a pro-rated portion of the S. Columbia /Eureka yellowtail rockfish ABC. Likewise, Sebastes south includes all rockfish in the Eureka, Monterey and Conception areas combined, including a pro-rated portion (46-104 mt) of the S. Columbia/Eureka yellowtail rockfish ABC.

n/ Yellowtail rockfish ABC (N. Columbia area) – applies to the Columbia area north of Cape Falcon.

o/ Yellowtail rockfish (S. Columbia-Eureka) – applies to the Columbia area south of Cape Falcon and the Eureka area combined. Approximately 46 – 104 mt of the ABC range will be apportioned to the Eureka area (in proportion to the reduction from the 1996 northern area catch level).

p/ Remaining rockfish includes the species below in the table, including the other rockfish category, but not the "Other rockfish" catch.

q/ Pacific ocean perch – the new Sebastes complex assessment proposes a new ABC (20 mt) for the Eureka, Monterey and Conception area.

r/ 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.

s/ Dover sole ABC (Vancouver area) is a range from the ABC recommended in the 1995 assessment (818 mt) up to the 1990-1994 average landing level (1,565 mt).

t/ Dover sole (Monterey) – 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.

u/ Dover sole (coastwide) – 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.

TABLE 29. Comparisons of MSY, ABC, domestic shore-based landings, stock condition, and abundance trends for major Pacific coast groundfish stocks coastwide, 1994-1997.

Species	MSY	Assessment Year	Assessment Status	1994 ABC	1994 Landings	1995 ABC	1995 Landings	1996 ABC	1997 Proposed ABC	Stock Condition	Abundance Trend
Flatfish											
Arrowtooth flounder	Unknown	1993		5,800	3,251	5,800	2,323	5,800	5,800	Unknown	Stable
Dover sole		1995	Needed	15,900	9,300	13,000	10,511	10,880-12,830	10,880-12,830		Declining
English sole	3,100	1993		3,100	1,098	3,100	1,133	3,100	3,100	Above MSY	Increasing
Petrale sole	2,700	1993		2,700	1,360	2,700	1,660	2,700	2,700	Above MSY	Stable
Other flatfish a/	Unknown			7,700	2,326	7,700	2,561	7,700	7,700	Unknown	Unknown
Rockfish											
Bocaccio i/	>= 1,800	1996		1,540	1,025	1,700	957	1,700	270	Below MSY	Declining
Canary rockfish		1996		2,900	1,049	1,250	860	1,250	1,220	Below MSY	Declining
Chilipepper	5,000	1993		4,000	1,382	4,000	1,869	4,000	4,000	Above MSY	Increasing
Yellowtail rockfish c/	<= 6,740	1996		6,740	4,961	6,740	4,941	6,740	825-1,877	Above MSY	Declining
Remaining Rockfish b/	Unknown	1996		11,500	5,036	11,500	3,737	11,500	11,200	Unknown	Unknown/Declining
Unspecified rockfish					2,766		2,147			N/A	
Other Rockfish											
Pacific Ocean perch	1,100	1995		0	975	0	814	0	0	Below MSY	Stable
Shortbelly rockfish	23,500	1989		23,500	50	23,500	33	23,500	23,500	Above MSY	Unknown
Widow rockfish i/	6,700	1993		6,500	6,198	7,700	6,688	7,700	7,700	Near MSY	Stable
Thornyheads e/	6,600	1994	Needed		7,892		7,524				
Shortspine	1,400			1,900		1,000				Near MSY	Stable/Declining
Longspine	5,200			10,100		7,000				Above MSY	Declining
Other Species											
Jack mackerel	12,000			52,600	201	52,600	16	52,600	52,600	Above MSY	Unknown
Lingcod	3,100	1994		7,000	1,890	2,400	1,467	2,400	2,400	Below MSY	Stable
Pacific cod d/				3,200	866	3,200	505	3,200	3,200	Unknown	Unknown
Pacific whiting f/	336,000	1996	Annual	325,000	232,522	223,000	174,628	265,000	290,000	Near MSY	
Sablefish i/	7,800	1994		7,000	7,545	8,700	7,963	8,700	8,700	Near MSY	Declining
Others h/	Unknown			14,700	2,737		1,470			Unknown	Unknown

Data Source: PacFIN data extracted September 12, 1994 and March 15, 1995.

a/ Other flatfish consists of all flatfish except arrowtooth flounder, Dover sole, English sole, and petrale sole.

b/ Landing estimates do not include substantial landings of this species which are included under "Unspecified rockfish".

c/ ABC is for Eureka, Columbia and Vancouver areas.

d/ ABC based upon historical landings.

e/ 1994 ABC and 1993 landings are for the Monterey, Eureka, and Columbia areas; 1995, 1996, and 1997 ABCs are coastwide north of Pt. Conception.

f/ ABC and MSY include Canada.

g/ Total coastwide removals were 199,994 mt, including U.S. discards and Canadian landings.

h/ Includes sharks, skates, rays, morids and grenadiers.

i/ ABC prior to 1995 did not include discard.

ECONOMIC STATUS OF THE WASHINGTON, OREGON, AND CALIFORNIA GROUNDFISH FISHERIES

Compiled by

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Southwest Region
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September 1996

TABLE EC-1. Quantity and exvessel value of groundfish landings in Washington, Oregon and California, including fish processed by motherships and catcher/processors in waters off these states, 1994-1995.[a/]

	1994	1995	Percent Change
Shoreside (mt)	135,512	134,038	-1.1
Domestic Floating Processor (mt)	89,997	39,444	-56.2
Domestic Catcher/Processor (mt)	85,208	60,359	-29.2
Total WOC Landings (mt)	310,716	233,840	-24.7
Shoreside Value ($)			
Current	67,585,155	86,495,998	+28.0
Real[b/]	69,318,107	86,495,998	+24.8
Domestic Floating Processors ($)			
Current	7,093,111	4,124,654	-41.8
Real	7,274,985	4,124,654	-43.3
Domestic Catcher/Processors ($)			
Current	6,988,917	6,213,154	-11.1
Real	7,168,120	6,213,154	-13.3
Total WOC Groundfish Landed Value ($)			
Current	81,667,183	96,833,805	+18.6
Real	83,761,213	96,833,805	+15.6

Sources: PacFIN data extracted August, 1996.

a/ Does not include landings of fish caught in Puget Sound, Alaska, Canada, Mexico, or other waters not off of Washington, Oregon and California.

b/ 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 GNP implicit price deflator, with a base year of 1995. The GNP deflator is 0.975 for 1994.

TABLE EC-2. Average annual exvessel prices (price per pound) paid for certain commercially important species, 1994-1995.[a/]

	1994	1995
Sablefish		
Current	0.824	1.352
Real[b/]	0.845	1.352
All Rockfish		
Current	0.477	0.572
Real	0.489	0.572
Widow Rockfish		
Current	0.315	0.336
Real	0.323	0.336
Dover Sole		
Current	0.295	0.326
Real	0.302	0.326
English Sole		
Current	0.341	0.369
Real	0.349	0.369
Petrale Sole		
Current	0.836	0.951
Real	0.858	0.951
Lingcod		
Current	0.414	0.460
Real	0.425	0.460
Arrowtooth Flounder		
Current	0.098	0.111
Real	0.100	0.111
Pacific Whiting		
Current	0.035	0.047
Real	0.035	0.047
Thornyheads		
Current	0.731	1.008
Real	0.750	1.008

Sources: PacFIN data extracted August 1996.

a/ This report includes only data for Council Areas: Vancouver, Columbia, Eureka, Monterey, and Conception.

b/ Real prices are current prices adjusted for inflation using the GNP implicit price deflator, where 1994 = 0.975 and 1995 = 1.00.

TABLE EC-3. Washington, Oregon, and California shoreside commercial groundfish landings (mt) and exvessel value (thousands of dollars), 1980-1995.[a/] The sum of the states may not equal the total due to rounding.

	California		Oregon		Washington		Coast	
Year	mt	$	mt	$	mt	$	mt	$
1980	36,862	16,551	28,515	11,425	22,514	9,119	87,891	37,095
1981	42,578	21,427	37,502	14,720	23,093	10,114	103,173	46,262
1982	52,608	28,036	41,023	20,449	25,368	1,404	118,999	59,889
1983	39,498	21,984	35,158	18,359	22,969	11,276	97,626	51,618
1984	40,570	22,917	28,209	15,237	21,080	10,484	89,859	48,637
1985	43,061	26,537	29,023	17,079	19,229	12,462	91,313	56,078
1986	41,246	28,571	24,931	16,814	16,121	10,912	82,298	56,296
1987	41,351	30,74	30,530	24,183	20,121	16,621	92,001	71,598
1988	39,760	28,528	32,114	23,916	20,341	15,687	92,214	68,131
1989	42,506	30,073	36,832	25,221	20,043	13,61	99,382	68,895
1990	39,169	28,996	35,505	23,234	18,331	11,499	93,005	63,728
1991	35,778	27,171	49,751	29,766	16,947	14,070	102,476	71,006
1992	34,781	28,578	81,915	31,045	15,737	11,421	132,432	71,043
1993	28,033	23,707	71,191	28,990	17,015	10,918	116,239	63,615
1994	24,742	24,575	94,088	32,622	16,682	10,388	135,512	67,585
1995	28,390	34,074	91,647	37,750	14,001	14,673	134,038	86,496

Source: PacFIN data extracted August 1996.

a/ 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 EC-4. Commercial shoreside landings[a/] (mt) of individual groundfish species by state, 1994-1995.

Species	California		Oregon		Washington	
	1994	1995	1994	1995	1994	1995
Lingcod	569	538	859	649	477	278
Pacific Cod	TR	TR	171	80	696	424
Pacific Whiting	3,613	4,091	65,10	66,839	4,884	4,037
Sablefish	2,183	2,793	4,005	3,133	1,388	2,037
Pacific Ocean Perch	4	8	641	587	346	287
Widow Rockfish	937	1,712	4,365	3,864	863	1,080
Thornyheads	3,310	3,609	4,043	3,336	564	581
Unspecified Rockfish	851	628	81	161	34	602
Other Rockfish	5,711	5,663	6,775	5,390	2,735	1,970
Arrowtooth Flounder	73	119	1,721	1,413	1,457	790
Dover Sole	4,488	6,043	3,871	3,535	1,000	935
English Sole	462	499	358	313	303	321
Petrale Sole	549	593	616	797	210	270
Other Flatfish	1,348	1,472	996	1,016	90	72
Other Groundfish	644	622	476	534	1,322	317

Source: PacFIN data extracted August 1996.

a/ 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 EC-5. Shoreside landings and exvessel value (thousands of dollars) of individual groundfish species landed in Washington, Oregon, and California, 1994-1995.[a/]

Species	1994		1995		Percent Change	
	mt	$	mt	$	mt	$
Lingcod	1,905	1,739	1,466	1,486	-23.0	-14.5
Pacific Cod	866	636	504	432	-41.8	-32.1
Pacific Whiting	73,607	4,907	74,967	7,821	+1.8	+59.4
Sablefish	7,576	13,761	7,963	23,728	+5.1	+72.4
Pacific Ocean Perch	991	721	882	661	-11.0	-9.1
Widow Rockfish	6,166	4,285	6,657	4,928	+8.0	+15.0
Thornyheads	7,917	12,762	7,525	16,717	-5.0	+31.0
Unspecified Rockfish	1,279	1,405	1,391	1,597	+8.8	+13.7
Other Rockfish	15,220	14,064	13,022	13,316	-14.4	-5.3
Arrowtooth Flounder	3,251	699	2,322	570	-28.6	-18.5
Dover Sole	9,359	6,078	10,512	7,559	+12.3	+24.4
English Sole	1,123	844	1,133	922	+0.1	+9.2
Petrale Sole	1,375	2,535	1,660	3,479	+20.7	+37.2
Other Flatfish	2,434	2,062	2,561	2,089	+5.2	+1.3
Other Groundfish	2,443	1,087	1,473	1,191	-39.7	+9.6

Source: PacFIN data extracted August 1996.

a/ Does not include landings of fish caught in Puget Sound, Alaska, Canada, Mexico, or other waters not in EEZ off Washington, Oregon and California.

TABLE EC-6. Percentage contribution of Washington, Oregon, and California landings and offshore deliveries to the total exvessel value (thousands of dollars) of West Coast marine fish landings, 1994-1995, by fishery.[a/]

Fishery	1994 Exvessel Value of Landings	Percent	1995 Exvessel Value of Landings	Percent
Tuna	28,700	8.2	20,543	5.6
Groundfish	91,089	26.1	104,312	28.4
Crab	59,613	17.1	72,405	19.7
Salmon	33,744	9.7	26,398	7.2
Shrimp	24,190	6.9	23,674	6.4
Coastal Pelagics[b/]	25,464	7.3	38,504	10.5
Other	86,206	24.7	81,391	22.2
Total	394,006	100.0	367,227	100.0

Sources: PacFIN data extracted August 1996.

a/ This value exceeds that reported for groundfish in Table 1 because they include fish caught in Puget Sound, outside of the U.S. EEZ, and in waters off Alaska.

b/ Coastal pelagics include Pacific mackerel, jack mackerel, Pacific sardines, northern anchovy, market squid, herring, and Pacific bonito.

TABLE EC-7. Washington, Oregon, and California combined landings and exvessel value (thousands of dollars) of sablefish by gear, 1994-1995.[a/]

	1994				1995			
	mt		$		mt		$	
Groundfish Trawl[b/]	3,762	(49.7)	5,719	(41.5)	3,779	(47.4)	9,764	(41.1)
Fish Pot	1,333	(17.6)	2,754	(20.0)	1,051	(13.2)	3,402	(14.3)
Hook and Line	2,349	(31.0)	5,088	(37.0)	3,054	(38.4)	10,382	(43.8)
Other Net[c/]	56	(0.7)	68	(0.5)	56	(0.7)	118	(0.5)
Other	76	(1.0)	132	(1.0)	23	(0.3)	62	(0.3)
Total	7,576		13,761		7,963		23,728	

Source: PacFIN data extracted August 1996.

a/ Does not include landings of fish caught in Puget Sound, Alaska, Canada, Mexico, or other waters not in EEZ off Washington, Oregon, or California. Figures in parentheses are the percentages each gear group contributed tot he total sablefish landed catch or exvessel value.

b/ Includes California groundfish landings with shrimp nets.

c/ Includes Oregon and Washington landings with shrimp nets, and all landings with set nets and purse seine nets.

TABLE EC-8. Washington, Oregon, and California groundfish shoreside landings (mt) by gear group, 1981-1995.[a/]

	Trawl	Trap/Pot	Hook and Line[b/]	Gill Net/Setnet[c/]	Other/Misc.[d/]
1981	92,638	3,956	4,000	1,666	2,920
1982	104,694	6,530	4,384	2,128	1,264
1983	82,887	5,423	2,191	2,299	4,824
1984	73,189	3,854	1,989	2,209	8,617
1985	75,875	3,703	4,603	3,937	3,195
1986	62,875	2,216	5,894	4,229	7,082
1987	76,160	2,131	4,232	3,712	5,765
1988	75,081	2,159	3,272	2,788	8,914
1989	85,729	2,112	2,776	2,836	5,929
1990	79,654	1,528	2,476	2,662	6,686
1991	90,188	1,086	8,239	1,780	1,184
1992	119,398	794	9,105	1,681	1,455
1993	106,254	872	7,712	1,224	177
1994	126,363	1,370	6,728	717	335
1995	125,413	1,105	6,608	764	147

Source: PacFIN data extracted August, 1996.

a/ 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.
b/ Does not include jig, troll, or other hook and line gear prior to 1991.
c/ Includes gill net, setnet, and other net, but not dip, trammel, seine, or miscellaneous nets.
d/ Includes jig, troll, and other hook and line gear prior to 1991.

TABLE EC-9. Exvessel value (thousands of dollars) of Washington, Oregon, and California groundfish shoreside landings by gear group, 1981-1995.[a/]

	Trawl	Trap/Pot	Hook and Line[b/]	Gill Net/Setnet[c/]	Other/Misc.[d/]
1981	38,490	1,996	3,715	1,501	563
1982	47,572	5,112	4,546	1,766	891
1983	41,133	3,609	2,112	1,784	2,981
1984	37,134	2,339	2,091	1,968	5,106
1985	41,546	3,134	5,346	3,385	2,667
1986	37,878	2,220	6,817	3,734	5,647
1987	53,224	2,443	6,021	3,496	6,414
1988	49,968	2,696	5,256	2,637	7,574
1989	53,386	2,364	3,866	2,635	6,643
1990	48,020	1,646	3,784	2,765	7,603
1991	51,993	1,693	14,574	1,711	1,036
1992	52,623	1,249	14,180	1,633	1,357
1993	49,352	1,214	11,547	1,288	214
1994	51,710	2,866	11,772	781	455
1995	64,564	3,661	17,162	868	241

Source: PacFIN data extracted August 1996.

a/ 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.
b/ Does not include jig, troll or other hook and line gear prior to 1991.
c/ Includes gill net, setnet, and other net, but not dip, trammel, seine or miscellaneous nets.
d/ Includes jig, troll and other hook and line gear prior to 1991.

TABLE EC-10. Number of vessels with shoreside groundfish landings, by gear type and limited entry permit status[a/], for 1990-1995.

	1990	1991	1992	1993	1994	1995
Groundfish Trawl	367	353	326	331	286	268
Limited Entry	-	-	-	-	286	268
Open Access	-	-	-	-	0	0
Hook and Line	1,800	1,796	1,820	1,495	1,290	1,305
Limited Entry	-	-	-	-	190	195
Open Access	-	-	-	-	1,100	1,110
Groundfish Pot	191	175	216	169	187	213
Limited Entry	-	-	-	-	44	48
Open Access	-	-	-	-	143	165
Shrimp Trawl	248	236	248	244	265	267
Limited Entry	-	-	-	-	158	99
Open Access	-	-	-	-	107	168
Net	194	172	163	112	91	112
Limited Entry	-	-	-	-	87	13
Open Access	-	-	-	-	4	99
Other Gear	2,539	1,842	1,743	1,524	989	832
Limited Entry	-	-	-	-	136	81
Open Access	-	-	-	-	853	751

Source: PacFIN, data extracted August 1996.

a/ Limited entry permit status is determined at the time a landing was made. Vessels which were attached to a permit for only a portion of the year may appear in both the limited entry and open access categories.

Groundfish Stock Assessment Review Meeting - June 3-7, 1996 in Newport, Oregon

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JUNE 27, 1996

Background

The National Marine Fisheries Service (NMFS) convened a Stock Assessment Review Meeting (SARM) at the Hatfield Marine Science Center in Newport Oregon on June 3-7, 1996. The purpose of the SARM was to review preliminary stock assessments for canary rockfish, bocaccio rockfish, Pacific whiting, yellowtail rockfish and the Sebastes species group. The stock assessments are information used by the Pacific Fishery Management Council (Council) to manage the Pacific coast groundfish fishery. Terms of reference for the meeting (Appendix 1), an agenda (Appendix 2) and list of attendees (Appendix 3) are attached.

The SARM in 1996 was part of a newly expanded review process for groundfish stock assessments developed by the Council's Science and Statistical Committee (SSC), Groundfish Management Team (GMT) and Groundfish Advisory Panel (GAP); other industry representatives; Council staff; and NMFS. The expanded process included a calendar of events (Appendix 4), an outline for stock assessment documents (Appendix 5), an e-mail mailing list called "wc-fish" for discussion of technical issues (Appendix 6), and external anonymous reviews of previous stock assessments where available (Appendix 7).

The Council family designed the expanded review process for groundfish assessments at meetings in March and April of 1996. Council adopted the process in April 1996 with the understanding that it was experimental and evolving. The calendar of events for 1996 includes meetings to evaluate the effectiveness of the expanded process and modify it.

Organization of Report

This report contains a list of specific recommendations for improvements to preliminary stock assessments, organized by species or species group. These recommendations were developed through extensive discussion and represent the consensus of all participants at the SARM. Most recommendations for changes were addressed by stock assessment authors at the review meeting.

A number of recommendations were general and applicable to all stock assessments. Recommendations applicable to all assessments are listed separately in the next section. Discussion notes taken by discussion leaders and rapporteurs are also attached (Appendices 8-10).

First authors, discussion leaders and rapporteurs for each assessment are given below. Discussion leaders and rapporteurs were responsible for summarizing consensus recommendations and drafting sections of this report.

Species or Group	First Author on Assessment	Discussion Leader / Rapporteur
Pacific whiting	M. Dorn (NMFS, Seattle, WA	G. Silvia (Oregon State Univ., Newport) / B. Culver (WDFW, Montesano)
Yellowtail rockfish	J. Tagart (WDFW, Olympia)	L. Jacobson (NMFS, La Jolla, CA) / A. Hoffmann (WDFW, Olympia)
Canary rockfish	D. Sampson (Oregon State Univ., Newport)	J. Brodziak (NMFS, Newport, OR) / D. Kamikawa (NMFS, Newport, OR)
Bocaccio rockfish	S. Ralston (NMFS, Tiburon, CA)	R. Conser (NMFS, Newport, OR) / P. Crone (Oregon State Univ., Newport)
Sebastes complex	J. Rogers (NMFS, Newport, OR)	T. Jagielo (WDFW, Olympia) / F. Wallace (WDFW, Olympia)

General Consensus Recommendations (Applicable to All Assessments)

1) Report the number of loads and number of fish sampled (by gear, season and area) in tables with age and length composition data.

2) Report the number of parameters (estimated and fixed) in each model by type (i.e. recruitments, selectivities, etc.).

3) The base-case model should be rerun with multiple starting points to test for achievement of global maximum. The new "randomization" feature of the stock synthesis model is useful for this task.

4) Determine if runs are fully converged by restarting the model from initial "final" parameter estimates.

5) Likelihood weights (emphasis factors) on all types of data should be 1.0 unless there is good reason for using a lower or higher value (e.g. simultaneous use of survey age and length composition data). In general, it is better to change the effective weights on age and length composition data by adjusting assumed sample sizes, rather than by adjusting likelihood weights.

6) Make sure that alternative models are compared using runs that are fully converged.

7) Conduct a retrospective analysis that covers at least the most recent five years for each area.

8) Identify two runs that bracket the uncertainty in current biomass estimates for each area. (This was an ad-hoc approach to describing uncertainty in stock assessments that is not expected to be permanent).

9) Provide residual plots from final runs for all data type.

10) Use residuals plots and consider changes in likelihoods, the number of model parameters and biological plausibility in making decisions about the number of fishery selectivity periods. See Appendix 11 for a proposal in this regard.

11) Put total landings for all areas (even if an area is not modeled) in tables so that coast wide landings can be examined.

12) Each assessment should include printed copies of a base model parameter file. Electronic copies of all model files (parameter, catch data, biological data, etc) should be provided to Ray Conser (NMFS, Northwest Fisheries Science Center, Newport, OR), who will maintain them at a central repository.

13) Procedures used to estimate age composition in Oregon and Washington should be made more consistent. The group agreed that it is desirable to weight the age composition of each landing by the number of fish landed (long term research).

Pacific whiting - Consensus Recommendations

1) Conduct a retrospective analysis in addition to the historical analysis already in the draft assessment to determine how stable biomass estimates for a given year are over time.

2) Try a "split-survey" approach that treats recent survey observations as absolute measures of whiting abundance and earlier survey observations as a relative index.

3) Try a model that incorporates time-varying selectivities for the U.S. fishery to account for the possibility of changes in fishery selectivity during recent years that would affect harvest projections.

4) It would be better to use the same time period for the assessment model and recruitment estimates used to estimate target fishing mortality rates and to project harvest/biomass levels.

6) Recruitment of the 1994 year class is uncertain. Develop an approach which reasonably describes the range of recruitment uncertainty as part of the harvest projections presented to the GMT.

Canary Rockfish - Consensus Recommendations

1) Include runs in the final assessment that address two hypotheses that account for scarcity of old female fish in length and age composition data: 1) dome-shaped selection with reduced selectivities at older ages, and 2) age-dependent female natural mortality (higher natural mortality in older females).

2) It is appears necessary to constrain recruitment estimates for recent years because the preliminary estimates are anomalously high.

3) The time-varying selectivity pattern for the Washington trawl fishery should be eliminated from the assessment model because there was little difference between the estimated selectivity curves for different time periods.

4) The presentation of landings used in the assessment should be clarified. Landings data actually used used in the assessment can be emphasized but inclusion of historic information on the landings in the Monterey-Eureka areas would be useful for documentation purposes.

Yellowtail Rockfish - Consensus Recommendations

1) The high relative weight on the spawner-recruit component of the likelihood should be reduced to minimize the influence of spawner-recruit assumptions on biomass estimates.

2) All runs and data indicate declining abundance but, in most cases, estimates of current biomass seem too low and estimates of current fishing mortality rates seem too high.

- Try constraining the most recent fishing mortality rates (and biomass estimates) to values observed in the immediately preceding years. This could be accomplished by tuning the model to a dummy fishing effort of CPUE data series that is constant over the last 4-5 years.

- Try tuning the run for yellowtail in the Southern Vancouver area to the bycatch rate for yellowtail in the Canadian whiting fishery. The bycatch rate can be computed as the bycatch of yellowtail divided by the fishing mortality rate for whiting in the yellowtail fishery (which is proportional to fishing effort).

- Try reducing the emphasis on survey length composition data.

3) Try to estimate, rather than assume, spawner-recruit shape parameters. Area specific spawner-recruit parameter estimates would be ideal.

4) The 16% correction for bycatch should be applied to total catch, not landed catch. For example, if landings were 100 mt, then total catch would be 100/0.84=119 mt instead of 100+16=116 mt.

5) The group does not believe that there is any firm evidence for genetic differences in yellowtail among assessment areas.

6) The NMFS triennial survey data used in the yellowtail assessment are estimates for 50-250 fathoms in 1977 and 30-200 fm in more recent years, post-stratified by three geographic areas with a break in the middle of the Columbia area. In principal, and for consistency with other assessments, it would be better to adjust the survey data so that the same depth strata were used in all years. However, the group agreed to accept the data as is because yellowtail occur primarily in the 50-100 fm depth range which was covered completely by the triennial survey in all years. Effects on biomass estimates of adjusting the survey data would likely be minimal and difficult in the available time, especially if new survey estimates with a break at the Columbia area were required (long term research).

7) Survey age composition data should be included in the model (if it can be obtained), at least for preliminary runs. Consider down weighting survey age and length data, if both are used, to avoid "double counting" (long term research).

Bocaccio Rockfish - Consensus Recommendations

1) Expand depth coverage of the 1977 Triennial Survey to make it more comparable to the depth coverage in all later years;

2) Use all available CalCOFI surveys in the assessment period (i.e. 1969 through 1984) for the spawning biomass index;

3) Reduce the emphasis factor (in the stock synthesis model) for the recruitment index (from 5 to 1) -- resulting in all emphasis factors set to 1;

4) For recreational fishery selectivity, use time varying selectivity and explore the double logistic function while keeping the model as parsimonious as possible;

5) For trawl fishery selectivity, make the time-varying selectivity model more parsimonious by estimating year-specific selectivity only for aberrant years (e.g. when a strong year-class appears) and a single selectivity parameter for all other years.

Based on the modified baseline run:

6) Carry out a retrospective analysis using terminal years 1990 through 1995.

7) Use the randomization option in the stock synthesis software to examine the likelihood surface and check for other local solutions with similar or larger likelihoods. Perturb each model parameter between 0.5 and 1.5 of the parameter value at the optimal solution from the baseline run (drawn randomly from a uniform distribution). Rerun the model (say 50 times) using the randomly drawn parameter vector as initial values.

8) Characterize the uncertainty (at least partially), by profiling over biomass (for the baseline model) for all likelihood components. Other profiles over other model parameters (e.g. natural mortality) may also be useful, but are left to the authors' discretion.

9) Show the distribution of bocaccio abundance by INPFC area from the NMFS Triennial Survey.

Sebastes Complex - Consensus Recommendations

The assessment presentation was divided into 4 parts: 1) an F=M approach using trawl survey biomass, 2) selected stock synthesis runs using assumed values of selectivity, and other parameters, 3) an analysis of selected trawl survey data to examine potential trends in the frequency of zero CPUE tows, and 4) a fisherman's opinion survey.

Part 1: F=M Approach

1) For all species sampled by the trawl survey, include a tabulation of fishery catch for all gears.

2) Clarify presentation of tables giving results.

3) Point out that use of an average F for the complex might result in over harvest of less productive species in the complex.

4) Make a clear distinction between the harvest policies explored in the assessment document, and those conducted in other management zones (e.g. NPFMC).

5) For rockfish species with traditional assessments, compare what ABC would be obtained if the F=M strategy were applied.

Part 2 Stock Synthesis Approach

1) Assume asymptotic fishery selectivity.

2) Go forward with the assumptions in the darkblotched assessment as proposed; show values of estimated F for the various scenarios.

Part 3: Trends in trawl survey zero CPUE tows

1) This approach may have promise, but it is not fully developed at this time. This should be considered an activity for future investigation. The selected trawl survey data set should be examined further for trends in biomass.

Part 4: Fisherman's Opinion Survey

1) The fisherman opinion survey is currently being conducted in Washington and Oregon ports. It will not be completed and analyzed in time to be incorporated into this analysis.

Appendix 1 - Terms of Reference for Stock Assessment Review Meeting

1996 STOCK ASSESSMENT REVIEW MEETING-TERMS OF REFERENCE

1. The National Marine Fisheries Service (NMFS) will plan, in consultation with the SSC and other interested parties, organize and hold a 5-day stock assessment review meeting (Monday -Friday) on June 3-7, 1996. The meeting will include and accommodate all interested persons including scientists, managers, industry representatives and any other members of the public. Participation by stock assessment scientists from outside the normal West Coast stock assessment process will be actively sought.

2. The purpose of the stock assessment review meeting will be to review and improve groundfish stock assessments for the 1996 management cycle. The goals of the meeting will be to finish biomass estimates and yield projections, provide necessary editorial changes, and to define issues to be addressed in future assessments. To further these goals and to enhance understanding of the stock assessment models, it is expected that working versions of the models will be available on computer. It is recognized, however, that these goals may not be reached in all cases and that follow up work after the meeting may be required.

3. All participants at the stock assessment review meeting will be responsible for documenting (in written form) the group's discussions and recommendations. This critique shall include a summary of the strengths and weaknesses of the stock assessment, and recommendations for improvement. To ensure timely responses from stock assessment authors, this critique must be completed before the end of this meeting.

4. The SSC will be responsible for appointing SSC members or other persons to track the review and revision process for all assessments.

5. Stock assessment authors shall respond in writing to the critique described in Number 3 above, specifically identifying how all recommendations were addressed. The written record of critiques and responses will be maintained either as an appendix to each assessment, an appendix to the SAFE report, or in other form.

6. A follow-up discussion by the SSC groundfish subcommittee and other persons (if possible) tracking reviews shall be held , prior to the Groundfish Management Team meeting in July, to determine if stock assessment issues have been addressed and if the stock assessments are ready to be used by the GMT to set ABC and harvest guidelines.

7. An SSC groundfish subcommittee member or members will attend the GMT meeting where stock assessments and harvest projections are discussed to explain the reviews.

PFMC
4/9/96

Appendix 2 - Agenda for Stock Assessment Review Meeting

West Coast Groundfish Stock Assessment Review Meeting
3-7 June, 1996
Hatfield Marine Science Center
Newport, Oregon 97365

Agenda

Monday, June 3. 8:00 AM - 5:00 PM
A. Introduction (Methot)
B. Distribution of unmailed documents
C. 25 minute overview of each assessment
Break
D. Triennial trawl surveys: 1995 results and long-term trends (Wilkins)
Lunch (2 hours - read documents, load computer models)
E. Pacific whiting (Dorn)

Tuesday, June 4. 8:00 AM - 5:00 PM
F. Canary rockfish (Sampson)
Lunch
G. Yellowtail rockfish (Tagart)

Wednesday, June 5. 8:00 AM - 5:00 PM
H. Bocaccio (Ralston)
Lunch
I. Sebastes complex (Rogers)

Thursday, June 6. 8:00 AM - 5:00 PM
J. Concurrent sessions for completion of follow-up work
Lunch
K. Plenary session to complete review

Friday, June 7. 8:00 AM - 5:00 PM
L. Distribution of draft consensus statements
M. Review and adopt statements

Appendix 3 - Participants at Stock Assessment Review Meeting

West Coast Groundfish Stock Assessment Review Meeting
3-7 June, 1996
Hatfield Marine Science Center
Newport, Oregon 97365

List of Participants

Name	Organization
Jon Brodziak	Northwest Fisheries Science Center
Ralph Brown	Fisherman's Marketing Association
Tonya Builder	Northwest Fisheries Science Center
Ray Conser	Northwest Fisheries Science Center
Paul Crone	Oregon State University
Brian Culver	Washington Department of Fish and Wildlife
Martin Dorn	Alaska Fisheries Science Center
Tira Foran	Environmental Defense Fund
Annette Hoffmann	Washington Department of Fish and Wildlife
Jim Ianelli	Alaska Fisheries Science Center
Larry Jacobson	Southwest Fisheries Science Center
Tom Jagielo	Washington Department of Fish and Wildlife
Steve Joner	Makah Tribe
Dan Kamikawa	Northwest Fisheries Science Center
Pete Leipzig	Fisherman's Marketing Association
Richard Methot	Northwest Fisheries Science Center
Rachael Miller	California Department of Fish and Game
Rod Moore	West Coast Seafood Processors Association
Steve Ralston	Southwest Fisheries Science Center
Jean Rogers	Northwest Fisheries Science Center
Mark Saelens	Oregon Department of Fish and Wildlife
David Sampson	Oregon State University
Gil Sylvia	Oregon State University
Dave Thomas	California Department of Fish and Game
Farron Wallace	Washington Department of Fish and Wildlife
Mark Wilkins	Alaska Fisheries Science Center

Appendix 4- Calendar for 1996 Review Process

Dec 12-13 1995	Preliminary planning meeting (National Marine Fisheries Service [NMFS], Scientific and Statistical Committee [SSC], and the Groundfish Management Team [GMT]) minutes distributed by Dr. Richard Methot.
Jan/Feb 1996	SSC sends previous assessments for bocaccio, yellowtail, canary and widow rockfish out for external anonymous review.
Feb 1996	SSC circulates draft outline for stock assessment documents.
Mar 1996	GMT discusses its role in review process, drafts statement.
	wc-fish mailing list goes online.
	SSC/GMT/NMFS discussion of review process at Council meeting.
Mar/May 1996	Preliminary stock assessments prepared.
Apr 1996	SSC/GMT/NMFS/GAP continue discussion of review process at Council meeting.
May 1996	Council makes available preliminary stock assessments to interested parties.
Jun 3-7, 1996	GMT/SSC/NMFS convene expanded assessment review workshop focusing on scientific and technical issues. The protocol for this meeting is described in the "1996 Stock Assessment Review Meeting-Terms of Reference".
Jun 1996	Stock assessment authors finalize documents.
	Council meeting (depending on funds).
	SSC decides whether questions raised in review have been answered and forwards comments to GMT.
Jul 1996	GMT meets to focus on management recommendations. Preliminary ABC's will be discussed. An SSC representative will attend this meeting and stock assessment authors should attend if they are needed. Members of the Groundfish Advisory Panel (GAP) and public may also be present. The GMT may need an additional July meeting to conduct other business.
Aug 1996	Council meeting to review preliminary ABC's and stock assessments, reviewed by SSC in plenary session.
	SSC to review IPHC Halibut assessment.
Sep 1996	GMT meets to make final ABC recommendations.
Oct 1996	Council meets to set final ABC's and Harvest Guidelines.
	SSC reviews 1996 assessment review process in plenary session.
	GMT/GAP/SSC/NMFS and other interested parties meet to discuss how the 1996 review process worked and to scope 1997 assessment process. Scoping discussions may include what species will be assessed, geographic extent of assessments, revisions to the long term assessment cycle.

Late 1996/1997 NMFS meets with public to review preliminary data for next assessment cycle. This year, the data will include the 1996 slope survey information.

Appendix 5 - Draft Outline for Groundfish Safe Documents

This is a draft outline of items that should be present in all stock assessment documents 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. It is unlikely that all items listed in the outline would be appropriate or available for each assessment. In the interest of clarity and uniformity of presentation, stock assessment authors are encouraged to use the same organization and section names as in the outline.

The SSC will, on a trial basis, use the outline in evaluating the technical merits and completeness of assessments prepared during the 1996 assessment cycle for groundfish.

Please contact me at 619-546-7117 (phone), 546-7003 (fax) or larryj@ucsd.edu (e-mail) if you have comments or suggestions.

Larry Jacobson
February 14, 1996

History as follows:

12/13/95 - Outline drafted by SSC members (Groundfish Subcommittee) based on items recommended by the North Pacific Council's SSC and discussions with GMT and stock assessment authors at the "Assessment and standardization meeting" in Seattle on December 12-13, 1995.

12/15/95 - Comments from Martin Dorn, AFSC. Dorn suggests changes to the draft outline and recommends an appendix be added to the annual "Stock Assessment and Fishery Evaluation Report" to define technical terms used in stock assessments.

OUTLINE

1) Summary/abstract

2) 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.)

3) Assessment

A) History of modeling approaches used for this stock

i) Changes between current and previous assessment models

B) Model description

i) Assessment program with last revision date

ii) Constraints on parameters, selectivity assumptions, natural mortality and other assumed parameters

iii) Stock-recruitment constraints

iv) Critical assumptions and consequences of assumption failures

v) Convergence criteria

C) Data

i) Landings by year and fishery, 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

- Include figures and complete tables if practical, otherwise include new data with references to data tables in previous assessments.

D) Model selection and evaluation

i) 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) Evidence of residual analysis (including plots of residuals vs predicted values and residuals vs. time for each data type).

-Show residual plots if there are patterns indicating lack of fit

iii) Convergence status for "base-run"

-Evidence of search for global best estimates

iv) Complete parameter file as an attachment or appendix

- Do parameter estimates make sense, are they credible?

E) Base-run results

i) Time series of biomass, recruitment and fishing mortality rate estimates (table and figures)

ii) Stock- recruitment relationship

F) Uncertainty and sensitivity analyses

i) CV's for biomass and other estimates if available

ii) Likelihood profiles, biomass profiles or other approach

iii) Subjective appraisal of magnitude and sources of uncertainty

iv) Retrospective analysis

- Plot showing actual estimates from current and previous assessments

- Information about retrospective bias in current model

4) Target fishing mortality rates (if changes are proposed based on new data, etc.)

5) Harvest projections

i) Table of yields for candidate fishing mortality targets (currently F20%, F35%, F40%, F45%, etc.)

ii) Short term biomass and yield projections (if appropriate)

6) Recommendations

7) Literature cited

8) Tables and figures

Appendix 6 - wc-fish mailing list

The Internet mail list wc-fish is used for discussions about groundfish assessments prepared for the Pacific Fishery Management Council. All persons interested or involved in assessment of groundfish stocks are invited to participate. The only requirement is respect for the opinions and time of others. Be polite and remember that the "world" is listening.

The wc-fish mailing list focusses on groundfish assessments but discussions about broader technical questions and issues are welcome. If you have any questions about using wc-fish, please contact "majordomo-owner@ljswc.ucsd.edu". If you have questions about the purpose and content of wc-fish, please contact Larry Jacobson at larryj@ucsd.edu.

To join wc-fish send a message to majordomo@ljswc.ucsd.edu with the word "subscribe" in the body of the message (not the "Subject:" line).

Appendix 7 - Anonymous reviews for groundfish stock assessments.

The attached anonymous external stock assessment reviews were solicited by the Council's SSC. The reviewers were asked to comment on the most recent stock assessment completed prior to 1996. Reviews were completed for canary, yellowtail, bocaccio and widow rockfish. The widow rockfish assessment was reviewed externally but not updated in 1996.

REVIEW OF STATUS OF BOCACCIO RECOMMENDATIONS FOR MANAGEMENT 1993

Within NMFS there are two current trends in fishery modeling. One is associated with risk analysis and the trend in this effort is a severe limitation of the number of model parameters and nearly a total absence of biological and fishery concepts. The other is associated with stock synthesis models and the trend in this effort is a severe increase in the number of model parameters and an excessive amount of attention to individual biological and/or fishery factors for which there is historical data.

The bocaccio model of course falls into the second category. It has 98 parameters, most of which are estimated within the model. I note that the management output from the 1993 model suggests an ABC of 800 MT of bocaccio. That is about 1 parameter per 8 MT of annual yield or about 1 parameter for each four days of fishing. I consider this clearly excessive.

Although there are a lot of details, some of which I will go into later, my major comment on the model is that it has no ability to estimate the population size of bocaccio.

This is of course stated in the manuscript by the authors (i.e. page B-6, "In preliminary runs, we found that the model could not discern the best absolute biomass level over a substantial range of levels." To get around this basic problem they "fixed" the size of the dominant 1977 year class and carried out a limited sensitivity analysis on this single aspect of the model. They did this by setting the initial, age 3, abundance of the dominant 1977 year class at 15, 22.5, 30 and 60 million fish and running the model with each of these four initial conditions. The likelihoods from these runs clearly demonstrate that the model has no ability to determine stock size (i.e. Table 8). This table shows that the likelihood from the 22.5 million fish run was -1285 whereas that from the 60 million fish run was -1302. A difference of only 17 units.

In my opinion on seeing the above results the authors should have carried out further runs at lower and higher initial levels (i.e. say 5, 10, and 100, 150 million age 3 bocaccio) to determine when the model begins to respond to the initial conditions. In my opinion the authors should also have tried a year class other than 1977 as their initial conditions. In other words. How robust are the model results. If you make a minor year class into a major year class does the model simply alter its numerous selectivity parameters and come up with a similar likelihood estimate.

The purpose of any fishery model is to provide advice. Instead of accepting the results of the modeling effort, i.e. that the model has a very limited capacity to resolve bocaccio biomass given different starting values for the 1977 year class, the authors apparently did not do any further sensitivity analysis along the lines suggested above. Instead they proceeded by providing the model with advice. They "ruled out" the 60 million fish level "because we considered implausible the very low fishing mortality rates, the very high initial biomass, and the implied very large drop in average recruitments." They "decided against" the 15 million fish level "based on its ;lower likelihood" (i.e. -1318 vs. -1285: note that the manuscript does not have a minus sign on the 1318 figure). I am at a loss to explain why the authors rejected the 15 million fish run when it is only 33 units away from the 22.5 million fish run. It is clear from both the likelihood estimates and figures 8, 9, 12, and 13 that there is no statistical reason to reject the 15 million fish simulation and to accept the 22.5 and/or 30 million fish simulations.

As stated above the purpose of any fishery model is to provide advice. After advising their model that the 1977 year class was between 22.5 and 30 million fish at age 3, something the model was unable to resolve on its own, the authors accept the final biomass and parameter estimates from their preferred model. "All the estimated parameters for our **two preferred runs** are in Table 1". The authors do not even present the estimated parameters for the two runs they reject. It would not have taken any more space to have four columns in Table 7 and the presentation of the parameters from 15 and 60 million fish runs would have allowed readers to see what parameters were static, and therefor unimportant in the context of this model, and which were causing the large variation in population size between the 60 million fish run and the other runs.

Selectivity:
This model probably should not be called a stock synthesis model it is rightly a selectivity model. There are 47 selectivity parameters. The bulk of these are to establish the size-dependence of selectivity of the various gear types and the rest represent year affects. They result in an extremely complicated series of fishing mortality rates, partitioned by age and year. In contrast natural mortality is assumed to be a constant. In effect the authors use 1 parameter to estimate M and 47 to estimate F. I think this is clearly excessive.

The authors obviously did some model manipulations or sensitivity analyses to reduce the likelihood estimates. For example, they state that adding 11 additional, year specific, selectivity parameters altered the maximum

likelihood estimate by nearly 200 units. I note that the observed year selectivity effects could be caused by varitations in M not selectivity.

The method of establishing the gear-dependent selectivities was based on a double logistic formulation which, at least in those presented in the figures, resulted in extremely peaked, domed relationships . Why is a narrowly peaked dome relationship desirable? Are the narrow peaks the result of the data or the mathematical model employed? When the narrow peak did not occur, due to the data distribution, the relationship was forced. What rational is there for forcing the fit when a bocaccio reaches 50 cm? Is there any information available that suggests that a 60 cm bocaccio has only 50% of the selectivity of a 50 cm bocaccio: as is suggested by Figure 7. Would not a broad Ricker type dome be more realistic? It would also require fewer parameters. In addition, it is stated that the selectivity appeared to be dependent upon year class size. I doubt this is the real relationship. It is more likely to be dependent upon the number of fish at a given size. Note that with this relationship two adjacent moderate-sized year classes might have the same selectivity as one large year class. Also I can visualize a steeply peaked selectivity in the case of set nets; however, I cannot imagine what would cause the pattern for males to be different than that for females. Why would a gillnet select for different sizes of males and females?

Natural Mortality

There is little doubt that the mortality rate of a 20 cm bocaccio is higher than that of a 50 cm bocaccio; if only because a 50 cm bocaccio can eat a 20 cm bocaccio. The revision of the natural mortality rate from 0.25 to 0.20 based on a maximum age of 36 is really based on the natural mortality rate of the larger, older bocaccio; which I agree, probably is closer to 0.15. In contrast the mortality rate of the 20 cm fish is probably closer to 0.4. With so many parameters utilized for estimating F why assume that M is a constant? A simple two parameter linear or nonlinear model of M vs. size would have been much preferable. In any case the difference between output with a constant M and a size-dependent M should be part of the sensitivity analysis of the model.

Fishery and Survey Data

Although I did not put much time in looking at the validity of the length-frequencies of the various gear types it was obvious that the authors had some concern about some of the data due to small numbers of samples and/or fish sampled. As this is the data which determine the model parameters it's quality is the principal factor in the determination of relative yearclass size.

I am sure they did their best with the data available. However, they could have given the reader a better feel for the data quality if they had presented the numbers of samples and fish sampled, or even just the number of fish sampled, in the corner of each of the length-frequency and age-frequency diagrams in Figures 1-6. As presented it is impossible for the reader to ascertain the relative validity if the length-frequency or age-frequency diagrams.

Recruitment estimates.

One wonders what the recruitment estimates would have looked like if the authors had used a series of age 3 values for the 1975 or 1978 year classes as initial conditions. I imagine that the model will produce the same pattern of recruitment no matter what the input data is. It will simply alter the selectivity parameters to fit the data.

SUMMARY

When viewed from a bit of a distance, the way in which the bocaccio model was used reduces to a rather ridiculous situation; which can be expressed as follows.

Equilibrium Yield = Function (Abundance of 1977 year class at age 3)

In effect the selectivity model is the function and equilibrium yield is entirely dependent on the estimate of the 1977 year class at age 3. If the authors had carried out the range of starting values suggested above they could have made a plot of Equilibrium Yield or ABC vs. the size of the 1977 year class. They could, of course, also turn the model around and use a range of EYs or ABCs to estimate the size of the 1977 yearclass.

The way the model was used you guess the 1977 year class size and this determines the EY and ABC. Is this really any better than guessing the value for the EY and ABC?

On the positive side, with the limited sensitivity analyses described in the report the model always predicted that the bocaccio stock is in an extended decline. This information appears to be quite robust. This pattern could be probably be seen in a straightforward examination of a suitable catch/effort time series: however, the multi-gear nature of the fishery would cause some problems. The model used in the 1993 report therefore appears to be a reasonable way to describe trends, but it appears not to be valid for estimating stock size.

Comments on "Status of the widow rockfish stock in 1993"

We appear to be entering an era when stock assessment documents will be subject to much greater scrutiny. Thus, future documents should provide the necessary background and documentation to allow external scientific review. Useful guidelines for the preparation of stock assessment documents are given in FAO Fisheries Technical Paper 350 (Precautionary approach to fisheries) which I would encourage all authors of assessment documents to read.

General comments

The authors of the widow rockfish assessment have done a reasonable job in presenting much of the necessary background information. Below I list suggestions for additions to the document which would facilitate an informed review.

1. Provide a background table listing all data sources or types. For example, the gear types, areas, and years with age composition data, the number of age composition samples, and the number of age structures examined.
2. Present exploratory analysis for the input data. Is there any information which could be gleaned from the old trawl survey data? Is there some approach which could be used to visualize the bycatch data input to the bycatch index?
3. Comment on stock structure and distribution. The assessment implicitly assumes a single widow rockfish stock.
4. Provide an explicit list of assumptions for all steps in the assessment process (i.e., data assembly and analysis). Much of this information is in the current document, but it could be presented in a more formal manner.
5. Provide any evidence (e.g., net avoidance) to support a decrease in selectivity for older widow rockfish.
6. Provide plots of model residuals. The document does contain plots of observed vs predicted age distributions. However, residuals based on log proportions cannot easily be interpreted from these plots.

Technical comments

I have some difficulty in identifying suggestions for new analyses because I am unaware of the full range of input data available for the assessment (point #1 above). Obviously, the analyses should reflect the data so that the appropriate analyses would depend on the data available. A few of the obvious technical comments follow:

1. I question the linear increase in aging error with age. For data I have examined, the degree of aging error is relatively constant for mature rockfish.
2. Were the early age data based on surface readings? If so, you might consider grouping ages at a cutoff younger than 19 years. For other rockfish species, age data from surface readings are biased for ages older than 12-16 years.
3. The issue of the influence of the initial point should be resolved for the synthesis runs. I am unclear from the information presented whether the solution is simply

indeterminate or whether the maximization algorithm is not converging properly to the global maximum, particularly in the case where the number of age 10 fish was fixed.

4. If the number of age 10 fish must be fixed (or at least fixed to obtain starting values for the final run) and the maximum likelihood depends on the starting values, then the choice of age 10 numbers will determine the biomass estimate.
5. Given the apparent indeterminacy and the factor of 2 changes in biomass associated with relatively small changes in log-likelihood (Table 4), a much broader range in possible biomass should be considered for ABC calculations. Values of the ABC should also be presented in language which implies a much greater degree of uncertainty.

Review of "Status of the yellowtail rockfish resource in 1993 (Jack V. Tagart)", with an emphasis for suggestions for future stock assessments.

March 4, 1996

By its nature, my charge of reviewing the previous assessment of yellowtail rockfish, with a view toward providing some guidance for future assessment work, promotes a critical view toward the earlier work, and its methodology. I do make critical comments, but these are intended to be constructive. My own work is subject to some of the same criticisms I bring forth below, and I recognize that full implementation of some of the suggestions outlined below will require concerted efforts over a number of years. It is unreasonable to expect they could all be evaluated and instituted in a period of few months when a stock assessment deadline is looming. I also wish to emphasize that I believe that Dr. Tagart's earlier assessment work, as reported in this and earlier stock assessment (and in his dissertation work) has been a significant contribution both in terms of management input and for the analytical and scientific advances. I believe that his work was exceptional, and I recognize the severe time deadlines under which the previous stock assessment document was produced. Further, I believe the theory, software, and guidance regarding assessment approach implicit in Dr. Methot's work on the stock synthesis model has produced important advances and has clearly improved the quality of assessments of stocks of Pacific coast groundfish.

My following comments fall into three general categories. The first deals with how the stock assessment method should be documented. Second, I turn to technical details of what was done in developing and fitting the analytical model, with some suggestions on new or different approaches. Third, I turn to the topic of projections of future yield and suggestions of new approaches for providing information on which decisions can be based.

DOCUMENTATION

In my view, some of the purposes of a document like this one are (1) to provide information on which management decisions can be based, (2) allow technical review of the validity of the methods employed, and (3) provide a formal mechanism for retaining institutional memory on how previous assessments were accomplished. To fully accomplish these goals, I believe that future stock assessment documents need to be more explicit about the details of the methodology and models used than the previous yellowtail stock assessment was, especially with regard to my second and third purposes. A critical question the authors of future assessments should ask themselves is "Could someone else repeat this assessment with access to the data and my written stock assessment". This someone else should be viewed as technically astute, but not necessarily intimately familiar with ongoing stock assessment work on Pacific coast groundfish. I recognize that this differs from the original target audience. I now provide more description on the kind of detail that is needed.

1. Methot's "stock synthesis model" is not really a single model, rather it is an analytical

approach combined with the use of software that he and his colleagues have developed. This allows great flexibility in model development, and tailoring the model to fit the system and available data. Hence I believe it is critical that the equations describing the specifics of the assumed model and objective function used to fit the model be included in the written documentation, and that all parameters values be included, perhaps in appendix tables. For example, I am guessing (and shouldn't have to) that the model used in the previous assessment was what Methot (1990) described as "Stage one". This means the model is essentially an age-based model (selectivity functions depend upon age not length), but predicts observed length compositions by invoking a submodel that predicts length composition at age. I make this guess based on plots of selectivity as a function of age included in the report and the statement on page E-7 that "identical weight-at-age vectors were used for the commercial fishery, trawl survey, and unfished population".

2. Even if my guess is correct it still would not be possible to reconstruct the model because critical details are missing. These missing details include lack of information on how length-at-age distributions were generated (assumptions and parameter values for distributions about means), lack of information on how the percent aging error was translated into a "transition matrix" to convert true age compositions into observed ones, and an absence of information on how uncertainty information associated with the data sets was incorporated into the objective functions (e.g., I assume that proportions at age were modeled as multinomial. Were nominal sample sizes used in multinomial components and was there some upper threshold (i.e., N>K set equal to K) or was N set by estimating some sort of "effective sample size" ? I assume that catch biomass was modeled by a lognormal. How were arithmetic confidence intervals (table 5) converted to provide the needed estimate of variance on a log-scale?)

3. When key assumptions and parameters are supplied, the logic or method (approach and data sources) used should be described. In the previous assessment we are sometimes just told what was assumed, but not given the basis. For example, no reason is supplied for why the selectivity function for males was assumed to be asymptotic, which differs from the assumption for females (bottom of page E-7).

TECHNICAL CONTENT

1. The only quantitative information on uncertainty included in the previous assessment is that implied by the changes in likelihood as virgin recruitment level or 1987 fishing intensity were profiled. By itself, this information is hard to interpret -- how does a reader know whether a 10 unit change in likelihood is meaningful? (In addition, it is not clear whether these values labeled "likelihoods" are log-likelihoods or log-likelihoods ignoring certain constant terms. The constant terms do not influence fitting but are critical for inference procedures). I believe that it is crucial that quantitative measures of uncertainty be presented and discussed in future assessments. I recognize this is a challenging topic, without a clearly defined and widely agreed on method for producing uncertainty results. For example, bootstrap approaches would be hard to implement given the time consuming nature of stock synthesis fitting and the use of multinomial distribution

assumptions. I think uncritical use of asymptotic variances based on the Hessian matrix could produce misleadingly small estimates. Work reported by Hightower at the 1994 national AFS meeting as well as results of others suggest this. One alternative would be to use likelihood ratio tests based on profiles like those reported in this document to develop confidence intervals. In any case I think this is a general topic for all stock assessment scientists using the stock synthesis model to address -- information on uncertainty is critical.

2. With regard to developing uncertainty estimates, it is important to keep in mind that assumed known constants have their own associated uncertainty. For example, we often assume that natural mortality is known, whereas in reality it is a quite uncertain estimate. This needs to be taken into account in some fashion. Two alternatives include (1) using a delta method or simulation/bootstrap approach to add in the uncertainty after the fitting process or (2) to incorporate uncertainty during fitting by treating the estimate of M (and other "known" constants) as a data point with an associated variance. Hence, the model will not need to fit M exactly and methods used to assess uncertainty will incorporate the uncertainty of the input. Note that I would expect that the second approach could produce numerical problems since the likelihood surface is likely to be exceedingly flat. As an aside note that this second approach brings the approach close to a Bayesian one since we are starting essentially with an informative prior.

3. I am uncomfortable with the simultaneous use of length and age-composition data from the same sample collections, even though I have done it myself. These data are clearly not independent, but they are treated as such in the fitting process. In some stock synthesis applications both these summaries plus mean length at age have been treated as independent data sources. One solution would be to replace the use of these marginal summaries of the joint age-length composition with a two dimensional matrix (age group by length group).

4. I assume that the absence of a likelihood component for harvest means that harvest was assumed known without error. I am uncomfortable with this assumption on general principles, and know it can sometimes be far from correct. It may be reasonable for yellowtail rockfish if this species is landed in an essentially pure market category, and the reporting system is carefully monitored.

5. In theory the use of separable models, auxiliary data, and a statistical fitting approach should obviate the need for specifying assumed values like a terminal F, as is required for VPA. In the previous stock assessment, however, models were fit conditional on the level of virgin recruitment or upon the fishing intensity in 1987. The need for this seems to result from a very flat likelihood surface, probably stemming from the large confidence intervals associated with the survey index. In some cases, however, there did seem to be a defined maximum to the overall likelihood, and it is not clear why the maximum likelihood solution could not be estimated through an unconditional fitting process. This topic needs more attention. Are we seeing problems associated with the fitting routine or simply limitations of the data?

6. In my opinion, reasonable assumptions about discard should be incorporated into the core

analyses, rather than in a set of extra runs.

7. Is the gram specific fecundity for yellowtail rockfish relatively constant as fish grow and age? Using spawning biomass as a measure of spawning stock size assumes this. Are any of the research results on yellowtail rockfish reproductive biology by the Physiology group at the NMFS Tiburon Lab useful in this context?

8. Choices about how to treat spatial heterogeneity in the fishery and in yellowtail rockfish populations may play a critical role in stock assessment results. Clearly much thought has already gone into this topic. Perhaps as a next step it might be worth exploring how different the answers are when areas are pooled or treated as distinct. I think, moreover, that a wider range of possibilities should be considered. For example, perhaps the larvae mix over wider distances than adults and the fishery operates on yet a third spatial scale. This would suggest a set of biological subpopulations that are potentially linked by recruitment and fishery actions. In principle, there is no reason that such a linked set of submodels could not be fit to the type of data used in the previous assessment. However, it would clearly require additional work in setting up the model, and explicit assumptions about how recruits get distributed among areas, and about how fishing activity (and associated mortality) gets split up among areas.

9. Perhaps my most serious concern relates to the quality of the auxiliary information used in the assessment, and hence the reliability of resulting estimates of stock size and fishing mortality. Theory, simulation studies, and practical experience have taught us that without a source of information indicating trends in abundance (either survey indices or fishery effort and an assumption about how CPUE relates to abundance), it can be difficult to use statistical methods like CAGEAN or Stock Synthesis to estimate absolute stock size. It is also clear that not all sources of such auxiliary information are equal; a survey that is very imprecise and provides a relative rather than absolute measure of abundance often does not impart much information. This, unfortunately, appears to be what was available for the yellowtail rockfish assessment. I worry that solutions chosen based on likelihoods may be simply chasing noise in the fishery age-composition data. In the absence of a reasonable abundance index the model might be able to tradeoff temporal patterns in recruitment and levels of fishing mortality and stock size to arrive at a multitude of solutions that are about equally likely. My concerns here would be addressed through analyses regarding uncertainty (see comment 5 above). My suspicion is that we know even less than we suspect (and Dr. Tagart is clear in the previous assessment that much uncertainty exists). If this is the case for yellowtail rockfish, and perhaps other rockfish species, serious efforts may be needed to develop alternative sources of auxiliary information. Unfortunately I do not have much insight on the best possibilities for yellowtail rockfish, although I wonder about larval production methods, and possible uses of logbook data.

YIELD PROJECTIONS, BIOMASS, AND THE INFORMATIONAL BASIS OF MANAGEMENT DECISIONS

The assessment document was somewhat unclear about what the projected yields are based on. I

presume this was assuming fishing mortality would occur at the rate that would reduce spawning stock size to 35% of virgin levels, based on a deterministic equilibrium analysis. Some discussion about how these projections could and should be translated into harvest levels and management actions would be useful.

I encourage some discussion of how useful and appropriate the $F_{35\%}$ reference point is for yellowtail rockfish in future assessments. Perhaps simulations based on the stock-recruitment curve estimated by the synthesis model (and the magnitude of variability about it) could help provide some additional guidance on what consequences are to be expected from different management actions. Given the high variability in recruitment, short-term projections assuming constant recruitment at an average rate seem to provide little information about potential risks. For example, given the skew in the distribution of recruitment estimates, I would assume that most stochastic realizations of future three year sequences of recruitment would average substantially below the arithmetic mean, although there would be a few realizations with averages far above the mean. [Note the text of the previous assessment does suggest this possibility.] Perhaps probability distributions of expected harvest and resulting spawning stock would be one way to present results. Using longer-term stochastic simulations, it would be possible to evaluate whether the $F_{35\%}$ reference point is an appropriate fishing level given what is being assumed and estimated by the stock synthesis assessment model.

Sampson, David, B. and Elaine Stewart. 1994. Status of the canary rockfish resource off Oregon and Washington in 1994. Appendix G, Canary Rockfish.

February 7, 1996.

General comments

I found the assessment a thorough and comprehensive treatment. My suggestions below for the next assessment cycle focus on making the SSMOD treatment, and the document, a little "leaner" and "meaner". I think the configuration is too complex. While I admire the attempts to maintain objective rigour, the stock synthesis model provides so much flexibility it easily becomes a mental juggling exercise.

My suggestions for simplifying reflect my personal opinion that a stock assessment is more of a modeling exercise and less a rigorous statistical analysis. One cannot provide meaningful advice without making a series of assumptions. This is not to say the assumptions should not be documented and discussed, but, make the choice, review it, and then move on. I started off using SSMOD as a splitter, now I am a lumper.

Secondly, the reporting of zillions of model runs is always very difficult to condense into a readable account and I sympathize with the authors. I subscribe to the single iteration approach. Lead the readers through the elaboration of one "baseline" parameterization and summarize the stock reconstruction that it implies. The baseline version would normally be the most attractive one to the authors and, actually, the end result of all the modeling. Then, go back and compare the baseline output with output as you vary critical parameters one at a time (constant or varying M; 1 vs 2 selectivity periods, etc.). Explore the impact of the each assumption that went into the baseline version. I found that too often the authors were exploring one parameter (i.e. fixed F) while allowing other important parameters to float (i.e. M), literally and figuratively. In general, the document follows the chronological exploration by the authors. I am not sure this is the best way to communicate their thoughts on the subject.

1. Data preparation

1.1. Non-random sampling and length data

On page G-5, last paragraph, the authors comment that few samples were taken from the shallow stratum in early years. This would inflate relative importance of younger fish in later years of survey. To compensate, the authors reduce the "sample" size to reduce the emphasis of these years in SSMOD. I think this is incorrect. The authors are confusing a bias with poor precision. The model will still try to fit the apparently larger proportion of

younger fish in later years and continue to suggest recruitment success in recent years, or, tend to indicate multiple selectivity curves over time.

Given the level of age sampling for the same years, I suggest throwing out the length data from the triennial survey. They never seem to provide any assistance in my modeling attempts, I think because they provide little information given the typical variance in size at age for rockfish. I think they are only useful if they fill in continuous blocks of time for which there is no ageing data, for example the first 10 years of a fishery. If they are left in this assessment, then the authors are stuck with exploring multiple selectivity curves, which seems to be a large increase in parameters for virtually no information.

1.2. Sample size weighting

I cannot quite tell from Tables 8 and 9 how many samples from each year were aged. If the number was over 10 each year, the following comment will have little effect and authors can disregard although, I think it is a better way to parameterize the "sample size" effect in SSMOD.

The authors weight "sample size" by number of aged fish. Work by Chester (1984), Sen (1986) and Kimura (1984), and more recently, Paul Crone (1995), strongly emphasize that the precision of the catch-at-age vector is really a function of the number of samples, since "among sample" variance is so large. For example, some modeling I did, would suggest that 5 aged rockfish samples of 25 fish provides better precision than 4 samples of 300. I think a better weighting for SSMOD is the square root of the number of samples regardless of sample size (unless some are ridiculously low, <10). For example, choose some number of samples as the asymptote (like you chose 400 fish), such as 16 samples. If a year with 16 or more samples, is reflected by a sample size of 400 in SSMOD. A year with 4 samples would then be reflected as 200 fish [($\sqrt{4}$ / $\sqrt{16}$) * 400].

This had quite an effect in my runs for yellowtail rockfish, where early years were represented by a few samples of 300 fish, and more recent years by many samples of 50 fish. [I have discussed this with Rick Methot. He agrees that setting the "sample size" proportional to the root of sample number is probably theoretically correct, he was not convinced that you have to go to my extreme, but I believe he has used a linear function of the number of samples in a sablefish example]

1.3. Mesh size effects

The mesh size differences in Table 10 seem quite scary but I would suspect that the larger meshes might only allow 3-4 year-olds to escape. I suggest you take a quick peak at the age composition by mesh size. If I am correct, or close to correct, I suggest that you find some way to throw out 3-4 year-old observations. They provide little information if their presence is function of mesh size.

1.4. Trip limit induced discarding

There is a reference to trip-limit induced discarding. Is there any way to input this? If everyone agrees it has been important, it might be worth exploring a run where catches are increased some arbitrary amount (i.e. 10%) for those years when trip limits were thought to have had an impact. This estimate might be derived simply by asking a few skippers. It is hardly rigorous science, but is really what distinguishes between scientific analysis and assessment modeling. SSMOD is a perfect tool for seeing if that change might be important. If it has big effect on the conclusions then you try to find a more objective means for estimating the dumping. If not, you can state that test runs with various levels of discards were examined with little impact on the conclusions.

1.5. Good and biased age data

I suggest that this dichotomy be removed. While rigorous, it results in a major increase in the number of parameters for little benefit. The initial runs (Tables 15 and 16) suggest no real difference. The multiple selectivity runs do show differences, but I think for the wrong reasons (my section 2.3). The split is also confounded with time because it is obvious that reader 1 did earlier ageing, reader 2 did later ageing. This is a really an ugly thing to throw at the model for the little bit of added detail. I suggest the authors find some basis for consolidation.

2. Parameterization of SSMOD

2.1. Constant versus age dependent M for females.

I run into this problem of disappearing females in yellowtail rockfish. At first I adopted the same approach, but now I have dropped the assumption of declining female M or selectivity with age. My reasoning is that if there were some means of refuge for elderly females, then at sometime over the 30 years of groundfish research cruises and port sampling, we would have come across at least one sample of old females. But, not one! Even more interesting, I found no evidence of old females in the samples collected during the mating season in the fall, or, a shortage of older males in these samples. This raises the obvious question of, with whom do these older females mate?

My approach is that until there is some evidence of this behavioural or habitat refuge (even one sample), I will allow an increase in M to account for their rapid disappearance. Interestingly, I found the best fit with SSMOD for yellowtail rockfish when I used the mortality function that simply steps to a higher constant rate and not an increasing linear function. Even more interesting, when I allowed the model to pick the age of change it picked an age almost exactly equal to a crude estimate of the age at 50% maturity. This

might imply that the rise in M is associated with reproductive "stress". If the added M is related to sexual maturation, it would support a rather rapid elevation of M, with an asymptote near the age of full maturity. I would guess this is more closely approximated by the two periods of constant M.

2.2. Emphasis factors

The large number of ageing (and length) series, all with an emphasis of 1.0, would normally be expected to remove the influence of the triennial survey in the anlaysis. This should at least be discussed. Its impact will increase by default if the number of ageing series is consolidated and the length data removed. It is obvious from Table 2 where increasing survey emphasis will drive the model. I suggest that the authors consolidate the ageing data as much as possible and then do a series of runs with decreasing emphasis on the survey to see which direction the ageing data alone wishes to push the model. The results will probably indicate a very flat trajectory of improvement in the age likelihood, indicating there is little signal in the age data as to what is going on.

My guess is that this will then expose the reality that the apparent declining biomass in the surveys is driving the model, even when given little emphasis. The age composition data will tend to be content with any survey trend.

This in turn focuses the discussion on the trend in the survey? I suspect this is the core of the analysis. Is this trend to be trusted? If not, why not? This issue tends to be clouded in the discussions of selectivity periods, good/bad ages, and so on. I have not yet seen a catch-at-age analysis for any long-lived fish where the catch-at-age data alone, without a tuning index, showed a strong signal.

2.3. Varying selection periods.

I found the varying of selectivity periods very interesting, I never thought of doing this. I agree with the importance of achieving the best selectivity vector but I am not sure this methodology is appropriate. You are always going to get a better fit as you throw in more parameters, but as you go to shorter and shorter time periods, the model will increasingly try to accommodate year-to-year aberrations or variation in recruitment. The likelihood ratios in Table 18 do not have one peak but go up and down.

If you have a very strong intuitive reason for picking one year (a gear change), or detect a very strong signal as you vary the years, then this would be justified but otherwise it seems to cloud the issue. I think in the present study that it was simply chasing the length frequency samples, and the varying contribution among years by various mesh sizes.

2.4. Floating M while varying constant F.

I think it is more reasonable to make the choice of M, however dissatisfying, and then leave it fixed while you explore other parameters. It has such a profound effect that the model can accommodate almost any variation in any parameter if M is floating.

3. Assessment methodology

3.1. Recent recruitment estimates

Catch-at-age models always tell you that the most recent years-classes are either the biggest on record or complete failures (Table 22). Since these estimates are derived from only one or two years observations of year classes that are about 1% recruited, they are meaningless. I think that the model should be parameterized to assume average recruitment for all year classes that have not yet been exposed to a significant cumulative F. The model has not had a good look at these year classes and will be unduly influenced by as little as one sample of juveniles in a recent year. I suggest authors also avoid plotting estimated recruitment for these recent year classes as in Figure 4. This always looks so optimistic and drives up current biomass estimates.

3.2. Forecasting

I am not sure how these assessment documents fit into the political process and I assume that there are some strictures on the form of the advice expected from this document. Nevertheless, the report seemed to run out of steam at the end. I think the report would be improved without exceeding its role if it used the forecasting module of SSMOD to predict, under some assumptions of recruitment, how the stock will do under varying F.

3.3. Assessment summary

I think this genre of document really deserves a recap of what the documents says in a "logical", non-mathematical sense. For example, the document could conclude with a statement to the effect that there are two sources of information on the dynamics for this stock; age composition and the triennial survey. The former alone provides little signal of a trend in biomass, the latter indicates a steady and significant decline. Analyzed simultaneously, in a catch-at-age model, they imply that current harvest levels will further reduce biomass and that current spawning biomass is probably less than ....."

4. Presentation

4.1. Rate of change of likelihood graphs

Rick Methot emphasized to me the value in showing how component likelihoods change graphically as one parameter is systematically varied. This allows one to see the relative improvement in the likelihood as the parameter is varied. This stops analysts from focusing on the best fit when alternative values produce virtually the same likelihood. I suggest the authors display more of the data, like Table 18, in graphical form.

4.2. Catch history

I have a personal preference for a simple graph of the catch history.

5. General Comments

5.1. Zero catches

While reviewing the possibility of contraction of geographic range, the authors comment that there is no significant trend in the proportion of zero catches. As an aside, there is some suggestion in sport fishery work (Bannerot and Austin, 1983), that the proportion of zero catches might be a more sensitive indicator of declining abundance than a measure of central tendency in CPUE. In this sense, the estimator does not indicate declining abundance. Since the authors go to the trouble of calculating this estimator they might as well get maximum benefit from the work and comment on it. It would be interesting to examine the most recent survey in this regard.

6. References:

Bannerot, S. and C. Austin. 1983. Using frequency distributions of catch per unit effort to measure fish-stock abundance. Trans. Amer. Fish. Soc. 112:608-617.

Chester, A. J. 1984. Sampling statistics in the Atlantic menhaden fishery. NOAA Tech. Rep. NMFS 9.

Crone, P. R. 1995. Sampling design and statistical considerations for the commercial groundfish of Oregon. Can. J. Aquat. Sci. 52: 716-732.

Kimura, D. K. 1984. Determining appropriate sampling levels for estimating age distribution from trawl landings. Wash. Dept. Fish. Tech. Rep. No. 80. 17 p.

Sen, A. R. 1985. Methodological problems in sampling commercial rockfish landings. Fish. Bull. 84(2):409-421.

Appendix 8 - Discussion notes for Pacific whiting

Session 1: Monday, June 3

Introduction
Dorn noted new book on Hake by Alheit and Pitcher. In the next assessment he plans to incorporate alternative ideas (e.g., recruitment) based on a review of general hake biology and assessments of all hake species.

Structure
Dorn presented background on whiting stock structure.

Jacobson and Sylvia commented that timing and/or area of fishery could affect selectivity.

Dorn stated that oceanographic regime shifts could also affect selectivity, e.g. movement of smaller fish northward during El Niño years; this could subsequently affect selectivity calculations made in cold-water years.

Brodziak requested that Bailey, et al. be listed in literature cited since it is a major data source for Table 1.

Sampson questioned whether there had been a comparison of catch-at-age comparison between the shore-based and at-sea fisheries. Dorn said he had looked at it and they were very similar.

Natural Mortality
Considerable discussion regarding natural mortality (set at 0.23).

Jacobson - Older fish may be north & demersal and not available to the fishery; also, substantial fishing mortality had been going on for some time prior to the data series, therefore, Martin may have overestimated natural mortality due to biases in the data.

Conser - M is difficult to measure; may need to look at what is being used for other *Merluccius* species and make a reasonable judgement call.

Tagart - What factors could cause the mortality estimate to be too low? More fish available to the survey, e.g., fish moved farther north in '92, then were distributed more south again and more available to the survey in '95. This could make it appear as though survival increased.

Dorn stated that he had tried a model that let natural mortality vary over time and that it greatly improved the fit.

Jacobson - Uncertainty about M could influence choice of harvest strategies.

Dorn - "The model can't seem to get enough old fish out there at the current mortality rate."
Not sure what in the model is confounded with mortality. It is probably best to stay with 0.23 now and continue examination. (This also appeared to be the consensus of the group).

Sylvia - pinniped populations have increased substantially and the effect of their predation upon whiting stocks may need to be re-examined (future research).

Catch at age
There was some question regarding the high catch of one-year-olds in the 1995 Canadian fishery -- where did these fish come from?

Jerry Bates reported that industry was seeing a large amount of small fish this year, perhaps as much as 60% of the tows were fish smaller than 12 inches. The shore side fishery is shutting down for a couple of weeks due to the abundance of small fish.

There was some discussion whether small fish in the north represented an increase in abundance or just a redistribution to the north.

Dorn stated that it is difficult to assess the distribution and abundance of one-year-olds with the acoustic survey. He asked the group for suggestions on specifying year-class strength of recruiting year classes in harvest projections (the model currently sets the '94 year-class at median recruitment). In response Tagart suggested dividing the history of observed recruitment into perhaps three "stanzas"; high, medium and low. Based upon any relevant data or observation, recruiting year classes could be set to the median of any of these three stanzas.

The consensus of the group was that any number of factors could be responsible for higher catches of small whiting (e.g., environmental anomalies); and that without scientific information they would be reluctant to support higher estimates of recruitment based on anecdotal information

Acoustic Survey

There was a long discussion on the shift to the new target strength according to Traynor (1996). There was concern that the 7 data points (direct measurement) of the new target strength were all conducted on fish above 40 cm and then extrapolated down to fish of smaller sizes which make up the bulk of the population.

Jacobson stated that we have moved from a "convention-based" value to a data driven value, but still had some concern about no direct measurement of fish below 40 cm and questioned whether this might be part of the cause for the model placing low selectivity on younger fish in the survey.

There was discussion around the fact that their was no correction for depth (swim bladder compression) in target strength measurement. Dorn reported that work was in progress to actually submerse the transducer and measure fish directly at depth.

Further research on target strength should be encouraged.

Model

Conser - Suggested looking at the survey as a relative index rather that the current version as an absolute index with a Q of 1, i.e., let the model estimate Q. (new model run carried out at meeting)

Dorn was asked to try an approach where the survey was used as a relative index of abundance; age comp and survey biomass would be used for the '77-'89 surveys, while *only* survey biomass would be used for '92 and '95 surveys. The second part of this assessment would use the age comp and survey biomass for '92 and '95 and treat the survey as an absolute estimate of biomass (including the offshore and northward survey extension). (additional model run)

There was discussion regarding the low selectivity the model places on younger fish in the survey which nevertheless make up a large part of the population. Suggestions were made on changing the selectivity slope or the inflection age where selectivity increases. (additional model run)

Other Questions

Why do we have different selectivities in Canada than in the US? This was followed by a discussion of fishery patterns and whiting migration behavior.

Methot expressed a concern that as we get further away from a survey year, constant selectivity could mislead us by not allowing us to track selectivity due to changes in timing and location of the fishery.

Suggested keeping the last four or five years at constant selectivity and letting the model set selectivity in earlier years. Sampson suggested examining a couple of "break points" in selectivity for earlier years.

There was a discussion of how to deal with data from earlier years (1966-1976). These years are not included in the overall model, but are used to bootstrap recruitment. To be consistent, two approaches were suggested; either throw out the years prior to 1977 (this would require a new bootstrap for years 1977 and later) or fully incorporate the earlier years into the model (if the data are sufficient to set recruitment, they are sufficient for other parameters). Methot suggested that if the former approach were to be used, then all the years prior to 1977 need not be thrown out; the data should be examined carefully for quality and usefulness (1972 was suggested as a cutoff point). (additional model run)

Brodziak suggested testing statistically for differences between recruitment vs. biomass in early years vs. late years to determine if there is even a need to be concerned with how to deal with the years prior to 1977.

There was a discussion on how to deal with recruiting year classes prior to their being measured by a survey or in years where there is now survey. The '94 year class serves as an example. The current assessment sets the '94 year class at median, but there are anecdotal information suggesting is strong. An industry-funded survey was discussed. Methot commented on the necessary extent of such a survey, stating that it would likely need to encompass the same area as the current acoustic survey to separate the difference between differences in abundance vs redistribution of small fish. (need for industry/scientists discussion)

Final comments
Jacobson - CV of the 1997 population biomass of 0.070 is "an absurd number - get rid of it!" The group concurred and the author agreed to delete it.

Jacobson suggested changing the model from single to double precision.

Session II - Thursday, June 6

New Model Runs

Run I - Retrospective Analysis
Dorn displayed graphs of biomass estimates and selectivity patterns for three sets of runs (1995, 1992, 1989) using the base model presented on Monday. The results showed much higher biomass estimates with most recent survey data. Dorn is suspicious of selectivity patterns which suggest that early surveys "don't see enough fish" (lower selectivities). Dorn proposed two explanations: 1) changes in natural mortality (decreasing relative to earlier surveys); 2) changes in acoustic survey methodology (e.g., range, software). He suggested caution in comparing survey results across time.

Conser suggested that Dorn be cautious in his interpretation: retrospective analyses are difficult to interpret since many factors can influence results.

Dorn believes that until we conduct one additional "expanded" survey, we will not be able to determine which factors are influencing these results (e.g., shift in M) -- the group concurred with his opinion.

Run II - Let the Model Estimate Q
Model did a poor job of estimating realistic q (.03) or ending biomass (50,000,000 mt).

Discussion centered on possible factors affecting model's inability to estimate q.

Run III -- Two Survey Model (Inshore 1977-1995: Offshore Full Range [1992-1995])
Various versions of this model were run including 1) asymptotic selectivities, 2) domed shaped selectivities, and 3) fixed, dome-shaped selectivities.

1) The asymptotic selectivity model estimated low selectivities and relatively high ending biomass. Jacobson believed this might be a good candidate for an "optimistic" version to present to the GMT. Dorn believed this was overly optimistic and that selectivity patterns didn't make sense.

2) Not much overall difference with domed shaped selectivities compared to asymptotic selectivity version. Dorn, however, believed that selectivities made more sense and that it was a definite improvement compared to the asymptotic selectivity version.

3) The version with fixed domed-shape selectivities showed considerably lower ending biomass. Martin believed that this model makes more sense biologically, particularly in terms of selectivities. Sampson noted that Martin still needs to look at length-frequency patterns of onshore and offshore survey to make sure there are no significant differences. Methot's hypothesis is that earlier surveys should have more domed shaped selectivities because didn't sample bigger fish associated with northern regions.

Run IV - One Survey Model (Low weights on early surveys, Q=1, Fixed ascending slope of dome-shaped selectivities with selectivity of .8 for 4+ fish based on historic availability)
Dorn developed this version based on experience with Run III versions. Dorn likes this approach since realistic selectivities and greater weight on more recent surveys.

Tagart concerned that low weights on early surveys causes loss of important information.

Sampson concerned that this focus on only a "couple of pictures" is too ad hoc -- Dorn needs more organized, systematic set of runs.

Jacobson felt this version of the model struck good balance and compromise given modeling and data problems.

The group generally echoed Jacobson's comments.

Bootstrapping Recruitment
In response to comments from previous session (Monday), Dorn discussed his approach to generating projected annual yields using results from bootstrapped recruitment stochastic simulations.

The group was still concerned that Dorn was planning on using a recruitment time series (1972-1995) inconsistent with the data series (1977-1995) used to estimate the model.

This issue generated considerable discussion. The group's consensus was that whichever time series he selected he must be consistent: if the model is based on 1972-1995 data then use this recruitment time series; if the model is based on 1977-1995 data then use this time series of recruitment

Dorn and Methot countered that changing the traditional approach and recruitment time series could have significant consequences on harvest projections. Because of sensitive negotiations with Canada over allocation they argued that for this assessment it may be better to be consistent with traditional approach (different starting date time series) used in model and recruitment time series estimates. Dorn and Methot will discuss this issue with Canadians.

The group's final consensus was that Dorn could pick whichever time series was "best" but that he should use the same time series for both the model and the bootstrapped recruitment simulations.

Appendix 9 - Discussion notes for Canary rockfish

A review of the 1996 canary rockfish (*Sebastes pinniger*) assessment was conducted. This assessment is an update of the 1994 assessment. The assessment addressed the terms of reference and took into consideration an external review of the previous assessment. This summary of discussions during the review meeting is given in three sections: Executive Summary, Summary of Review Discussion, and Research Recommendations.

Executive Summary

The Stock Synthesis model was applied to the canary rockfish population within the Columbia and Vancouver (USA) INPFC areas. The assessment period was 1978-1995. The review committee considered several formulations of the Stock Synthesis model for canary rockfish. The age-based version of the Stock Synthesis model was tuned to abundance indices and biological samples collected during the NMFS triennial survey. The assessment also incorporated size composition data from the Oregon and Washington trawl fisheries. During the meeting some additional model runs were completed to address the comments of the review committee. The committee reached consensus that there were two credible model scenarios based on the available data. These scenarios differed in the treatment of the lack of observations of older female rockfish in the trawl fishery. In one scenario, an age-dependent natural mortality rate was applied, while in the other, a dome-shaped selectivity curve was used. Both scenarios were consistent with the data, and the committee had difficulty in choosing between them. The committee chose to forward both scenarios to the GMT because both indicated that stock biomass has decreased substantially from its unfished level. Some members expressed a precautionary note and thought that the age-dependent natural mortality scenario should be given special attention because reductions in stock biomass under this scenario were more severe. Regardless, the consensus of the committee agreed that stock biomass is presently at a low level. Fishing mortality in recent years has exceeded the target fishing mortality, and reported landings were below the Allowable Biological Catch in 1994-1995.

Summary of Review Discussion

Landings Data

Revised canary rockfish landings were used in this assessment. The group discussed the general issue of the quality of reported rockfish landings at great length. It was mentioned that reported landings may differ from PACFIN landings due to later compilation and better assignment of species composition in the TSC reports. There was a consensus that, until the PACFIN database is revised, the best source of landings data would be the TSC reports. It was mentioned that revisions to the PACFIN database were being made as time permits but the completion date was unknown. There was a recommendation that a workshop be held to address the issue of determining species composition of unspecified rockfish landings. It was mentioned that there could be credibility problems if official landings statistics were changing frequently. It was also mentioned that the lack of a central source of landings data was a limitation for assessing groundfish resources, including canary rockfish, but that additional revenues would likely be needed to improve landings data. In summary, the species composition of landings was considered to be a major source of uncertainty.

It was pointed out that the management ABC for canary rockfish was not achieved in 1994-1995. This was taken to be an indication that the stock was depressed, which was the conclusion of the previous assessment.

The issue of discard of canary rockfish was discussed. It was mentioned that the bycatch of canary rockfish in the whiting fishery was not considered to be substantial. Mark Saelens of ODFW provided some unpublished data on the bycatch of canary rockfish in the whiting fishery off Oregon in 1991-1992. These data supported the notion that canary rockfish catches were intermittent in the whiting fishery. An assumed discard rate of 1.2% by weight was used in the assessment. This value was based on at-sea observations of discarding practices.

Recreational landings were discussed. The use of mean weights in the MRFSS survey was a potential concern because the mean weights in some of the MRFSS strata were suggested to be

inconsistent with other samples from the recreational fishery. As a result, MRFSS size composition data were not used in the assessment although recreational landings were incorporated.

Research Survey Data

The use of the NMFS triennial trawl research survey as an abundance index for canary rockfish was discussed. Catches of canary rockfish in the 1977 survey appeared to be unusually large. It was noted that the removal of the 1977 survey data point would not appreciably change assessment results and that survey mean weights had a declining trend. It was suggested that it may be advisable to exclude the size composition taken in the 1977 trawl survey due to differences in the spatial and depth coverage between this survey and others used in the assessment. There were no age compositions available from NMFS triennial surveys. This was a source of uncertainty because the age of larger male and female canary rockfish captured in the survey was unknown. It was remarked that growth slows considerably for canary rockfish around 15 years old and that the observed number of large fish (> 40 cm) could have a considerable range of ages.

Assessment model

A number of exploratory assessment model scenarios were presented and discussed. An emphasis was placed on two scenarios: age-dependent natural mortality of females that increased with age and dome-shaped selectivity to the survey and fishery. There was considerable discussion of the underlying hypotheses for both scenarios.

Age-dependent natural mortality of females was hypothesized to result from reproductive stress experienced by older fish. It was noted that old females are relatively rare in the commercial catch compared to males. It was suggested that the fishery provided relatively synoptic coverage of the range of canary rockfish and that older females should be more prevalent than the low observed levels. The question of the level of reproductive stress experienced by older males was also raised but there was no consensus on its relevance to population dynamics. It was mentioned that unpublished data at the Tiburon laboratory indicate that the total fecundity of a similar species, yellowtail rockfish (*Sebastes flavidus*), decreased as females aged and it was suggested that this may be true for canary rockfish as well.

Dome-shaped selectivity was hypothesized to result because older fish, especially females, might be less accessible to fishery capture. It was suggested that the spatial extent of the fishery may not completely overlap the range of older canary rockfish because the older fish were diffusely distributed in areas where it was not profitable to fish. It was pointed out that the age composition data for larger fish was subject to sampling variation and that the level of sampling intensity may lead to infrequent observations of older fish. It was also suggested that schools of canary rockfish may segregate by sex but no data were presented to support this point. It was requested that some data be tabulated for the older fish to show the difference in frequency of observations of older males and females; these data were later presented.

The committee considered both scenarios to be plausible but was not able to reach consensus given the lack of supporting data. The committee agreed that both scenarios should be presented and that some emphasis should be given to the age-dependent natural mortality scenario. It was noted that the age-dependent natural mortality scenario was more sensitive to the inclusion of recent survey data based on a retrospective analysis. In addition, it was suggested that the presentation of the estimated F values be clarified so that they could be directly compared to the estimated target F and overfishing F values.

The issue of age reader bias was discussed. Two age readers have provided age composition data for the assessment. It was pointed out that there was some indication of a persistent difference between readers, but it was asserted that the potential bias was relatively small, on the order of 1 year. The committee requested that a plot of paired age readings be provided to show that magnitude of difference between the age readers but otherwise considered the treatment of ageing data to be adequate for assessment purposes.

The potential for overparameterization was mentioned as a concern given the number of possible configurations of the assessment model. The committee requested that the number of parameters be identified in the documentation of the two assessment scenarios.

The issue of whether the selectivity patterns of the Oregon and Washington trawl fisheries had changed over time was examined in the assessment. Model diagnostics indicated that there was likely a

change in selection between 1982 and 1983 in the Oregon fishery under both scenarios. It was mentioned that this time period coincided with implementation of some management measures and also coincided with an El Nino event. The committee reached consensus that a change in selectivity would be useful to incorporate for the Oregon fishery. However, the committee also concluded that a time-varying selectivity pattern was inappropriate for the Washington fishery. The question of why selectivity patterns in Oregon and Washington were different was also discussed. It was noted that older females were not as common in the Washington fishery but it was unknown whether this was due to sampling variation or due to geographical differences in age composition.

The committee considered the preliminary analysis of the importance of initial parameter values to be useful. The randomization of initial parameter values showed that the initial parameter values would have some effect on model outputs but further research was needed to quantify this.

The committee noted that estimated recruitment in 1993-1994 was unusually high. It was recommended that recruitment levels in these years be constrained because there were limited data available to measure recent recruitment. It was suggested that Washington age composition samples would have a strong effect on the 1993-1994 recruitment because there were few samples collected in Oregon in 1994. The committee suggested the use of mean recruitment or the use of model prediction based on the recent downward trend in recruitment. This was considered to be essential to making projections of potential yields.

Research Recommendations

- It would be desirable to age the backlog of canary rockfish otoliths collected during NMFS triennial surveys, particularly for large females..
- Progress toward a uniform database for landings, e.g., completion of improvements to the PACFIN database would be highly desirable. This would greatly facilitate assessment of west coast groundfish. It was also recommended that representative measures of fishing effort be collected in a database.
- It was recommended that a workshop be held to address the issue of species composition of rockfish landings with particular reference to how these data are reported within the PACFIN database. Species composition of the unspecified rockfish landings continues to be a major source of uncertainty for rockfish assessments.
- There is potential for overparameterization with the synthesis model, and the development of statistical methods to compare model formulations would be beneficial. It would be useful to characterize the difference between likelihood components of different synthesis model fits with tests of significance for the improvement of model fit. It was mentioned that a F-ratio test may provide an adequate statistical framework for comparison but further work would be needed to support the validity of this approach.

Appendix 9 - Discussion notes for yellowtail rockfish

Yellowtail were modeled as three separate stocks (Eureka/South Columbia, North Columbia, and Southern Vancouver). Most rockfish assessments assume a single stock. The author justified his assumptions about stock structure but the group did not reach consensus on whether a separate stock approach was desirable.

Age based stock synthesis models for 1967-1995 were used for all three stocks. Data included total catch (landings plus 16% discard, 1996 catch assumed equal to 1995); NMFS triennial bottom trawl survey abundance and length composition data for 1977, 1980, 1983, 1986, 1989, 1992, and 1995; and age composition for the commercial trawl fishery during 1977-1995 (Eureka/South Columbia and South Vancouver). The model for the Southern Vancouver area used Canadian, as well as U.S. data. Recruitments during the last three years (1994-1996) were fixed at median values in preliminary runs.

Old male yellowtail rockfish are more common in trawl and survey samples than old females. There are two hypotheses: 1) old females may be harder to capture (have lower selectivity) than males; or 2) old females may die more quickly (have a higher rate of natural mortality rate) than males due to reproductive stress. The stock assessment models for yellowtail rockfish assumed that the shortage of old females was due to increased mortality, rather than lower selectivity. This assumption was important because higher biomass estimates are obtained from models that assume lower selectivity for old fish. Although biomass estimates assuming increased mortality are lower, ABC levels are less affected because a lower biomass is offset by higher estimates of F35%. The author justified his assumptions about mortality and selectivity of older female yellowtail but the group did not reach consensus on which hypothesis was most likely.

All data indicate declines in yellowtail abundance but uncertainty about the current biomass is very large. NMFS survey abundance data indicate that yellowtail abundance has declined significantly since 1977. Age and length composition data indicate low recruitment in recent years, reductions in the number of old fish, and are compatible with declining stock abundance. Model results indicated that biomass had declined to low levels in 1995 but preliminary estimates of yellowtail biomass in 1995 seemed too low. Higher biomass estimates were obtained by assuming constant fishing mortality rates during the 1992-1996.

A thorough retrospective analysis conducted at the meeting demonstrated that recent biomass and recruitment estimates are strongly dependent on the most recent triennial survey data. Further, recent biomass estimates tend to be unstable because major changes tend to occur at three year intervals as new survey data become available. No retrospective bias was evident but the analysis and subsequent discussion convinced the group that model estimates indicating very strong or very weak recruitments in the most recent years need to be interpreted with caution.

Appendix 10 - Discussion notes for bocaccio rockfish

Bocaccio rockfish (*Sebastes paucispinis*) is an important species of rockfish that has a long history of exploitation in the west coast groundfish fishery, particularly in California. The distribution of the species ranges from Kodiak Island, Alaska to Punta Blanca, Baja California. It is abundant off southern and central California, but is uncommon between Cape Mendocino and Cape Blanco. A second population center exists, however, near the Oregon-Washington border, and extends north to Cape Flattery. This assessment considers the major portion of the overall population in the Conception, Monterey, and Eureka INPFC areas where relatively good biological and fisheries data are available.

The Ralston et al. bocaccio assessment is a major revision of the work of Bence and Rogers (1992). Particularly noteworthy are the:

(a) reconstruction of catch history for all gears back to 1950;

(b) incorporation of data from three additional triennial surveys (1977, 1992, and 1995);

(c) development of an index of spawning biomass based on CalCOFI larval surveys; and

(d) development of a recruitment index using mid-water travel survey data.

In general, the Review Group feels that the new assessment represents a significant advancement in understanding the status of the stock as well as shedding additional light on several key biological and fishery dynamics issues.

Appendix 11 - Proposal for guidelines in choosing model selectivities

This proposal was put forward at the 1996 SARM by M. Dorn (NMFS, Alaska Fisheries Science Center, Seattle, WA) but was neither discussed extensively nor adopted by the group. It is included here to facilitate future discussion.

Proposed guidelines for modeling fishery selectivity patterns:

1. Analysts should begin with a time-invariant selectivity pattern, then consider models with time-varying selectivity.

2. Analysts should evaluate models with variation in fishery selectivity for each fishery in the model. The analyst is free to decide how to model the annual variation, whether by separate stanzas, or with annually varying selectivity, but be prepared to defend the choice.

3. Criteria for accepting more complex selectivity patterns must be based on both biological plausibility and changes in log likelihood.

4. Inferential statistics based on stock synthesis likelihoods are not appropriate given the current level of understanding of likelihood models for age-structured populations.

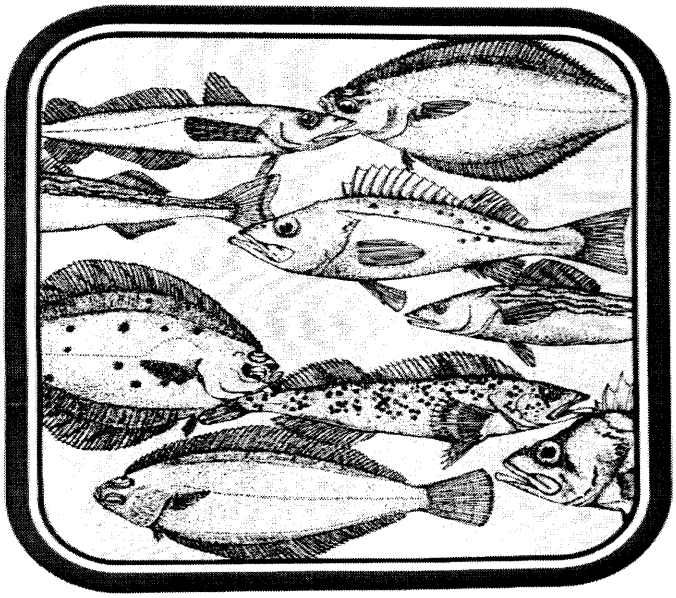
5. Qualitative assessment of likelihood changes per parameter added should be based on the following criteria:

Large	> 5
Moderate	2-5
Small	< 2

APPENDIX VOLUME I

TO THE STATUS OF THE PACIFIC COAST GROUNDFISH FISHERY THROUGH 1996 AND RECOMMENDED ACCEPTABLE BIOLOGICAL CATCHES FOR 1997

Stock Assessment and Fishery Evaluation



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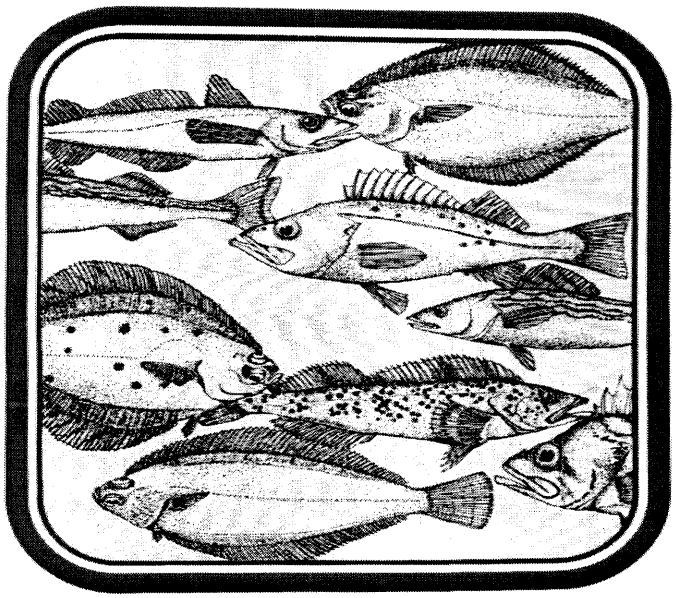
A report of the Pacific Fishery Management Council pursuant to National Oceanic and Atmospheric Administration Award Number NA67FC0006.

APPENDIX VOLUME II

TO THE STATUS OF THE PACIFIC COAST GROUNDFISH FISHERY THROUGH 1996 AND RECOMMENDED ACCEPTABLE BIOLOGICAL CATCHES FOR 1997

Stock Assessment and Fishery Evaluation



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